

# The Effects of 110 mm and 120 mm Cod-Ends on the Catches of a Low Powered Trawler

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## Summary

A series of trials were carried out in August and September 2001 to assess the potential effects on catches by smaller, inshore trawlers of introducing 110 and 120 mm cod-ends (compared to the normal 100 mm cod-end). Both cod-ends tested showed the potential to significantly reduce catches of undersized whitefish, but there were also substantial reductions in catches of marketable whitefish. The results suggest that the introduction of either of the cod-ends tested would have a significant short-term (and possibly longer-term) impact on whitefish catches by smaller trawlers. Overall the effect on catches would be greater with the 120 mm than the 110 mm cod-end.



The fishing vessel *Sharyn Louise* (LK 250) used in these trials.

## Introduction

Under a recent agreement between Norway and the EU the minimum mesh size of demersal trawl nets is to be increased in an effort to reduce the bycatch of undersized (immature) fish, especially cod. The current high bycatch of immature fish, the vast majority of which are subsequently discarded dead, is arguably one of the most serious issues currently facing commercial

fishermen and fisheries managers. This mortality of immature fish results in smaller future stock sizes and reduced earnings for fishermen.

Under the new agreement from 1<sup>st</sup> January 2002 the minimum mesh size of towed nets for demersal species in the North Sea and Norwegian waters will increase from 100 to 120 mm. A derogation will allow EU vessels targeting cod, haddock, saithe and whiting in EU waters to use 110 mm mesh until 31<sup>st</sup> December 2002, subject to conditions regarding the composition of catches. This derogation is to be reviewed before the end of 2002 so will not automatically end on 31<sup>st</sup> December 2002. Existing square-mesh panel rules will apply when using 110 mm mesh, but square-mesh panels will not be a legal requirement when 120 mm mesh is used.

In order to assess the likely effects of these regulations on commercial fish catches by smaller, lower powered vessels the North Atlantic Fisheries College undertook a series of trials during August and September 2001 to compare the catches taken with 110 mm and 120 mm cod-ends by such a vessel with those taken with the current standard 100 mm cod-end. These trials followed an earlier, similar series carried out with a larger, more powerful trawler (26 m, 487 kW; *Fisheries Development Note No. 10*).

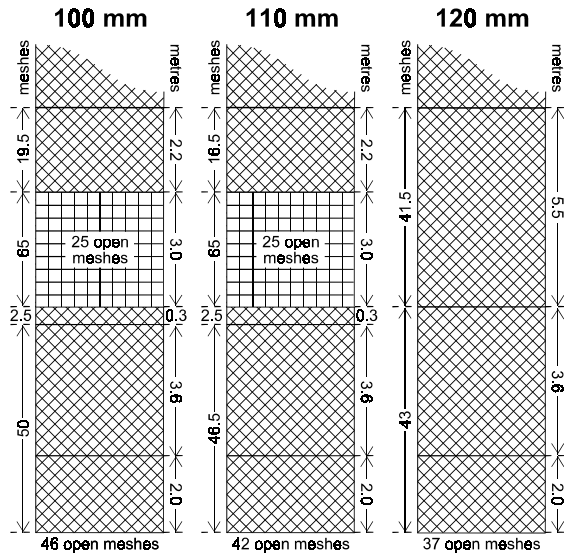
## Methods

The trials were carried out by the Shetland fishing vessel *Sharyn Louise* (LK 250), a 18.8 m, 298 kW demersal trawler, typical of the smaller vessels in the Shetland whitefish fleet.

Three cod-ends were manufactured for the trials (as shown overleaf); a normal 100 mm cod-end fitted with a square-mesh panel (the control), a 110 mm cod-end, also fitted with a square-mesh panel, and a 120 mm cod-end, with no square-mesh panel. The square-mesh panels were 3 m in length, constructed of 6 mm black, knotless twine with a mesh size of 90 mm, and were fitted between 6 and 9 m from the cod-line.

Two series of trials were carried out between 13<sup>th</sup> August and 7<sup>th</sup> September 2001, one to compare the 110 mm cod-end with the 100 mm control cod-end, the other to compare the 120 mm cod-end with the control. The cod-ends were tested in a series of pairs of successive hauls, one with the test cod-end and one

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Schematic diagrams of the cod-ends used in these trials.

with the control. Both hauls in each pair were made in the same area and were of the same duration so that the catches could be directly compared. Both hauls in each pair were made either in darkness or daylight. Apart from alternating the cod-end on the net between hauls, and some modification of haul durations, the skipper's normal fishing practices were followed as closely as possible (e.g. fishing pattern, choice of grounds, etc.).

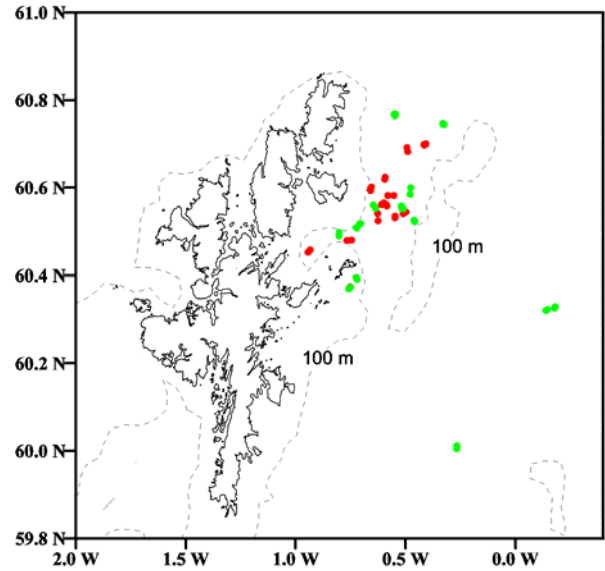
After each haul the catch was sorted by species and the total weight of each determined using a motion-compensated electronic balance. The haddock, whiting, cod, monkfish, ling and saithe, which accounted for the bulk of the catch, were measured. Haddock were subsampled in a few cases where large catches were taken but normally all fish were measured.

## Results

During the period from 13<sup>th</sup> August to 7<sup>th</sup> September 2001 the *Sharyn Louise* carried out a total of 32 pairs of hauls (i.e. 64 in total) on fishing grounds to the East of Shetland as shown on the map at right. One pair of hauls was discarded as the net had been damaged during one of the hauls, leaving 31 valid pairs, 14 with the 110 mm cod-end and 17 with the 120 mm cod-end.

The average haul duration was 4 hours 11 minutes and the fishing times with the control and experimental cod-ends was closely matched with differences of only 19 and 16 minutes respectively in the total fishing time with the experimental and control cod-ends in the two parts of the trial.

The *Sharyn Louise's* total catch during the trials was just over 23,000 kg, of which about 13,500 kg (64%) was classed as marketable and retained. The remaining 35% of the catch was either unmarketable species or fish below minimum landing sizes, and was discarded. The marketable component of the catch was dominated



Location of hauls made by the *Sharyn Louise* during these trials. Points indicate the mid-point of each haul (● Part 1, ● Part 2).

by haddock which accounted for 45% by weight. Cod, whiting and monkfish accounted for a further 36%.

The discards were dominated by undersized haddock (85% by weight), but contained very little whiting or cod (0.2% and 0.4% by weight, respectively). The remainder of the discards included species such as skate, lemon sole, plaice and dabs.

The catches of cod, haddock and whiting are summarised in more detail in the Table opposite, and the graphs on the following pages show the numbers of these species of each length caught with each cod-end.

Haddock was the only species for which significant quantities of undersized fish were caught and the catch rate was substantially reduced with both of the cod-ends tested, as shown in the Table below. There were also substantial reductions in the catch rates of undersized cod and whiting, although only relatively small numbers of undersized fish of these species were caught. For both haddock and whiting the reduction in discards was markedly greater with the 120 mm cod-end, compared the 110 mm cod-end. (Cod did not fit this pattern; probably as a result of the relatively small numbers caught).

There were also substantial reductions in the catches of marketable cod, haddock and whiting with both of the

*Percentage reductions in the catch rates (kg/hr) of undersized cod, haddock and whiting with the experimental cod-ends compared the control (100 mm) cod-end.*

	Cod	Haddock	Whiting
<b>Part 1</b> (110 mm, panel)	77%	65%	65%
<b>Part 2</b> (120 mm, no panel)	48%	87%	91%

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Summary of the total weights (kg) of cod, haddock and whiting caught with the control (100 mm; shaded) and experimental cod-ends, by size grade and marketable (retained) and undersized (discarded) components.

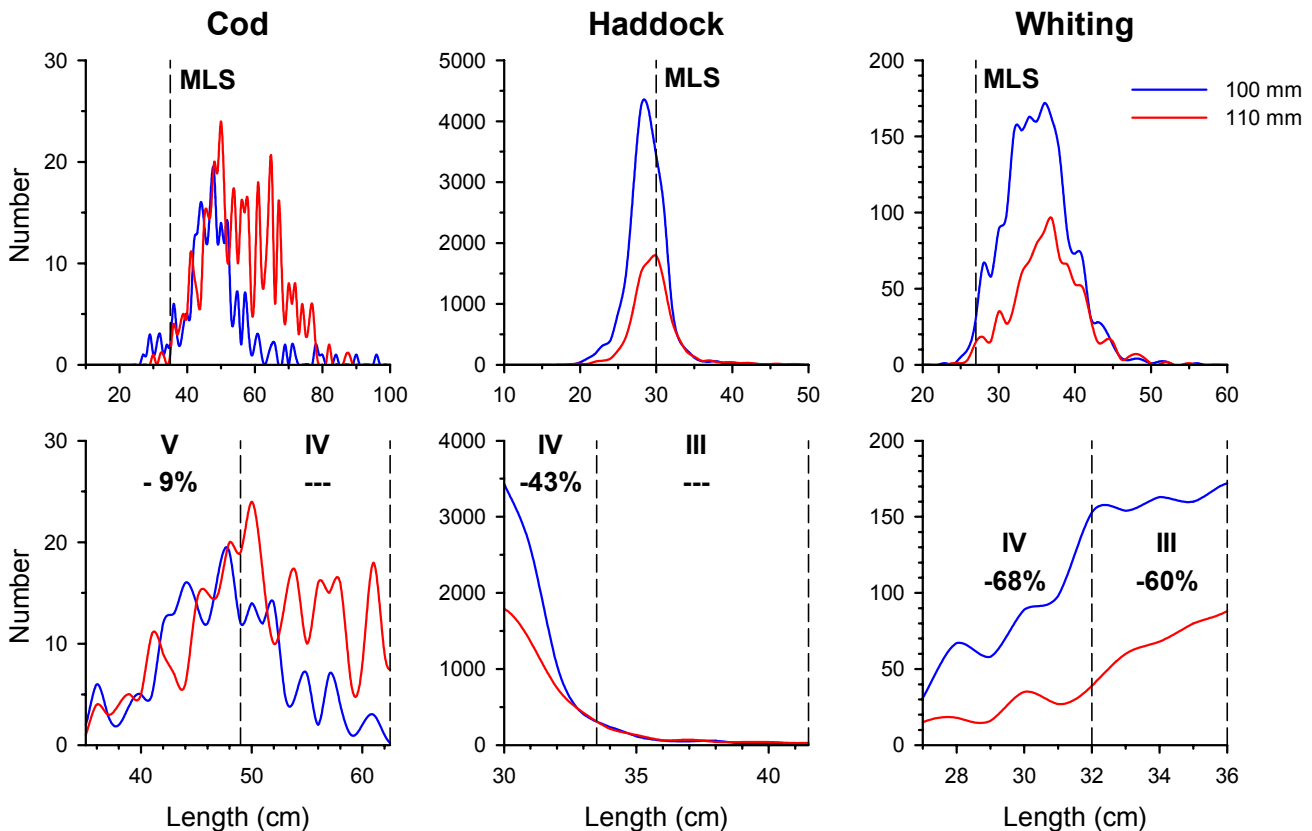
Part 1		100 mm v. 110 mm (with panel)					
		Cod		Haddock		Whiting	
		100	110	100	110	100	120
Grade	I	8	0	20	84	125	103
	II	19	22	43	78	226	133
	III	42	386	274	297	173	69
	IV	131	311	1,753	1,004	65	21
	V	113	103				
Marketable		313	822	2,090	1,464	588	326
Undersized		4	1	2,570	911	2	1
Total		317	823	4,661	2,374	590	327

Part 2		100 mm v. 120 mm (without panel)					
		Cod		Haddock		Whiting	
		100	110	100	110	100	120
Grade	I	0	0	26	31	43	50
	II	8	64	165	82	106	37
	III	54	50	355	188	150	23
	IV	188	127	1,347	303	104	11
	V	229	157				
Marketable		479	398	1,893	603	404	120
Undersized		14	7	2,526	331	10	1
Total		492	405	4,419	934	414	121

cod-ends tested, as shown on the graphs below and overleaf. Overall the catch rate of marketable haddock was reduced by 30% with the 110 mm cod-end and 68% with the 120 mm. The effect on whiting was even greater, with reductions of 45% and 71%, respectively.

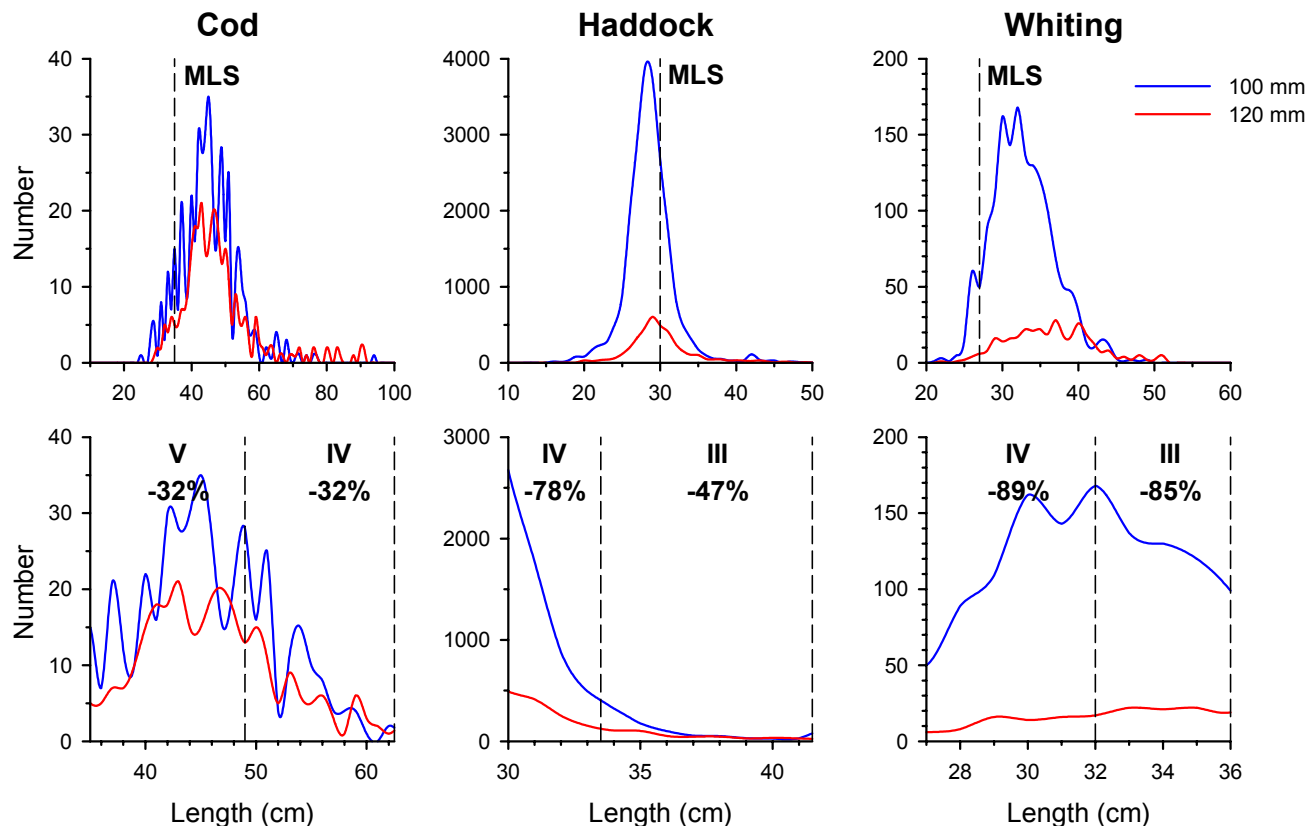
## Discussion

The results of these trials clearly demonstrate the potential of both 110 and 120 mm cod-ends to substantially reduce catches of undersized whitefish by smaller, inshore trawlers. However, these cod-ends also resulted in substantial losses of marketable whitefish,



The numbers of cod, haddock and whiting of each length caught by the Sharyn Louise with the control (100 mm) and experimental (110 mm) cod-ends. The lower row of graphs show the smaller marketable size grades only, and the percentage reductions in catch rates (kg/hr) with the experimental cod-end, compared to the control cod-end. The minimum landing sizes (top) and divisions between size grades (bottom) are indicated by dashed vertical line. Note that axes scales vary in these graphs.

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The numbers of cod, haddock and whiting of each length caught by the Sharyn Louise with the control (100 mm) and experimental (120 mm) cod-ends. The lower row of graphs show the smaller marketable size grades only, and the percentage reductions in catch rates (kg/hr) with the experimental cod-end, compared to the control cod-end. The minimum landing sizes (top) and divisions between size grades (bottom) are indicated by dashed vertical line. Note that axes scales vary in these graphs.

especially of haddock and whiting. The introduction of such cod-end designs is thus likely to have a significant economic impact on smaller trawlers, at least in the short term.

In the longer term these losses may be at least partly offset by increased catches of larger fish (which escaped through the larger mesh cod-ends and survived to grow to a larger size). Given the magnitude of the losses, however, it is uncertain whether increased future catches of larger fish would fully compensate for the immediate losses of smaller marketable fish.

Overall, as might have been expected the 120 mm cod-end had a greater effect on catches than the 110 mm cod-end. The magnitude of the effects of these cod-ends in these trials was greater than was observed in trials of similar cod-ends on a large demersal trawler

(Fisheries Development Note No. 10), but were of broadly similar scale to those observed on a seine net vessel (Fisheries Development Note No. 11). In addition, the general discarding rate was higher in these trials than was observed on the larger trawler.

These differences may reflect differences in the composition of fish stocks between the areas fished in the different trials, or may reflect differences in the design and operation of the fishing gear (speed, power of towing, etc.).

### Acknowledgements

The cooperation and assistance of the skipper and crew of the *Sharyn Louise*, without which these trials could not have been conducted, is gratefully acknowledged.

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