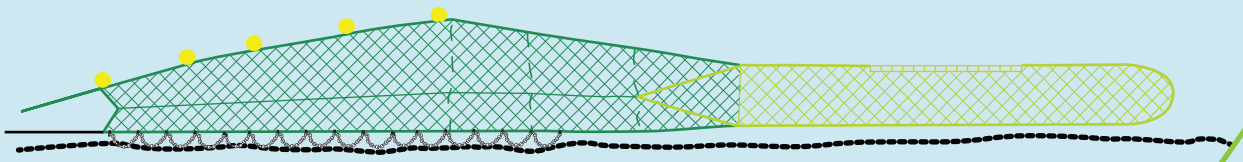
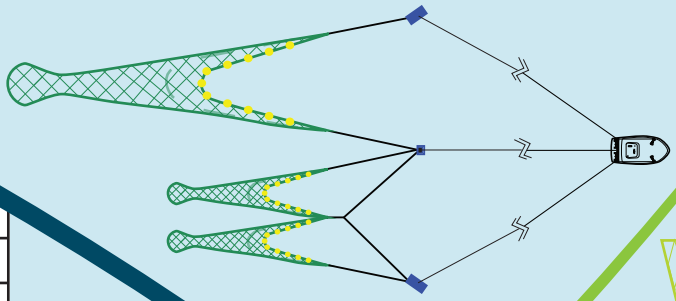
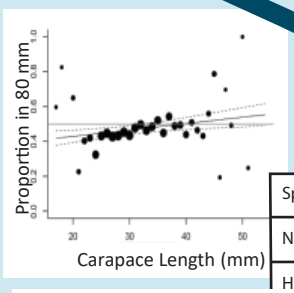
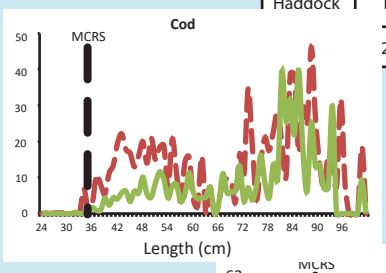
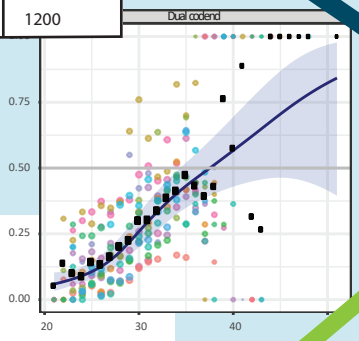


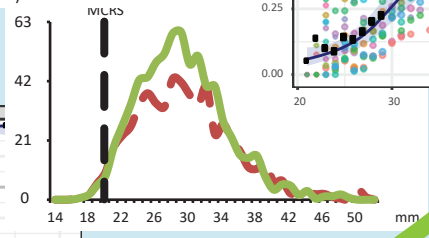


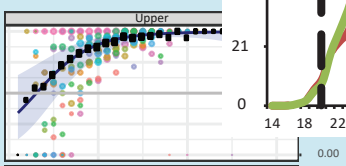


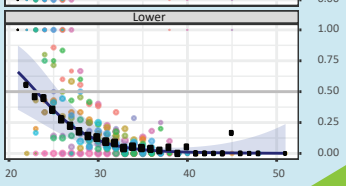
Species	Test (kg)	Control (kg)
Nephrops	1000	500
Haddock	1500	1000
	2000	1200

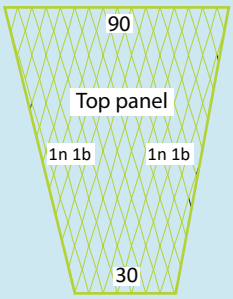


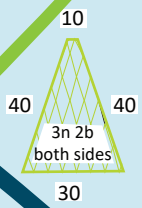


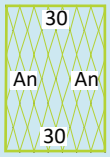


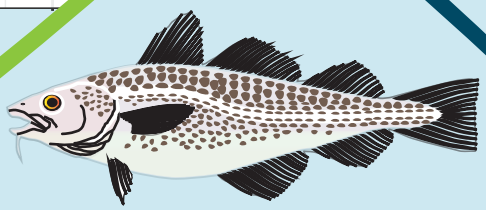


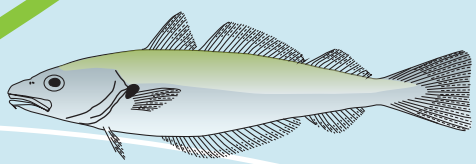


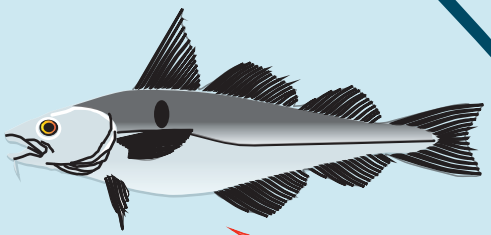












BIM
Ireland's Seafood Development Agency

Reducing unwanted catches: one page summaries of technical solutions developed by BIM and the Irish fishing industry

Ireland's EU Structural and Investment Funds Programmes 2014 - 2020
Co-funded by the Irish Government and the European Union

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

EUROPEAN UNION
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Introduction

The Fisheries Conservation team in BIM works closely with the Irish fishing industry to develop and test fishing gear modifications that reduce unwanted catches and:

- Provide a solid foundation to sustainability initiatives such as BIM's Responsibly Sourced Seafood Standard, Fishery Improvement Projects, Marine Stewardship Council certification, and Origin Green
- Assist vessel owners in meeting challenges posed by the EU landing obligation

This collection of one page fact sheets provides brief summaries of studies completed by BIM since 2014 that are available in full at: http://www.bim.ie/our-publications/fisheries/

The fact sheets are organised in three categories of gear modifications that aim to:

A. Reduce small, over quota and non-target fish species in *Nephrops* trawls
B. Reduce small *Nephrops* in *Nephrops* trawls
C. Reduce small, over quota and non-target fish species in demersal trawls targeting fish species

Many of the fact sheets were produced in collaboration with the EU project, DiscardLess, which aims to provide knowledge, tools and technologies as well as the involvement of stakeholders to achieve the gradual elimination of discarding (http://www.discardless.eu/).

A full compendium of summarised fact sheets, produced from a wide range of studies completed across the EU, is available at: https://data.marine.gov.scot/dataset/selectivity-trawl-fishing-gears

Acknowledgements
We would like to thank the owners, skippers and crews of the Irish vessels who worked closely with BIM in developing these solutions and made the trials possible. The work was funded by the Irish Government and part-financed by the European Union through the EMFF Operational Programme 2014–2020 under the BIM Sustainable Fisheries Scheme

A. Reduce small, over quota and non-target fish species in *Nephrops* trawls using:

1. A 300 mm square-mesh panel
2. A SELTRA sorting box compared with a standard trawl
3. A SELTRA sorting box compared with a 300 mm square-mesh panel
4. A Swedish grid
5. A dual-codend separator

Reducing fish catches with a 300 mm square-mesh panel in *Nephrops* trawls

AREA, VESSEL

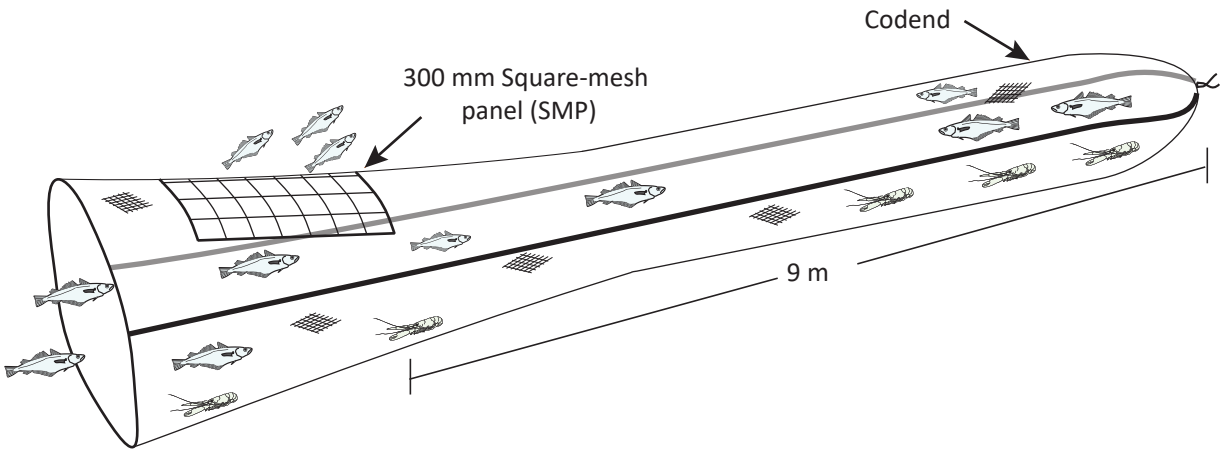
The 23 haul quad-rig catch comparison trial took plave in the western Irish Sea (ICES VIIa) on board the MFV Sella Nova (DA57) (23.5 m 441 kW) during August 2014, while targeting *Nephrops*.

GEAR MODIFICATION

A 3 m long 300 mm square-mesh panel (SMP) was inserted 9 m from the cod-line in the two-panel test gear. The standard gear was identical but without a square-mesh panel. Nominal codend mesh size and fishing circle were 80 mm and 386 × 70 mm.

RESULTS

- Haddock and whiting catches were reduced across most size grades
- Nephrops catches were not reduced



Species	Standard gear (kg)	300 mm SMP (kg)	Difference (%)
Haddock	214	65	-70
Whiting	136	66	-52
Nephrops	1106	1262	14

SMP square-mesh panel

FURTHER INFORMATION

https://tinyurl.com/yavthdfg
geartrials@bim.ie

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Reducing fish catches with a SELTRA sorting box in *Nephrops* trawls

AREA, VESSEL

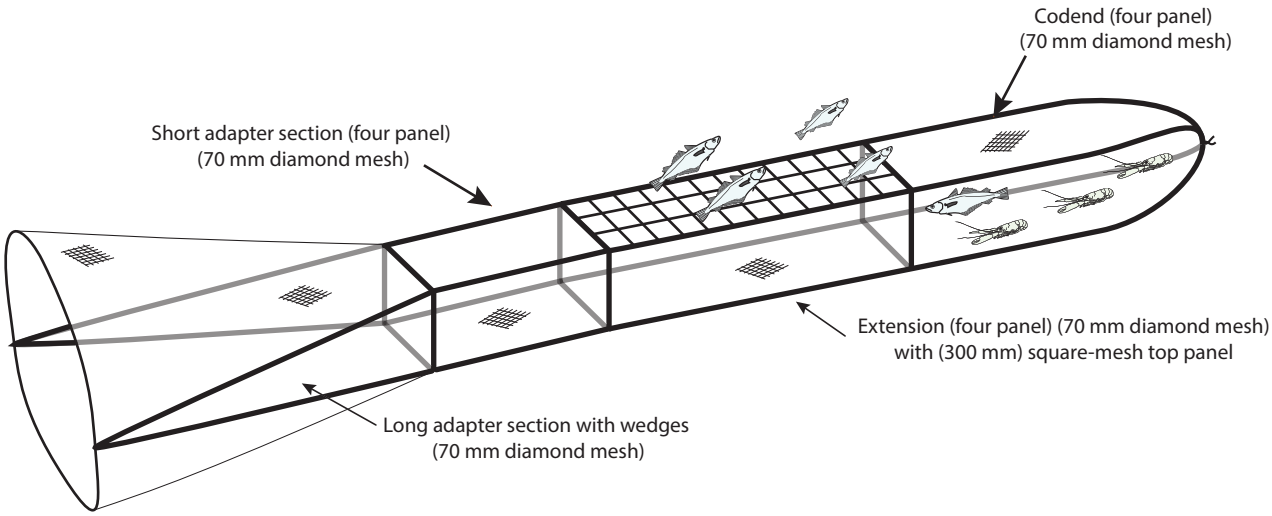
The twin-rig catch comparison trial took place in the western Irish Sea (ICES VIIa) on board MFV Ocean Breeze (D96)(17 m, 224 kW) during September 2016, while targeting *Nephrops*.

GEAR MODIFICATION

The SELTRA sorting box:

- a 3 m long four-panel section of 70 mm diamond mesh
- with a 3 m long 300 mm square-mesh escape window in the top panel attached 3 m from the cod-line

The standard and SELTRA gears were fished on identical twin-rigged trawls (380 × 80 mm fishing circle) and both were fitted with a 70 mm codend. A square-mesh panel was not present in the standard gear.



Species	Standard gear (kg)	SELTRA (kg)	Difference (%)
Whiting	152	66	-57
Haddock	126	12	-91
Flatfish	20	6	-69
Monkfish	5	9	-72
Dogfish	351	25	-93
Nephrops	362	396	9

RESULTS

- Substantial catches reductions of:
  - whiting
  - haddock
  - flatfish
  - lesser-spotted dogfish
- Catches of *Nephrops* increased
- Catches of very-small whiting <20 cm were not reduced

FURTHER INFORMATION

https://tinyurl.com/bim-seltra
geartrials@bim.ie

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Comparing catches between a SELTRA sorting box and a 300 mm square-mesh panel in *Nephrops* trawls

AREA, VESSEL

The twin-rig catch comparison trial took place in the western Irish Sea (ICES VIIa) on board MFV Ocean Breeze (D96) (17 m, 224 kW) during December 2016, while targeting *Nephrops*.

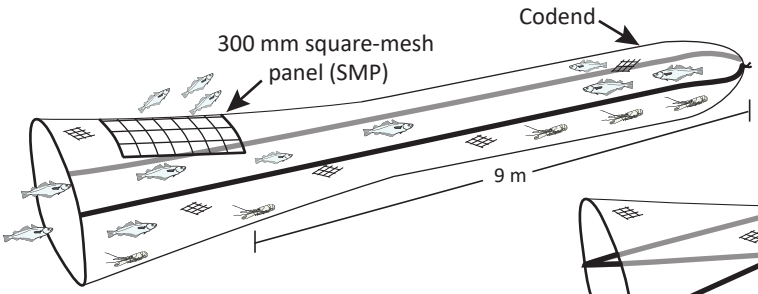
GEAR MODIFICATION

The SELTRA sorting box:

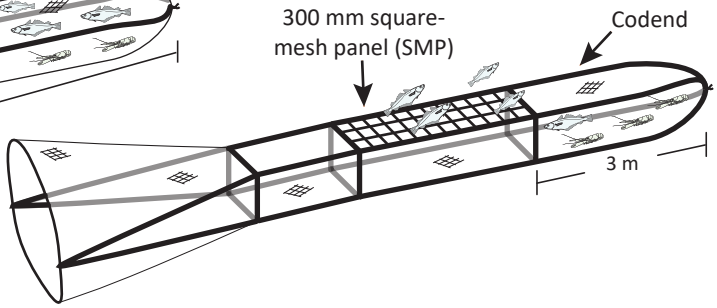
- a 3 m long four-panel section of 70 mm diamond mesh
- with a 3 m long 300 mm square-mesh escape window in the top panel attached 3 m from the cod-line

The standard gear was fitted with a 3 m long 300 mm square-mesh panel (SMP) 9 m from the cod-line, in a two-panel trawl. Both gears were fished on identical twin-rigged trawls (380 × 80 mm fishing circle) and fitted with 70 mm codends.

300 mm SMP gear



SELTRA



Species	300 mm SMP (kg)	SELTRA (kg)	Difference (%)
Whiting	362	277	-24
Haddock	639	314	-51
Cod	43	8	-81
Flatfish	118	53	-55
Monkfish	123	107	-12
Dogfish	1617	419	-74
Nephrops	610	725	19

SMP square-mesh panel

RESULTS

- Substantial reductions in catches of:
  - haddock
  - cod
  - flatfish
  - lesser-spotted dogfish
- *Nephrops* catches increased
- Catches of very-small whiting <20 cm were not reduced

FURTHER INFORMATION

https://tinyurl.com/bim-seltra
geartrials@bim.ie

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Reducing fish catches with a Swedish grid in *Nephrops* trawls

AREA, VESSEL

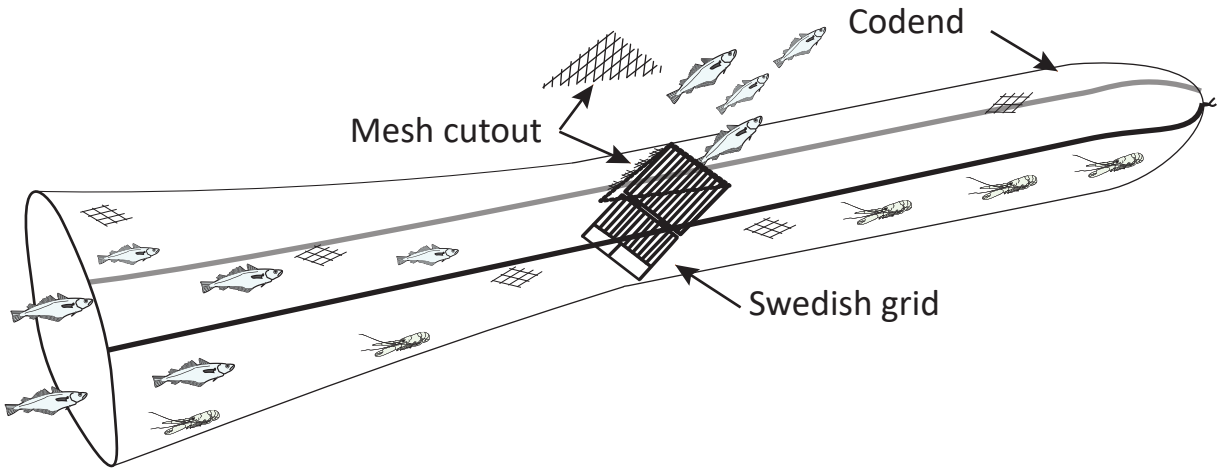
The 12 haul quad-rig catch comparison trial took place in the western Irish Sea (ICES VIIa) on board MFV Our Lass II (DA261) (21.7 m, 484 kW) during September 2015, while targeting *Nephrops*.

GEAR MODIFICATION

The test gear was fitted with:
A Swedish grid with vertical bars:

- spaced 35 mm apart and
- a 15 cm high gap at the bottom

An escape hole in the top sheet of the trawl forward of the grid. The standard gear was identical but without a grid. Nominal codend mesh size was 70 mm for both gears and fishing circle was 380 × 80 mm.



Species	Standard gear (kg)	Swedish grid (kg)	Difference (%)
Whiting	183	42	-77
Cod	75	0	-100
Haddock	42	4	-90
Nephrops	1908	1834	-4

RESULTS

- Substantial reduction in catches across all length classes of:
  - whiting
  - cod
  - haddock
- Small reduction in catches of *Nephrops*

FURTHER INFORMATION

https://tinyurl.com/ybecnvcs
geartrials@bim.ie

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Reducing catches of small fish with a dual-codend separator in *Nephrops* trawls

AREA, VESSEL

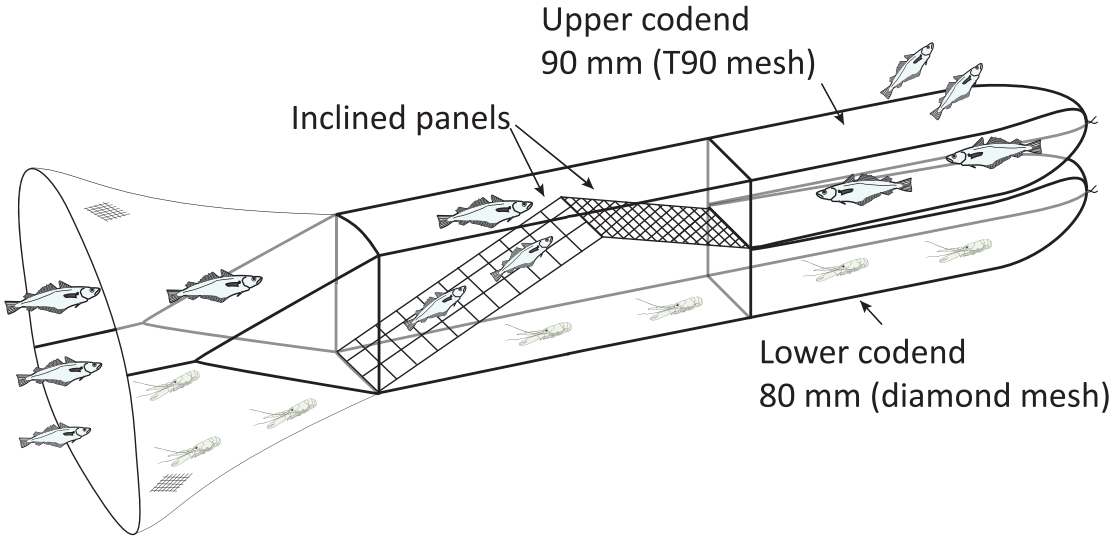
The catch comparison trial took place at the Smalls (ICES VIIg) on board MFV Stella Nova (DA57) (23.5 m, 441 kW) during October 2016, while targeting *Nephrops*.

GEAR MODIFICATION

The test gear consisted of:

- a four-panel 80 mm diamond mesh extension piece
- a 300 mm inclined square-mesh panel
- an 80 mm inclined diamond-mesh panel
- an upper codend with 90 mm T90 mesh
- a lower 80 mm diamond-mesh codend

The standard codend and extension piece were constructed with 80 mm diamond mesh. A square-mesh panel was not present in either gear.



Species	Standard gear (kg)	Test gear (kg)	Difference (%)
Haddock < 30 cm	100	52	-49
Haddock ≥ 30 cm	254	277	9
Whiting < 32 cm	1435	401	-72
Whiting ≥ 32 cm	874	553	-37
Nephrops			
< 25 mm*	325	289	-11
≥ 25 mm*	2103	2094	0

*carapace length

RESULTS

- Substantial reduction in catches of
  - haddock below 30 cm#
  - whiting below market size (32 cm)
- No loss of *Nephrops* above 25 mm*#

Minimum Conservation Reference Size

FURTHER INFORMATION

https://tinyurl.com/lulhv9e
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B. Reduce small *Nephrops* in *Nephrops* trawls by:

6. Increasing codend mesh size from 70 to 80 mm
7. Demonstrating high survivability for *Nephrops* using a SELTRA
8. Modifying the codend circumference
9. Using a *Nephrops* sorting grid

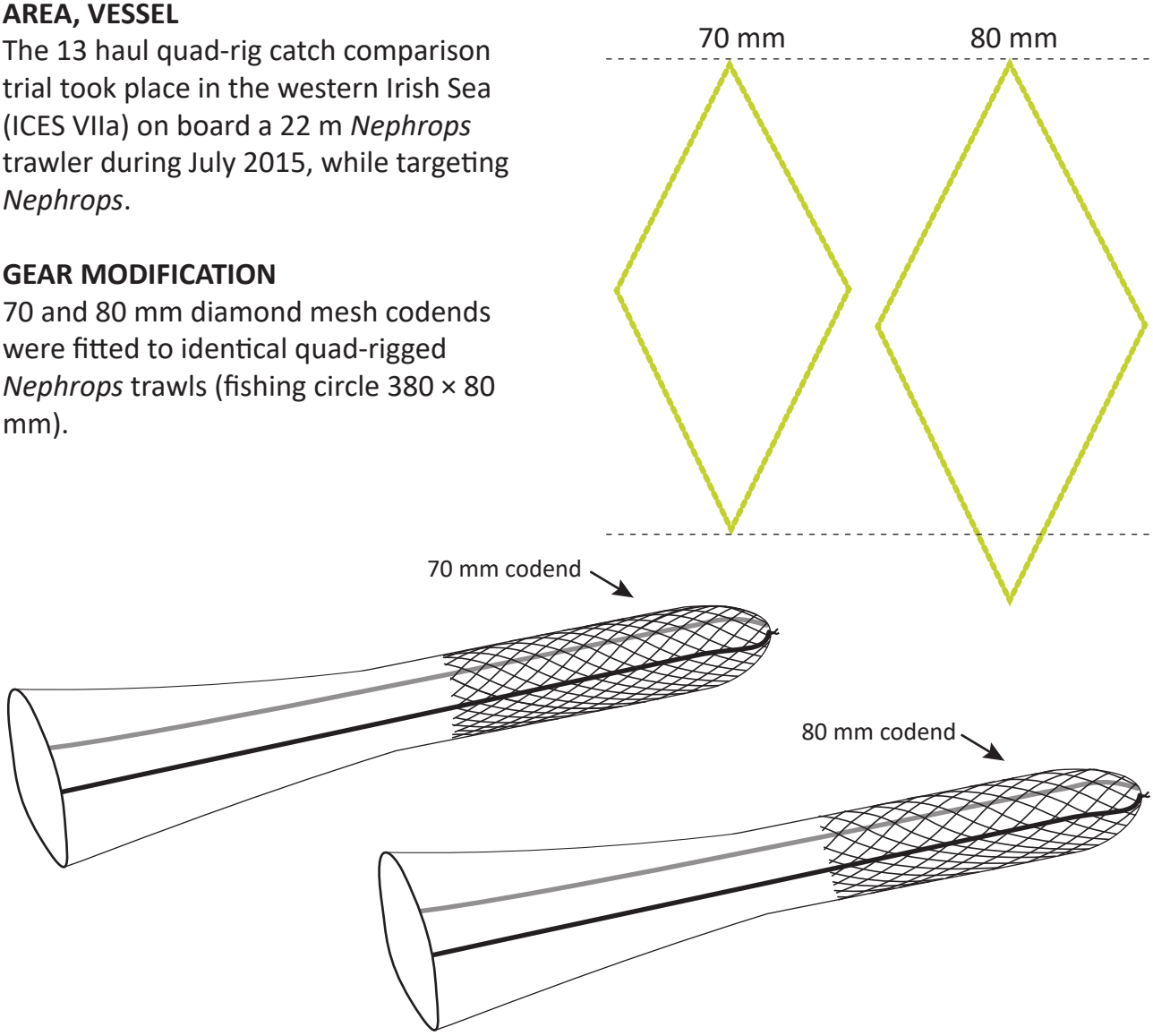
Reducing catches of small *Nephrops* with an increase in codend mesh size from 70 to 80 mm

AREA, VESSEL

The 13 haul quad-rig catch comparison trial took place in the western Irish Sea (ICES VIIa) on board a 22 m *Nephrops* trawler during July 2015, while targeting *Nephrops*.

GEAR MODIFICATION

70 and 80 mm diamond mesh codends were fitted to identical quad-rigged *Nephrops* trawls (fishing circle 380 × 80 mm).



Species	70 mm codend (kg)	80 mm codend (kg)	Difference (%)
Nephrops			
< 25 mm*	53	29	-45
≥ 25 mm*	2040	1808	-11

*carapace length

RESULTS

- Significant reduction in catches of small *Nephrops* below 25 mm
- Small reduction in *Nephrops* >25 mm
- No loss in profitability over the course of a fishing season
- New regulated mesh size increase from 2017

FURTHER INFORMATION

https://tinyurl.com/ydf8aoys
geartrials@bim.ie

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Reducing landings of small *Nephrops* by demonstrating high survivability of discarded *Nephrops*

AREA, VESSEL

The study took place on the Galway and Aran fishing grounds (ICES VIIb) on board a 11.6 m trawler and a 9.8 m creel vessel during July 2017.

GEAR MODIFICATION

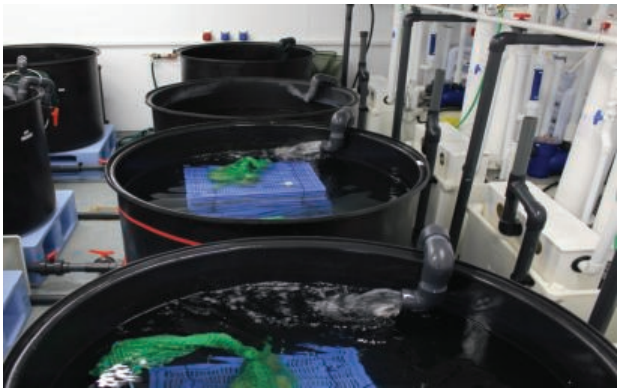
A standard SELTRA sorting box with:

- a 3 m long four-panel section
- 80 mm diamond mesh

The SELTRA gear was employed on a single-rigged trawl (380 × 80 mm fishing circle) with an 80 mm codend.

Control *Nephrops* caught with creels were stored along with the test *Nephrops* for two weeks at an onshore facility.

Nephrops in storage crate



Onshore holding facility

Nephrops	Number caught	Survivors (Number)	Survival (%)
Trawl	1664	1070	64
Creel	204	200	98

RESULTS

- The overall *Nephrops* survivability was:
  - 64%, trawl
  - 98%, creel
- An application has been made for a high survivability exemption from the landing obligation

FURTHER INFORMATION

https://tinyurl.com/y9umf9nb
geartrials@bim.ie

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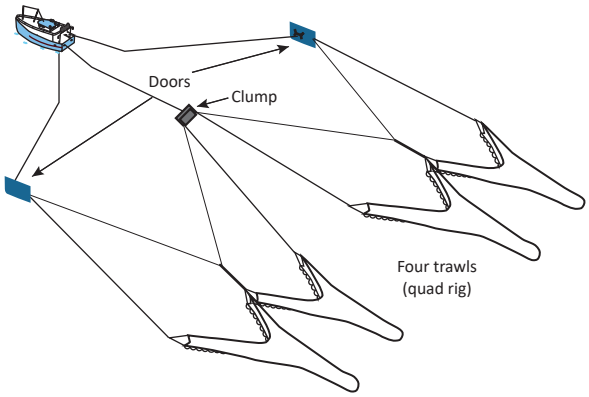
Modifying the codend circumference to reduce catches of small *Nephrops* and whiting in *Nephrops* trawls

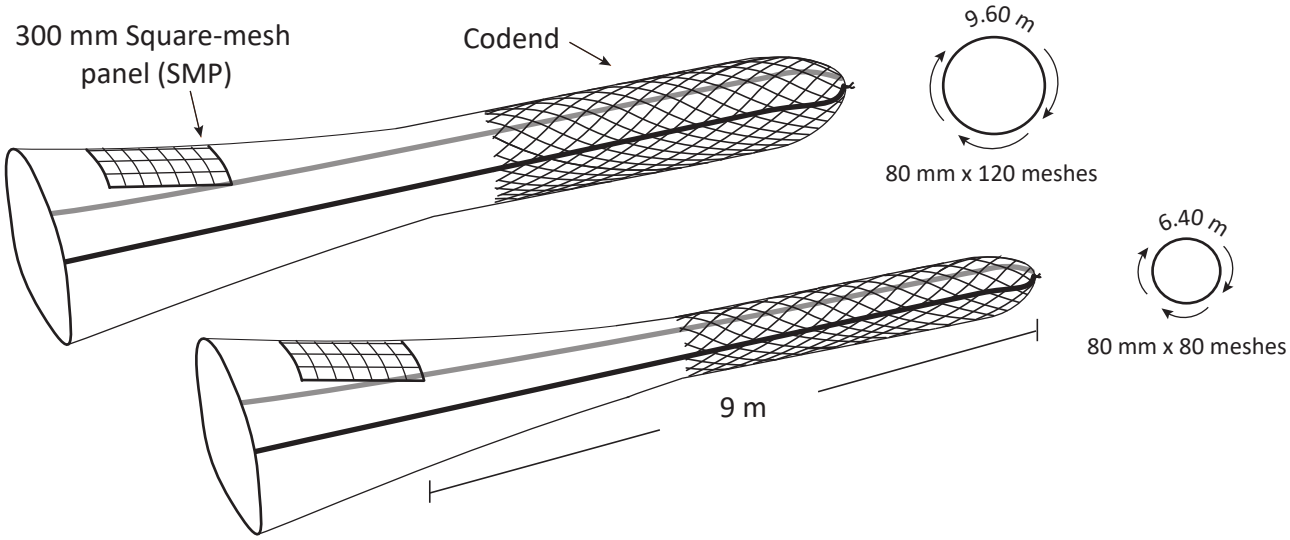
AREA, VESSEL

The 12 haul catch comparison trial took place in the Western Irish Sea (ICES VIIa) on a 23 m quad-rig trawler, during February 2018, while targeting *Nephrops*.



GEAR MODIFICATION

An 80 × 80 codend was compared against a standard 80 × 120 codend (mesh size (mm) × number of meshes in diameter). The circumference and mesh size in the extension piece matched the codend to which it was attached. A 300 mm square -mesh panel (SMP) was mounted 9 –12 m from the codline in each trawl.



Species	80 × 120 (kg)	80 × 80 (kg)	Difference (%)
Nephrops			
≥ 25 mm*	396	350	-12
< 25 mm*	48	33	-30
Whiting			
< 20 cm	144	122	-15

RESULTS

- Significant reduction in *Nephrops* below 25 mm#
- Small reduction in *Nephrops* above 25 mm*
- Small reductions in whiting below 20 cm

#Minimum Conservation Reference Size
*Carapace length

FURTHER INFORMATION

https://tinyurl.com/ya5kajzy
geartrials@bim.ie

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Reducing catches of small *Nephrops* using a *Nephrops* sorting grid

AREA, VESSEL

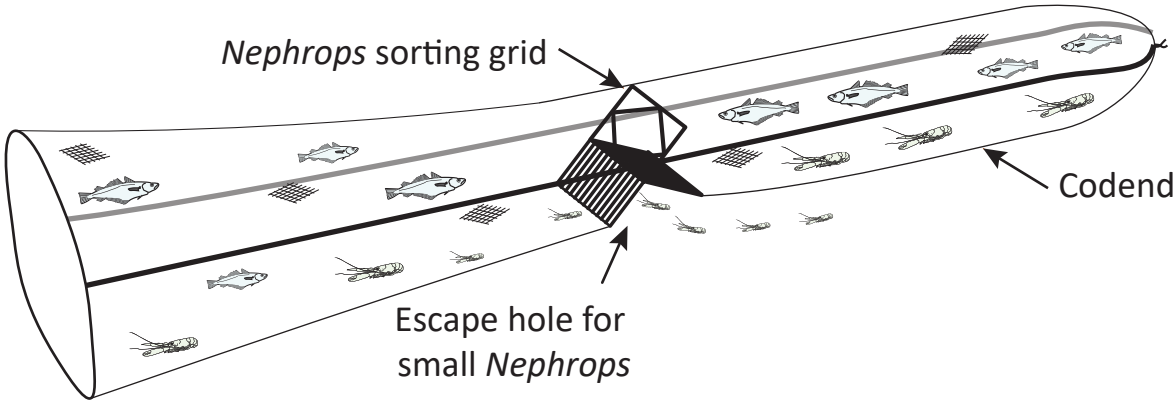
The 12 haul quad-rig catch comparison trial took place in the western Irish Sea (ICES VIIa) on board MFV Our Lass II (DA261) (21.7 m, 484 kW) during September 2015, while targeting *Nephrops*.

GEAR MODIFICATION

The test gear was fitted with a *Nephrops* sorting grid (NSG):

- Vertical bars spaced 15 mm apart in the lower half
- Reinforced opening in the top half
- Guiding panel and escape hole in trawl's bottom sheet to the rear of the grid

The standard gear was identical but without a rigid grid.
Nominal codend mesh size and fishing circle were 70 mm and 380 × 80 mm.



Species	Standard gear (kg)	NSG (kg)	Difference (%)
Nephrops			
< 25 mm*	454	293	-35
≥ 25 mm*	1454	1232	-15
> 31 mm*	346	332	-4

NSG= *Nephrops* sorting grid
*Carapace length

RESULTS

- Catches of small *Nephrops* (< 25 mm*) reduced by 35%
- Catches of larger *Nephrops* (≥ 25 mm*) reduced by 15% with most losses in the tailed grade (≤ 31 mm*)
- Fish catches were maintained

FURTHER INFORMATION

https://tinyurl.com/ybecnvcs
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C. Reduce small, over quota and non-target fish species in the demersal trawls targeting fish species by:

10. Using T90 (turned 90°) mesh to reduce undersize whiting
11. Raising the fishing line to reduce cod catches

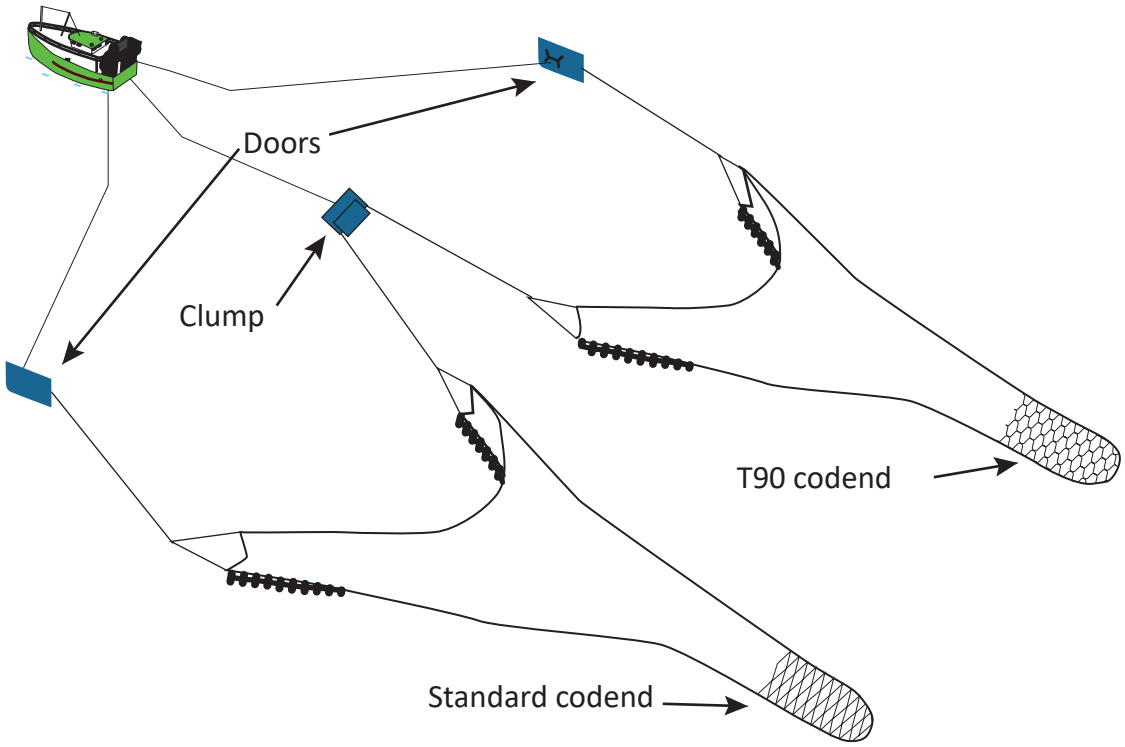
Reducing catches of small whiting with T90 mesh in whitefish trawls

AREA, VESSEL

The 13 haul twin-rig catch comparison trial took place in the Celtic Sea (ICES VIIg) on board MFV Foyle Fisher (G497) (24.7 m, 441 kW) during April 2016, while targeting whiting.

GEAR MODIFICATION

The test codend and extension piece were constructed from T90 (turned 90°) 80 mm mesh.
The standard codend and extension piece were constructed from diamond 80 mm mesh.
The fishing circle of the twin-rigged hopper trawls was 550 × 80 mm.



Species	Standard gear (count)	T90 (count)	Difference (%)
Whiting			
< 32 cm	2628	857	-67
≥ 32 cm	6691	857	16

RESULTS

- Substantial reductions in whiting catches below 32 cm (market size)
- Increases in catches of larger haddock, whiting and plaice
- Substantial increase in catch quality

FURTHER INFORMATION

https://tinyurl.com/yddak2ho
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BIM Ireland's Seafood Development Agency

Ireland's EU Structural and Investment Funds Programmes 2014 - 2020
Co-funded by the Irish Government and the European Union
An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine
EUROPEAN UNION
This measure is part-financed by the European Maritime and Fisheries Fund

Reducing cod catches with a raised fishing line in whitefish trawls

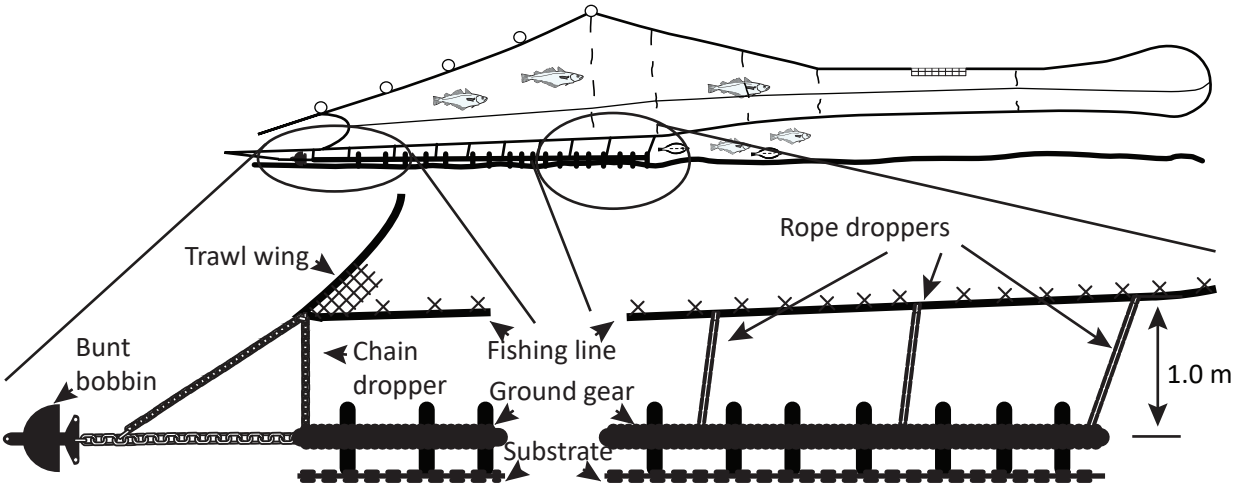
AREA, VESSEL

The twin-rig catch comparison trial took place in the Celtic Sea (ICES VIIg) on board a 25 m whitefish trawler during March 2017, while targeting whiting.

GEAR MODIFICATION

Two identical whitefish trawls (620 × 80 mm fishing circle) were used during the trial.

On the standard gear the ground gear/ fishing line arrangement was unaltered. On the test gear the droppers between the fishing line and the ground gear were lengthened to 1 m.



Species	Standard gear (kg)	Raised fishing line (kg)	Difference (%)
Cod	798	488	-39
Whiting	2706	5069	87
Haddock	1975	2713	37
Flatfish	584	250	-57
Monkfish	202	57	-72
Skate and ray	124	25	-80

RESULTS

- Reduced catches of cod, flatfish, monkfish, and skate and ray
- Substantial increases in whiting and haddock catches
- Total catch value increased by 14%

FURTHER INFORMATION

https://tinyurl.com/y9qtq5m2

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