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

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 place 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

<table>
<thead>
<tr>
<th>Species</th>
<th>Standard gear (kg)</th>
<th>300 mm SMP (kg)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haddock</td>
<td>214</td>
<td>65</td>
<td>-70</td>
</tr>
<tr>
<td>Whiting</td>
<td>136</td>
<td>66</td>
<td>-52</td>
</tr>
<tr>
<td><em>Nephrops</em></td>
<td>1106</td>
<td>1262</td>
<td>14</td>
</tr>
</tbody>
</table>

**FURTHER INFORMATION**
https://tinyurl.com/yavthdfg
geartrials@bim.ie
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.

![Diagram of SELTRA sorting box](image)

<table>
<thead>
<tr>
<th>Species</th>
<th>Standard gear (kg)</th>
<th>SELTRA (kg)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whiting</td>
<td>152</td>
<td>66</td>
<td>-57</td>
</tr>
<tr>
<td>Haddock</td>
<td>126</td>
<td>12</td>
<td>-91</td>
</tr>
<tr>
<td>Flatfish</td>
<td>20</td>
<td>6</td>
<td>-69</td>
</tr>
<tr>
<td>Monkfish</td>
<td>5</td>
<td>9</td>
<td>-72</td>
</tr>
<tr>
<td>Dogfish</td>
<td>351</td>
<td>25</td>
<td>-93</td>
</tr>
<tr>
<td>Nephrops</td>
<td>362</td>
<td>396</td>
<td>9</td>
</tr>
</tbody>
</table>

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
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)

300 mm SMP gear

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.

**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

<table>
<thead>
<tr>
<th>Species</th>
<th>300 mm SMP (kg)</th>
<th>SELTRA (kg)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whiting</td>
<td>362</td>
<td>277</td>
<td>-24</td>
</tr>
<tr>
<td>Haddock</td>
<td>639</td>
<td>314</td>
<td>-51</td>
</tr>
<tr>
<td>Cod</td>
<td>43</td>
<td>8</td>
<td>-81</td>
</tr>
<tr>
<td>Flatfish</td>
<td>118</td>
<td>53</td>
<td>-55</td>
</tr>
<tr>
<td>Monkfish</td>
<td>123</td>
<td>107</td>
<td>-12</td>
</tr>
<tr>
<td>Dogfish</td>
<td>1617</td>
<td>419</td>
<td>-74</td>
</tr>
<tr>
<td><em>Nephrops</em></td>
<td>610</td>
<td>725</td>
<td>19</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Species</th>
<th>Standard gear (kg)</th>
<th>Swedish grid (kg)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whiting</td>
<td>183</td>
<td>42</td>
<td>-77</td>
</tr>
<tr>
<td>Cod</td>
<td>75</td>
<td>0</td>
<td>-100</td>
</tr>
<tr>
<td>Haddock</td>
<td>42</td>
<td>4</td>
<td>-90</td>
</tr>
<tr>
<td>Nephrops</td>
<td>1908</td>
<td>1834</td>
<td>-4</td>
</tr>
</tbody>
</table>

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
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.

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

**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

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**FURTHER INFORMATION**
https://tinyurl.com/ulhv9e
geartrials@bim.ie
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).

**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

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

*carapace length

**FURTHER INFORMATION**
[https://tinyurl.com/ydf8aoys](https://tinyurl.com/ydf8aoys)
geartrials@bim.ie
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](image1)

![Onshore holding facility](image2)

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

<table>
<thead>
<tr>
<th><em>Nephrops</em></th>
<th>Number caught (Number)</th>
<th>Survivors (Number)</th>
<th>Survival (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trawl</td>
<td>1664</td>
<td>1070</td>
<td>64</td>
</tr>
<tr>
<td>Creel</td>
<td>204</td>
<td>200</td>
<td>98</td>
</tr>
</tbody>
</table>

**FURTHER INFORMATION**
https://tinyurl.com/y9umf9nb
geartrials@bim.ie
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.

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

<table>
<thead>
<tr>
<th>Species</th>
<th>80 × 120 (kg)</th>
<th>80 × 80 (kg)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nephrops</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 25 mm*</td>
<td>396</td>
<td>350</td>
<td>-12</td>
</tr>
<tr>
<td>&lt; 25 mm*</td>
<td>48</td>
<td>33</td>
<td>-30</td>
</tr>
<tr>
<td>Whiting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 20 cm</td>
<td>144</td>
<td>122</td>
<td>-15</td>
</tr>
</tbody>
</table>

*Carapace length

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

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**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

<table>
<thead>
<tr>
<th>Species</th>
<th>Standard gear (kg)</th>
<th>NSG (kg)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 25 mm*</td>
<td>454</td>
<td>293</td>
<td>-35</td>
</tr>
<tr>
<td>≥ 25 mm*</td>
<td>1454</td>
<td>1232</td>
<td>-15</td>
</tr>
<tr>
<td>&gt; 31 mm*</td>
<td>346</td>
<td>332</td>
<td>-4</td>
</tr>
</tbody>
</table>

NSG = *Nephrops* sorting grid
*Carapace length

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**FURTHER INFORMATION**
https://tinyurl.com/ybecnvcs
geartrials@bim.ie
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.

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

<table>
<thead>
<tr>
<th>Species</th>
<th>Standard gear (count)</th>
<th>T90 gear (count)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whiting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 32 cm</td>
<td>2628</td>
<td>857</td>
<td>-67</td>
</tr>
<tr>
<td>≥ 32 cm</td>
<td>6691</td>
<td>857</td>
<td>16</td>
</tr>
</tbody>
</table>

FURTHER INFORMATION
https://tinyurl.com/yddak2ho
geartrials@bim.ie
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.

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

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

FURTHER INFORMATION
https://tinyurl.com/y9qtq5m2
geartrials@bim.ie