

Patterns of whiting discards by Northern Irish otter trawlers targeting Nephrops

The main fleets contributing to discards of whiting in the Irish Sea are otter bottom trawlers targeting Nephrops from Ireland and Northern Ireland. Recently introduced highly selective gears aimed to reduce cod catch are mandatory for all boats fishing with 70-99 mesh otter trawls in the Irish Sea. The international estimates of whiting discards are the lowest since 2005 whilst the Spawning Stock Biomass is the highest since 2000. Bycatch within targeted whitefish trawls is low. These gears have been shown to reduce the bycatch of larger individuals. Further technical measures are currently being explored to reduce bycatch of smaller fish, with national gear trials in development.

Square mesh panel legislation was introduced for both the UK and Irish vessels in 1994 specifically to reduce the fishing mortality on juvenile whiting in the Nephrops fishery. This may have changed the selectivity for whiting but probably had lesser impacts on cod and haddock. Experimentally the SMPs had been shown to reduce whiting bycatches (Briggs, 1992). Despite the introduction of these measures discarding of whiting has been a persistent problem in the Nephrops fishery.

Council Regulation (EC) No. 850/1998 was one of the first major international regulations that had an impact on the Irish Seas as it attempted to adapt technical measures. It included new measures to improve the selectivity of towed gears by applying detailed rules on the construction of fishing gears (e.g. codend circumference, twine thickness), making the use of square mesh panels mandatory in certain fisheries, additional closed areas/seasons and gear restrictions as well as maintaining the legal architecture for emergency measures and the development of local measures for in-shore fisheries within MS territorial waters, (STECF, 2012). Council Regulation (EC) 850/1998 is still applicable and has been amended numerous times since its introduction. Council Regulation (EC) 850/1998 also established the minimum landings sizes of 27 cm for whiting, 35 cm for Cod, 30 cm for haddock and 27 cm for plaice.

In 2006 and 2007 buyers and sellers and sales notes regulations were introduced in the UK and Ireland. These regulation are expected to have improved the accuracy of the landings data because they make the landings offered for sale traceable back to vessels.

Gear development – 2008 to present

2008

Significant escapes of juvenile haddock and whiting occurred when a 120mm SMP was inserted 8m from the codend extension. This reinforces the findings of earlier studies (Briggs et al., 1996, Anon. 1996 and Armstrong et al., 1998). The loss of some *Nephrops* with a 120mm SMP in this position could be due to sagging of the panel. Trial of a 50-55 mm square mesh extension resulted in losses of 44% haddock, 75% whiting and 58% *Nephrops* by number

2012

A steering group, comprising industry, scientific, DARD representatives selected a range of selectivity devices which had shown positive results in discard reduction in other fisheries. The conclusions made during the trials for each device are outlined below.

Swedish grid

The Swedish grid successfully separated the *Nephrops* and released the larger fish but had severe problems with repeatedly choking up. There are definite safety issues in handling this device on the type of vessels working in the Irish Sea. All three skippers expressed concerns about the safety of their crew during the hauling and shooting of the grids.

Plastic semi flexible grid

The plastic grids were slightly less hazardous to handle onboard but they tended to release too much of the target species. They were also prone to choking up with debris. There were no indications during any of the grid trials that any of the grids used could effectively be used for release of cod or other by-catch in the Irish Sea *Nephrops* fishery if the industry was to remain viable and not be exposed to unnecessary dangers onboard.

Coverless, low headline trawl

The coverless trawls were modifications of the standard nets used in the fishery. They showed very little difference in the catch composition to the standard trawls and no noticeable reduction in cod catches. They were easy to use but not effective as by-catch or cod release device.

Boxed section

A boxed (4 panel) extension similar to that used in the SELTRA trawl project. Of the four devices the boxed extension showed most promise of releasing cod from the *Nephrops* trawl without loss of *Nephrops*. For this reason modifications were made to the original design in an attempt to further

improve the selectivity of the device and trialled for another series of experimental hauls. This device was easy and safe for the fishermen to use. It is relatively cheap and simple to construct using materials that the crew are familiar with.

2012 & 2013

Trials of highly selective gears on commercial vessels engaged in normal fishing activity were under taken in 2013. This followed scientific trials on-board chartered fishing vessels

Four selectivity devices/gears were presented to STECF [PLEN-13-03] as separate cases for efficiently reducing cod catches in the TR2 fleet. The Agri-Food and Biosciences Institute (AFBI) collected gear trial data followed by observer information on commercial vessels that had these devices fitted. STECF was requested to evaluate each of the cases independently to validate whether the evidence shows an efficient reduction of cod catch to less than 1.5% of the total catch. This will enable these devices to form the basis of cases for groups of vessels using these selectivity devices/gears to be exempted from the effort regime as laid down in Article 11 of Regulation (EC) No 1342/2008 (the cod plan).

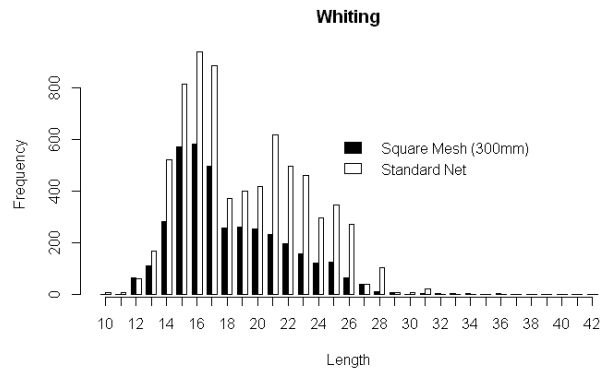
SELTRA "300" Trawl (4m box section with 300 mm square mesh)

The data supported the conclusion that during the reference period for which the data have been collected, the catches of cod by the vessel group deploying SELTRA 300 were on average less than or equal to 1.5% of the total catches of that vessel group.

Whiting; Limited catch reduction of whiting in commercial trials of 1%.

300 mm Square Mesh Panel (SMP)

The data support the conclusion that during the reference period for which the data have been collected, the catches of cod by the vessel group deploying 300 mm Square Mesh Panel were on average less than or equal to 1.5% of the total catches of that vessel group.

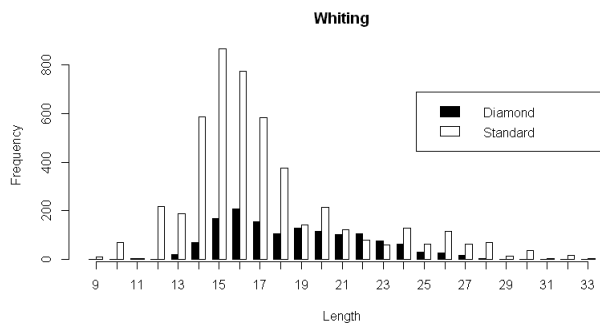


Gear trial comparison of whiting catches by length

Whiting; Evidence of strongest effect on fish above 22cm. During commercial trials the square mesh panel reduced whiting catches rates by 33.0 %

SELTRA “270” Trawl (3m box section with 270 mm diamond mesh)

The data did NOT support the conclusion that during the reference period for which the data have been collected, the catches of cod by the vessel group deploying SELTRA 270 were on average less than or equal to 1.5% of the total catches of that vessel group.



Gear trial comparison of whiting catches by length

Whiting; The 270mm diamond mesh was not supported as a permitted gear by STECF due to cod rates - evidence suggested it was likely to retain to a similar degree cod (and other species) above 35 cm. However, this gear had the second largest catch rate reduction on whiting of all gears.

During commercial trials the square mesh panel reduced whiting catches rates by 27.7 %

2015

It is considered that the highly selective gears currently used within the Northern Irish fleet in the Irish Sea Nephrops fishery has made progress toward reducing bycatch of non-target species (STECF 2013). However, it is recognised by both scientists and the industry that improvement should be sought. Following visits to the Hirtshals flume tank in Denmark, organised by SeaFish, attended by members of the fishing industry, AFBI staff and DARD staff discussion through workshops led to a suggestion to re-trial of a large mesh top panel trialled by in 2008 to assess the feasibility of these gear modifications to further reduce non-target species bycatch.

Four scenarios were tested using two gears (detailed below) and two fishing vessel 'types' (twin and single rig).

200mm square mesh top panel

The single-rig net used in the trial was a 20 fathom trawl, the same size as that trialled previously (Briggs 2010) the net was fitted with a regulation 300 mm square mesh panel. The 200 mm experimental square mesh top panel in this trawl was positioned in the same position as trialled by Briggs (2010). This is where the stimulus for the fish to raise is stimulated.

300mm diamond mesh top panel

The 300 mm experimental diamond mesh top panel in this trawl was positioned in the trawl body and would provide an opening of 90 - 100mm in conjunction with a 300 square mesh panel.

The results of these addition modifications were highly inconsistent between individuals hauls, between vessel types and species. At time experimental nets caught more total bycatch than modified nets. Modified nets also showed a likelihood to catch more cod, although the total catch rates were low. In three out of four scenarios between there was a 25% - 30% reduction in whiting catch, whilst the 300mm diamond panel on a twin rig vessel caught 46% more whiting than the control net. The trial highlights the highly variable and complex nature of the current position of gear selectivity developments with the Irish Sea Nephrops fishery.

On-going development

A collaborative industry-science, 2 year project is underway in Northern Ireland with a programme of work involving the design, trialling and implementation of fishing gear with increased selectivity. The project is focused on the commercial fishing fleets that operate out of the three main harbours in Northern Ireland, Kilkeel, Ardglass and Portavogie. It is recognised that the local fishermen engagement plays a key role in any future gear development and their knowledge and input to the gear

development process is essential in ensuring that the local fishing industry is best placed to meet the requirements of the landing obligation whilst not impacting negatively on fishermen's catchability of target species.

Through a series of workshops and review of existing solutions from other fishing areas a series of gear modifications have been suggested. Initial trials of two ideas have shown ability to reduce total bycatch amounts. However, more development is needed to fully evaluate the effect on small undersized fish, which were still caught. The two gears that were tested are an inclined grid and a large (pelagic mesh sized) top sheet. These gears were tested in August 2017. Further trials are planned for early 2018.

'Lights' trials are being conducted in November 2018. The behavioural response of fish and Nephrops to light is not fully understood with commercial fishing activity. Lights (blue, green and white) will be attached to the existing escape grid (300mm square mesh panel). It is intended that this shall be a precursor to further trials in 2018.

[Monitoring discards \[Northern Ireland at-sea observer sampling\]](#)

Observer schemes provide estimates of discards. Discard estimates derived from these sampling schemes for mixed fisheries are characteristically uncertain due to a number of contributing and linked factors. These include factors such as the natural fluctuation in population abundance, seasonal distribution patterns of species and changes in fisher behaviour. Low observer sampling coverage of all or part of the discard fleet will thus exacerbate the variability of estimates within and between years. Inter-annual variation observed in the international whiting discards estimates in the Irish Sea can be attributed to a combination of these factors.

Trends in discards cannot be assessed in isolation from the trends in the stock. Figure 1 shows the mean standardised recruitment index and mean standardised spawning stock biomass from the ICES assessment of the Irish Sea whiting stock. This is plotted with the standardised international discard estimate. Recently that has been an interrelationship between the fishery pattern and the recruitment of the stock. The increased discard volume observed since during 2013 to 2014 is a product of increased stock recruitment and spawning stock biomass. With reduced recruitment 2014 - 2015 discards are also reduced, however, at present these are at the lowest levels since 2005, whilst the SSB is the highest since 2000.

ICES had recognised that the estimates of whiting discards in the Irish Sea are uncertain and required review before being incorporated into the advice or used for management. This was undertaken in the WKIrish initiatives. The discard estimates

are included within the newly derived quantitative assessment method used for the first time to give advice in 2017 for 2018.

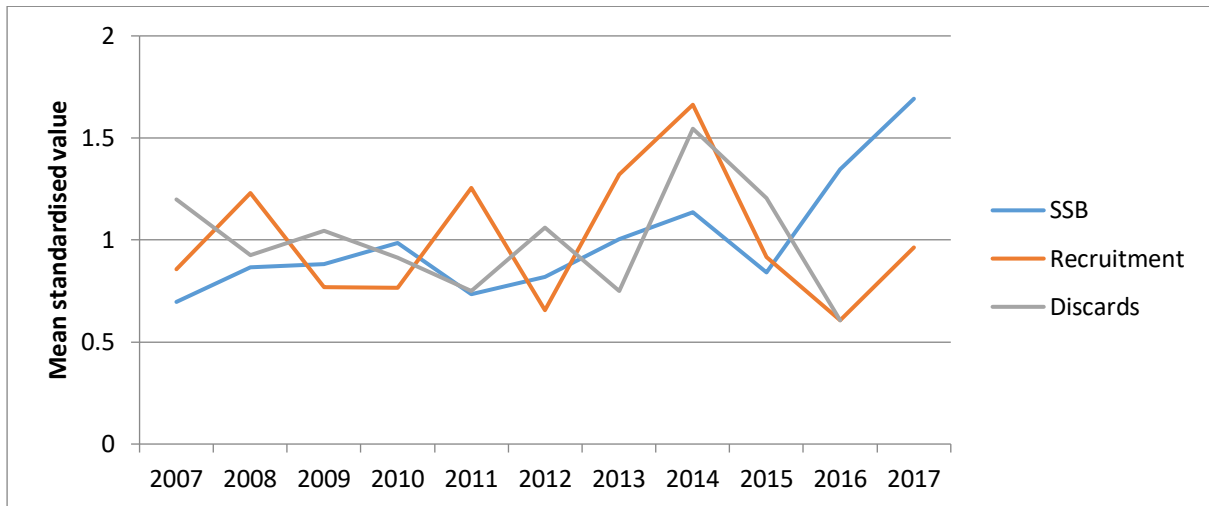


Figure 1. Mean standardised relative recruitment, mean standardised Spawning Stock Biomass (SSB) from the ICES assessment of Irish Sea whiting and mean standardised international discard estimate.

Patterns of discarding

Spatial patterns.

- High inter-annual variation - due to a combination of areas of fleet activity and behavioural movements / seasonal abundance of whiting.

Little evidence for a consistent area of high CPUE

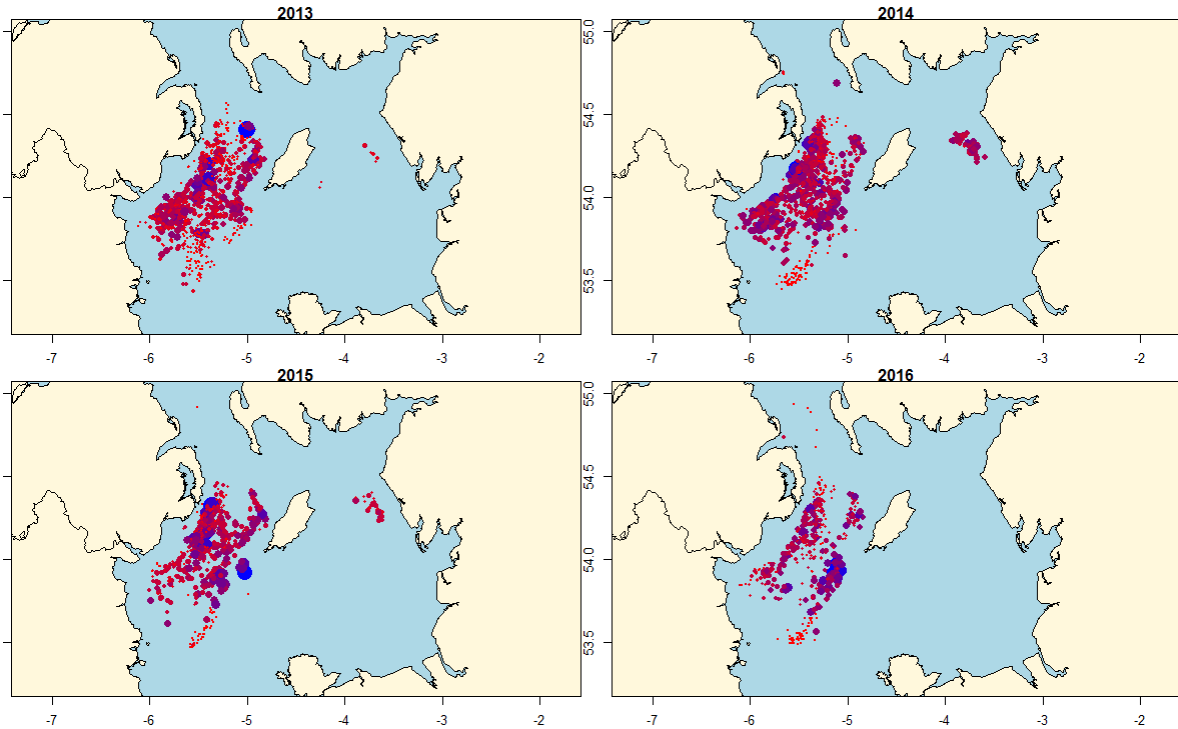


Figure 1. Catch Per Unit Effort (CPUE) of whiting as recorded by AFBI discard observers. Symbols are scaled the CPUE rate with a gradient of red(low) to blue(high) colouration.

Temporal catch rates

A season trends in catch rates is apparent with lowest CPUE May - September. This is likely to be caused by a combination of species behaviour - spawning aggregations in quarter 1 and also species growth and development with recruits developing during summer months to be become vulnerable to the fishery in late quarter 3 onwards.

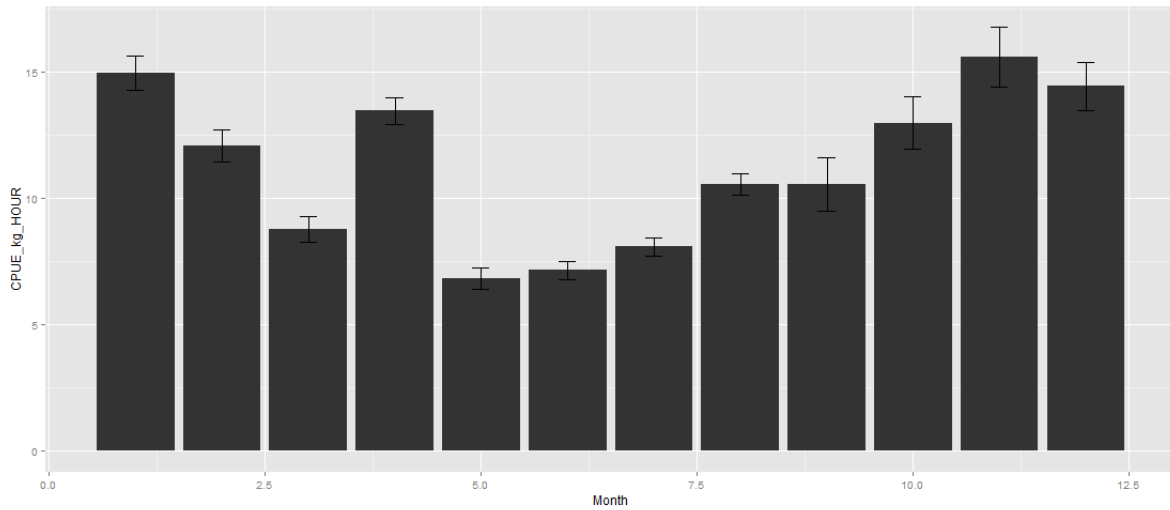


Figure 2. Catch Per Unit Effort (CPUE) of whiting as recorded by AFBI observes (2013 - 2016) by calendar month.

Temporal discard progression.

Although CPUE is lowest May - September due to higher levels of fishing activity there it results that total discard volume during April - August are higher than in other Months (Figure 3). It should be noted that discard raising from observer trips is not normally raised by month. The AFBI observer scheme is designed for quarterly raising.

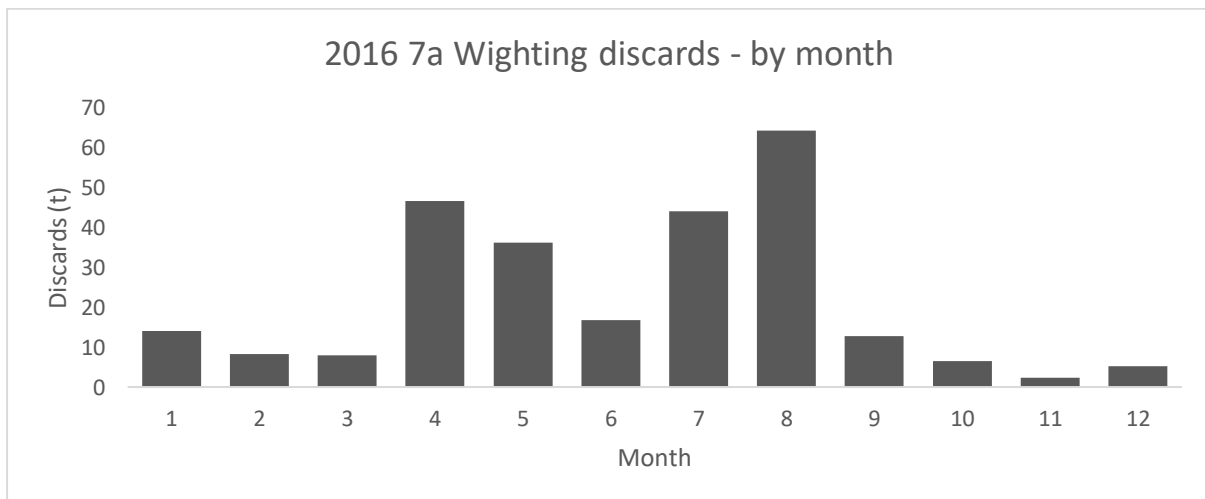


Figure 3. Discards of whiting in 7a by calendar month.

- Temporal and season patterns of whiting bycatch are complex and show high levels of inter-annual variability

- A significant body of work exists relating to gear selectivity developments in the Irish Sea Nephrops fishery
- The current gear used by the industry has been developed with the aim to reduce bycatch of a range of species
- Trials of gear known to work in other sea areas have shown highly variable results given the characteristics of both the Nephrops/fish community and the character of the fishing fleets perusing these fishery's
- Commitment to further developments is evident and trial for novel solutions are on-going.