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Case Study Report, Task 7.3

Synthesis and suggestions for Discard Mitigation Strategies by case study

Year 2 : March 2016-February 2017

Case Study: Celtic Sea

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Main Authors: Dave Reid & Julia Calderwood (MI, Beneficiary 14), Mike Fitzpatrick (MNRG, Beneficiary 27), Marianne Robert & Youen Vermard (IFREMER, Beneficiary 2) & Didier Gascuel (Agrocampus Ouest, Beneficiary 29).

Task Leader: Clara Ulrich

DTU, Beneficiary 1

WP Leader: Kåre Nolde Nielsen

UIT, Beneficiary 26

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1 What has been going on in this case study during the last 12 months?

The Celtic Sea case study in DiscardLess is focusing on demersal fisheries in ICES area VII(excluding VIIa and VIId). These fisheries were not subject to Landing Obligation in 2015. The (EU) 2015/2438 commission delegated regulation defines the fisheries subject to the Landing Obligation in 2016. This regulation has been repealed by the discard plan adopted for 2017 (EU 2375/2016) which defines the species and fisheries subject to the LO in North West Waters (incorporating the Celtic Sea) with the following rules for 2017:

- Nephrops all areas – if your total landings in 2014/2015 were more than 20% nephrops then you must land all of your catches of Nephrops in 2017 as well as bycatch of haddock in Area 6 only.
- Mixed whitefish in the Celtic Sea – if your landings in 2014/2015 were more than 20% cod, haddock, whiting and saithe (gadoids) combined then you must land all of your catches of whiting in 2017
- Hake longline and gillnet fisheries - all hake must be landed
- Hake all areas – if your total landings in 2014/2015 were more than 20% hake then you must land all your catches of hake in 2017
- Common sole - All trammel net, gill net and beam trawl fisheries in ICES area VIId - Eastern Channel must land all catches of common sole.
- Common sole - All trammel net & gill net fisheries in ICES area VII (excluding VIIa & VIId) Celtic Sea & Western Channel must land all catches of common sole.

The landing obligation does not apply to:

- Species covered by a high survivability exemption. There is currently only one such exemption relevant in the Celtic Sea which applies to Nephrops caught using pots, traps or creels in Areas VI and VII. An additional high survivability exemption was added in 2017 for Common Sole in Area VIId under very specific conditions (catches within 6 nautical miles of the coast, vessels <10m and <180kw power, water depth <15m and max tow duration of 1.5 hours).
- Catches falling under de minimis exemptions. These are:
- A maximum of 7% for whiting of the total annual catches of this species by vessels using bottom trawls ≥ 100 mm to catch whiting in the Celtic Sea and the Channel (ICES Areas VIIb-j)
- A maximum of 7% for whiting of the total annual catches of this species by vessels using bottom trawls < 100mm to catch whiting in the Celtic Sea (ICES Area VII (excluding VIIa, d and e))
- A maximum of 7% for Norway lobster (*nephrops*) of the total annual catches of this species by vessels obliged to land Norway lobster (*nephrops*) in ICES Area VII.
- A maximum of 3 % for common sole (*Solea solea*) of the total annual catches of that species by vessels using trammel and gill nets to catch common sole in ICES divisions VIId, VIIe, VIIf and VIIg.
- A maximum of 3 % for common sole (*Solea solea*)of the total annual catches of that species by vessels obliged to land common sole and using TBB gear with mesh size of 80-119 mm with increased selectivity, such as a large mesh extension, in ICES divisions VIId, VIIe, VIIf, VIIg and VIIh.

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Changes for 2017

Fishery	Changes for 2017
Hake trawl fishery Area VI & VII	Reduction in threshold from 30% to 20% and change in reference period from 2013-2014 to 2014-2015. Where the total landing per vessel of all species in 2014 & 2015 consisted of more than 20% hake then that vessel has an obligation to land all catches of Hake.
Nephrops fishery in Area VII	Reduction in threshold from 30% to 20% and change in reference period from 2013-2014 to 2014-2015. Where the total landing per vessel of all species in 2014 & 2015 consisted of more than 20% Nephrops the vessel has an obligation to land all Nephrops.
Gadoid fishery in the Celtic Sea	Reduction in threshold from 25% to 20% and change in reference period from 2013-2014 to 2014-2015. Where the total landing per vessel of all species in 2014 & 2015 consisted of more than 20% gadoids* the vessel has a landing obligation to land all catches of whiting.
All Trammel nets & Gill Nets for Sole area VIIhjk	All catches of sole are subject to the landing obligation
All Gillnets & longlines for Hake area VI & VII	All catches of hake are subject to the landing obligation
All Trammel nets & Gill Nets for Pollack area VIId & VIIe	All catches of Pollack are subject to the landing obligation

*Gadoids – Cod, Haddock, Whiting & Saithe combined

To date there is no reliable information from the fisheries on how the LO is operating or on the impact on fishing or fishermens behaviour

1.1 Important changes in stock development, discard data and ecosystem after 2016

The cod TAC in 2017 has been reduced by 38% and that for megrim by 25%, haddock TAC increased by 7%. Both cod and haddock are key choke species for the Irish fishers, so this represents a very significant challenge. There has also been a reduction in TAC for Nephrops in the Celtic Sea fisheries. No other major changes have been noted in stock development. The same applies to the ecosystem. No reports have been made on any major changes in the discarding by the fleets. One major change has been the influx of Bluefin tuna into the Celtic Sea, as most fleets only have small bycatch quotas for this species, issues of discarding may start to arise.

ICES stock assessment report:

http://www.ices.dk/community/groups/Pages/WGCSE.aspx

Changes to the Landing Obligation requirements in 2017:

http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R2375&from=EN

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Ireland: http://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/landobligationsdiscardsban/

TACs and Quota for 2017:

http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0127&from=EN

1.2 Important changes in terms of fisheries and stakeholders perception

A series of interviews have been carried out with fishermen in the Celtic Sea, using a standard set of questions for semi-structured interviews. The details are reported in WP4.1, and Deliverable 4.1.

A range of discard drivers were identified including:

- Quota restrictions and "choke species" were key drivers of discarding
- Small fish in the catch, generally <MCRS fish remains a key driver.
- Discarding of damaged fish was also identified.

Tactical & Technical approaches being deployed by fishermen included:

- Change of fishing grounds in response to high levels of the choke species or small fish.
- Avoidance of spawning/nursery areas used as a tactic to avoid <MCRS catches.
- Information sharing between fishermen on areas to be avoided due to choke or high levels of <MCRS fish.
- "Moving on" after high catches of choke or <MCRS fish.
- Change of target species.
- Increases in mesh size in the cod end or across the net
- Square mesh panels.
- Changing gear/metier, i.e. switching from one gear to another with a different selectivity.
- Multiple rigs (twin or quad) in *Nephrops* fisheries

Fishermen also identified the possible use of quota management tools to help mitigate the impacts of the LO, particularly changes to the monthly quotas used in Ireland.

1.3 Important changes in management

There have not been any concrete changes in management due to or relevant to the Landing Obligation. Management efforts have focussed on the development of new discard plans via the submission of Joint Recommendations and responding to Commission requests for feedback in early 2016 and early 2017 on how the LO has been implemented to date. The 2016 submissions from the NWWAC and the individual MS's involved in the HLG were very circumspect in the information they contained due to the fact that implementation of the LO was only starting. The 2017 response from the NWWAC (http://www.nwwac.org/publications/nwwac-answer-on-the-ec-annual-report-on-the-implementation-of-the-landing-obligation.2222.html) and their advice to the HLG for a Joint Recommendation for 2018 (http://www.nwwac.org/publications/nwwac-advice-on-the-

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implementation-of-the-landing-obligation.2219.html) did not contain any references to specific management changes but did focus on the following management related points.

LO implementation is hindered by conflicts with a number of other CFP legislative requirements including:

- mixed fishery TAC setting
- the MSY timetable (all species to be managed according to the principles of MSY by 2020, irrespective of stock status or consequences;
- the setting of zero TACs;
- Relative Stability allocations;
- The long process of the revision of the technical conservation regime and its ability to facilitate changes in the selectivity of fishing gear.

Other issues highlighted by the NWWAC include problems caused by regional differences in implementation between NWW and the North Sea and Bay of Biscay, the lack of collection infrastructure for undersize fish, the early Common Sole choke related closure of Areas VIIh,j,k to Belgian beam trawlers and associated effort displacement, lack of harmonised catch documentation programmes in different MS. The NWWAC also pointed out that on a more positive note relations between the AC and the MS were improving. They felt that access to the MS reports to the Commission on LO implementation would be very useful.

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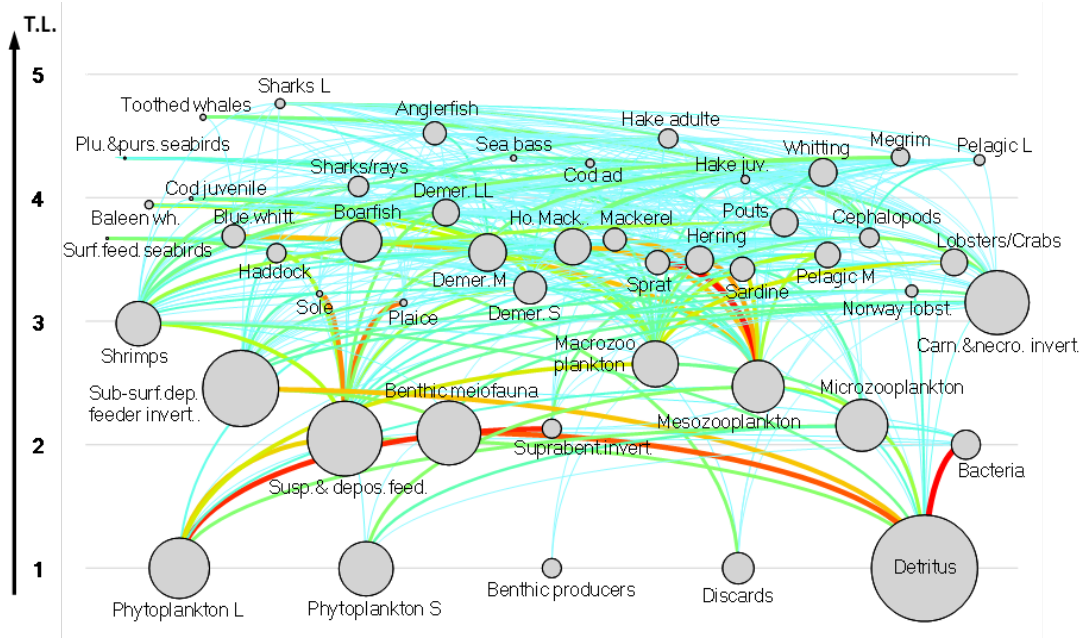
2 The Year behind us (2016-2017): What has DiscardLess produced in this case study during the last 12 months?

2.1 Impact assessments

2.1.1 ecosystem scale

Mappings discards : Discard mapping has been completed for both Irish and French fisheries, some examples of the outputs are presented below. The discarding maps in the online Atlas have also been updated and reviewed.

Ecosystem modelling: The 1980 and 2013 Ecopath models, previously developed in the Celtic Sea (Moullec et al., 2017) were modified in order to allow for simulation of the landing obligation (Hernvann, 2016). In particular, the share between landing and discard was specified for every fleet and the amount of discards was updated according to Discardless estimates.



The model provides an overview of the major trophic flow in the ecosystem, and especially of the flux of discards. Production of discards is mainly issued from catch of rays, whiting, pout and large démersales, but also of benthic invertebrate. These discards are consumed mainly by seabirds (especially surface feeder seabirds), by necrophagic benthic invertebrates and by the lobsters/crabs group. The total flow to discards is estimated equal to 0.38 t/year/km2, while the total consumption is 0.27 t/year/km2 (i.e. 70% of production). Thus, flows related to discards appear very low, compared for instance with the total flows in the ecosystem (9857 t/year/km2) or into detritus (2733 t/year/km2) or with the total consumptions (5060 t/year/km2). This mean that discards may only have a very limited impact on the overall ecosystem trophic functioning.

At the group level, discards are important for seabirds only, and especially for surface feeder seabirds for which they represent 30% of the diet. Detritus flow to the very large group of carnivorous and

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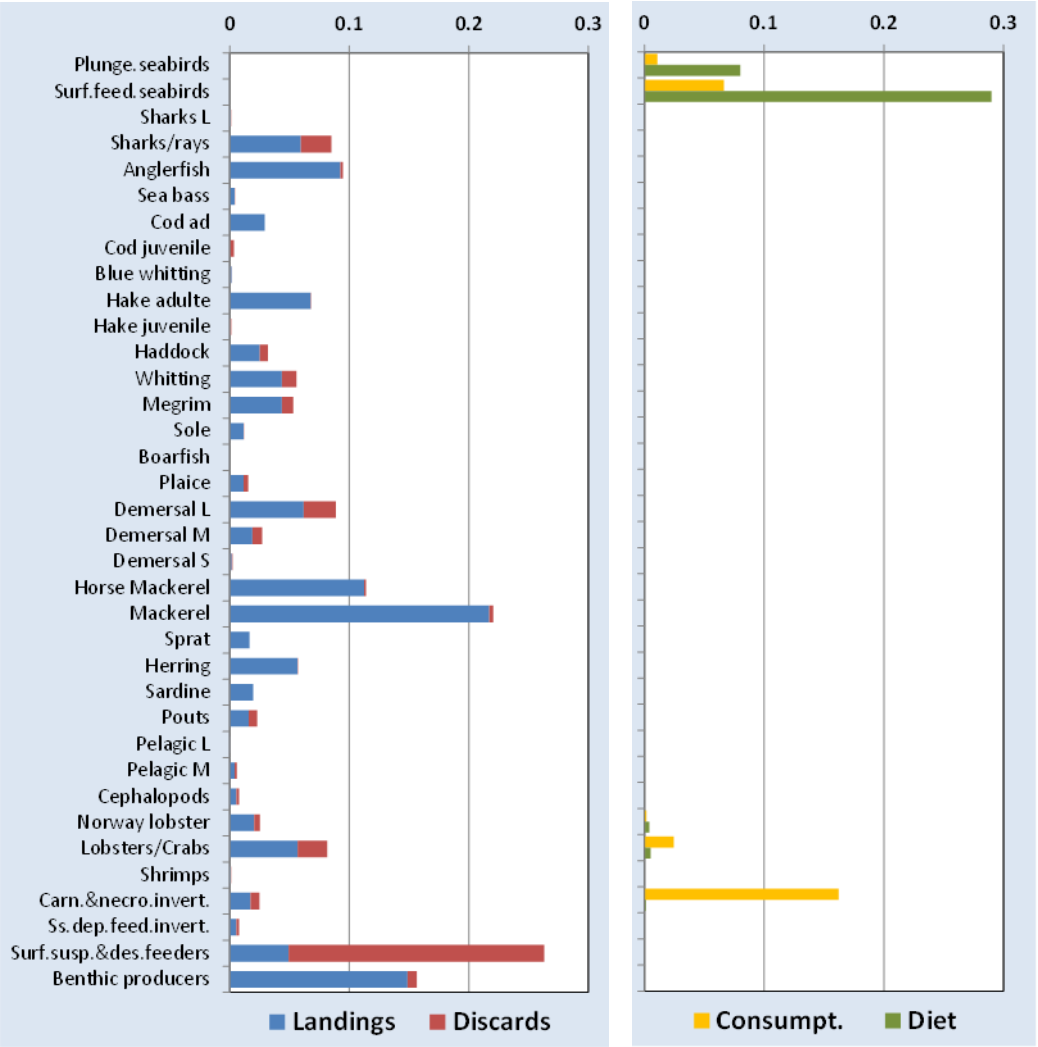
necrophagous benthic invertebrates is also significant (because of the abundance of this group), but in this case discards only constitute 0.1 % of the diet, and a flow one hundred time smaller than the flow from other detritus.



Using Ecosim fitted on the 1980-2013 period (on catch and abundance time series), 5 scenarios were simulated over the 2014-2030 period: 1. the baseline assuming the 2013 fishing pattern remain unchanged, 2. all discards landed (no improvement in selectivity), 3. all discards avoided (perfect selectivity), 4. Discards of TAC species landed (no improvement in selectivity), 5. Discards of TAC species avoided (perfect selectivity). Simulations of each scenario for year 2030 are compared to baseline.

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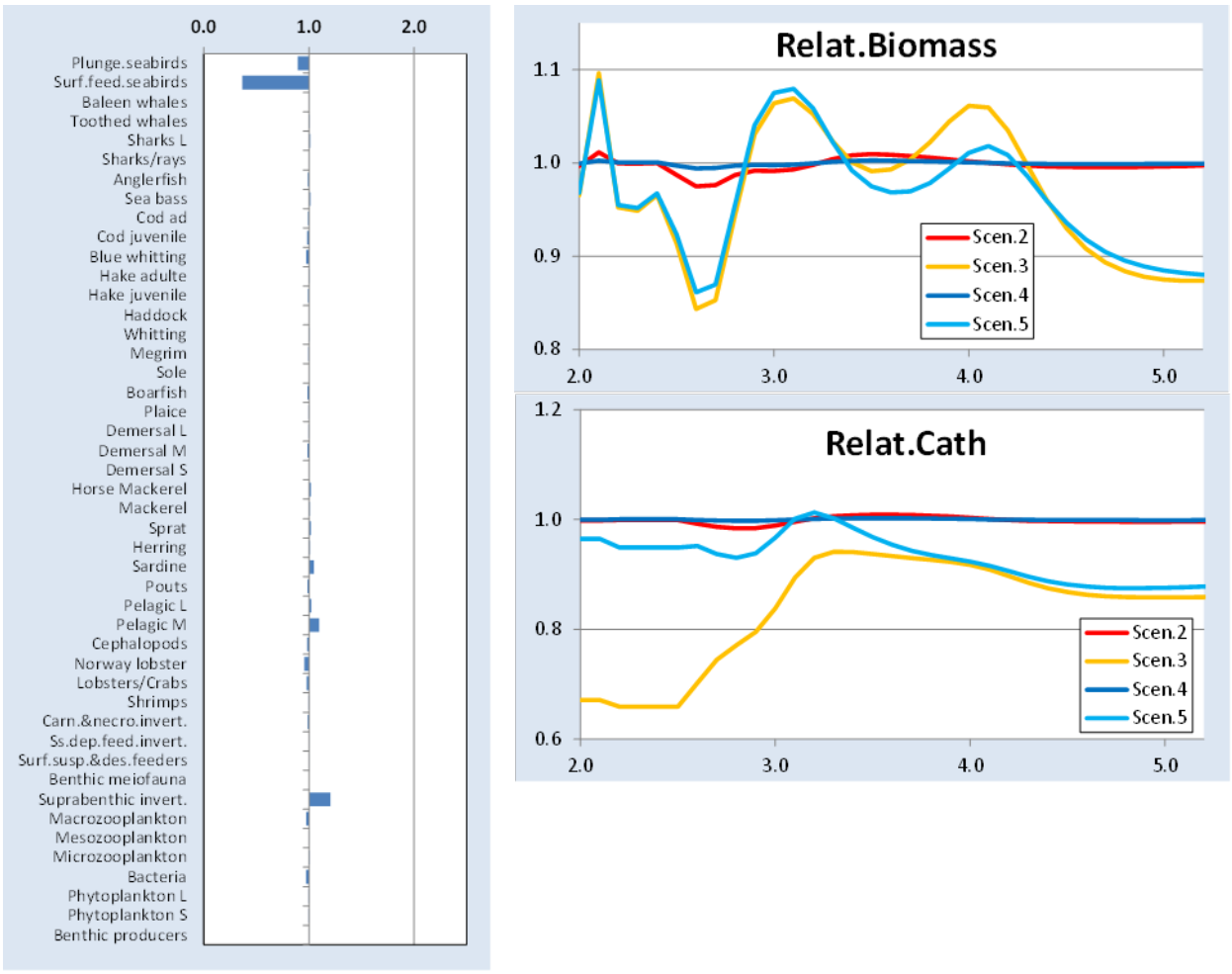

Figure 3 - Relative changes induced by the landing obligation, compared to baseline (values equal to 1 means no change). Left: biomass per Ecopath group for scenario 2; right: trophic spectra of biomass (top) and catches (bottom)

Logically, the landing obligation mainly affects the group whose diet includes discards, that is to say seabirds in the model (biomass reduced by 11% & 63% for the 2 groups, respectively). At the same time, seabirds preys (mainly small pelagics) increase. But this affects appear very limited. More generally if discards are landed then the fishing mortalities remain unchanged and effects at the ecosystem level are low (less than 3% for all trophic levels). In contrast, if the landing obligation leads to improve the selectivity and to avoid the catch of all previous discards, then the fishing impacts are changed. Biomass of discarded species, such as whiting, rays or megrim increases, while biomass of their preys decreases. Related trophic spectra show that changes reach about 10% for some trophic levels.

Sensitivity analysis showed that the main parameter determining the impact of the landing obligation is the diet on discards. Results are still preliminary and simulations will be expended to other scenario.

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2.1.2 Fishery scale

Interviews with fishermen, their representatives and sales agents on LO perceptions were carried out in conjunction with WP4 and WP7 related interview work. To some extent in the case study region the LO has been superseded by Brexit and its potential implications as the principal concern among fishers and fishing communities. Overiding fishers perceptions of the LO are still largely negative although the initial fears of immediate choke related problems have been postponed rather than resolved. Given that the demersal LO is only 16 months old uncertainty and a lack of understanding are still very prevalent. Some fishers are very concerned that a few years of partial or non-implementation could be followed by a big bang scenario which they feel would be extremely difficult to live with due to choke problems when all quota species are included.

2.2 Avoiding unwanted catches

2.2.1 gear technology

BIM/MI reports on gear tech measures were provided to the gear manual under WP3. New studies relevant to the LO carried out by BIM comprised:

- Cosgrove et al (2016) Assessment of a dual codend with net separator panel in an Irish Nephrops fishery
    - Catches of undersize whiting and haddock in the dual codend with net separator panel were reduced by 72% and 49% respectively compared with a standard trawl.
    - Selectivity of different fish species can effectively be altered without reducing Nephrops catches.
    - The dual codend with net separator panel has major potential to address a range of challenges posed by the landing obligation. By removing the top codend, the gear can used as a fish exclusion device when fish quotas are low.
    - Automated species separation greatly reduced catch sorting times and improved fish quality.
    - Aside from a 37% reduction in marketable whiting, no reductions of marketable catch occurred for any other species.
    - Separation of key retained fish species by weight into the top codend consisted of 82% of flatfish, 83% of haddock, 90% of cod and hake, 94% of whiting, and 98% of monkfish. 1 2 3
- Browne et al (2016) Assessment of T90 mesh in a fishery targeting whiting in the Celtic Sea
    - Whiting catches below the minimum conservation reference size of 27 cm were reduced by 60% using the 80 mm T90 mesh. Taking into account current market preferences, whiting catches below 32 cm were reduced by 67% while catches of market sized fish increased by 16%.
    - A larger T90 mesh size will be required to optimise reductions in below minimumconservation reference size haddock.
    - Substantial increases in catches of haddock in the T90 could be problematic when that species is phased in under the Landing Obligation in the Celtic Sea. A bioeconomic assessment of optimal gear design and economic return from the mixed demersal species fishery targeting whiting and haddock in the Celtic Sea would assist in addressing this issue
- Cosgrove et al (2016b) Assessment of square mesh cod-ends in an Irish Nephrops fishery

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- The smallest 45 mm mesh performed the best of the three square mesh cod-ends tested in terms of improving the catch profile of Nephrops.
- Smaller scale reductions in undersize Nephrops and increased catches of undersize whitefish were observed in the 45 mm square mesh cod-end compared with a previous assessment of an increase in diamond cod-end mesh size from 70 to 80 mm. This suggests that an increase in diamond cod-end mesh is a better option for reducing catches of undersize Nephrops in the Irish fishery.
- Substantial reductions of undersize whiting and haddock with marginal losses of marketable fish in the 65 mm square mesh cod suggests that larger square mesh cod-ends have major potential to improve the selectivity of these species in trawl fisheries.

- Cosgrove et al (2016c) Assessment of rigid sorting grids in an Irish quad-rig trawl fishery for Nephrops
  - Modified sorting grids to reduce catches of small Nephrops and a traditional 'Swedish grid' to reduce fish catches were assessed in a quad-rig trawl fishery for Nephrops.
  - The 'Nephrops sorting grids' worked well, achieving substantial reductions in catches of small Nephrops while retaining fish catches.
  - Larger reductions in small Nephrops occurred in the Nephrops sorting grid with a larger cod-end mesh size of 75 mm compared with a 70 mm cod-end mesh size in the other Nephrops sorting grid. Further reductions are likely using an 80 mm cod-end.
  - In the context of the landing obligation, improving Nephrops size selectivity in this manner provides more opportunity to catch larger more valuable Nephrops and maximise profits over the course of a fishing season.
- Tyndall et al (2017) The SELTRA sorting box: A highly selective gear for fish in the Irish Nephrops fishery
  - A preliminary trial of a SELTRA with a modified adapter was successful on board a quad-rig Nephrops vessel. Nephrops catches improved by 19% in the SELTRA compared with a standard 300 mm square mesh panel.
  - Substantial reductions in catches of fish species in the SELTRA minimises catch sorting times leading to further improvements in catch quality and working conditions for the crew.

Browne et al (2016) Assessment of T90 mesh in a fishery targeting whiting in the Celtic Sea http://www.bim.ie/media/bim/content/publications/5536%20BIM%20Assessment%20-%20T90%20mesh%20-%20Whiting%20-%20Celtic%20Sea%20-%20ONLINE.pdf

Cosgrove et al (2016a) Assessment of a dual codend with net separator panel in an Irish Nephrops fishery. http://www.bim.ie/media/bim/content/publications/5987-BIM-Stella-Nova-Trial-Brochure.pdf

Cosgrove et al (2016b) Assessment of square mesh cod-ends in an Irish Nephrops fishery http://www.bim.ie/media/bim/content/publications/BIM%20Report%20Assessment%20of%20square%20mesh%20cod%20ends%20in%20an%20Irish%20Nephrops%20fishery%20May2016.pdf

Cosgrove et al (2016c) Assessment of rigid sorting grids in an Irish quad-rig trawl fishery for Nephrops
http://www.bim.ie/media/bim/content/publications/BIM%20Report%20Assessment%20of

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%20rigid%20sorting%20grids%20in%20an%20Irish%20quad-rig%20trawl%20fishery%20for%20Nephrops.pdf

Tyndall et al (2017) The SELTRA sorting box: A highly selective gear for fish in the Irish Nephrops fishery http://www.bim.ie/media/bim/content/publications/fisheries/6140-BIM-Fisheries-Conservation-report-4-1.pdf

The French CelSelect project, in collaboration between scientists and fisherman from Producers organization « Les Pêcheurs de Bretagne » aims to improve selectivity patterns of twin trawls operating in this area in response to the landing obligation. Three differences selective devices, T90, square mesh cylinder and grid were tested on seven twin trawlers during several months leading to more than 100 fishing operations sampled. Over the three devices tested, the 100mm T90 extension and codend showed a significant decrease in catches of non-target species such as boarfish and pelagic fish. For the main target species such as haddock and whiting, results show significant escapement of under size fish but also fish above minimum landings size. This device allows an almost elimination of discards of whitefish. In the new CFP context and knowing the current onboard selectivity ogive, the commercial loses seem to be acceptable for fisherman, at least for some boats included in the program. This device is now implemented on various vessels during commercial trips on a voluntary base which highlights the success of this collaborative project. The dissemination of the Celselect result to Discardless was performed by writing three selectivity factsheets presenting the results of the trials.

2.2.2 fishing strategies

Task 1.

A series of interviews have been carried out and analysed with fishers in Ireland and France. These were reported in Deliverable 4.1, in draft (October 2016), completed March 2017. A brief review of the results for the Celtic Sea are given in section 1.2. above

Task 2

Irish challenge trials completed and analysed. The report has been published as Calderwood et al (2016) http://www.bim.ie/media/bim/content/publications/Lo%20report%202016_final.pdf The key findings were:

- Cod and haddock were the principal choke species for both the Nephrops and mixed demersal whitefish vessels.
- The Nephrops vessel was able to reduce cod catches and mitigate the economic impact of the landing obligation, and a range of technical measures are available to further assist Nephrops vessels in this regard.
- Similar to the results of the 2014 study, the mixed demersal whitefish vessel failed to minimise the economic impact of the landing obligation through tactical measures.
- The technical measures tried during the trials did not reduce catches of haddock sufficiently to avoid choking in the whiting fishery.
- No increase in the number of days fished occurred under quota uplift or de minimis scenarios.
- Reducing the quota imbalance between whitefish species such as haddock and whiting will likely be required if the mixed demersal whitefish fisheries are to remain commercially viable.

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- Persistent choking of the demersal whitefish fishery may lead to an influx of vessels to the Nephrops fishery when the LO is fully implemented.
- An alternative fishery based quota management system which optimises quota allocations on the basis of the main species upon which vessels are reliant, would help lessen choke issues.

Task 3.

Ireland

Mapping using Irish survey and observer data has continues to progress over the last year. Analysis of Irish groundfish survey data has shown that it provides a good proxy for predicting areas where TAC species are most or least likely to be encountered by fishing vessels in the Celtic Sea. Observer data has further been used to map where unwanted catches consistently occur in addition to where catches of target species are consistently high over time. Subsequently maps highlighting where these areas overlap have been produced to equip the fishing industry with information that may help inform where to best target effort. Additionally fishing behaviour amongst the Irish fleet has been analysed to explore what motivates fishing strategies and how best tactical decision can be made to avoid unwanted catches.

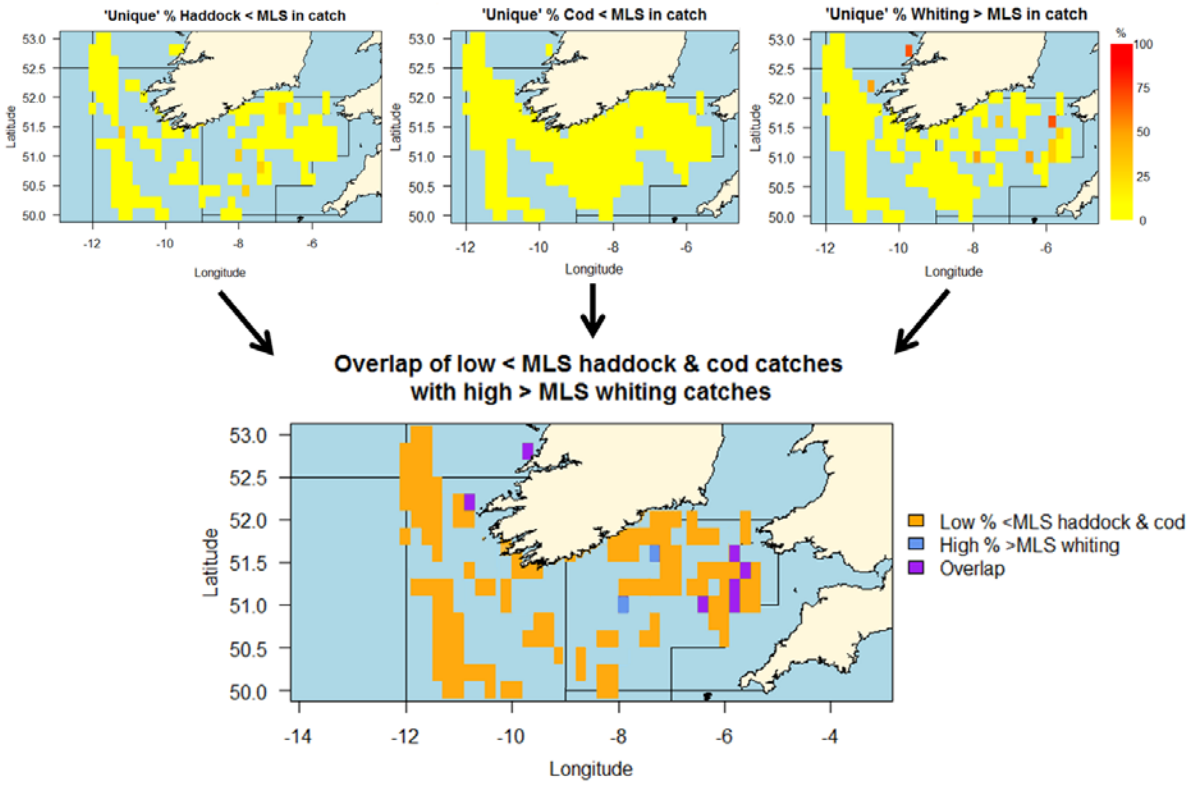

Fig: The process of combining maps which highlight where choke species are least likely to be caught and where non-restricted quota species are most likely to be caught to identify areas where optimum catch composition is most likely.

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Collaboration between colleagues at the Marine Institute in Ireland and DTU Aqua in Copenhagen has allowed the mapping techniques to identify consistent fishing patterns to be applied to fully documented Danish fisheries data. Economic data has also been used to display where the industry makes most money from fishing operations to further provide information and tools for fishermen to make informed decisions about where it may be best to fish.

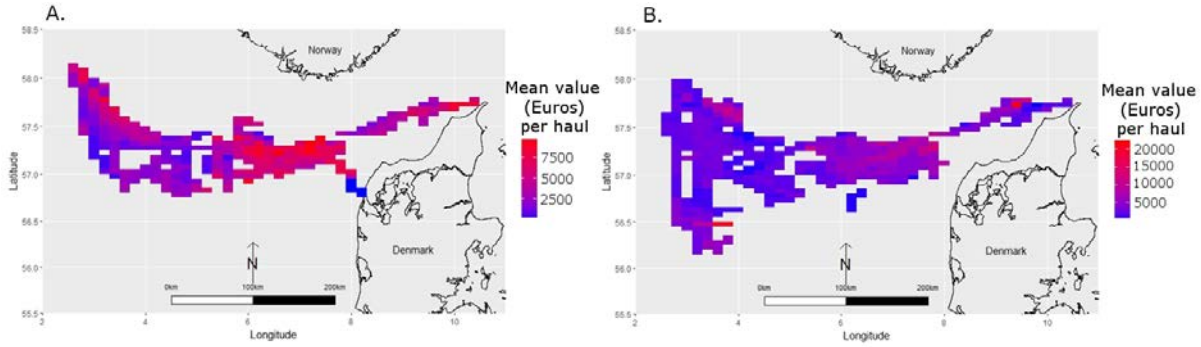

Fig: Mean value per haul from a Danish fishing vessel operating a fully documented fishery in A. 2015 and B. 2016

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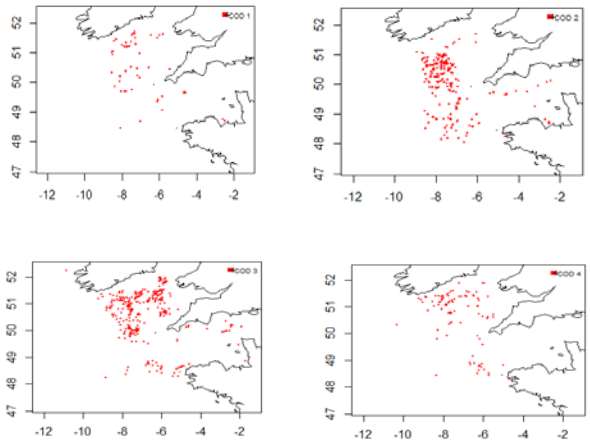
France

Maps of observed undersized discards of each species were produce based on French observers at sea data. Quarterly based maps have allowed identifying that for the gadoids undersized discards enter the fisheries in quarter 2 and 3. Historical analysis identified that area distribution of undersized fish are quite stable over time except for years with high recruitment where distribution area increased importantly.

Examples give below illustrate maps of undersized cod (*Gadus Morhua*) based on French observers at sea data on a quarterly and annual basis.



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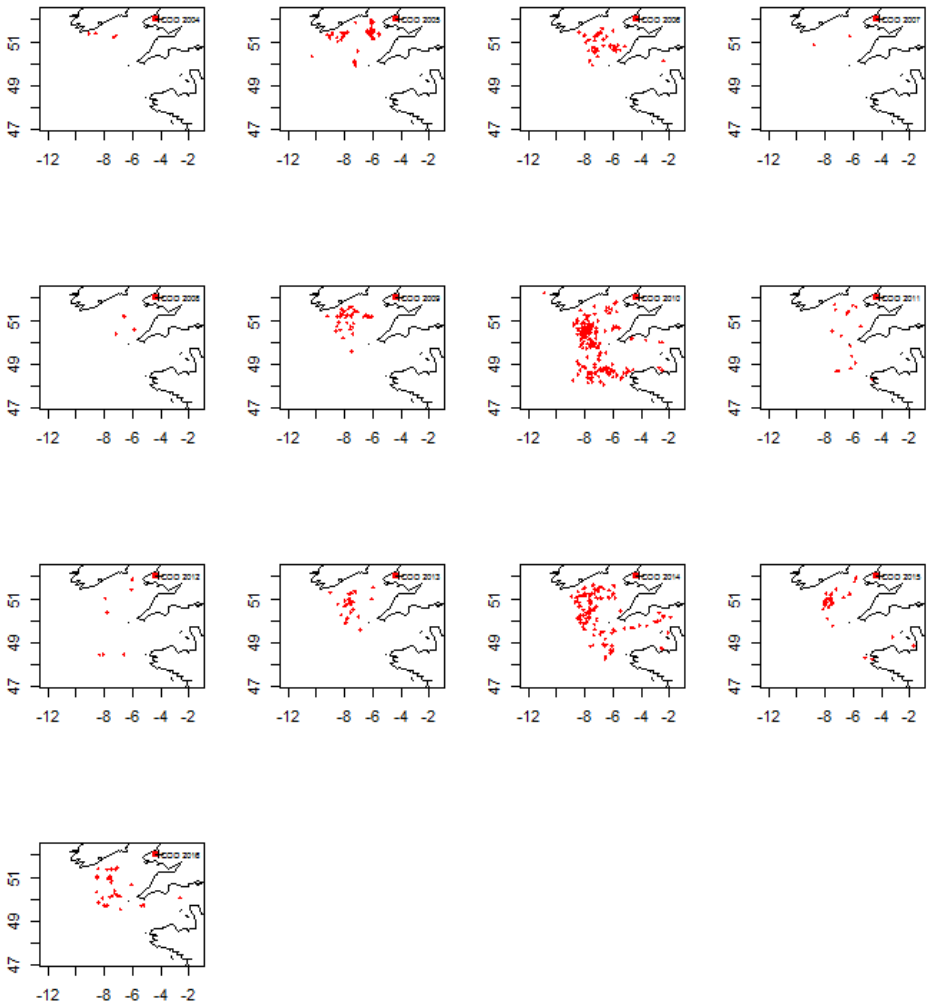

Discardless focuses is a mixed demersal fisheries operating in the Celtic sea which consist of several fleets mainly comprising of bottom trawlers, but also including beam trawlers, gillnetters and longlines, using different métiers and targeting different species assemblages throughout the year. The main species caught are angler fish (*Lophius piscatorius & budegassa*), hake (*Merluccius merluccius*), haddock (*Melanogrammus aeglefinus*), whiting (*Merlangius merlangus*) and Norway lobster (*Nephrops norvegicus*). Two areas are important in terms of landings, south of Ireland (especially statistical rectangle 31E3) and south Cornwall in area VIIe (especially statistical rectangle 28E5). The mixed nature of these fisheries leads to high discard ratios, especially in the mixed demersal trawl fishery where many species occupy similar habitats and display similar behaviours making it difficult to selectively fish for individual species. The most discarded quota species in the Celtic Sea include whiting (*Merlangius merlangus*), Atlantic mackerel (*Scomber scombrus*), hake (*Merluccius merluccius*), plaice (*Pleuronectes platessa*) and Norway lobster (*Nephrops norvegicus*).

As such, it is important to account for this multi-species dimension when analysis discards avoidance strategies. Homogeneous spatial species assemblages of landings had been identified in the Celtic sea

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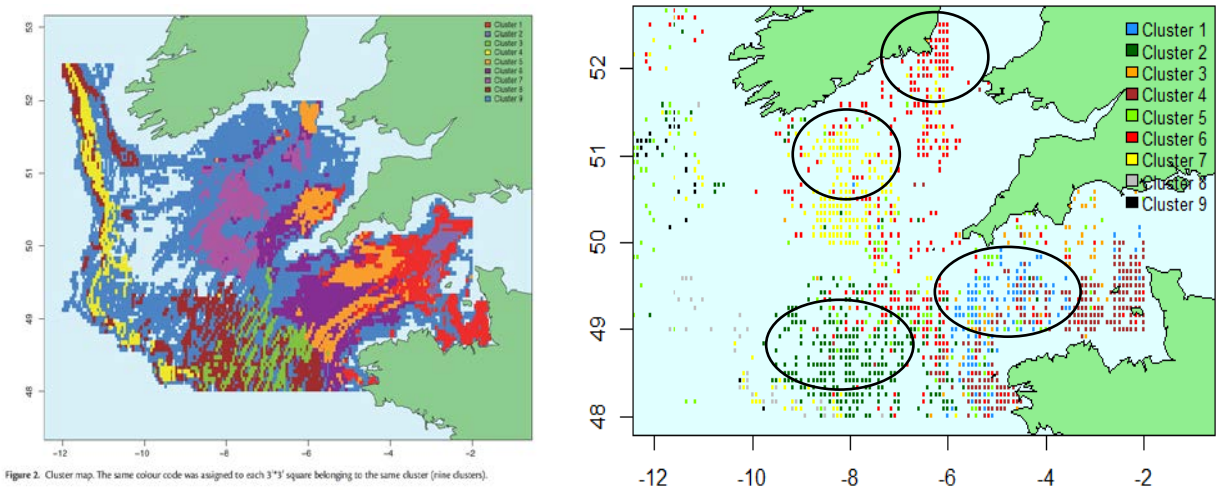
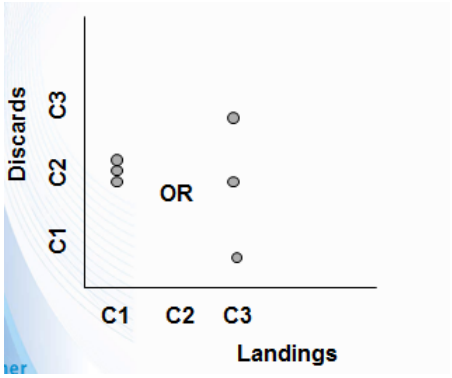
using French integrating Vessel Monitoring Systems (VMS) and logbook data (Mateo et al 2016). The next question is therefore: is there an homogeneous spatial species assemblages in discards and is there a link between landings and discards profile at some spatial scales? If so we can maybe use this link to inform on discards composition in area not covered by observers at sea program. In this view we apply the same methodology as described in Mateo et al 2016 (PCA and cluster analysis) on observers at sea data to investigate spatial structure in discards species assemblages. Then, the next step consists in identifying if cells attribute to one cluster in the landings analysis belongs to the same cluster in analysis based on discard data (see figures below).



Cluster maps of homogeneous landings (left) and discards (right).



When analysing maps of the landings and discard available on the online atlas produce by Discardless project, one can spot the strong spatial segregation in effort by countries. It is therefore important to integrate data of the different countries operating in the Celtic sea to draw a global and realistic picture. Through the scope of the project data exchange between France and Ireland are under negotiation and should be available soon. The objective is to run the analysis described above on the joined data set.

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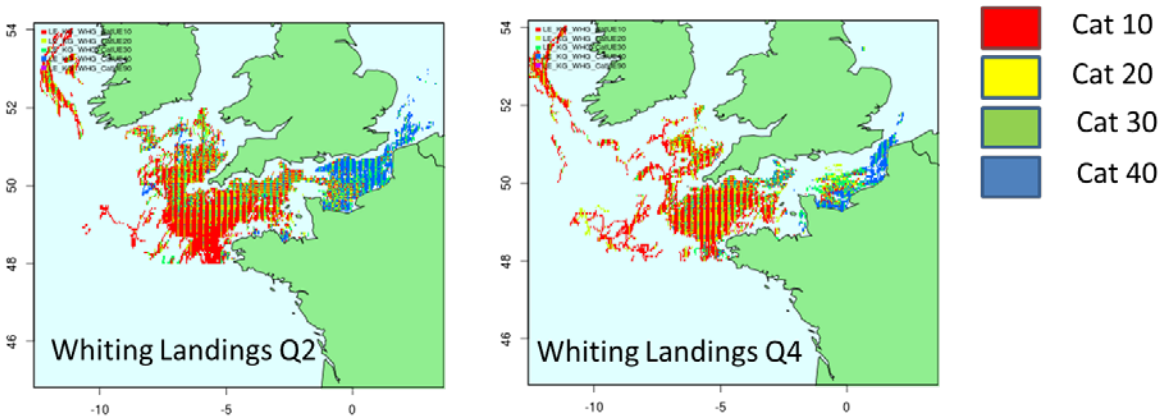
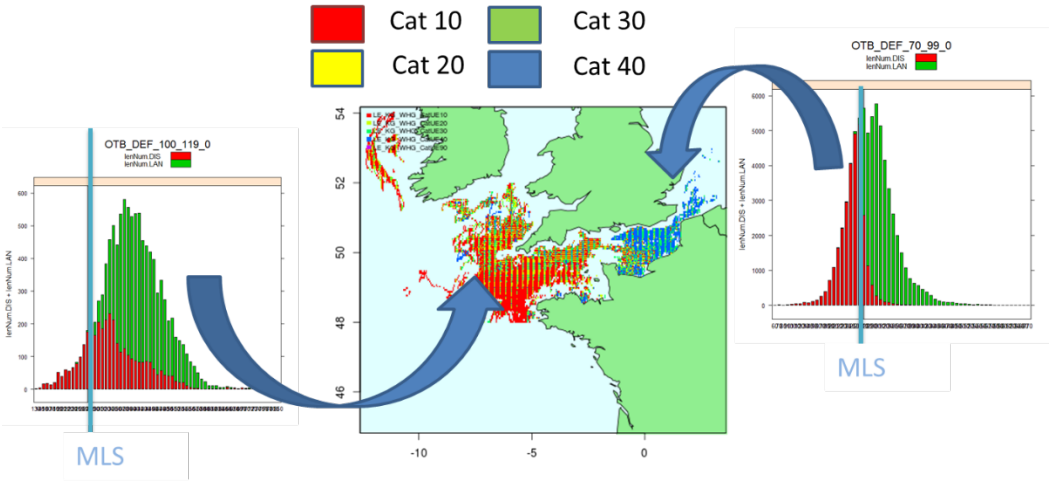
Mapping Landings length structure to infer potential problematic areas in French fisheries in the Celtic Sea

Landings are divide by Commercial Categories using VMS/Logbooks/Sale slips and mapped at fine scale (see figure below).



Different gears with different strategies and targetted species show similar discard rates (see figure below.



This analysis shows that we need to take account of the impact of TACs & Quotas, fishing strategies, PO's policies and other targetted species to infer discards

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2.3 Policy outreach

Interviews with fishers, fishers reps and fish sales agents have been conducted in Ireland as part of combined WP2, WP4 and WP7 work. From a WP7 perspective general attitudes across all of these stakeholders are that discards is an issue that must be tackled but that the LO as it is currently structured creates some significant problems. A number of respondents mentioned an excessive economic impact for whitefish vessels which will drive a large part of the industry out of business due to choke problems. As a way to mitigate against this a number of fishers favoured a move towards some form of effort management regime as they felt that the overall share of whitefish quota received by the Irish fleet will cause problems regardless of tweaks to quota management. Increased use of seasonal and spawning justified spatial closures was also favoured by some fishers. Pelagic fishers felt that the LO was not creating undue problems although a number of unforeseen implications were emerging such as abuse of the LO to land pelagic species which certain vessels did not have an entitlement to catch and conflict between pelagic and demersal sectors as pelagic vessels now had to land bycatch species such as Whiting which was now being deducted from demersal allocations.

Many Irish fishermen still view the application of Relative Stability as a particular problem in the context of the LO. In particular the possibility that those fleets which are least constrained by restrictive quotas would benefit most from a quota uplift associated with the Landing Obligation is regarded as a barrier to successful implementation of the LO.

Approaches for the project have been presented to Stakeholders – e.g. Irish Fisheries Science Research Partnership. Similar presentations in France.

2.4 Summary:

Main Discard Mitigation Strategies used by fishers investigated

- Tactical changes – time and place of fishing
- Technical changes – use of grids and mesh change
- Manangement changes – use of temporary closed areas and quota management tools

Stakeholders Involvement

- Challenge trial carried out with stakeholders.
- Full series of interviews on technical, tactical and management changes for discard mitigation

Main outcomes

- Challenge completed, analysed and published
- Selectivity analyses underway
- Interviews with stakeholders completed, and collated. Published as Deliverable D4.1.
- Ongoing analyses using survey, observer and landings data

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3 The Year ahead of us (2017-2018): What do we expect for the next year?

WP1

Development of Ecopath with Ecosim models for the Celtic Sea by University of Rennes and University College Cork (UCC).

In collaboration with UCC, MI will explore the use of an Ecopath with EcoSIM (EwE) approach to evaluate the impact of fisheries and discarding changes on the fish communities and on top predator components of the ecosystem and vice versa. Size structured multispecies models being developed in a companion project will be used to evaluate biodiversity and food web indicators, building on earlier work. EwE can perform a similar role when used in simulation mode. We will simulate changes to biomass and catch trajectories and compare these to the associated biological reference points for commercially important finfish and the current biomass levels of marine mammals and seabirds. We will also use the models to evaluate whether discard changes under the LO and based on MSY reference values, would likely have a negative impact on top predators. This will also be conducted in collaboration with Agrocampus Rennes, where a PhD has been started.

WP4

Task 1. Continue with interviews with stakeholders on attitude to LO, mitigation approaches, and tactical and gear proposals, build on D4.1

Task 3. Continue with analyses of spatial probability mapping for discards from surveys, observers etc. Compile Deliverable for this work.

Sharing of observer data between the Marine Institute in Ireland and IFREMER in France will allow for more complete maps to be produced for the Celtic sea with greater areal coverage being provided by the joint dataset. It is then intended to present these maps to fishermen and those working within the fishing industry to determine how useful this resource may be, as well as gauge how accurate the industry deem to information contained within the maps to be. Following feedback from the industry the maps can be developed further to suit the needs of the industry (by altering spatial and temporal scales, species composition, geographical areas etc…).

We have noted in this task that we are able to generate a range of possible maps and tools that could help fishers to mitigate some of the impacts of the LO. However, this is still a long way from having them actually use them for this purpose. We have proposed that we identify a small number of skippers that could be willing to work with us to explore the utility of the maps in their daily work. We aim to ask them to explore how useful or otherwise they may be operationally, and also, if they wish, to propose additional maps etc, that might work better for them. This direct, early adopter, approach is likely to lead to better uptake than a broadcast offering of maps in group presentations, and will be tested out during 2017.

Task 4.4 "the managers story" and Task 7.4 quota management and incentives in the Celtic Sea.

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To date there has been little evidence of any management proposals for helping mitigate the LO, beyond those stipulated in the legislation, e.g. high survival and *de minimis* provisions. Following discussions at the GA in Rome, we propose to take a more proactive approach to the "Managers story". Many of the fishermen interviewed under Task 4.1 indicated that changes in quota management and in spatial or temporal closures should be considered, as well as the existing provisions. We propose developing a manual (analogous to the gear manual in WP3) that would provide a check list of possible management changes that could help make the LO easier to implement and to live with for fishermen. The check list would be based on the suggestions ftom task 1, and from a literature review. One useful external source would be the EU Discard Reduction Manual produced by the Environmental Defence Fund. https://www.edf.org/sites/default/files/content/the-eu-discard-reduction-manual.pdf.

We would then go to stakeholders with the check list, and seek their views on the pros and cons of each suggestion, possible edditions to the list or changes that could be made. If at all possible, the stakeholders should include managers and policy makers.

Another element of this task which we hope to do (but which will be dependent on sufficient co-operation from POs and other quota managers) would be to do a comparison of how different quota management regimes deal with the LO in mixed demersal fleets in the Celtic Sea (Ireland, France and the UK fleets).