

Case Study Report, Task 7.3

Synthesis and suggestions for Discard Mitigation Strategies by case study

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Case Study: Eastern Channel

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

Since the beginning of 2016, the (EU) 2015/2438 commission delegated regulation defines the fisheries subject to the Landing Obligation. These fisheries are fisheries targeting Sole and gadoids. All fisheries catching Sole are subject to the Landing Obligation with different rules depending on the gear used: All gillnets and beam trawls have a *de minimis* exemption (concerning maximum 3% of the annual landings of each fleet) while the demersal trawls using mesh size <100mm do not (2016, 2017 and 2018).

The Landing Obligation also apply to whiting in demersal fisheries using demersal trawls and seines that landed more than 25% of cod, haddock, whiting and saithe combined in 2013-2014. These fleets have a *de minimis* exemption of 7% of the annual landings in 2016 and 2017 and 6% in 2018

The Southern North Sea is not part of the Case Study but some of the fleets described in the Case Study have part of their activities in this area. In the North Sea, Saithe, Haddock, Plaice and Prawn are under LO for demersal seines and trawl using a mesh size >100 mm. For demersal trawls and seines using mesh sizes <100mm, Sole is under LO.

1.1 Important changes in stock development, discard data and ecosystem

Within the case study area the main source of information and advice on principle fish stocks is the International Council for the Exploration of the Sea (ICES). ICES also provides ecosystem overviews covering the North Sea and Celtic Seas areas.

<http://www.ices.dk/community/advisory-process/Pages/Latest-advice.aspx>

Despite the implementation of the LO on several species, no major changes were observed in stocks, discard data or ecosystem. This can be explained by the *de minimis* exemptions and little enforcement of the relementation.

In 2016, ICES has provided catch advice together with the corresponding landing advice, using the observed and estimated discard rate estimated in 2015.

After an increase in the refusal rate to have an observer onboard increased by more than 130% in 2015 in France compared to 2014 (282 compared to 140), the refusal rate decreased again in 2016. Among those the skippers who stated they never wanted to see an observer again, the observation programme itself is still the main reason for not having an observer, the LO does not seem to have an impact for now.

The most recent assessments of exploited stocks within the case study area were conducted by ICES in 2016. The left hand part of the diagram below illustrates the state of the main commercial stocks in the Eastern Channel, comparing the 2016 outcome with the year before (gree is improving, red is declining). SBB has been increasing for cod and whiting, but the majority of stocks are fished over Fmsy. The only stock for which fishing opportunities have increased is plaice. All other stocks have

seen their fishing opportunities reduced over the last years. This potentially creates a situation where fisheries are limited in term of fishing opportunities and not in favour of the implementation of another reglementation such as the Landing Obligation.

Eastern Channel

Stock	State of the stocks				Fishing opportunities (ADVICE)					
	2015		2016		2015			2016		
	F	SSB	F	SSB	Landings	%	Basis	Landings	%	Basis
Cod IIIa-IV-VIId					40419	15%	MSY Approach	39651	-2%	MSY Approach
Whiting IV-VIId	?	?			13957	-15%	Management Plan	12679	-34%	MSY Approach
Red Mullet	?	?	?	?	No TAC		No TAC	No TAC		No TAC
Sole VIId					2376	-40%	MSY Approach	2487	-36%	MSY Approach
Plaice VIId					12512	257%	MSY Approach	8764	105%	MSY Approach

Estimates of overall discards occurring in the key stocks within the case study area are available from the ICES assessments (see link above). For cod, the quantities of discarded fish have been falling. Sole is considered to have a low discard rate. For some species, however, discarding remains relatively high (for example whiting and plaice). These overall observations frequently mask particular issues connected with certain types of towed fishing gear and detail at a more disaggregated level is available in the report of the STECF EWG on Fisheries Dependent Information.

<https://datacollection.jrc.ec.europa.eu/dd/effort>

This information is also available in a more accessible form through the DISCARDLESS atlas, <http://www.discardless.eu/atlas>

1.2 Important changes in terms of fisheries and stakeholders perception

- Despite the implementation of the LO to the Eastern Channel demersal fisheries in 2016, no changes in the fisheries were observed until March 2017. This can be explained by the *de minimis* exemption for most of the fisheries under LO but also by the little enforcement of the reglementation the last year. On top of that nothing is in place yet to deal with undersize fish that would be landed. The few experience of fishermen landing under size fishes were reported as a failure as no one was able to decide who was in charge of treating the discards.
- For fisheries where the fishes are still alive after the fishing operation and suspected to have high survival rate, fishermen express incomprehension and have lots of reluctance to comply with the Landing Obligation. They put forward their good fishing practices and the fact that they release fishes alive.
- Face to face interviews were conducted in Boulogne in November 2016 with fishers, and completed with an opinion survey carried out exclusively with fishers. The survey, to be continued, covers the entire Eastern Channel and others maritime regions of the country. Both tools use the same methodology and have the same objective: evaluate fishers' knowledge and

behaviour one year after implementation of LO. Interviews and questionnaire focused on the same issues, such as knowledge about LO (implementation, opinion), recording of discards (or lack of), impact of LO on work on board, boat's economics, causes of discards, use of discards, solutions to avoid discards, adaptation of gears and compliance with the regulation. Some of the preliminary results are summarized under.

- One year after implementation, the majority of the 17 fishers said they never heard about LO, and they don't know that this regulation is already in force. All of them considered LO as an "unfair rule" because it does not take into account the interests of the fisheries sector but only the interests of other important lobbies such as environmentalists and aquaculture. This lack of knowledge is incomprehensible in Boulogne, a harbour where the CRPMEM conducted its own project related to LO (EODE¹). It must be added here that CRPMEM published one newsletter exclusively on LO. This lack of knowledge can probably be explained by the fact that the majority of interviewed fishers are belonging to the small-scale fleet using nets. Bottom trawlers seemed to have a better knowledge about LO.
- Fishers have not declared/registered discards during the first year of implementation. This is due to different factors: first, the lack of knowledge about LO (explained above), second, the lack of enforcement, and last, the idea that discards will be included in the quotas. According to one of the POs, only one vessel was controlled last year, and it is probably the only one to have declared discards (interview). Fishers said that they don't declare discards because "they are afraid they might be included in the quota". It seems also that there is a problem with entering discards species by species in the logbook. Few of the interviewed fishers heard about current exemptions in the area, though they are making use of them and that POs explained them several times the existing rules. For the majority of them, sole has a high survival rate and is released just after the fishing operation. Another issue that is not understood is the choke species.
- All of them considered that LO will impact the work on board, but they are divided when they mention the economic impacts. Concerning the causes of discards, lack of quotas, composition of catches and lack of market are considered to be the most important. For some of them, discards of one particular species can seasonally increase. So bottom trawlers practising different *métiers* shift to another gear and species to avoid discards.
- Responses concerning solutions to avoid discards were the following: improve gear selectivity, decrease the legal number of fishers and even increase quotas. The majority of them accepted to try more selective gears (13 over 17). Real time closures were also mentioned, and this was already mentioned as happening: "*I move to another area when fish caught are undersized*", especially when it concerns sole "*because is better to let them grow*". If whiting is too small in one place, we inform the others to "*avoid the area*". Spatial and temporary closures are seen as a possible solution. (see report of WP4.1)
- The majority of interviewed fishers agreed to have observers on board, with financial compensation or without. This is a new attitude compared to the previous years, when they were reluctant to receive observers. One fisher may explain why: "*We should be clear about LO. I tell my young son to learn how to declare and register discards*".

¹ <http://www.francefilierapeche.fr/projet/eode/>

Reduction of quotas for cod, sole and others species probably pushed fishers to adapt a new attitude towards observers on board, and also selectivity trials.

- About using unwanted catch, the majority of them considered that they can go for human consumption. But they are against their use in aquaculture or animal feed.

Comparing fishers' opinions about LO and its implementation, as expressed during interviews made in 2015, no change is observed concerning the use of unwanted catch. But they now appear rather willing to experiment more selective gears and also to have observers on board. As soon as the national survey is completed, final results will bring more information for Estern Channel area and also from other parts of the country.

- One of the main concern of some fishermen is the delayed implementation of the LO: all the *de minimis* and other measures made to ease the process of the implementation will all stop in 2019, when the LO will be fully enforced, and nobody will be prepared to this relementation.

1.3 Important changes in management

Discussions on the discard ban and exemption (Administration's/fishers' representatives)

- At national level, POs, Regional and National Fisheries Committees, national Administration and the IFREMER research institute have created a national group (MOOD) where they discuss and cooperate to adopt a common position to be brought to the European negotiations on Landing Obligation. Since the exemptions were obtained, MOOD has reduced its activity. During 2016, only two meetings were apparently organised. The first one evaluated exemptions allocated to the pelagic fleet, and the second discussed the issue of choke species after the European workshop organised in Edinburg. At this meeting, the French fishing industry discussed different scenarios to avoid or reduce choke species.
- The French administration elaborated onlines documents for fishermen and fishermen organisation to summarize the implementation of the Landing Obligations in the different areas exploited by French fishermen²

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

2.1 Impact assessment

2.1.1 ecosystem scale

Current status of ecosystem knowledge and data and identification of knowledge gaps

Catch and discard data collected and presented in the CS Factsheet (Appendix to Deliverable D1.1) have been published in the Discardless Atlas. <http://www.discardless.eu/atlas>

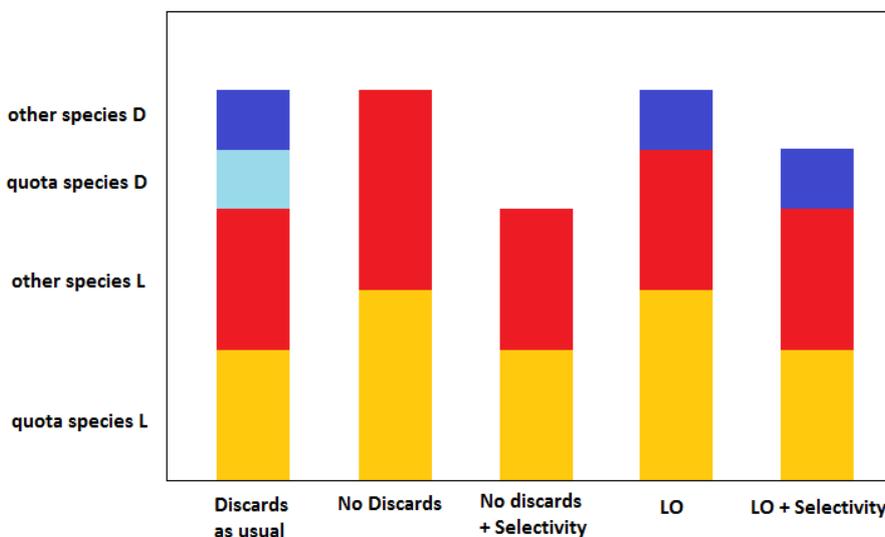
² <http://www.ecologique-solidaire.gouv.fr/sites/default/files/FICHES%20PEDAGOGIQUES%20OD%20PELAGIQUE%20-%202016-2017.pdf>

Discard mitigation strategies scenarios and parameterisation of operational models

Collaborative work between project partners has been going on throughout the second reporting period to define a first series of common scenarios to be run with all models explicitly including discards in the foodweb modelling, the Atlantis model in the case of this Case study. In those scenarios, the fishing pressure is represented as a constant fishing mortality. All biological processes must be constant (reproduction, natural mortality, trophic interaction, migration etc), i.e. should not vary from one year to the other. All the fish discarded are assumed to die.

Scenarios	Fsim	Landings	Discards
1 Discard as Usual	Fcur	Fcur- <i>lan</i>	Fcur- <i>dis</i>
2 No discards	Fcur	Fcur- <i>lan</i> + Fcur- <i>dis</i>	0
3 No Discards and Selectivity	Fcur- <i>lan</i>	Fcur- <i>lan</i>	0
4 Landing Obligation	For quota species Fcur For others Fcur	Fcur- <i>lan</i> + Fcur- <i>dis</i> Fcur- <i>lan</i>	0 Fcur- <i>dis</i>
5 Landing Obligation and Sel	For quota species Fcur- <i>lan</i> For others Fcur	Fcur- <i>lan</i> Fcur- <i>lan</i>	0 Fcur- <i>dis</i>

Fcur: Fcurrent, Fcur-*lan*: proportion of the total F due to landings, Fcur-*dis*: proportion of the total F due to discards



Schematic representation of the 5 scenarios defined to run with the foodweb models.

These scenarios were run with the Eastern English Channel Atlantis model and results are compared with those of the other foodweb models accross case studies. The results suggest low impacts of the discard ban on discards consumers (seabirds, benthic scavengers) and virtually no impacts on the rest of the foodweb.

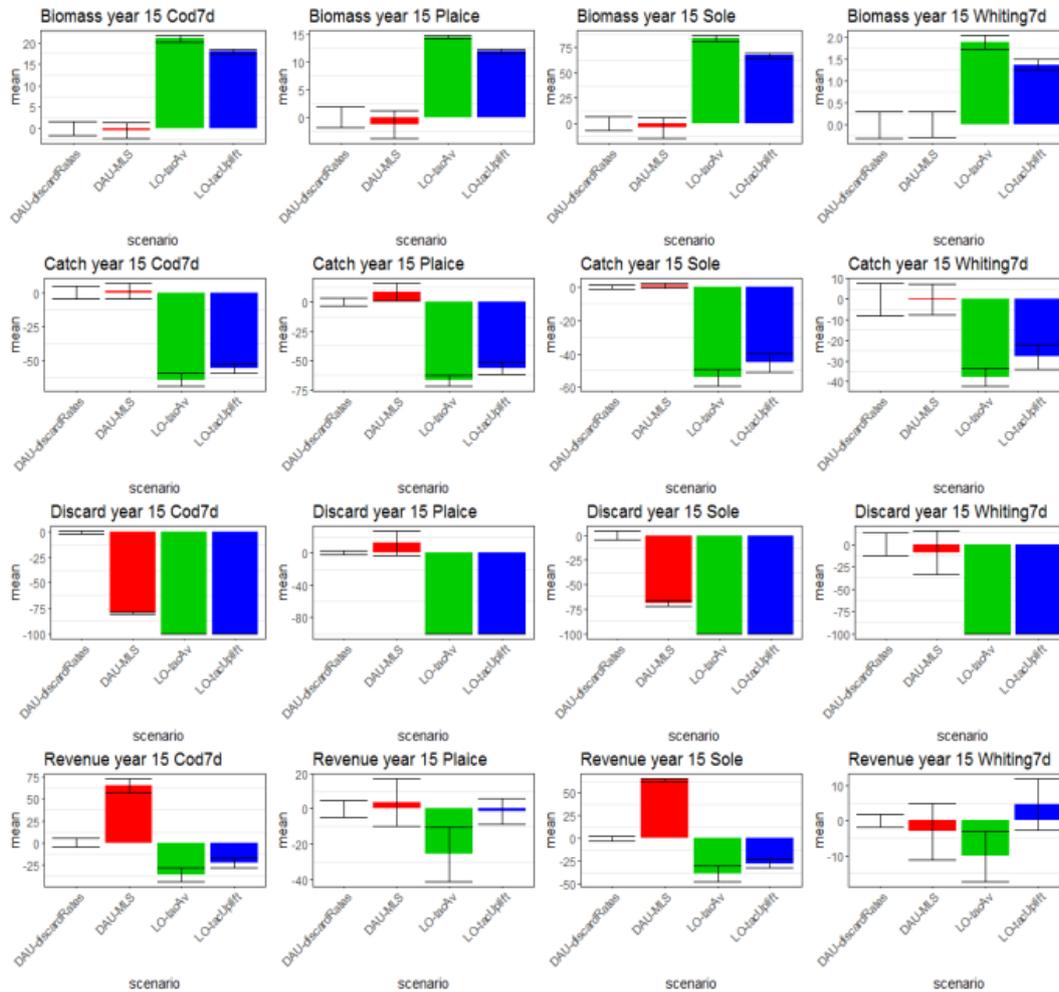
Lehuta et al have been further developing their ISIS-Fish model. Improvements were made in the selectivity assumptions, and the model was recalibrated using a genetic algorithm: accessibility values by age (and seasons for cephalopods and red mullet) are calibrated so that the model reproduces catches at age per year over the period 2008-2011 (and per month for cephalopods and red mullet) as closely as possible. A validation exercise is ongoing where simulated outputs over the period 2008-2014 are compared with available observations not used in calibration (abundances at age, catches per month, gear, zone). The goal is to inform model strengths and caveats in order to help critical discussion of simulation results.

The simulation design (table below) aimed at comparing DAU (Discard As Usual) scenarios for the two assumed discarding behavior and LO obligation with and without TAC uplifts. Uncertainties are accounted for regarding fleet behavior (level of opportunistic behavior).

			<i>Sole</i>	<i>Plaice</i>	<i>Cod</i>	<i>Whiting</i>
1	Discard as usual	MLS strict	24cm	27cm	35cm	27cm
		TAC	av. 2008-2014	av. 2008-2014	av. 2008-2014	av. 2008-2014
2		Discard rates	2012	2008-2014	2012	2012
		TAC	av. 2008-2014	av. 2008-2014	av. 2008-2014	av. 2008-2014
3	Landing obligation	TAC	av. 2008-2014	av. 2008-2014	av. 2008-2014	av. 2008-2014
4		TAC + uplift	+11.5%	+36%	+18%	+44%
x	Fleet opportunism			10-20-30%		

For all regulated species, the implementation of the landing obligation (LO) has a positive effect on the biomass (of about 2% for whiting, to 75% for sole). The positive effects propagate to other species jointly targeted such as red mullet and cuttlefish although values must be taken with precaution given the high variability in recruitment and accessibility of these species (that are not accounted for in the simulations)(Figure3). At worst, LO has no effect on biomass as is the case for scallops, which appear to be the only species which exploitation is very constrained already.

It appears that fleets have little flexibility to report their effort, which explains the small variations in biomass and catches brought by opportunism levels. In comparison with LO without uplifts, TAC uplifts provide a significant increase of revenue of up to 20%, while impairing stock biomasses of less than 8%. It thus represents an important mitigation measure.



Biomass, Catch, Discard and revenue over the last year of simulation for the four stocks submitted to landing obligation (arrows represent the standard deviation of the variability induced by the scenarios of fleet opportunism).

A fleet-dynamic model Dynamic State Variable Mode (DSVM) is integrated within the pre-existing mechanistic individual-based model OSMOSE of the Eastern English Channel. The OSMOSE model simulates the full life cycle of 15 species and their dynamics based on size-based opportunistic predation. The DSVM component models exclusive bottom-trawl French fishers and allows scenarios with varying quotas and fines for discards and quota over-shooting, taking fishers' short- and long-term constraints into account. The model is currently parameterized and will be calibrated approximately in May-June.

2.2 Avoiding unwanted catches: fishing strategies

- *“The Fisher’s story: Challenge experiments”*

The experimental trips in the Eastern English Channel and Southern North Sea and analysis were completed in the beginning of 2016 (EODE project:³). In total 86 experimental trips have been conducted: 37 onboard a large trawler (23 m) from October 2014 to September 2015, and 49 onboard three small trawlers (11 - 12 m) May - September 2015. A complex protocol was used with three types of fishing operations: LO fishing operations, operated as if the landing obligation was in force, where all landings weights (including unwanted catch of quota-species), sorting and tying times were recorded; the other fishing operations were operated under the current regulation (no landing obligation), and either all the catch was identified, weighed and measured; or just landings weight and sorting and tying times were recorded.

The main findings from these experiments can be summarized as follows.

- ✓ Skippers and crews were reluctant to comply with the landing obligation and ended up using the experimental trips to demonstrate that increases in selectivity are difficult to achieve and/or that the costs of handling unwanted catches are disproportionate, rather than to adapt to the new regulation.
- ✓ Increases in selectivity were indeed difficult to achieve, in the sense that designing and producing new selective gears required months – a time longer than anticipated. As a result, too few trials could be made with the selective gears to enable a quantitative estimation of their efficacy. Some of the new gears seemed to reduce the unwanted catches, generally with some loss of marketable catch; variability was high. Spatio-temporal effort reallocation seemed to be highly constrained by regulations, weather, and abundance of marketable resource. As a consequence of these difficulties and/or the limited commitment of the skippers and crews, no time trend in amounts or proportions of undesired catch (undersized individuals of quota-species) could be detected on any of the four vessels participating in the experiment.
- ✓ Size was the major cause for discarding or falling under the landing obligation onboard the small vessels, whereas a mixture of size, market, quality and quota limitations (by decreasing importance) were mentioned by the crew on the large trawler.
- ✓ Sorting time was generally higher during the fishing operations operated under landing obligation conditions than on “normal” operations; tying time was similar, for the unwanted part of the landings was not iced and was kept on the deck. Under the landing obligation, storage capacity would constrain trip duration on 20% of trips on the small vessels, with a high variability between vessels. Capacity seems to be less constraining for the large vessel.

³ <http://www.comitedespeches-npdcp.fr/wp-content/uploads/2016/03/Rapport-final-EODE-Exp%C3%A9rimentation-de-lObligation-de-DEbarquement-CRPMEM-NPdCP-Version-f%C3%A9vrier-2016.pdf>

- ✓ Utilization of unwanted catches subject to landing obligation might be complicated by seasonal variability, and the small volumes landed at a time. Additional costs directly generated by the landing obligation would be variable across vessels and catch composition, and might average 50-100 euros per day at sea, in addition to the investments required to handle these catches on the decks of the vessels and in harbours.
 - *The Scientists story – identification of locations, times and practices to fish to avoid unwanted catch*

A paper has been published (Bourdeau et al, 2017) that focuses in mapping species spatio-temporal distribution using survey and observer data in order to inform and discuss with fishers on the spatio-temporal fish distribution. Data on species distribution are available via scientific survey but only during the period of the survey. Other are available from onboard observer programs but not for the entire area and need standardization. The spatio-temporal fish distribution is essential to get a realistic idea of migration and spatial distribution in the operating models developed in WP1. These spatial distribution will also allow identifying potential overlap of species of commercial interest and by catch species that are subject to high discarding rates.

Bourdaud Pierre, Travers-Trolet Morgane, Vermard Youen, Cormon Xochitl, Marchal Paul Inferring the annual, seasonal, and spatial distributions of marine species from complementary research and commercial vessels' catch rates . ICES Journal of Marine Science 2017 . Publisher's official version : <http://doi.org/10.1093/icesjms/fsx092>. Open Access version : <http://archimer.ifremer.fr/doc/00387/49805/>

Other methodologies based on spatio-temporal distribution of the landings per commercial categories to identify areas, periods with high proportion of small fishes were discussed during the WP4 Work Shop in Dublin and are still under development. Some preliminary maps were produced but still need to be developed to achieve the objective of identifying discard hot spots and to be used to define sensitive areas.

Some collaboration with the industry have started to develop a phone application that would allow fishermen to exchange in real time on discard hot spots. A first version of the application have been released but it is still in developpement to fit the fishermen needs.

2.3 Policy outreach

DISCARDLESS members have been involved at various levels in discussing with a variety of stakeholders the work of the project in the context of the landing Obligation. This discussion has mostly taken place in national forums such as the Regional or National Comitees for Fisheries.

2.4 Summary:

- *Main Discard Mitigation Strategies investigated:*
In the challenge experiments, all vessels tried selective devices expected to address their major discard issue, but owing to various constraints the number of trials were limited and insufficient to allow a quantitative analysis. As for spatial strategies, they were reportedly already implemented by the large vessel. The small vessels are highly dependent on a small area for their major marketable catches during the summer season. Therefore they did not feel they could move to different areas. The cost-effectiveness of the solutions tested during the trials were assessed.
Some work started to map species distribution and in particular discard hot spots and spatio-temporal distribution of sensitive areas
- *Impact assesement:*
The modelling exercerce realized suggest, as in the other areas that LO has a low impact on discards consumers and virtually no impact on the rest of the foodweb
- Stakeholders Involvement has been important throughout, with several meetings with fishers & fisher representatives, and very constructive discussions on model parameterisation / indicators.
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3 The Year ahead of us (2017-2018): What do we expect for the next year?

- Ecosystem-scale:
 - Work will continue on the three models.
In the case of Isis, simulations highlighted the need to refine the description of métiers in the model to account for the targeting capacities of fleets. This also opens opportunities for designing spatial and temporal escapement scenarios. Also, CFP scenarios should be described and implemented in the model including HCRs, management plans, discard plans and exemptions. Uncertainties must be considered in simulations regarding recruitment, assessment and compliance (discarding still occur (at various rates) while it is ignored in assessment). Finally, sensitivity of the impact of LO implementation to certain gear and species will be tested.
The osmose- DSVM model will be calibrated in May-June and used to run CFP scenarios. The fleet dynamics and management modules of the Atlantis model will be parametrised this year.
 - A summary of what have been observed during the ICES assessment Working Groups impacted by LO, will be produced.
- Fishery scale:
 - The main action to be pursued in course of 2017 is the follow-up of the evolution of stakeholders view based on collaborative work with an informant group.
- Fishing strategies:

- We will continue compilation of the spatially explicit data and run species distribution models in order to produce maps of sensitive areas for discards to be discussed with fishermen and to input in operational models.
- The potentiality of further developing the mobile application to exchange on problematic areas in real time.