

# Deliverable No. 4.1

## DiscardLess

### Strategies for the gradual elimination of discards in European fisheries

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## Deliverable D4.1

# Initial avoidance manuals by case study including tactical, strategic and gear based approaches agreed by scientists and fishers.

**(Month 18)**

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# Executive Summary

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## WP4.1 – The Fishermen’s Story

Fisheries stakeholders from Ireland, Denmark, Spain-the Balearics, France-Eastern Channel, Greece-North Aegean Sea, and Portugal-Azores were interviewed. They include whitefish and pelagic trawlers (both single and twin rig trawlers), prawn trawlers and seine netters. It also includes small scale fishers using gill and trammel nets and bottom deep-water longlines and handlines. The semi-structured interviews addressed a range of issues relating to the fishermen’s responses to the Landing Obligation regulations. Solutions proposed by fishermen were separated into technical (gear changes), tactical (fishing behaviour changes) and management. The responses and synthesis by question theme are given below.

### Causes and levels of discarding

A range of discard drivers were identified including:

- Quota restrictions and “choke species” were key drivers of discarding in most areas, except the Mediterranean, where there are no quotas.
- Small fish in the catch, generally <MCRS fish was a key driver in most fisheries.
- Discarding of damaged fish was also identified in some countries.
- Small-scale fisheries in France and the Azores identified that likely high survival may be a factor in discarding.

There were a wide range of fishery specific drivers including quota management, high grading, and keeping quota available. Some small scale fishers also indicated that fish that might/should be discarded were used for bait, or to make fish stalls more attractive.

### Current methods used to avoid unwanted catch - Technical

A range of common approaches were identified that were used by fishers to avoid discards:

- Increases in mesh size in the cod end or across the net are utilised in all the areas. Analogously, Azores fishers also use large, more size-selective hooks, sometimes even larger than legally required, and this actually leads to using more expensive bait!. **This is a key commonality, almost everywhere fishers are voluntarily using more selective gear than required by law!**
- Square mesh panels.
- Changing gear/metier, i.e. switching from one gear to another that had a different selectivity.

More fishery specific approaches included:

- Multiple rigs (twin or quad) in *Nephrops* fisheries
- Special on-board handling systems for separating species and controlling discards, and for survival.
- Problems with space and crew to handle discards.

### **Current methods used to avoid unwanted catch - Tactical**

Again a number of common approaches were identified:

- Change of fishing grounds in response to high levels of the choke species or small fish.
- Avoidance of spawning/nursery areas was 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. This is a key commonality that should merit further examination. Moving on is probably occurring in many fisheries, but possibly without much guidance of how far to move, etc. This is potentially an area where scientists could help analyse what move on rules might be effective.
- Change of target species.
- Fishers developing their own quota approaches. There seems to be an appetite among fishers to use quota management as a tool to mitigate the LO. Again, this is an area where scientists can help, and will be explored further in Task 4.4.

A number of potentially useful approaches used in only one fishery were also identified, including:

- Changing the depth for fishing to change species mix.
- Shorter hauls.
- Use of sonar to target hauls.

### **Interest expressed in additional methods to avoid unwanted catch - Technical**

Fishers generally appeared unenthusiastic about more gear changes. But two were clear:

- Larger mesh size (or hooks in line fisheries) even if not legally mandated.
- The need for more flexible and faster approaches to testing out new discard reducing gears.
- Tamper proofing of fishing gear.

### **Interest expressed in additional methods to avoid unwanted catch - Tactical**

There were few entirely new suggestions for tactical change from fishers. This may be because fishers are already exploring most of the tactical changes they can envisage. Many fishers interviewed had little or no knowledge of the LO and so also of tactical measures to mitigate it.

### **Interest expressed in additional methods to avoid unwanted catch - management**

Two main features were apparent:

- Temporary area closures – to protect juveniles, spawning areas or high aggregation areas. The emphasis was on TEMPORARY. These should be deployed tactically by managers and then removed when no longer needed.
- Quota management – This was often mentioned, but without clarity on what exactly was needed or how to make it happen. This is another area where DiscardLess can help through Task 4.4-“The Managers Story”, by proposing management approaches that could work.

### **No support for the following proposed methods to avoid unwanted catch - Technical and Tactical**

- There was little enthusiasm for more gear based technical approaches.
- Also similar doubts about closures and particularly permanent closures.
- Information sharing was something mentioned by many fishers, but they were often unsure if they could trust other fishers. This is again an area where DiscardLess might be able to help. This could be by assisting in the setting up of small schemes with limited number of fishers, and aimed at information on a few key aspects, e.g. hot spots of <MCRS fish, or of choke species.

### **Other information**

- Unsurprising, but notable was that the most obvious common theme was steadfast opposition to the LO, and that it would not deliver its objectives, particularly in actually reducing discards or ecosystem benefits.
- Also considerable antipathy towards scientific advice! Particularly that advice does not reflect the fishery as they see it, mainly due to the lag between assessment and quota setting.

There was a common feeling that the current management system, including the LO, lacked credibility, potential to deliver its stated objectives and management measures that are perceived as inappropriate, e.g. restrictive quotas and the landing obligation.

# WP4.1 – The Fishermen's Story

## Deliverable D4.1

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## 1 Introduction

To date skippers, owner/skippers and shore based managers have been interviewed representing a wide range of fisheries and countries (Ireland, Denmark, Spain-the Balearics, France-Eastern Channel, Greece-North Aegean Sea, and Portugal-Azores). They include whitefish and pelagic trawlers (both single and twin rig trawlers), prawn trawlers and seine netters. It also includes small scale fishers using gill and trammel nets and bottom deep-water longlines and handlines. The semi-structured interviews addressed a range of issues relating to the fishermen's responses to the Landing Obligation regulations. They were asked initially about what they saw as the causes of discarding and the levels of that. They were then asked about methods of mitigating the impacts of the Landing Obligation in their day to day operations. The interviews were carried out following a semi-structured design. The interviewer had a core list of issues that they wished to address. However, the interview was based on asking very broad questions, and allowing the interviewee to talk first about what they wanted to discuss, and following up to obtain the more specific responses sought in the outline (An example used in the Irish interviews is presented after the report). Solutions proposed by fishermen were separated into technical (gear changes) and tactical (fishing behaviour changes). They were also asked about management responses that might or might not help.

We have presented the summarised ideas identified by fishermen in a series of different categories in the following tables. We have also sought to identify both commonalities, where fishermen from two or more countries identified the same issues. We have also tried to identify where ideas from one country might be applied to fisheries in others. Conversely, we have also tried to show where the responses reflect the unique characteristics of fisheries management in that country. The most obvious of these would be the quota based management outside the Mediterranean.

## 2 Causes and levels of discarding

### 2.1 Responses

Ireland	Sector
Discarding is caused by quota restrictions. In particular, many interviewees emphasised the interactions of the Landing Obligation with Relative Stability. Specifically where they had relatively small quotas for a species, despite relatively high abundance of those fish on the grounds. A key example was for cod and haddock in the Celtic Sea, with low quota, and whiting with a high quota. This caused real issues as these species were often caught together.	All interviewees
Only undersized and damaged fish are discarded.	Single-rig whitefish trawler
Discard levels <5% are possible within the fishery.	Whitefish trawler & seiner
Discarding needs to be reduced but a certain level is inevitable.	Whitefish trawler
Discard ban should be about simultaneously forcing the landing of marketable fish and selectivity improvements.	Whitefish trawler
The mismanagement of quotas and how they are allocated throughout the year (often with little/none left for certain species in the last few months of the year) makes it impossible to avoid discarding.	Nephrops Trawler
Generally can manage to avoid exceeding quota apart from when encounter unexpected 'lightning strike' hauls with an unusually high amount of a quota species.	Whitefish trawler
There is less fishing and time at sea for small boats in winter as restricted by weather so easier to keep inside quota at this time of year.	Whitefish trawler
Denmark	Sector
Cod as a choke species. Mainly for <MCRS fish, but also lack of quota. Nephrops, plaice, saithe, haddock and dab as potential choke species with relatively high discard levels. Mainly due to quota restrictions, but also <MCRS was mentioned to some extend too. One fishermen also stated whiting and due to quota restrictions.	Bottom whitefish and Nephrops trawlers
Sole and dab as potential choke species mainly due to storage issues and low marketing price making it unprofitable to retain these catches.	Gillnetter - North Sea and Skagerrak
Spain-the Balearics	Sector
Main problem of small-sized fish is for hake ( <i>Merluccius merluccius</i> ). Hake recruitment does not seem to have a clear	Bottom Trawlers

<p>seasonality and large quantities of recruits can be captured almost all year round at some specific continental shelf areas and depths. These areas were not exploited routinely; they were only used when the bad weather conditions prevented working at deeper depths. Other fishers report that these hake recruits were only taken during some specific periods (February-March, May-June). After the implementation of the MCRS, fishermen do not use these areas and periods in order to avoid catching small-sized hake.</p>	
<p>Large catches of picarel (<i>Spicara smaris</i>) and horse mackerel (<i>Trachurus</i> spp.) which saturated the market and were sold at very low prices.</p>	
<p>Transparent goby (<i>Aphia minuta</i>) fishery: small amount of discards, basically recruits of other fish species (e.g. <i>Pagellus</i> spp.). Discards are believed to be released in good condition.</p>	<p>Small scale Fishery - monospecific boat seine</p>
<p>Dolphinfish (<i>Coryphaena hippurus</i>) fishery: small-sized recruits appear during late summer/early autumn and grow fast. Discards of small individuals in the first days of the fishing season.</p>	<p>Small scale Fishery - Trammel nets</p>
<p><b>Greece-North Aegean Sea</b></p>	
	<p>Sector</p>
<p>We discard only if our catches are mixed but this happen rarely.</p>	<p>All purse seines</p>
<p>Only undersized fish and damaged fish is discarded.</p>	<p>All trawlers interviewees</p>
<p>During some months we discard anchovy and sardines.</p>	<p>Trawlers</p>
<p>We don't discard fish because we feed birds.</p>	<p>Trawler and purse seines</p>
<p>We bring all fish without commercial value to offer it to poor people and orphanage.</p>	<p>All Trawlers</p>
<p>During October and April our discards are higher.</p>	<p>2 trawlers</p>
<p>In some areas undersized fish is important.</p>	<p>All trawlers</p>
<p>In April near the coast there an important number of undersized fish but we are not allowed to fish there.</p>	<p>Trawlers</p>
<p><b>France-Eastern Channel</b></p>	
	<p>Sector</p>
<p>Protected species are being discarded (e.g. Undulate Ray (<i>Raja undulata</i>) and "skate").</p>	<p>Trawlers and netters</p>
<p>Regulations related to catch composition (e.g. cod or sole management plans). Fishers usually keep quota of species without commercial value to adjust landings.</p>	<p>Trawlers and netters</p>
<p>PO's decision didn't allow them to bring ashore small sizes of non-commercial species, even if they are of the legal size leading to high-grading.</p>	<p>All Trawlers (12m and up and pelagic)</p>
<p>Don't bring ashore species without good prices (plaice, horse mackerel, dab, etc.)</p>	<p>all trawlers and netters</p>
<p>Undersized and damaged fish are also discarded.</p>	<p>Bottom Trawlers</p>
<p>Not enough quota (e.g. mackerel, skate)</p>	<p>All trawlers</p>
<p>Discard herring because no quota, "national quota is OK"</p>	<p>Pelagic trawler</p>

but it was given to the Franco-Dutch boats”	
We are not allowed to land whiting when we use mesh of 80mm.	Pelagic trawl
We discard species that have a high survival (e.g. plaice, dab)	Bottom trawlers
Portugal-Azores	Sector
The fishing gears are very selective, especially the handline, and discard amounts are generally very low.	Bottom deep-water longliners and handliners
Discarding mostly happens because of regulations: catch of undersized (<MCRS) individuals being the first reason, followed by quota.	Bottom deep-water longliners and handliners
Given that the fishing gears are selective and the market is diversified, discarding rarely happens because of lack of commercial value.	Bottom deep-water longliners and handliners
Most fishers use part of the unwanted catch for bait or for the crew’s own consumption.	Bottom deep-water longliners and handliners
The potential choke species are alfonsinos ( <i>Beryx</i> spp.) and blackspot seabream ( <i>Pagellus bogaraveo</i> ).	Bottom deep-water longliners and handliners
Even if no decision has been taken by the EC yet regarding the implementation of the LO on TAC 0 species such as deep-water sharks, these are a common bycatch of the longliners that could become highly limiting choke species.	Bottom deep-water longliners and handliners
Most fishers return all alive fish to the water. Survivability is assumed to be high for several species, especially in the handline fishery.	Bottom deep-water longliners and handliners

## 2.2 Commonalities

The main commonalities of what causes discarding across the different regions are in:

- Quota restrictions and “choke species” were identified as key drivers of discarding in Ireland, France, Denmark, the Azores and the Balearics. This is not necessarily surprising, but important that all identified this as a key issue. In the Balearics, where there are no official quotas, the main drivers appeared to be unwanted bycatch. In Greece-North Aegean Sea, there was also no mention of “choke” species.
- Small fish in the catch, generally <MCRS fish. This was a major issue in the Irish, Greek, Azores and the Balearics cases, but also mentioned as important in Denmark, though less critical than chokes.
- Discarding of damaged fish was identified in Ireland, France (mainly netters) and Greece-North Aegean Sea.
- Small scale fisheries in France and the Azores identified that likely high survival may be a factor in discarding

## 2.3 Specifics

1. Quota management was mentioned as an issue in Ireland where monthly quota allocation was identified as a driver. This management approach is unique to Ireland.
2. The main driver in the Balearics appears to be catches of small (<MCRS) fish, often but not always of a single species within either a targeted or mixed fishery.
3. In France one of the main causes of discarding mentioned by individual fishers is the high-grading practised by POs for all species but more particularly for less valuable species. Fishers call that “no price”.
4. In France another cause mentioned is the EU regulation on catch composition ([Council Regulation \(EC\) No. 850/98](#),etc). To fulfil the EU regulation on catch composition, they keep no valuable species quotas for trips catching cod. Leading to discards of “other species” to be able to land cod during some period of the year.
5. Small deep trawlers and netters practising direct sale of fish (Dieppe and Boulogne, Etaples) don't have the same attitude towards “species without commercial value” because they “need to garnish their stalls with variety of species”. So they discard less “species without commercial value” than other boats marketing their catches through auction.
6. In the Azores, some unwanted catches are used for bait, or consumed by the crew. Use as bait will likely only occur for passive gear fisheries. Likely high survival was also suggested.

### 3 Current methods used to avoid unwanted catch – Technical

#### 3.1 Responses

Ireland	Sector
Square mesh panel is effective, especially in avoiding whiting, hake, megrim and monk and a lot of juveniles.	All
Quad rig significantly reduces fish catch in prawn trawler in comparison to twin rig.	Quad-rig prawn trawler
100mm mesh size across all of net (not just cod end) to avoid small unwanted catch.	Single-rig whitefish trawler
Denmark	Sector
Have made changes to their fishing gear to increase selectivity e.g. square mesh panels, and cod end mesh.	Bottom trawlers
Spain–the Balearics	Sector
Transparent goby ( <i>Aphia minuta</i> ) fishery: Once on board, the catch is placed in a tank to separate the transparent goby (it remains on the top) from the discards (on the bottom). After taking the transparent goby, discards are released in good condition.	Bottom Trawlers
Cuttlefish ( <i>Sepia officinalis</i> ) fishery: in general, fishermen use larger mesh sizes than those established by law to avoid unwanted catch.	Small scale Fishery – Trammel nets
Striped red mullet ( <i>Mullus surmuletus</i> ) fishery: to avoid taking a lot of debris and small-sized fish, fishermen increased the mesh size as in cuttlefish.	Small scale Fishery – gillnets
Greece-North Aegean Sea	Sector
We just introduced bigger mesh to our trawlers.	All trawlers
With the new mesh (40 mm square) less discards are taken.	Trawlers
France-Eastern Channel	Sector
For French fishers trawl mesh is okay and “cannot make more effort”.	
Individual fishers consider that they cannot improve their selectivity, but see next row.	
Tested square mesh panel (80, 100 and 115mm) of different length (1 or 2m) and also a selective grid were tested.	Artisanal trawlers via Selecfish project
Portugal-Azores	Sector
The hook size is the most effective way to reduce the amount of small individuals in the catch. The legal hook size (n <sup>o</sup> 9) is already large, and some fishers even use larger hooks.	Bottom deep-water longliners and handliners
Some fishers also use Spanish hooks (slightly curved J-hooks) to reduce unwanted catch, with unproved	Bottom deep-water longliners and handliners

efficacy.	
Several fishers have recently changed fishing gears from bottom longlining to handlining, which is a more selective and cost-effective fishery.	Bottom deep-water longliners and handliners

### 3.2 Commonalities

Gear based technical changes have been deployed in all the areas as a way of mitigating the impacts of the LO. As would be expected, these vary between the fisheries, but again there are some common approaches:

- Increases in mesh size in the cod end or across the net are utilised in all the areas. These entail using larger mesh sizes than required by law. Analogously, some Azores fishermen also use larger, more selective hooks than legally required. **This is a key commonality, almost everywhere fishermen are voluntarily using more selective gear than required by law!**
- Square mesh panels were identified in both the Irish and Danish examples as useful tools for eliminating unwanted catches, presumably particularly for undersized target species.
- Changing gear/metier was mentioned for Irish Nephrops trawlers – using quad instead of twin rigs. Azores fishermen mentioned switching from long line to hand line, and switching to a different hook design/shape.

### 3.3 Specifics – that could be applied elsewhere

- The use of quad rig Nephrops trawls was mentioned in the Irish case. This type of gear is not generally allowed outside Ireland.
- The Balearics case identified on-board handling systems as important for separating species and controlling discards, and particularly for the survival of the fish ultimately discarded.
- Greek fishers think that they have little discards and on board handling will not be increased if they have to keep discards. The number of crew on Greek boats is important so working time will not increase. Deep trawlers have enough space to store discards if necessary.
- French fishers consider that sorting out discards by species will require more people on board and they cannot afford this extra cost. Larger trawlers may have enough space to store discards. This is not possible for small coastal deep trawlers (12 – 14 meters) because some of them don't have storage room and fish has to be kept on the deck. Current regulation do not allow fishers to keep human consumption fish and discards in the same place.



## 4 Current methods used to avoid unwanted catch – Tactical

### 4.1 Responses

Ireland	Sector
Knowledge of location of spawning grounds allows for the avoidance of <MCRS fish at certain times of year in some locations.	All except prawn trawlers
Vessels are constantly moving between fishing grounds to try and avoid cod and haddock (choke species) as much as possible. This can include moving between management units.	Whitefish trawlers
Information is shared between vessels if the other skippers are known/trusted and this can help to avoid unwanted catch.	Whitefish trawlers
“Moving on”, i.e. moving away from a location where high catch rates of <MCRS fish, or possibly choke species was mentioned outside the interviews.	All
Denmark	Sector
Avoidance of fishing grounds where a potential choke species is believed to be abundant. This has been expressed particularly to reduce catches of saithe.	Bottom whitefish and Nephrops trawlers
Change of target species. One interviewed fisherman leased plaice quota and targeted plaice for 4 months to maintain an income and avoiding choking on saithe and cod quota.	Bottom whitefish trawlers
Lease of quota via the Danish ITQ system (turning definitely unwanted catches into wanted/acceptable catches.	Bottom whitefish and Nephrops trawlers
Changes fishing grounds slightly more with CQM verified by REM than prior to having REM.	3 trawlers with REM
Spain–the Balearics	Sector
After the implementation of the MLS, fishermen avoid areas and periods where they know juvenile hake occur in order to avoid catching small-sized hake.	Bottom Trawlers
For the picarel ( <i>Spicara smaris</i> ) fishery, fishermen agreed to implement quotas per vessel and day (200 kg). Currently fishermen avoid taking catches over this quota to reduce the discards of picarel.	Bottom Trawlers
For horse mackerel ( <i>Trachurus</i> spp.) the problem is taking more catch than the market can cope with. When fishermen see a lot of horse mackerel, they react by using shorter hauls to avoid large catches.	Bottom Trawlers
In some areas and at specific depths (220-270 m), bottom trawlers take boarfish ( <i>Capros aper</i> ) in large amounts and this damages the commercial catch. Fishermen do not use these areas to avoid this problem.	Bottom Trawlers

Transparent goby ( <i>Aphia minuta</i> ) fishery: In some cases, if the fishfinder indicates a high proportion of unwanted fish, fishermen do not fish to avoid catching discards.	Small scale Fishery - monospecific boat seine
Spiny lobster ( <i>Palinurus elephas</i> ) fishery: Some rocky areas in the Menorca Channel are known to concentrate juveniles of spiny lobster during the fishing season. These areas are avoided by some fishermen in order to reduce the catches of small-sized specimens.	Small scale Fishery - Trammel nets
Dolphinfish ( <i>Coryphaena hippurus</i> ) fishery: As with the picarel in the bottom trawl fishery, small-scale fishers also use a system of quotas per day and vessel (200 kg) for dolphinfish in Mallorca to avoid market saturation.	Small scale Fishery - Trammel nets
<b>Greece-North Aegean Sea</b>	<b>Sector</b>
Knowledge of location of spawning grounds allows for the avoidance of undersize fish at certain times of year in some locations.	All trawlers
Vessels are constantly moving between fishing grounds to try and avoid small hake.	Trawlers
Information about areas to be avoided is shared between family members and friends.	Trawlers
<b>France-Eastern Channel</b>	
Fishers moved to another fishing ground when <u>unwanted</u> species are present (unwanted means species without quotas or without commercial value).	All Trawlers
Keep our quota of whiting to be used when we are targeting cod (regulation about the composition of captures).	Trawlers
Use their knowledge about seasonality of the species, "when herring is here, horse mackerel is not here".	
Fisheries activity based on the seasonality of the species "we caught less small sole between March and May. It is just after the end of scallop season. "We know that the period before Christmas whiting has the best size".	
<b>Portugal-Azores</b>	<b>Sector</b>
Some fishers avoid specific areas because they know there are high concentrations of small fishes. However, most fishers argue that it is very difficult to identify such areas, as in most areas the small and large fishes are mixed.	Bottom deep-water longliners and handliners
Whenever they catch small individuals, the large majority of fishers change fishing grounds. This change can occur within the same day for the handliners because the fishing gear is more flexible, while it is undertaken within the following days by the longliners.	Bottom deep-water longliners and handliners
Fishers adapt their fishing depth according to what they are targeting. When fishing deeper, they would usually catch less but larger individuals of blackspot seabreams.	Bottom deep-water longliners and handliners

When fishing deeper, they would also catch more alfonsinos and deep-water sharks.	
Most fishers avoid fishing at night because there is more predation on the catch.	Bottom deep-water longliners and handliners
In all islands, except São Miguel, fishers have an individual quota for blackspot seabream. It is common there that fishers change target species for some months in order to keep their quota for the end of the year when the price is higher.	Bottom deep-water longliners and handliners

## 4.2 Commonalities

There are less common approaches taken across the areas in the cases of tactical measures. Nevertheless, some commonalities were identified:

- In all the areas, the fishermen changed the fishing grounds in response to high levels of the choke species or small fish. French fishermen highlighted area changes based on seasonal differences in what species could be found and where.
- Avoidance of spawning/nursery areas was used as a tactic to avoid <MCRS catches in Ireland, the Balearics and the North Aegean Sea. It was not mentioned as an approach in Denmark, nor in the Azores, as such areas are not identified/known.
- Information sharing between fishermen on areas to be avoided due to choke or high levels of <MCRS fish was identified in both Ireland and the North Aegean Sea.
- “Moving on” was mentioned by both Irish and Azores fishermen. We think it is likely that this is often used by other fishermen, but maybe considered too obvious or routine to mention. It can be inferred from French and Greek fishermen’s comments that they also do this. The approach is implicit in elements of the Scottish Cod Conservation credit scheme, and has been developed by Dunn et al (2014). **This is a key commonality that should merit further examination. Moving on is probably occurring in many fisheries, but possibly without much guidance of how far to move etc. This is potentially an area where scientists could help analyse what move on rules might be effective.**
- Change of target species was mentioned by both Danish and Azores fishermen, and may also be a tactic that is operating elsewhere but was too obvious to mention.
- Fishermen developing their own quota approaches was suggested by Danish fishermen, and also occurs in the purse seine fishery in the Azores, where a daily limit was implemented to restrict the fishery to only meet the local market demand. It should be noted that this was not a fishery included in the survey, but was information from a representative of fisher’s organization. This would potentially be transferrable to the Greek fishermen but not under current systems. It would probably not be applicable for the Danish and Irish fishermen.

### 4.3 Specifics – that could be applied elsewhere

A number of tactics were identified in only one case study:

1. Changing of target species and Quota Leasing were identified in Denmark. Quota leasing is an approach that is not available to fishermen in many of the other case studies. Quota leasing is allowed in the Azores, but rarely occurs. While no quotas are currently mandated in the Mediterranean this approach is probably not transferable. Quota management in Ireland does not allow leasing, but potentially some approach that allows some flexibility in quota allocations may be of help.
2. Balearic fishermen identified two approaches that none of the others did:
  - a. Shorter hauls – this is probably a tactic that all could use. However, in the case mentioned, it was focused on reducing the size of the catch to avoid too many fish on the market, rather than specifically for discarding, but it should be a potentially valuable tool. It may well already be used in the other fisheries, but merits further investigation.
  - b. Use of the fish finder sonar. Again, this may well be already used, and was simply not mentioned, but should definitely be raised in any follow up interviews.
3. French fishermen also identified holding on to quota to give them options in other seasonal fisheries.
4. Azores fishermen mentioned changing the depth of fishing in response to the size of fish in the catch. In the “challenge” trials with Irish fishermen, changing depth was also mentioned as a way of avoiding choke. **Like “move on” rules, this may also merit scientific investigation elsewhere.**

Dunn et al (2014). Empirical move-on rules to inform fishing strategies: a New England case study. *Fish and Fisheries*, 15(3): 359–375.

## 5 Interest expressed in additional methods to avoid unwanted catch - Technical

### 5.1 Responses

Ireland	Sector
Larger meshes are a key to reducing unwanted catch and the minimum mesh size should be raised to at least 100mm across the fleet.	Whitefish trawler and seiner (not prawn fishery)
Use of larger meshes (120mm) should be rewarded with extra quota.	Whitefish trawler and seiner
Need tamper-proof gear technology and this (along with mesh size) needs to be properly inspected and policed.	Whitefish trawler and seiner
Need a fast track system so that changes to fishing gear that can reduce discards can be introduced easily and quickly.	Whitefish trawler
Denmark	Sector
Free gear selection, but only minor interest has been expressed by interviewed fishermen	Bottom whitefish and Nephrops trawlers
Spain-the Balearics	Sector
Spiny lobster ( <i>Palinurus elephas</i> ) fishery: Some fishermen, in collaboration with scientists, have looked at V-notching for this species. Although V-notching has been primarily aimed at boosting egg production by protecting gravid females, V-notching of undersized individuals could be used to monitor the fulfilment of the MLS regulation.	Small scale Fishery – Trammel nets
Greece-North Aegean Sea	Sector
Ready to test bigger mesh if a second boat is fishing near to them to evaluate the loss.	2 Trawlers
France-Eastern Channel	Sector
Fishers organisations are conducting programs to improve selectivity.	Bottom trawlers
Agree to test more selective gears if compensate.	Netters (Boulogne)
Portugal-Azores	Sector
Few fishers would agree to increase the hook size even more, but they do not believe it would make a significant difference.	Bottom deep-water longliners and handliners
Most hand liners promoted the use of this type of fishing gear, and believed the long liners should convert to hand-lining.	Bottom deep-water handliners

## 5.2 Commonalities

In the context of additional technical approaches, there was a relatively low enthusiasm for more gear changes. Two elements were identified in two case studies:

- Larger mesh size (which was already identified as a tool they were using) was identified by Irish and Greek fishermen, and is clearly an approach that could be used across all fisheries. It should be recognized that this may reduce the landable catch as well, but this identifies a clear role for gear technologists and the work in WP3. The analogous use of larger hooks in the Azores follows the same logic.
- Both Irish and Danish fishermen identified more flexible and faster approaches to testing out new discard reducing gears. While this is really a management issue, as it could require a relaxation of the gear regulations, it is clearly an important issue, and some means of allowing quick and easy derogations for fishermen to test a gear would be useful. This would be prior to approaching gear technologists to carry out specific selectivity trials.

## 5.3 Specifics – that could be applied elsewhere

On the basis of the interviews to date, no other major proposals were identified around gear based measures. Tamper proofing of fishing gear was identified by an Irish fisherman. The use of V-notching was identified in the Balearic case, however, this is widely used elsewhere already.

Azores hand liners suggested that their approach/fishing method was more selective than long lining and should be adopted more widely in the Azores

## 6 Interest expressed in additional methods to avoid unwanted catch - Tactical

### 6.1 Responses

Ireland	Sector
Information sharing on where there are lots of unwanted catch could be useful (but reluctant to share information on commercially important catches).	Whitefish/prawn trawler
Respondant would use information/maps on when and where spawning is taking place every year. They feel that although they have good knowledge on spawning areas, this is can vary in timings between years.	Whitefish/prawn trawler
Denmark	Sector
“Better” biological advice and “better” adaption of regulations to the actual situation meeting the fishermen in their daily work. One interviewed fisherman operating mainly in Kattegat and targeting Nephrops stated that: “I would prefer that we are 5 happy fishermen in Kattegat rather than 35 unsatisfied fishermen because of bad regulations and how things are”. This statement was backed by another fisherman targeting Nephrops in Kattegat.	Bottom whitefish and Nephrops trawlers
Spain–the Balearics	Sector
Implementation of quota for horse mackerel species as with Picarel quota currently used voluntarily by fishermen.	Bottom Trawlers
Greece-North Aegean Sea	Sector
The new mesh used by trawlers (40 mm square) permits to save petrol and reduce their consumption	Trawl fisher
France-Eastern Channel	Sector
They know the areas producing more discards. They are able to explain the reasons of high discards in these areas (estuary, near the coast,)	Trawlers and netters
Portugal-Azores	Sector
Most fishers agree with the biological closure that has been implemented since 2015 for the blackspot seabream, but many argue that the closure is not at the appropriate time and should be changed to when the fish actually spawn. Some further argue that the closure could be expanded to all species, as otherwise they keep fishing and catch blackspot seabream anyway, but for such a closure they would need financial compensation.	Bottom deep-water longliners and handliners

## 6.2 Commonalities

No clear commonalities could be clearly identified under this heading. This may be because fishermen envisaged utilising the types of tactical response that they already deploy to help them **address** the impacts of the LO. It may also be because this was not an aspect emphasised in the interviews. However, it should be noted that even in the Irish interviews, where tactical approaches were emphasised, the responses were not particularly radical. The main aspect was the raising of information sharing with each other, and recognition that the information developed in Task 4.3 “the Scientists story” MIGHT be of help.

Under the „Management“ section of this report, many fishers expressed interest in some form or other of spatial management, for instance, spawning closures or temporary bycatch hotspots of fish they wish to avoid e.g. <MCRS or choke species. This could also be considered as a tactical proposal from fishers, but is dealt with in the following section on management measures.

The main problem for many fishers on individual level is that they never heard about the LO (the North Aegean Sea, France and Azores). When asked about their opinion towards the LO it first has to be explained. For instance, in France interviewers had to use the term “zero discards” to be understandable by fishers. They are also unaware of exemptions.

It would be useful if Discardless produced a good flyer explaining the LO regulation and all related issues. For example “choke species” which is another term that fishermen often do not understand. Other terms include Real Time Closure, exemptions, derogations etc. It is possible that a simple guide on the regulation could also be very positive for the LO implementation.

Little interest in maps of unwanted catch was expressed by most fishers in the Azores as they argue that they already know, and that the fish are mixed in all areas anyway making it impossible to identify hotspots of discards. Some feared that it would result in closing areas and thus limiting fishing grounds.



## 7 Interest expressed in additional methods to avoid unwanted catch - management

### 7.1 Responses

Ireland	Sector
Anything would be better than the current quota system.	Prawn/whitefish trawler
Spreading quotas over a longer time period (bi-monthly or quarterly) would provide useful flexibility and allow for better planning.	Whitefish and prawn trawlers
Local management that was given control to respond to what is on the ground would be useful.	Seiner
Pooled quota may help a little.	Seiner
Days at sea would be better as much harder to cheat the system and lie about amount caught.	Whitefish trawler
Need an effort based management system, or equally a management approach that does not depend on very tight quota restrictions.	Whitefish trawlers and seiners
Rolling area closures to protect spawning and nursery habitats for skates and rays in the Irish and Celtic Seas.	Whitefish Trawlers
Need reallocation of unused quota across Europe to address issues with choking under LO (doesn't have to be on a permanent basis, just when one nation has excess that another country is in need of at that time).	Whitefish trawlers and seiners
Denmark	Sector
Interest was expressed in the use of Real Time Closure (RTC) zones, resembling the Norwegian system, by two fishermen. Their main interest was that the Norwegian RTC system should be used instead of introducing the Landing Obligation – that is, discarding should still be allowed!	Bottom whitefish and Nephrops trawlers
“Better” biological advice and “better” adaption of regulations to the actual situation meeting the fishermen in their daily work. One interviewed fisherman operating mainly in Kattegat and targeting Nephrops stated that: “I would prefer that we are 5 happy fishermen in Kattegat rather than 35 unsatisfied fishermen because of bad regulations and how things are”. This statement was backed by another fisherman targeting Nephrops in Kattegat.	Bottom whitefish and Nephrops trawlers
Change the TAC system to a system that gives extra quota benefits to vessels operating with the most selective gears.	Fisheries Inspectors
If the fishers see increases in quotas as a result of the landing obligation this may induce compliance.	Fisheries Inspectors
Spain-the Balearics	Sector

Implementation of quota for horse mackerel species as with picarel quota currently used voluntarily by fishermen.	Bottom Trawlers
<b>Greece-North Aegean Sea</b>	<b>Sector</b>
Ask for real time closures to avoid undersized hake.	Trawlers and purse seiners
Look for a legal frame to allow real time closures.	Trawlers
Afraid that if the real time closures are not valid legally and monitor "some fishers will continue fishing these areas".	Trawler
Real-time closures can work if the ministry is able to act fast.	Trawlers
Fishers consider that they have enough knowledge to avoid areas producing high discards during some seasons. Their knowledge, often not share with others fishers, is considered better than those of scientists.	Trawlers
<b>France-Eastern Channel</b>	<b>Sector</b>
Fisheries activity should follow the seasonality of the species.	Bottom trawlers
Biological rest (closure) was also mentioned by Dieppe fishers but only if they get a compensation	Bottom Trawlers
<b>Portugal-Azores</b>	<b>Sector</b>
Fishers in São Miguel, the only island where the quota for blackspot seabream is collective, would like to change for ITQ. In the other islands, fishers mostly agree with the current quota system even if the sharing is considered by most as unfair.	Bottom deep-water longliners and handliners
A multi-species (for blackspot seabream and splendid alfonsino) and multi-annual (2-3 years) quota that would allow them to deal with the stock natural variability could help [supported by 1 fisher].	Bottom deep-water longliners and handliners
Some fishers are in favour of controlling the number of vessels. They argue that the deep-water fisheries are already at their maximum, and that the number of fishing vessels should be distributed according to the resource capacities, eventually by developing new fisheries.	Bottom deep-water longliners and handliners

## 7.2 Commonalities

There were again fewer commonalities in the area of suggested management changes.

- **Temporary area closure**

The most obvious commonality was in temporary area closures.

Danish and Greek fishermen both specifically proposed the use of Real Time Closures (RTC) to protect particular species.

Irish fishermen have proposed closures before, e.g. Celtic Sea cod box, and would probably support others as long as they were fully involved. Some also supported the use of rolling closures in the Irish Sea for the protection of skates and rays. They are suspicious of outcomes (see following section), but definitely support closures that are not permanent.

In the Eastern Channel, French fishermen were in favour of biologically based closures, provided compensation was available.

In the Azores however, there is little support for RTC as most fishers argue that it would result in closing all fishing grounds. However most fishermen that were interviewed support the biological seasonal closure of blackspot seabream that has been implemented in the Azores since 2015. In the Balearics, spatio-temporal closures, together with selectivity improvements, are thought to be the main management tools to avoid discards.

- **Quota management**

Use of the quota system was mentioned by respondents in a number of the fisheries examined. However, there was no consensus on HOW changes in quota management would help, with different suggestions from each fishery. A broad conclusion might be that fishermen definitely see quota management as a potential mitigation measure, but are not entirely sure how this might work.

ITQs were also mentioned by French and Azorean fishermen.

Irish fishermen suggested that the monthly quotas could be extended to 2 or 3 months to allow less pressure from choke species. They also proposed quota being pooled across a number of vessels. Although very difficult to see how it would work, they also suggested that unused national quotas should be redistributed to countries with issues.

French fishers find that quotas of some species (mackerel, herring) were “given” to foreigner owners (French/Dutch owner) and this is considered as unfair as French owners practised discards. Very few complain about the amount of French quota except for some species that France has low quota for like “skate”. But some fishermen, especially in Boulogne, think that an individual quota system could be better than collective amount of quota share by POs on the historical records of each boat. IVQ could

be exchanged directly between owners without going through PO system. Nowadays, quotas exchange are managed by POs and with the agreement of national authorities.

There was a strong impression from Irish fishermen that they were really fed up with the current quota management system in Ireland as well as the LO. They seemed attracted to an effort based management system. It is interesting to note that in the Mediterranean, in contrast, fishermen are actually using a sort of quota based approaches where none existed before.

The most obvious consensus from the interviews might be that certainly in Denmark and Ireland, and probably in the Balearics, the current management, whatever it might be has little credibility with the fishermen, and that they would seriously wish to explore newer, and probably more flexible approaches.

Individual fishers have very little knowledge about LO and even less about its impact on their activity. This lack of knowledge makes difficult for the formulation of any mitigation or adaptation strategies except those proposed by their organisations such as “more selective gear”. For example, the notion of choke species is not understood yet by French fishers. Only POs and Fisheries Committees tend to speak about it. Nobody contested the current quota system based on historical rights.

## 8 No support for the following proposed methods to avoid unwanted catch – Technical

### 8.1 Responses

Ireland	Sector
Gear-technology often provides little help in a mixed fisheries as can't avoid everything.	Prawn/whitefish trawler
Grids are difficult to use and not very effective.	Nephrops trawlers
Denmark	Sector
No specific comments.	All
Spain–the Balearics	Sector
Bottom trawl fishers did not use gear modifications to avoid catching small-sized individuals because this is a highly multispecific fishery and the main problem is reduced to hake. For fishers, increasing the mesh size to reduce hake recruits would entail reducing the catches of small-sized species with important commercial value. Currently, with the implementation of the 40 mm square mesh cod-end this problem has been reduced because it reduces considerably the capture of individuals under the MLS.	Bottom Trawlers
Greece-North Aegean Sea	Sector
Scientists were working to improve trawl selectivity but fishers made their own nets before the results of the scientific project.	Shrimp fishery (trawlers)
They imported nets from Spain but they were not so good for the area, each area has its own characteristics so we prefer to make our nets. And is also cheaper.	Bottom trawlers
France-Eastern Channel	Sector
Fishers consider that they cannot do more efforts to improve trawl selectivity.	Bottom Trawlers
Portugal-Azores	Sector
There is no support for a reduction of the total number of hooks for longliners because it would result in a decrease of the commercial catch, and because they consider that the only efficient measure to reduce the amount of small fish in the catch is the hook size.	Bottom longliners      deep-water
Fishers were not interested in using circular hooks or shark repellents to avoid the catch of deep-water sharks. They do not see the point as, for most of them, the catch of deep-water sharks is only occasional and most sharks are released alive.	Bottom longliners      deep-water

## 8.2 Commonalities

Enthusiasm for further gear based technical approaches seemed to be rather muted. Most fishermen do not think that new gear modifications are really the answer, and where they have tried them have generally found them less that effective. This seemed to be based on a combination of difficulty in deployment and use, and the perception that more selective gears led to reduced catches and profits.

## 9 No support for the following proposed methods to avoid unwanted catch – Tactical

### 9.1 Responses

Ireland	Sector
Information sharing won't work outside of immediate friends/colleagues as there is no belief that people will be honest or willing to share information as there is no real incentive to do so. Also not really needed as they consider themselves to have lots of personal knowledge on where things are, and where best to fish.	Whitefish trawlers and seiners
Real-time closures won't work as there is a lack of decent real-time information to allow these areas to be effectively designed or implemented and fluctuations in fish populations are too short-term and sporadic for them to work.	Whitefish trawlers and seiners
Seasonal closures would likely restrict access to target species too much – but some support from other vessels for the Celtic Sea box closure. Cape ground (near Greencastle) closure for cod has had less evidence of benefit.	Whitefish trawler
Pooled co-op or community based quota management wouldn't be effective as not enough quota available to share out.	Whitefish and prawn trawlers
Denmark	Sector
No interview responses.	All
Spain–the Balearics	Sector
Traditionally, bottom trawlers only used northern-western Mallorca fishing grounds (Sóller) to take the red shrimp ( <i>Aristeus antennatus</i> ) during the summer and moved to southern grounds (Cabrera) during the winter months. This displacement was related to the individual size of the shrimp since fishermen avoided catching small-sized individuals. Nowadays, however, this migration pattern has been relaxed and both areas are exploited all the year round.	Bottom Trawlers
Greece-North Aegean Sea	Sector
Against new permanent closures of fishing areas, preferences for real time closures because presence of undersized fish is seasonal.	Trawlers
France-Eastern Channel	Sector
Fishers said “we avoid already areas with small fish or unwanted species” and that they would inform friends or family members.	Trawlers
Already know areas having more juvenile species	Trawlers

(estuary areas).	
Fisheries activity is based on the seasonality of big species	Trawlers
Portugal-Azores	Sector
A reduction of the soak time is not supported by the bottom deep-water longliners as it would result in a decrease in the catch amount, and as it is a lot of work to deploy and haul back the gear, it does not worth the effort.	Bottom deep-water longliners
Fishers believe that real time closures would not be efficient in the Azores as the fish populations are too short-term and variable “the whole EEZ would have to be closed”.	Bottom deep-water longliners and handliners
Most fishers consider that there is already enough closed areas and they do not want more, as it would result in more fishing effort on the other already limited fishing grounds, and it would not be efficient to avoid the unwanted catch as the populations and ages are mixed and their distribution is highly variable.	Bottom deep-water longliners and handliners
Information sharing only occasionally occur between close friends and family members. But, in general there is little trust among fishers and they are not willing to share information even on where the small fishes are, because that would result in increased competition on the good fishing grounds.	Bottom deep-water longliners and handliners

There were few commonalities under this heading. Probably the most apparent was the doubt expressed by both Irish, Greek and Azores fishermen about closures and particularly permanent closures. The most detailed responses came from the Irish fishermen, but this may be as they were asked this question specifically. What was interesting here, was that they expressed opposition to ideas that other fishermen in Ireland had supported or proposed in earlier sections e.g. information sharing and non permanent closures, like RTC. Information sharing was also seen as useful by some fishers in both the Eastern Channel, and the Azores, but again only at small, and local scale, “friends and family members” in the Channel, and lack of trust as an issue in the Azores.

This is discussed in more detail in the text sections below.



## 10 Other

### 10.1 Responses

Ireland	Sector
<p>There is a real need to properly feed fisheries data into the assessment so that it truly reflects what is on the ground. There is recognition that in the past industry data may not reflect the true picture due to a lack of logging of discards but there is still an overall feeling that science is letting the industry down in terms of stock assessment!</p>	All
<p>One particular criticism is of the lag between the assessment/TAC setting cycle and the actual management on the ground. For instance, that the last landings used in assessment can be two years out of date. An approach e.g. sentinel fisheries in year could help.</p>	All
<p>Little understanding of what the Landing Obligation actually is, how it effects the fishery and how it will be enforced.</p>	Whitefish trawler
<p>Cannot see the LO being effectively policed and can envisage too many people exploiting the system</p>	Prawn and whitefish trawlers
<p>Quotas aren't effective as the market generally appears to be flooded with fish (from Irish as well as Spanish/French fleets), ultimately effecting prices and requiring fishermen to fish for longer to cover costs. An effective quota system should be reflected by decent market prices for catches.</p>	Whitefish trawler
Denmark	Sector
<p>There is a widespread opposition towards the Landing Obligation and the concept of a discard ban. Fishermen do not believe the landing obligation will benefit the marine environment. Some fishermen (mainly pelagic) argue that the landing obligation is just going to add a bureaucratic layer but that in practice there will be no change – meaning that the landing obligation is not harmful or beneficial. It is simply pointless. The majority of interviewed fishermen argue against the landing obligation by stating that discards act as a food source for other marine organisms and that the productivity will decrease if no discards occur.</p>	All
<p>Interviewed fishermen mentioned quota uplifts, possibility to store bycatch as ensilage and to some extent free gear selection as options which they saw as benefits that would make it acceptable to take on REM</p>	Bottom whitefish and Nephrops trawlers

<p>with CCTV as a means to verify compliance with the Landing Obligation. However, the majority of interviewed fishermen were against the use of REM with CCTV, especially among fishermen who had no experience with the use of REM with CCTV. Among this group, some fishermen were quite passionate in their responses against the use of REM with CCTV. Quoting one response to the question “If video surveillance gave an increase in quota, how large would such an increase have to be for you to take cameras on board? “:</p> <p>“The question is not relevant. A quota increase cannot be great enough for me to be willing to sell my soul”.</p>	
<p>“Better” biological advice and “better” adaption of regulations to the actual situation meeting the fishermen in their daily work. One interviewed fisherman operating mainly in Kattegat and targeting Nephrops stated that: “I would prefer that we are 5 happy fishermen in Kattegat rather than 35 unsatisfied fishermen because of bad regulations and how things are”. This statement was backed by another fisherman targeting Nephrops in Kattegat.</p>	<p>Bottom whitefish and Nephrops trawlers</p>
<p>Spain–the Balearics</p>	<p>Sector</p>
<p>No additional suggestions</p>	<p>All</p>
<p>In general, fishermen consider that the LO cannot be implemented to the Mediterranean fisheries</p>	<p>All</p>
<p>Stakeholders trust on exemptions to implement the LO in the Mediterranean.</p>	<p>All</p>
<p>Greece-North Aegean Sea</p>	<p>Sector</p>
<p>All fishers consider that LO cannot be applied to the Hellenic Sea and to their fishing</p>	<p>All</p>
<p>All wait the approval of the exemptions asked by the national fisheries authorities</p>	<p>All</p>
<p>Some are ready to declare in their logbook discards</p>	<p>2 fishers</p>
<p>France-Eastern Channel</p>	<p>Sector</p>
<p>For French fishers’ LO shows that decision makers respond to the claims of particular groups, for example environmental NGO’s and the aquaculture sector. Fishers’ needs and interests, they maintain, were not taken into consideration by decision makers.</p>	<p>Trawlers</p>
<p>For fishers this decision illustrates the ignorance of decision makers about all the efforts they have expended on resources management over recent years. “We are responsible people and our decisions to obtain a better management of the resources demonstrate that, but it seems that nobody sees what we do”.</p>	<p>Trawlers and gillnets</p>
<p>Portugal-Azores</p>	<p>Sector</p>
<p>Limited knowledge about the LO and its potential impacts on their activity. For most fishers, the interview</p>	<p>Bottom deep-water longliners and handliners</p>

was the first time they heard about the LO, likely due to the fact that the LO would only be implemented in 2019 in the Azores.	
There is a strong disagreement with the LO. Most fishers do not see the point of the regulation, and believe it would be damaging for both the stocks and the fishers. They believe no one would comply, and they cannot see it properly enforced.	Bottom deep-water longliners and handliners
Criticism that scientists should perform good stock assessments for everyone to know exactly what is in the water.	Bottom deep-water longliners and handliners
Little understanding on how the quota system work, and why, no matter what they do, the management response is always a decrease in the quota: for blackspot seabream for example if they do not manage to reach the quota, the EU concludes that the abundance is too low, and the quota is reduced, while for alfonsinos it is the opposite: the quota is reached each year earlier, the EU concludes there is too much fishing, and the quota is also reduced.	Bottom deep-water longliners and handliners

## 10.2 Commonalities

We might not have expected commonalities in unsolicited ideas, but the most obvious common theme was steadfast opposition to the LO. There were also strong feelings that it would not deliver its objectives, particularly in actually reducing discards or ecosystem benefits. It was also clear that many fishermen had limited understanding of the workings, purpose and implementation of the LO.

There was also considerable antipathy expressed towards scientific advice, particularly from Irish, Danish and Azores fishermen. They clearly feel that the information fed into the assessment and hence advice does not represent the situation that they see on the fishing grounds. Several identified this as likely due to the lag in the data (surveys, landings, etc) being plugged into the assessments and then the final TACs and quotas being set.

This lack of credibility in the system to deliver its stated objectives and, what are probably seen as inappropriate management measures, e.g. restrictive quotas and the landing obligation are clearly undermining any support for the process by most of the fishermen interviewed.

## 11 Specific Issues

### 11.1 Information sharing

Information sharing between fishermen was a principle area of disagreement. Several fishermen thought that sharing information on areas where they had identified hot spots of under MCRS fish or choke species would be useful. However others thought that they would only support this within small groups where trust would be high. Discussions with one fishermen suggested that an approach would be to start such an approach with a small and coherent group of fishermen. This could be mediated through the co-op or PO systems. It could start with <MCRS hot spots, and then explore other options. The view was expressed that if this worked, it could naturally expand to others. The Marine Institute (Ireland) plans to work with one co-op to explore this option.

### 11.2 Trust

Many of the measures that encountered resistance in the interviews have also been suggested to us in other fora by other fishermen, e.g. RTC, spawning or nursery closures (e.g. seasonal), and also information sharing. Closures in particular represent constraints on their fishing opportunities, so they may be unable to fish at times and places they would like to. It is possible that they do not trust the authorities to manage these in even-handed and sensitive way. In particular that the closures would go on longer or cover wider areas than initially envisaged. However, some seasonal closures have been proposed by industry, such as the Celtic Sea cod box. Ideas like information sharing are seen as requiring trust in other fishermen, where local and detailed knowledge is seen as commercially important, and trusting competitors is difficult.

# Appendix 1: Questions for semi structured Interviews with Skippers

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## General Attitudes on Discards and the Landings Obligation (LO):

- Is there a need for a discard ban? If not: is there a better way to address unwanted bycatch?
- What do you think the purpose of the EUs Landing Obligation (LO) is?
- What are your general views on the EUs LO?
- What factors cause you to discard fish? (Quota, market, quality etc)

## Technical and tactical issues:

- What potential is there to reduce discards by gear changes?
- What potential is there to reduce discards by fishing in different areas than you usually would or by moving away from high discard areas?
- What potential is there to reduce discards by fishing at different times than you usually would?
- What kind of changes to gear or tactics have you already tried?
- What has been the effect of these changes?
- Is there any documentation of these changes or effects?

## Economic and operational issues

- How has the unwanted catch been handled onboard? How did that work out?
- How have landings of unwanted catch been handled ashore? How did that work out?
- What will the impact of the LO be on your fishing activities?
- What do you think the impact on the crew will be?
- What do you think the economic impact of the LO will be?

## Solutions/Ideas

How would the following management measures address the main problems that you face with the implementation of the LO:

### Spatial measures

- Real time closures of areas where high discard concentration are reported?
- Seasonal closures of areas with high concentrations of juveniles or quota exhausted species?
- Establishment of fleet information sharing initiatives to avoid areas of high discarding (used with some success in Canadian fisheries)?
- How would such an initiative work?

#### Gear based measures

- A ban on certain fishing gears with high discard rates?

#### Quota based measures

- Multi-month quota management (mainly relevant to Irish case)?
- Pooled quota management? (could be PO, Co-Op or community based)
- Individualised ownership of quotas?
- Multi-species quotas (e.g. a mixed quota which would cover catches of Haddock, Whiting and Cod)?

#### Combination measures

- Preferential allocation of quota to those who can demonstrate low discard rates or who use gears demonstrated to have low discard rates?

#### Governance measures

- Limit the maximum quantity of discard (de minimis exemption)?
- Changes to how international quota swaps are organised and conducted (touching on Relative Stability without mentioning it)?
- Switch to an effort based management regime (could include RTI's here)?
- Establish regional (or local where appropriate) management committees for all fisheries charged with developing adaptive fisheries management plans with a specific emphasis on discard reduction? (Adaptive management in short means that the effectiveness of management strategies must be continuously monitored and adjusted where appropriate – has a lot of crossover with results based management in that the burden of proof emphasis is shifted significantly and within reason the results are more important than the measures employed).

#### Other issues

- Are there any other measures which would help which have not been included in this list?
- What information would help you to address discarding issues? e.g. discard maps, information on discard reduction measures used elsewhere etc

## Appendix 2: Interviews with stakeholders carried out for Task 4.1

The table below presents the lists of interviews carried out within WP4 and used for this Deliverable. This includes the project task, the DiscardLess partner in charge, the number of interviews and their function/institution. These data are taken from Appendix 1 of the DiscardLess 18 month report.

	When was/were the interview(s) conducted?	Type of interview and means of recording	List of interview questions / interview guide	Affiliation/type of the interviewed persons	Language	DiscardLess Beneficiary
WP4: T4.1	12, 14 and 15 September 2016	Semi-structured; interview notes, lasting 0.5-1 hour	Interview 2	Fishermen from Mallorca (Balearic Islands)	Catalan	3 (IEO)
WP4: T4.1	April 27 2016	Interview, notes (1.5 hours)	Interview 5	Irish Fisherman	English	14 (MI)
WP4: T4.1	May 20 2016	Interview, notes (1 hour)	Interview 5	Irish Fisherman	English	14 (MI)
WP4: T4.1	July 4 2016	Interview, audio recorded (2 hours)	Interview 5	Irish Fisherman	English	14 (MI)
WP4: T4.1	July 5 2016	Interview, audio recorded (1.5 hours)	Interview 5	Irish Fisherman	English	14 (MI)
WP4: T4.1	August 3 2016	Interview, audio recorded (1 hour)	Interview 5	Irish Fishermen	English	14 (MI)
WP4: T4.1	October 24 2016	Interview, audio recorded (1 hour)	Interview 5	Irish Fisherman	English	14 (MI)
WP4: T4.1	October 24 2016	Interview, audio recorded (1 hour)	Interview 5	Irish Fisherman	English	14 (MI)

		hour)				
WP4: T4.1	27-31 March 2015	Interview, notes	Interview 2	Various fishermen representatives	Greek	15 (NAYS)
WP2: T2.5 WP4: T4.1. & WP7: T7.4	17-21 September 2016	Semi- structured; interview notes, lasting 1 to 2 hours each	Interview 2	Fishermen representatives from trawlers & purse seiners (10 people) and coastal segment (2 people)	Greek	7 UBO
WP2: T2.5 WP4: T4.1. & WP7: T7.4	Nov-Dec 2016  (22 interviews)	Semi- structured; interview notes, lasting 1 to 2 hours each	Interview 2	fishers (mostly skippers and boat owners, 3 are also presidents of fishers associations); other representatives of fishers associations	Portuguese	7 UBO, 17 IMAR-UAz
WP4: T4.2	July 2015	Semi- structured; interview notes, lasting 1.5 hours	Interview 5	Irish Fisherman	English	27, MNRG
WP4: T4.2	July 2015	Semi- structured; interview notes, lasting 2.5 hours	Interview 5	Irish Fisherman	English	27, MNRG
WP4: T4.2	November 2015	Semi- structured; interview notes, lasting 2 hours	Interview 5	Irish Fisherman	English	27, MNRG