

DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT
STRUCTURAL AND COHESION POLICIES **B**



Agriculture and Rural Development



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**SMALL-SCALE FISHERIES
AND THE ZERO
DISCARD TARGET**

STUDY





DIRECTORATE-GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES

FISHERIES

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STUDY

This document was requested by the European Parliament's Committee on Fisheries.

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Abstract

Discarding was considered by the European Commission a serious problem in European fisheries and one which must be addressed as a high priority. The aim of the present study is to provide a comprehensive analysis of the discard problem on small-scale fisheries in Europe in order to put forward recommendations and policy-relevant advice for decision-makers.

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LIST OF ABBREVIATIONS

AGRI	Agriculture and Rural Development Committee
ACEs	Annual Catch Entitlements
CFP	Common Fisheries Policy
EC	European Commission
EMFF	European Maritime and Fisheries Fund
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
ITQ	Individual Transferable Quota
IVQ	Individual Vessel Quota
ICES	International Council for the Exploration of the Sea
TAC	Total Allowable Catches
MSFD	Marine Strategy Framework Directive
TURF	Territorial Uses of Right Fisheries
SSF	Small-scale fisheries
WFD	Water Framework Directive

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EXECUTIVE SUMMARY

Background

Based on Kelleher (2005), the global weighted discard rate is 8%, which represents 6.8 million tonnes with respect to total recorded landings of 78.4 million tonnes at the time this estimate was made. Discarding was considered by the European Commission (EC) to be a serious problem in European fisheries and one which must be addressed as a high priority (European Commission, 2007). Discarding is also perceived as unethical and a waste of resources (Kelleher, 2005; European Commission, 2011). Large individuals of a given species usually attract a higher market price than smaller individuals. The vast majority of fish discarded in European Union (EU) waters are sexually immature. Discarding returns biomass directly to the ecosystem but the effects of so doing are poorly understood (European Commission, 2002).

The discard problem also has economic and social consequences and ultimately affects the stock assessment of commercial species. The loss of growth potential incurred by the harvest of small fish, regardless of whether or not they are discarded, reduces the potential yield from a given fishery. Reduction in yield may in the short run be compensated economically by an increase in seafood prices.

However, the most probable outcome is that the fish stock cannot replenish itself due to a too small spawning stock (European Commission, 2002). As a result, the real quantities of discards are often unknown, and the real exploitation rates exerted on stocks, especially on young fish, are uncertain. This has a number of repercussions, especially for the evaluation of measures intended to improve selectivity in order to reduce catches of young fish. Solutions to the problem of discarding in fisheries have been debated for decades. Despite this attention, measures to ameliorate discarding have had limited success (Stockhausen et al., 2012). The discard problem was considered as an important objective for the future of the Common Fisheries Policy in its Communication on this subject adopted in 2002¹.

Reforms of the Common Fisheries Policy (CFP) included the implementation of an EU-wide ban on discarding, to be phased in from 2015, requiring the landing of unwanted small and unmarketable fish. The EC argues that this will create strong incentives for more selective fishing practices; however, there is little information to allow us to predict likely changes in fishing behaviour and good reason to think that outcomes may be different in large- and small-scale fisheries (SSFs) (Condie et al., 2014).

Aim

The aim of the present study is to provide a comprehensive analysis of the discard ban in the context of SSFs in Europe, in order to put forward recommendations and policy-relevant advice for decision-makers.

The qualitative method used here included the development of a participatory dialogue to discuss with key stakeholders (scientists, fishermen) to better understand the impacts of the discard ban of the new CFP on SSFs in Europe.

The approach used three combined methodological approaches:

¹ COM (2002) 656. Other Communications which refer to the discard issue from an environmental perspective are COM(2002) 186 and COM(2004) 438.

1. An exhaustive literature review about the impacts of the discard ban on small-scale fisheries based on the collection and processing of secondary data available from the vast literature on small-scale fisheries in Europe and elsewhere;
2. An expert consultation focused on experts who work on discards and small-scale fisheries in Europe and elsewhere;
3. Analysis of data collected from fieldwork and case studies in the Northwest of Spain (Galicia) by focusing on a multispecific small-scale fishery (mainly European hake, horse mackerel and mackerel).

Literature review

The first approach is a review of the peer-reviewed and grey (newspapers, webpages, reports, thesis, etc.) literature to identify studies documenting the discard problem in SSFs in developed countries under different fisheries management tools and the relationships between discarding behaviour, management measures and fisheries stock status. This analysis will enable us to quantify current rates of discards in different types of SSF, identify which fisheries characteristics may be related to the current discard problem.

To date there been no systematic review of SSFs and discards to adopt discards bans and/or measures which analyse the topic from the environmental, social and economic disciplines. Such a review serves as a decision-making framework for determining which critical factors may have greater success in dealing with the implementation of the discard ban in European SSFs.

We conducted a literature review that identified not only which countries adopted technical measures to reduce/eradicate discards but also key factors and enabling conditions that may be important to solve the discard problem. This analysis can be used to help managers identify the incentives to successfully implement the new CFP. The literature review is based on the experience from developed countries (Australia, Canada, Japan, New Zealand, Norway, Iceland and USA) which have developed a set of advanced fisheries management systems and regulations on discards, with experience in the use of effective technical measures, where there is available scientific evidence on such measures. The literature search was limited to the dimensions and impacts of discards of different type of species caught for human consumption and which are directly and indirectly targeted in SSFs.

Expert consultation

We combined the literature review with an online expert consultation carried out during December 2014 to February 2015 which included the opinion of fisheries scientists engaged in SSF and officials from the administration from different Member States in the EU. The overall objective of the consultation was to collect detailed information on the current knowledge about discards in European SSFs, including the Atlantic and Mediterranean seas. The expert consultation took into account the specific context of SSFs and how the discard ban can affect them. The expert consultation also evaluated the latest scientific evidence and lessons learned in different countries from implementing a discard ban and/or technical measures to eradicate discards in SSFs.

The selection of expert participants followed standard criteria, including geographic, gender balance and expertise in SSFs from different disciplines (e.g., anthropology, biology, ecology, economics, law, etc.). All participants were informed about the confidentiality of the information gathered from the questionnaire. Forty experts were identified, 75% of them from Southern countries where SSFs have specially high cultural, economic and social

relevance for coastal communities. The questionnaire included questions related to the specific knowledge and expertise of each expert on discards in SSF in his/her country by including the following topics (Annex 1):

- a) Identifying the main advantages, drivers, and problems derived from a discard ban or successful technical measures to eradicate them;
- b) Examining potential incentives for non-compliance with the zero discard ban;
- c) Considering which changes in the EU regulations for technical measures could be adopted to facilitate the landing obligation for the SSF fleets;
- d) Identifying the major economic and social consequences of these technical measures;
- e) Formulating recommendations concerning a discard ban and how small-scale fishers can/should deal with it while maintaining the sustainable development of SSFs.

The interview protocol involved five parts (Annex 1):

- Part A (*Personal information and knowledge about SSFs*): Each interview began with questions to gain insights about the current affiliation of the interviewee and years of experience working with SSF. This part also includes information about their personal and professional experiences on SSFs (e.g., where relevant, name of main commercial species, fishing gear, length and tonnage of fishing vessels, type of fisheries management system and average value of catches for the last 5 years). In addition, interviewees were also asked to provide information of their level of education and capacity building on SSF.
- Part B (*Perceptions on the landing obligation and its socioeconomic impacts*): the interviewer asked questions to reveal the perceptions of experts about the landing obligation adopted by the Basic Regulation (CE) N° 1380/2013, and whether the expert believed if that this measure provided advantages (and which ones) for small-scale fishers. The interviewee was asked through an open question about the difficulties they foresee for fishers to comply with the discard ban. This part of the interview also incorporated questions related to the economic and social impacts of the discard ban. The interviewee was also asked to provide an estimate of the economic value as well as the potential loss of employment due to the landing obligation.
- Part C (*Willingness to comply with the discard ban and incentives*): the interviewees were asked to identify the perceptions about the willingness to comply by the fishers and which type of fishing gears changes would be needed to achieve compliance. In addition, this section also incorporated open questions about what are the most effective incentives to reduce discard practices as well as the experts' perceptions towards the effectiveness of potential exemptions for the "*de minimis*" discards set in the Regulation CE N° 1380/2013, and if the adoption of exemptions could help to solve the discard problem.
- Part D (*Technical measures*): the interviewees were asked to provide their opinion about which technical measures could help to flexibilise the discard ban and what type of capacity/technological adaptations would be necessary for adoption by the owners small-scale fishing vessels, including the affordability of setting up a separate storage area in their vessels, and the capability to handle the harvested catches on board. This part of the interview concludes with a question about the type of changes in the seafood markets that could incentivise the reduction/eradication of discards.
- Part E (*General opinion*): the interview concludes with an open and general question to determine what other changes and/or measures could help to reduce discards in European small-scale fisheries.

Attitudes and perceptions of small-scale fishers towards the discard ban

The general methodological approach used in this subsection is mainly based on semi-structured interviews. The data and information gathered through this technique were then used to generate questionnaires in order to provide a qualitative basis for statistical analysis. In most cases, defining the boundaries of a group of people who are affected by a regulation may be critical for the development of their activities (Ostrom, 2000). We sought people whose profession and/or means of livelihood are linked to the species included in the Regulation (CE) Nº 1380/2013.

Using non-proportional quota sampling (Tashakkori and Teddlie, 2003), our sample included those small-scale fishers who play an active role in fisheries for key species of SSF affected by the discard ban. In-person interviews with narrative-based methods and appropriate probes can be well-suited for exploring subjective and experiential topics, arguably helping people reflect on their values more deeply than paper or web-based surveys. Considering the limited time to develop this study (2 months), we therefore effectively chose qualitative over quantitative methods, involving a smaller sample in an in-depth exploration of each case study.

When conducting in-depth interviews, the number of new concepts and/or results associated with each additional interview generally tends to diminish after 20 and 30 interviews (Morgan, 2002). Accordingly, in this study we used a small sample size since the goal was to identify the diversity of ways in which the consequences of the discard ban is relevant to people. The people we interviewed represent a wide range of employment activities in each of the different fisheries and live in several coastal communities in the north and south across the Autonomous Community of Galicia (NW Spain).

The stakeholders' attitudes and perceptions can contribute to: a) provide key information about the local dynamics of SSFs currently unavailable in official data and reports and on the problems and challenges related to the discard ban, b) recognize the spatial-temporal dimension of the discard practices, c) indicate how discards affect their economy, d) reveal the level of knowledge about the discard ban of the new CFP, d) identify the obstacles (if any) that small-scale fishers will face in relation to the discard ban, f) identify the best incentives to motivate small-scale fishers to land all their catches, and g) collate the technical measures proposed from the fisheries sector to avoid discards in SSFs.

We designed a semi-structured interview to enable interviewees to verbalize how the discard ban will affect their small-scale fishing activities under the new CFP. We conducted interviews with key fishers in the hake, horse mackerel and mackerel fisheries. We interviewed 20 fishers in a face-to-face manner with questionnaires designed in the Galician language. We conducted fieldwork between mid-December 2014 to February 2015, which comprised one main stage. Interviews began with signing a consent form and confidentiality agreement along with a brief project description, both in writing and verbalized by the interviewer. The content of the interview protocol is structured in three parts by collecting information on key topics related to the discard ban (See Annex 2 for detail information on the Questionnaire for fishermen).

1. GENERAL INFORMATION: STATUS OF GLOBAL MARINE RESOURCES, THE SMALL-SCALE FISHERIES AND IMPACTS OF DISCARDS

KEY FINDINGS

- **Wild-capture fisheries are a critical source of food and employment** for people worldwide, providing a source of livelihoods and income for an estimated 260 million people worldwide;
- **Small-scale fisheries rely on local resources** and have lower overhead in terms of capital, but generate a higher number of jobs relative to large-scale industrialized fisheries;
- **Discard practices constitute a purposeless waste of valuable living resources;**
- **Discards** also represent a major **source of undocumented mortality**, contributing to the **overfishing of European fish stocks**.

The global marine catch has been stagnant for at least the last two decades, hovering around 85-90 millions per year. In 2011, 8.8% of fish stocks were estimated as fished at a biologically unsustainable level and, therefore, overfished. Of the stocks assessed for that year, fully fished stocks accounted for 61.3% and underfished stocks 9.9% (FAO, 2014). The percentage of overexploited, depleted and recovering stocks has tripled since the 1970s (Kleisner et al., 2012). The overexploitation of so many commercially exploited species is the result of high fishing effort exerted globally, which is estimated to exceed the optimum by a factor of three to four (Anticamara et al., 2011). The World Bank and the United Nations' Food and Agriculture Organization (FAO) estimated that the excess of fishing effort may cost the world roughly \$50 billion a year in net economic losses (World Bank, 2009), contributing to the decline of fish stocks.

Wild-capture fisheries are a critical source of food and employment for people worldwide, providing a source of livelihoods and income for an estimated 260 million people worldwide (Teh and Sumaila, 2013). FAO (2014) estimates that, overall, fisheries and aquaculture assure the livelihoods of 10–12% of the world's population. In addition to livelihoods, fish are a critical source of dietary protein and micronutrients for impoverished communities that may not have ready access to other sources of nutrition (FAO, 2014). In many parts of the world, the livelihoods and nutritional benefits from marine resources are derived locally, from communities that fish in coastal and inland waters near their homes (FAO, 2014).

Most of the world's fisheries are mainly to be considered to be 'small-scale', although there is no clear definition of what constitutes a small-scale fishery. Allison and Ellis (2001) broadly define SSFs as those "that operate from shore or from small boats", fundamentally, in coastal and inland waters, with an average of 1-4 crew on board and strongly linked to local communities. Generally, SSF rely on local resources and have lower overhead in terms of capital, but higher labour intensity (Salas et al., 2007) relative to large-scale "industrialized" fisheries (Chuenpagdee et al., 2006).

However, conventional fisheries management has generally focused on large-scale, single stock fisheries, with monitoring and enforcement methodologies that are data-intensive which also require high economic costs to maintain such system, and with relatively little focus on human dimensions or local knowledge. While some management tools may be

applicable to SSF, evaluations of their effectiveness and their integration into broad-scale management frameworks lag behind evaluations of fisheries management tools for large-scale fisheries. As result, better management of both large-scale and SSFs is needed to ensure that exploitation levels remain sustainable.

The definition of discards adopted by FAO (1996) is as follows: "*Discards, or discarded catch is that portion of the total organic material of animal origin in the catch, which is thrown away, or dumped at sea for whatever reason. It does not include plant materials and post harvest waste such as offal. The discards may be dead, or alive*".

By-catch is the total catch of non-target animals. Discards are not a subset of bycatch since the target species is often discarded (Kelleher, 2005). Discard practices constitute a purposeless waste of valuable living resources, and play an important role in the depletion of marine populations (Kelleher 2005; Zhou 2008; Bellido et al. 2011). Furthermore, discarding may produce a number of adverse ecological impacts in marine ecosystems due to changes in the overall structure of trophic webs and habitats, which in turn could risk the sustainability of current fisheries. Discarding can be highly variable in time and space as a consequence of changing economic, environmental, and institutional factors (Crean, 1994).

However, knowledge of the effects of discarding on ecosystem structure and function is still quite incomplete. All estimates of quantities of fish discarded arise from scientific sampling programmes, which have existed since the 1930's. The scientific sampling programmes have usually been directed at demersal species often taken in "mixed fisheries" where several commercial species are taken simultaneously by each deployment of the fishing gear (European Commission, 2002).

Currently, solid evidence exists on the adverse effects on the stability of trophic webs and their negative implications for commercial stocks, as for instance in demersal communities. However, the effects on ecosystem structure and function (e.g., biodiversity, community structure, trophic links) of returning biomass directly to the ecosystem through discarding, the incentives of fishers, and the economic and social impacts of discarding are not well known. The effects of discarding on the stability of trophic webs may have negative consequences for commercial stocks due to the disruption of species interactions and cascading effects throughout the trophic chains.

According to the published research, the problem is greater in industrialized large-scale fisheries than in SSF, and hence, the rather industrialized Northeast Atlantic and Northwest Pacific fisheries account for 40% of the world's discards (Kelleher, 2005). Discarding occurs not only due to poor gear selectivity and the capture of unwanted fish. Undersize fish may be discarded due to the minimum landing size regulations, overquota fish can be discarded in a multi-species fishery due to quota exhaustion of one species, and less valuable size classes of target species may be discarded to make room for more valuable size classes (high grading). All these issues are reported to be present in EU fisheries, although for those that are not managed by quota the biggest problem is minimum landing size discards (European Commission, 2011). These different reasons for discarding impact heavily on the willingness to comply with rules and regulations.

In the European Union, discards represent a major source of undocumented (or poorly documented) mortality, contributing to the overfishing of European fish stocks (European Commission, 2011a). Discarding levels in EU fisheries vary between locations, gears, species and fishing grounds (Uhlman et al. 2011). The International Council for the Exploration of the Sea (ICES) has estimated the total quantities of haddock and whiting discarded in the North Sea (ICES Sub-area IV) and to the west of Scotland (ICES Division VIa) and of cod in

the eastern and western Baltic Sea. For haddock and whiting, the sampling programmes were initiated in the mid-1970's. Estimates for Baltic cod first became available in 1996 but have only relatively recently been included in routine stock assessments. Now, these estimates have been extended to most of the commercial species (ICES, 2014), and much research has been carried out.

However, the data collection and estimates of discards for all commercial species in EU waters under the CFP are far from being complete and generally have low precision. This reflects the relatively low intensity of discard sampling and the high variability in amounts of fish discarded, even within a single fishery (e.g. Stratoudakis et al., 1999). The omission and/or poor discard data from stock assessments may also result in underestimation of exploitation rates and can lead to biased assessments and policy recommendations, hampering the achievement of resilient and sustainable fishery resources uses (Aarts and Poos, 2009).

The discarded proportions in trammel net fisheries vary between 20% in the Northeast Atlantic to 40% in the North Sea (Sigurðardóttir et al., 2014). In the Mediterranean, discard ratios from bottom trawlers show high differences among areas and operations, varying from 20% to 65% (Coll et al., 2014; Ksagarikis et al., 2014). In general, it is clear that there is a relationship between the selectivity of the fishing gears and the percentage of catch discarded. The use of gears of large mesh size incurs less discarding (10-15% by weight) than the use of gears of small mesh size (50% or more in some cases).

2. THE ROLE OF SMALL-SCALE FISHERIES IN THE EUROPEAN UNION

KEY FINDINGS

- **Small-scale fisheries (SSF)** is a sector with **high social, economic and cultural importance for coastal communities**, especially in Southern Europe;
- SSF has developed different **diversification** strategies over time to ensure their **economic and social viability**, while the industrialized fisheries sector developed a specialization strategy based on internationalization at seafood markets;
- Despite their high importance there is a **lack of knowledge on biological, environmental, socioeconomic, management and policy aspects of SSF**.

The EU's blue economy (all economic activities that depend on the sea) represents 5.4 million jobs and a gross added value of just under €500 thousand million per year. The sea and the coasts are drivers of the economy (European Commission, 2012). Within this context, the focus of the present in-depth study is small-scale fisheries (SSF²). The term SSF implies small vessel size and, sometimes, low levels of technology and capital investment per fisher³. For the purposes of the European Maritime and Fisheries Fund (Regulation (CE) N° 508/2014, "small-scale coastal fishing" was formally defined as fishing carried out by fishing vessels of an overall length <12 metres and not using towed gear. SSF are thus typically "artisanal" and coastal, using small boats, targeting multiple resource species using traditional gears.

Landings from European Union (EU) SSFs are worth around €2 thousand million euros annually, i.e. 25% of the revenue generated by EU fisheries and SSF thus have a high value in the seafood supply chain. Around 80% of EU fishing boats and more than 40% of EU fishers (90,000) are engaged in SSFs (Macfadyen et al., 2011), emphasizing that SSFs represents a sector with high social, economic and cultural importance for coastal communities, especially in southern Europe. Fish and fishery products are one of the most traded food commodities globally, and this trend is expected to continue rising. If considered as a whole, the EU is by far the largest importer of fish and fisheries products in the world (around 65% of the total in 2010), with a trade balance for fish that has been negative and deteriorating over the years. From 1990 to 2010 its fish trade deficit almost tripled, as imports increased from US\$15.9 billion to US\$44.6 billion (Natale et al., 2014). For this reason, managing sustainably EU fisheries (including SSF) should be a top priority for the EC to reduce the dependency of seafood imports around the world (Villasante et al. 2013).

The small-scale fleet has declined by 20% over the last 10 years, to just over 70,000 vessels. Small-scale vessels are on average between 5-7 m in length, weigh 3GT, and have engines with a power of 34 Kw (Macfadyen et al., 2011). More than 90% primarily use passive gears (i.e. gears that are not towed or dragged through the water) such as drift and fixed nets, hook and lines, or pots and traps.

² The term "small-scale fisheries" implies a relatively small vessel size and sometimes has the added connotation of low levels of technology and capital investment per fisher (<http://www.fao.org/fishery/topic/14753/en>)

³ <http://www.fao.org/fishery/topic/14753/en>

Despite their high importance, for decades, EU fishery policy (e.g, quotas, subsidies, management systems) has focused on large-scale fishing, and there is a lack of knowledge on biological, environmental, socioeconomic, management and policy aspects of SSFs. SSFs face diverse challenges and pressures, not least to establish appropriate governance systems. Thus, the top priority for decision makers is to explore measures to enhance production and increase seafood consumption from European waters as well as optimise benefits and reduce costs, including the reduction of discards as a waste of food for human consumption.

The need for sustainable SSFs is recognized in EU and international policy, e.g. Europe 2020, Water Framework Directive (WFD), Marine Strategy Framework Directive (MSFD), European Commission's CFP⁴, Food and Agriculture Organization of the United Nations (FAO). The new CFP specifically aims to have a differentiated management regime for SSFs in Europe. In a recent vote on the European Maritime and Fisheries Fund (EMFF), the European Parliament recognized the importance of SSF for the sustainability of local coastal communities, particularly concerning women and youth. In November 2012, EU artisanal fishers presented a Declaration asking EU policy-makers to 1) Grant the right to fish to those who fish sustainably; 2) Reduce fleet overcapacity, while preserving jobs in artisanal, low impact fisheries; 3) End harmful subsidies and unsustainable and destructive practices; and 4) Restore the health of our seas in Europe and the rest of the world⁵.

SSF present particular challenges for governance, including the large numbers of boats and fishers, the relatively low incomes for fishers, and the high diversities of gear and target species (e.g. many coastal species not targeted by large-scale fisheries). The distinctive nature of the SSF sector means many traditional approaches to fishery monitoring, assessment and management are inappropriate. SSFs have traditionally received less research effort than large-scale fisheries and are generally under-studied in Europe, even though the SSFs are highly represented in all EU member States (Guyader et al., 2013). Historically there has been little assessment of targeted stocks, management and regulation have been light, and landings and fishing effort have been poorly documented.

Despite the increased recognition of SSFs there is a need to ensure that policymakers receive good scientific data and information on which to base decisions and thus ensure coherent policy. High levels of discarding are often associated with trawl fisheries. However, given the influence of regulation and perverse market incentives, discarding can occur in fisheries targeted by any gear type.

⁴ Regulation (EU) No 1380/2013.

⁵ Joint declaration of European artisanal and low impact fishers and shellfish harvesters, from the European Artisanal Fishermen's Congress, November 2012.

3. THE DISCARD BAN UNDER THE NEW COMMON FISHERIES POLICY

KEY FINDINGS

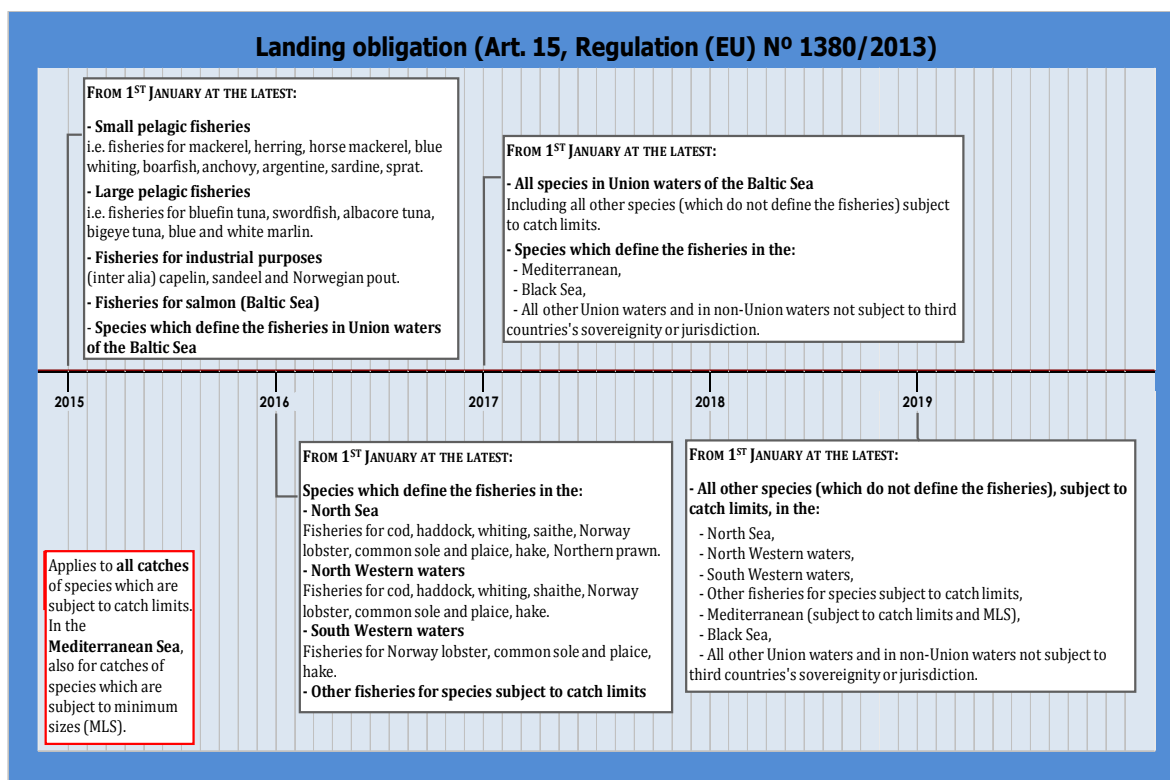
- The **new CFP does away with the wasteful practice of discarding** through the introduction of a landing obligation;
- The new Regulation (CE) N° 1380/2013 calls for a move towards a **gradual elimination of discards on a case-by-case basis**;
- The discard ban **enhances the dilemma and the challenges** to address different biological, economic and conservation objectives in fisheries.

The Green Paper on the CFP identified the high level of discards in Europe as one of the structural deficiencies of this policy (European Commission, 2009). The EC has proposed reforms of the CFP that seek to reduce these unwanted catches and eliminate discards by 2019 (European Commission 2012; Regulation (EU) N° 1380/2013). The new CFP does away with the wasteful practice of discarding through the introduction of a landing obligation.

The new orientation of the CFP (Regulation (CE) N° 1380/2013) calls for a move towards a gradual elimination of discards on a case-by-case basis. For the new regulation period (2014-2020) the plan is to phase out discarding of commercial (and TAC or effort regulated) species. The successful implementation of this new regulatory framework will rely heavily on the provision of effective technical options and appropriate incentives for fishers to adopt harvesting methods and industrial strategies that (i) avoid the catch of unwanted biomass and (ii) encourage the retention of what is harvested. To achieve this goal requires addressing the problem on a case-by case basis employing a multidisciplinary approach.

The landing obligation is expected to stimulate the adoption of selectivity measures by fishers. However, since harvesting selectivity cannot be perfect, the landing obligation also represents a challenge regarding the best handling and use of the unwanted catch. To the extent this is dealt with successfully, it will also contribute to the mitigation of the negative impact on fishers from the potential loss of wanted catch that may accompany increased harvesting selectivity and which may create an incentive for non-compliance. Under the landing obligation all catches have to be kept on board, landed and counted against the quotas. Undersized fish cannot be marketed for human consumption purposes.

The landing obligation will be applied on a fishery by fishery basis. It is currently only effective in certain European fisheries, namely pelagic, industrial and Baltic salmon and cod fisheries. By 2019, however, all European fisheries will come under the landing obligation, in which all exploited pelagic, demersal and shellfish species that are managed (e.g. by TACs, quotas, and/or minimum sizes) caught must be landed. This includes accidental catches of non-target species, but not catches of prohibited species, which cannot be retained and must be returned to the sea. Captured live fish, that potentially could survive, after being returned to sea, may also be exempt under certain conditions.

Figure 1 Timeline of the discard ban under the new Common Fisheries Policy

Legal minimum landing sizes will generally remain the same. Nevertheless, undersized fish must be landed and will be counted against quotas. Under the landing obligation, undersized fish can be sold in accordance with existing European marketing standards (e.g. not for human consumption). Catch reporting rules will remain the same, in that all catches (including undersized fish and/or exempted discards) must be registered in the fishing log book. Details of the implementation of the landing obligation will be included in multiannual plans or in specific discard plans when no multiannual plan is in place. These details include the species covered, provisions on catch documentation, minimum conservation reference sizes, and exemptions (for fish that may survive after returning them to the sea, and a specific *de minimis* discard allowance under certain conditions). Quota management will also become more flexible in its application to facilitate the landing obligation.

The existing minimum landing sizes remain largely the same, except for Baltic cod and anchovy in the South-Western waters, where minimum conservation reference sizes have been established in regional discard plans. In October 2014 the Commission has proposed five discard plans (through so-called "delegated acts")⁶ in preparation for the implementation of the landing obligation that is applicable from 2015 in pelagic and industrial fisheries in all Union waters, and fisheries for cod in the Baltic.

⁶ Commission Delegated Regulation (EU) No 1392/2014 of 20 October 2014 establishing a *discard plan for certain small pelagic fisheries in the Mediterranean Sea*; Commission Delegated Regulation (EU) No 1393/2014 of 20 October 2014 establishing a *discard plan for certain pelagic fisheries in north-western waters*; Commission Delegated Regulation (EU) No 1394/2014 of 20 October 2014 establishing a *discard plan for certain pelagic fisheries in south-western waters*, Commission Delegated Regulation (EU) No 1395/2014 of 20 October 2014 establishing a *discard plan for certain small pelagic fisheries and fisheries for industrial purposes in the North Sea* and Commission Delegated Regulation (EU) No 1396/2014 of 20 October 2014 establishing a *discard plan in the Baltic Sea*.

4. THE DISCARD PROBLEM IN MODERN FISHERIES MANAGEMENT

KEY FINDINGS

- The discard problem in **SSF attracted little attention for the scientific community**. A total of 3,924 scientific papers have been published on discards, of which 3,760 are related to industrial fisheries and **only 164 papers focused on SSF**;
- The **effectiveness of a discard ban** in pioneer **developed countries** is still **unclear** mainly because **discard data is not methodically collected by most countries' fisheries authorities**;
- The expert's opinion and the participatory consultation made with the small-scale fisheries sector show that **changing the fisheries management system based on the TAC regulation** would be the most important reason to compliance the discard ban;
- Experts and fishermen also pointed out that **the exemptions of «de minimis» nor help to reduce discards in SSF neither will be an incentive to comply the ban**;
- In **Galician SSF** the level of **discards is low**. The main reason to discard in the case study is due to the **over quota** allocated for the commercial species.

4.1. Literature review of discards on small-scale fisheries

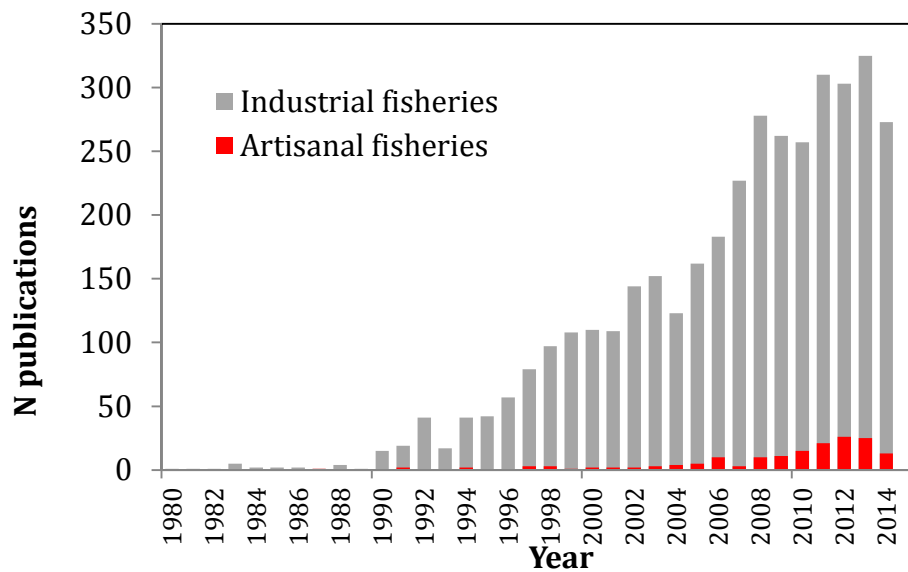
To date there has been no systematic review of SSFs and discards to determine which fishery characteristics or enabling conditions may affect discards reduction from an environmental, social and economic perspective. Such a review could serve as a decision-making framework for determining which management strategies may have greater success in specific geographic locations, governance systems, types of fishing gears and fish stocks.

The literature review was based on the experience from developed countries (Australia, Canada, Japan, New Zealand, Norway, Iceland and USA) which have developed a set of advanced fisheries management systems and regulations on discards, with experience in the use of effective technical measures where there is available scientific evidence on them. The literature search was limited to the dimensions and impacts of discards of species caught for human consumption and which are directly and indirectly targeted in SSFs.

We searched for scientific papers published between 1950-2014 period in the Web of Science, by using the following criteria: "fishery" or "fishing" or "fisheries"; and "discard" or "discarding" or "bycatch" or "by-catch" and "artisanal" or "small-scale" or "industrial".

The results obtained show that the topic of discards in SSFs attracted little attention for the scientific community. Figure 2 indicates that a total of 3,924 papers have been published, of which 3,760 are related to industrial fisheries (95.8%) and only 164 papers focused on artisanal/small-scale fisheries (4.2%). In 2014, the number of papers published was 273 and 13, industrial and artisanal/small-scale fisheries respectively.

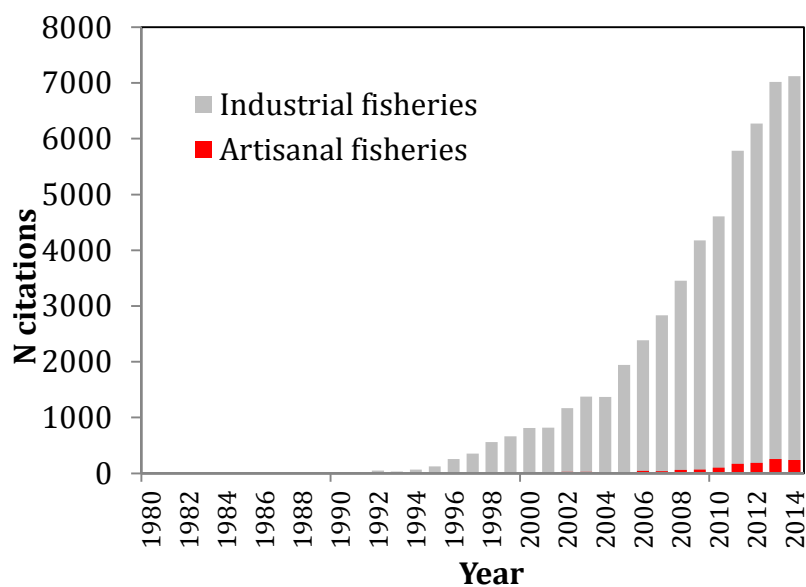
Figure 2. Global number of publications related to discards for industrial and artisanal fisheries (1950-2014)



Source: own elaboration from Web of Science.

By following the same criteria of search, Figure 3 also shows that papers on discards were cited in 54,614 papers during the 1950-2014 period, in which industrial fisheries represent again the largest (97.5%) number of total citations. On the contrary, the discard problem in SSF is only presented in 1,313 papers.

Figure 3. Global number of citations related to discards for industrial and artisanal fisheries (1950-2014)



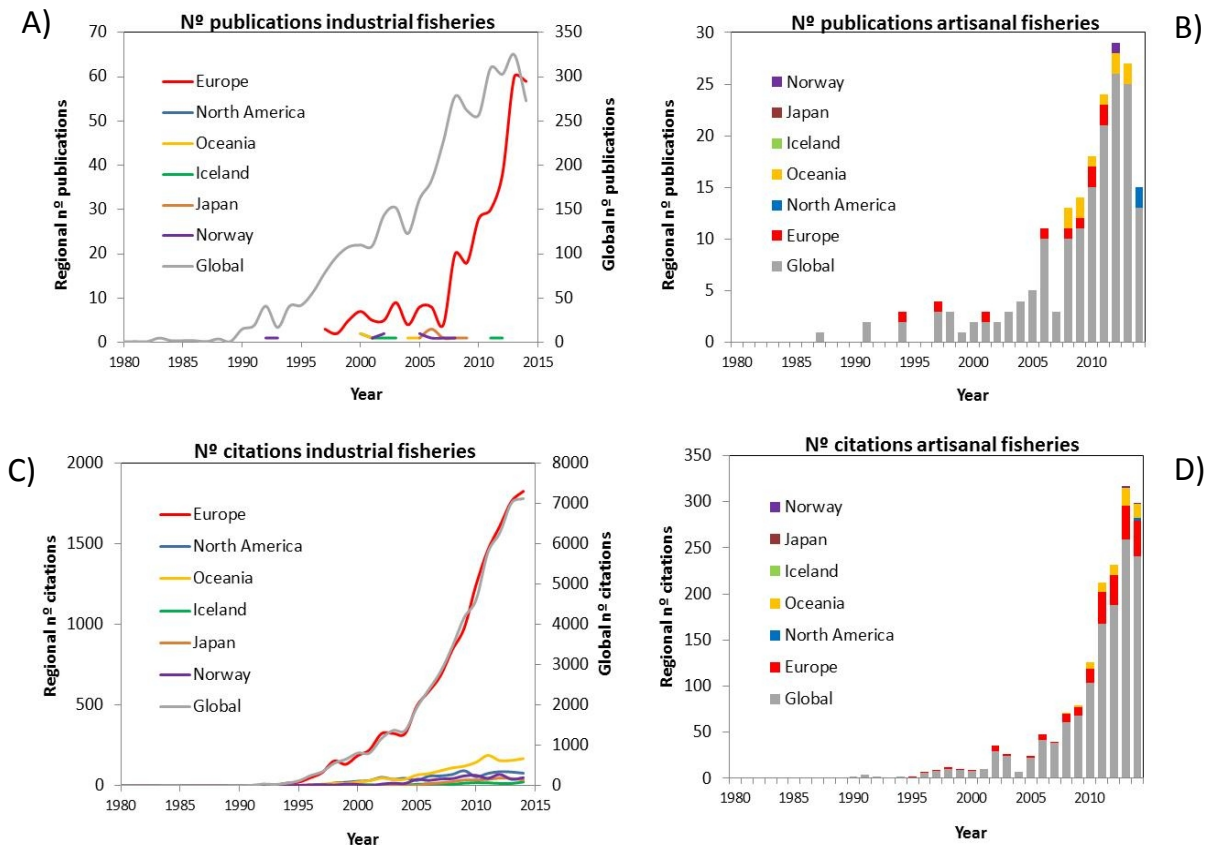
Source: own elaboration from Web of Science.

However, since 2010 there has been a particular emphasis on discards in SSFs, with an average of 192 citations per year, while the number of citations of discards in industrial fisheries for the same period was 6,160 per year.

The little attention paid by the scientific community to discards in SSFs is due to the fact that the magnitude of the problem was mainly concentrated in industrial fisheries, while SSFs generally have lower discard rates than industrial fisheries. According to Kelleher (2008), SSFs account for over 11% of the discard database landings and have a weighted discard rate of 3.7%. However, it may also be true that SSF discards are less well-documented.

Given that all developed countries and/or regions with advanced fisheries policies are included in this study, it is possible to identify which are the most active countries in the scientific understanding of the discard problem and elucidate measures to solve it. Figure 4a and b shows that the European Union concentrated only the 8.5% and 6.1% of the total publications related to discards in industrial and small-scale fisheries respectively. During the last 10 years (2004-2014) in which 143 papers related to discards and SSFs were published in scientific journals. The most active developed regions/countries (in this order Oceania, Europe and North America) represented 13.9% of total publications (Figure 4b).

Figure 4. Global number of publication and citations related to discards for industrial and artisanal fisheries by regions and countries (1950-2014)



Source: own elaboration from Web of Science.

Figure 4c also presents the literature review results of the number of citations of scientific papers published in referred journals linking discards and industrial fisheries and SSFs globally. The results indicate that Europe developed an important role in the scientific citations of papers in developed regions/countries, with 25% and 15% of total citations related to discards in industrial and SSF respectively. During the last 10 years (2004-2014) in which 1,198 papers related to discards and SSFs were cited in scientific journals, the most

active developed regions/countries (in this order Europe, Oceania, and North America and Norway) represented 21.3% of the total citations (Figure 4d).

From the developing countries, Latin America is the region of the world with almost 50% of total number of papers published which address the discard problem in small-scale fisheries. Probably, because Latin American and Caribbean (LAC) countries are among the worlds' richest in marine biodiversity in which SSFs are of critical important for fishing communities, and fishing activities engage several million people (Villasante and Österblom, 2015). These fish stocks are produced in some of the most diverse ecosystems of the world (Bovarnick et al. 2010), which emphasizes the need for ecosystem stewardship that can contribute to securing functioning and resilient marine social-ecological systems.

The recent adoption by national governments of co-management tools as an integral part of their fisheries policies is providing increased potential for innovation and experimentation of novel governance approaches (Villasante and Österblom, 2015). Studies of such experimentation provide informative case studies that contribute to the development of the theory and empirical research regarding co-management and other forms of ecosystem stewardship (Gelcich et al. 2010). Gutiérrez et al. (2011) have investigated factors that contribute to the success of co-management initiatives in Latin American countries and elsewhere. Relevant factors, especially for meeting social-ecological goals in small-scale fisheries, include trust, cooperation, leadership, and community cohesion. In spite that discards are not a widespread problem in Latin American SSFs due to the sedentary features of the harvested species which are sedentary, the scientific research done in the region show that the co-management system helped significantly to improve the situation of SSFs.

4.2. Technical measures taken by developed countries to eradicate discards

The majority of measures to reduce discards have been introduced in large-scale fisheries. It should be borne in mind that measures linked to tradable quotas, which have been partially successful in reducing discards in large-scale fisheries may be less suitable in SSFs. Additionally, empirical evidence that transferable quota systems alone (e.g., ITQs, ACEs) contribute to discard reduction is still lacking (Parslow 2010; Hatcher 2014). ITQs can result in fishing rights being concentrated among a few large companies, increasing economic efficiency but reducing the social value of the fisheries, an aspect that is crucial in the context of SSFs.

Although discards are generally considered to be a bigger issue for large-scale fisheries than for SSFs, comparison of Atlantic and Mediterranean case studies suggests that discard rates may be generally high in the Mediterranean despite the high importance of SSF in the latter area. The monitoring of compliance with a discard ban is typically based on onboard observer coverage of fishing activity, again something unsuitable for fleets comprising very numerous small boats. The use of on-board camera systems may represent a viable alternative. However, the high logistical, surveillance and monitoring costs of introducing a discard ban for SSFs could be a reason to not extend the discard ban to these fisheries.

4.2.1. New Zealand

New Zealand fisheries are under a quota management system that encompasses both ITQs and annual catch entitlements (ACEs), which are a leasable form of ITQ that can be traded independently (MRAG, 2007). A total ban on discards is in force, with the exception for species with high survival rates (MRAG, 2007) and specimens below MLS (Sanchirico et al., 2006). Compliance with discard regulations is incentivised by the permission to land

overquota and bycatch species. To do so, fishers have the option to buy additional quota or pay a “deemed value”, i.e., a penalty corresponding to the market value and weight of catch subtracted to catch profits. The deemed value increases with the magnitude of the overage in order to discourage excessive overruns of quota.

The impact of the discard ban cannot be accurately assessed because there are no comprehensive data on discards in New Zealand. Nevertheless, some studies indicate that discarding is still in place. In some fisheries, fishers discard catch to avoid deemed values (Mace et al., 2014). Information from anecdotal reports mentioned by Mace et al. (2014) indicate that increasing amounts of fish are being discarded illegally for being undersized, or because fishers do not possess enough quota to cover by-catch. This arises from decreasing incentive to comply with regulations. Many fishers in New Zealand have sold their lucrative ITQs and bought cheaper ACEs. Furthermore, new people entering the industry normally buy ACEs instead of the costly ITQs. This results in reduced fishers’ sense of ownership due to loss of property rights that discourage compliance with discard and bycatch regulations (Mace et al., 2014).

4.2.2. North America (USA and Canada)

The **US Alaskan groundfish fishery** has operated under annual species-specific total allowable catches (TACs), allocated by area, season, and gear type, which, depending on the vessel size, are monitored through partial or full observer coverage (Graham et al., 2007). A discard ban is operational since 1998 and a system of individual vessel quotas (IVQs) allocates the fishing rights to commercial species (Sigler and Lunsford, 2001), while non-target species are protected by fishery specific bycatch limits (Graham et al., 2007). The retention of some vulnerable and commercially important bycatch species is prohibited and, in case bycatch exceeds specified levels, the fishery has to be relocated or closed (Graham et al., 2007; Gilman et al., 2006). Alongside these management measures, it is also implemented a fleet communication programme intended to report near real-time observations of bycatch hotspots (Gilman et al., 2006). In this way, so vessels stay informed and avoid these fishing areas, consequently reducing bycatch of protected species.

These efforts to reduce bycatch and discards have proven to be successful since they incentivised more selective fishing (Condie et al., 2014). Discard rates of Pacific cod have sharply fallen from 11.7 to 6.8 % between 1997 and 1998, declining and pollock have fallen from 6.8% to 0.4% by 2003 (Graham et al., 2007). Discards of pollock have dropped from 3.7, and to less than 1%, respectively between 1997 and 2003 (Graham et al., 2007). In response to high bycatch of prohibited species, there was a voluntary change from demersal to pelagic trawling, which resulted in bycatch rates falling below 2% (Graham et al., 2007). The fleet communication programme contributed to the redistribution of demersal longline fishery vessels from areas associated with higher bycatches, resulting in bycatch rates 30% lower than those of vessels which were not associated with the communication programme (Condie et al., 2014), and 33% lower bycatch mortality rates of Pacific halibut (Gilman et al., 2006; Williams and Chen, 2004). The implementation of IVQs reduced the number of vessels operating in the sablefish and halibut longline fishery, which combined with improved choice of fishing grounds the avoidance of high bycatch fishing areas, resulted in a 9% increase in the spawning biomass per recruit by 2001 (Sigler and Lunsford, 2001). According to Aydin et al. (2010), there are not overfished groundfish stocks in these fisheries, with the exception of 3 stocks that are below target biomass levels.

The **British Columbia groundfish trawl fishery** is managed under an ITQ system supported by an extensive observer and monitoring coverage of the fishing activities. A full dockside monitoring is in force, which requires all vessels to inform the Fisheries

Management office at least one day before returning to port where they intend to land their catch, which will be monitored by a dockside inspector (Rice, 2003). Furthermore, this monitoring programme is complemented by full observer coverage at sea, with the objective to prevent discarding and high grading and to ensure that no fish enter the market illegally (Rice, 2003). The discarding of the main target rockfish (*Sebastes*) species is banned in this fishery, and only species which cannot be retained legally can be discarded with caution to maximise their survival (Rice, 2003).

When fishers reach their quota, they can no longer fish in the area or, alternatively, can buy additional quota within specified limits (Grafton et al., 2005). However, there are a few exceptions. For example, when fishers catch until 37.5% of halibut and 15% of hake over quota, they can still legally land the catch without buying additional quota, which reduces the incentive to discard (Condie et al., 2014). The value of these catches' overages is confiscated and the catch counted against the following year's quota, removing the incentive to target overquota catch that can be legally landed (Condie et al., 2014). To discourage highgrading, the discarded catch with market value is counted against quota (Condie et al., 2014). Furthermore, bycatch limits exist for non-target and non-quota species (Grafton et al., 2005; Sanchirico et al., 2006).

It was observed a decrease in discards of several rockfish target species but Condie et al. (2014) argue that they are due to constraining quotas and the accounting of discard mortality by on-board observers. Fishers started to target species with bigger quotas and avoided areas where species with limited quotas were more abundant (Condie et al., 2014), resulting in 50% reduction in some rockfish species' catches (Branch et al., 2008). Bycatch limits were also successful in incentivising more selective fishing, as discard rates of spiny dogfish decreased by 5% between 1997 and 2004 (Condie et al., 2014), and the annual bycatch of halibut by 15% (Grafton et al., 2005).

4.2.3. Iceland

In order to find the best approach to fisheries management in Icelandic fisheries, the country's authorities implemented effort regulation schemes based on maximum allowable fishing days at sea for all vessels (Johnsen and Eliassen, 2011). However, these effort restrictions were abandoned and replaced by an ITQ system, first for larger vessels, and later for inshore fishing boats under 10 GT as well the remaining fishing boats (Haraldsson, 2008).

In Iceland, discards are banned fishers are obliged to land all catch, with the exception of live young haddock and cod caught by handline (Sanchirico et al., 2006). Catch information is reported by both buyers and sellers to the Directorate of Fisheries, and, in case of mismatching information and violation of the law, the uncompliant can be fined, lose the fishing licence or even be detained (Johnsen and Eliassen, 2011). Inspectors from the Directorate of Fisheries monitor the landing of the catch and publish the information, together with quota use, on the Web, for transparency (Johnsen and Eliassen, 2011).

In case fishers catch above their quota, they still have an incentive to land all the fish caught. They can either be covered by quota from the following year (up to 5% quota of the coming year) (Sanchirico et al., 2006; Hutton et al., 2010), purchase additional quota (in case of larger overages and non-target catch) (Johnsen and Eliassen, 2011), or land a small bycatch percentage without using quota (Johnsen and Eliassen, 2011). The value of over quota and non-target catch is channelled for fisheries research (MFA 2015), after 20% of the total value is subtracted to cover fishers' landing costs (Sanchirico et al., 2006; Hutton et al., 2010).

There is no minimum landing size in Icelandic regulations. To prevent catching small size fish, mesh size regulations are enforced (ICES, 2014). Additionally, the Directorate of Fisheries discourages the capture of juvenile fish by applying real-time closures to fishing grounds from which large quantities of undersized fish are caught (MFA, 2015). Fishing is prohibited for two weeks in such areas, and if there are several consecutive quick closures, the Minister of Fisheries can enforce area closures for longer periods and force the fleet to move to other fishing areas (ICES, 2014).

The efforts made and the management strategies chosen by Icelandic authorities to reduce discards have proven successful since discarding of the main commercial species has declined and remains low. Discard rates of cod are below 2.2%, of haddock below 5%, and for saithe and golden redfish discards are negligible (ICES, 2014). ICES (2014) argue that the country's low discard rates are a result of the flexibility embedded in its ITQ system.

However, some issues still persist. Misreporting in landings might be happening due to the TAC system. In an unpublished report by the Icelandic Directorate of Fisheries, in which export information from fish processing plants is compared to landings weight, indicates mismatching information in landing statistics in the order of single digit percentages (ICES 2014). Additionally, about 10,000 t of over quota and small size catch is landed annually under the permitted 5% quota overages (MRAG, 2007).

The effectiveness of the area closures is still unclear. It is argued that juveniles might not be protected by short-term closures but by successive ones instead (ICES, 2011). Nevertheless, in the last 3 decades, Icelandic authorities closed temporarily about 2000 fishing areas, usually due to bans on by banning bottom trawling and longlining (MFA 2015).

4.2.4. Norway

A discard ban is in place in Norwegian fisheries, meaning that all commercial species caught must be landed under this policy (MRAG, 2007). Nevertheless, there are some exceptions, namely certain shellfish, crustaceans, starfish, sponges and other marine organisms that, if alive and able to survive, can be discarded (Johnsen and Eliassen, 2011). Under the Norwegian discard policy, vessels which possess a quota for a certain species can see this quota reduced as a result of bycatch of that species taking place in other fishery (Johnsen and Eliassen, 2011). The responsibility to ensure the vessel has quota to fish belongs to the skipper. The fishing industry in Norway largely supports the discard ban (Graham et al., 2007).

The main Norwegian fisheries are regulated under a TAC system subdivided into ITQs or group quotas (MRAG, 2007; Graham et al., 2007). All catches are counted against quota and, in case quota or bycatch is exceeded slightly, fishers can still land and retain their catch (Johnsen and Eliassen, 2011). If large overages of quota or undersized fish are caught unintentionally, landing of all catch can still be legally done, but the catch is confiscated and its sale value given to the marketing organization (Graham et al., 2007), after the subtraction of 20% to cover landing costs, in the case of demersal fisheries (Gezelius, 2008). When large overages of quota and/or high amounts of undersized fish are landed, fishers have to change fishing grounds (Johnsen and Eliassen, 2011). If fish above vessel's quota or non-target species are caught, legal action can be taken against those who caught it on purpose and/or did not reported them (Johnsen and Eliassen, 2011).

A system of real-time area closures is controlled by the Directorate of Fisheries to protect undersized fish, and monitored by inspectors in the field (Johnsen and Eliassen, 2011). Area closures can also extend over larger periods of time and be as large as almost half the

Barents Sea area, which had to be shut down due to high retention of undersized fish (Graham et al., 2007). The closure of the fishing areas can be triggered by many events, including the cases when more than 15% of the catch corresponds to below legal size cod, haddock and saithe (ICES, 2011). Furthermore, some closures are related to fish behaviour, namely in the herring purse seine fishery, where day-time closures are enforced if the possibility of seine bursts are predictable due to the presence of large herring shoals during daylight in the area (Johnsen and Eliassen, 2011).

The effectiveness of the discard ban cannot be totally evaluated since discard data is not methodically collected. The EU Discarding Commission of 2004 estimated that Norwegian discards to be between 5-10%, slightly higher than those of the Institute of Marine Research of Norway, i.e., 2-8% (MRAG, 2007). The main reason for discards in Norway is believed to be highgrading because most Norwegian fisheries are regulated by quotas. An EU Commission report on discarding (MRAG, 2007) argues that highgrading is usually not removed with technical measures and restrictions.

The area closure system has created incentives for the use of more selective gear, as is the case of the successful Nordmøre grid (Isaksen et al., 1992). The *Pandalus* shrimp fishery was responsible for catching large amounts of undersized fish which triggered the closure of large areas of the Barents Sea (Graham et al., 2007). As a result, affected fishers had a strong incentive to engage in more selective practices and some of them developed the Nordmøre grid, which greatly reduced bycatch, and consequently spread beyond borders and is now mandatory in all *Pandalus* fisheries of the North Atlantic.

4.2.5. North Atlantic (Faroe Islands)

Discarding levels in EU fisheries vary between locations, gears, species and fishing grounds (Uhlmann et al., 2013). For example, the discarded proportions in trammel net fisheries vary between 20% in the Northeast Atlantic to 40% in the North Sea (STECF, 2006; Tzanatos et al., 2007). Similarly, proportions discarded by trawl fisheries will vary with fishing ground, and also between trawl types (Uhlmann et al., 2013). Northeast Atlantic pair trawlers discard from 40% to 60% of their catch, while single bottom trawlers discard between 20% and 40% of their catch throughout the Northeast Atlantic (Uhlmann et al., 2013).

In 1994, the Faroe Islands banned discard from its waters and implemented a TAC/ITQ system. However, by 1996, the TAC/ITQ system was abandoned, not only due to high administrative costs and effort to impose such measures, but also because illegal landings and discards were thought to continue (Jákupsstovu et al., 2007). The TAC/ITQ system was substituted by an effort regulation system that allocates a specific number of fishing days to license holders based on the estimated capacity of each vessel or gear group (Løkkegard et al., 2007). Alongside with effort regulation and a discard ban, the Faroese authorities implemented specific restrictions in the 200 m depth contour area around the island, called “the ring” (Johnsen and Eliassen, 2011).

During the spawning season, some areas inside the ring are closed to fishing, and the great majority of trawlers are forbidden to fish inside the area (Jákupsstovu et al., 2007). The Fisheries Inspection can also close the area when big hauls of juvenile fish are reported, although the “small-fish regulations” allow fishermen to bring a certain share of fish below the minimum landing size (MLS) per haul (e.g., 30% of cod sized under 55 cm per haul; Johnsen and Eliassen, 2011). Reporting big hauls of juvenile fish is strictly mandatory, and fishers are obliged to leave the fishing ground if 4% or more of the total trip catch of cod is below 40 cm (Gezelius, 2008). To avoid catching undersized fish outside the ring, trawlers

have to comply with regulations that specify the use of large minimum mesh sizes and sorting grids (Løkkegard et al., 2007).

The management system in the Faroe Islands is largely based in effort regulations coupled with area closures. Johnsen and Eliassen (2011) point out the importance of capacity control for the fishing-day system, as greater capture capacity corresponds to greater effort per fishing day. Monitoring is also fundamental. In fact, in the Faroe Islands, vessels over 15 tonnes are obliged to have monitoring systems (VMS) installed, while smaller ones are monitored by landing tickets (Gezelius, 2008).

Discarding in the Faroese fisheries targeting cod, saithe and haddock is estimated to be low (ICES, 2011), but no comprehensive discard data is available to analyse the efficacy of the ban. Although it is difficult to know if this management system creates incentives for more selective fishing, it is evident that it did not improved the status of haddock stocks (currently depleted), nor the status of cod and saithe stocks, which according to ICES (2011) advice should see a reduction of over 30% in effort to result in sustainable exploitation.

4.2.6. Mediterranean Sea

Mediterranean fisheries represent an important and vital sector of European Union fisheries, accounting for 46% of total EU fishing vessels. They comprise up to 22% of the EU fleet in terms of tonnage and 34% in terms of engine power. Artisanal fisheries include a range of gears such as gillnets, trammel nets, traps, pots and other small-scale gear (STEFC, 2011).

In the Mediterranean discards include both species with no commercial value and marketable species (Annex 3 of Council Regulation (EC) No 1967/2006). The latter are represented both by undersized specimens, considered unmarketable for their minimum landing sizes, and species discarded for their low market value, despite their legal size (Bellido et al., 2014)⁷.

Discards are characterised by extremely high species diversity (more than >100 species in a bottom otter trawl and of these >60 discarded) with a high percentage of non- commercial catch (commercial portion of catch may range from 30-80%) and high variability in total discard rate due to seasonality (Bellido et al., 2014).

Unreported removals and discards represented important portions of total removals in the Mediterranean (Coll et al., 2014). In the Mediterranean, discard ratios from bottom trawlers show high differences among areas and operations, varying from 20% to 65% (Tsagarakis et al., 2014). A study combining data collected via the data collection framework indicates that there is a high difference in discard levels between the Mediterranean Sea and other regions in the EU and overall the variation in discard ratios for a number of commonly-discarded species is often greater between regions than between fisheries (Uhlmann et al., 2013). In the case of percentage of discards by fleet, gillnets (25-30%) and artisanal gears (45%) show important percentages of discards in the Balearic Islands and Andalusia discards from the artisanal fishery in the Gulf of Cadiz may have experienced an increase from the 1990s to 2010 (Coll et al., 2014).

⁷ For a detail description of the discard regulation in force in the Mediterranean Sea, see Bellido et al. (2014, p. 27-30).

The landing obligation of regulated species in the EU Mediterranean is raising some concerns about its effective implementation (Bellido et al., 2014). The EU CFP should caution about the contextualization of discard management according to the local/regional characteristics of each SSF; coordination and participation between/with stakeholders; and caution about the ecological cost of landing discards. The high logistical, surveillance, monitoring and ecological costs could produce a negative outcome despite the objective pursued, the willingness of the fishing industry to reduce discards and the profitable use of the resource by its proposed end users. This may lead to the measure proving unviable in the Mediterranean Sea and its ensuing failure to reduce discards (García-Rivera et al., 2015).

4.3. Expert consultation on the discard ban in European small-scale fisheries

We conducted an online expert consultation between December 2014 and January 2015 which included the opinion of fisheries scientists and officials from the administration. The overall objective of the consultation was to collect detailed information about the current knowledge about discards in European SSF, including the Atlantic and Mediterranean seas. The expert consultation took into account the specific context of SSFs and how the discard ban can affect them. The expert consultation also evaluated the latest scientific evidence and lessons learned in different countries from implementing a discard ban or technical measures to eradicate discards in SSF.

The selection of expert participants followed standard criteria, including geographic and expertise in SSFs from different disciplines (e.g., anthropology, biology, ecology, economics, law, etc.). All participants were informed about the confidentiality of the information gathered from the questionnaire. Forty experts were identified, 75% of them from Southern countries where SSF have specially high cultural, economic and social relevance for coastal communities. The questionnaire included questions related to the specific knowledge and expertise of each expert on discards in SSFs in his/her country by including the following topics (questionnaire in Annex 1):

- a) Identifying the main advantages, drivers, and problems derived from a discard ban or successful technical measures to eradicate them;
- b) Examining potential incentives for non-compliance with the zero discard ban;
- c) Considering which changes in the EU regulations for technical measures could be adopted to facilitate the landing obligation for the SSF fleets;
- d) Identifying the major economic and social consequences of these technical measures;
- e) Formulating recommendations concerning a discard ban and how small-scale fishers can/should deal with it while maintaining the sustainable development of SSFs.

We obtained 75% returns of the total questionnaires sent to experts, and 66% of the respondents come from countries of Southern Europe, 30% from Northern European countries (United Kingdom, Sweden) and the remaining 5% from North America (USA/Canada). The socioeconomic characterization of interviewees indicate that 100% of them holds a University degree and 75% of them has received training in SSF. Regarding their professional activities, 33% are currently working on at regional/national administrations specialized on fisheries and non-governmental organizations (NGOs), while the rest of experts came from the academia and research institutes (16% each respectively).

Results from expert consultation show that 55% of stakeholders perceived the discard ban as not being the most important measure adopted by the new CFP to maintain SSFs under the maximum sustainable yield. However, the remaining 45% of the experts stated that the discard ban was also necessary to stop the wasteful discarding of perfectly edible catches. The majority of the consulted experts also pointed out that the discard problem in SSFs is in general low, which is consistent with global estimates of discards for SSFs (Kelleher, 2005).

They have also provided important insights to be taken into account necessarily for the successful implementation of the discard ban at productive and institutional levels. The fishing sector has an opportunity to demonstrate that they are really willing to do the best to reduce discards significantly, and this will necessarily involve the adoption of new technologies and the implementation of innovation strategies at all levels in their business including, of course, governance and organizational levels.

Collaboration with scientific and institutional organizations is also an essential driver for success in this process. If significant progress is achieved in a short time, this will be an opportunity to recover trust and claim the support of civil society to their activity, for example, through increasing the willingness to pay for sustainable fishery products. For the authorities it is also a big challenge because they need to really demonstrate that they are really committed and are effective in enforcing more sustainable fishing practices and at the same time do whatever is in their hands to guarantee that fishing communities (at least the most vulnerable ones) are able to survive to this process.

Experts from the academia, administration and NGOs were also asked to answer questions related to the discard ban, about critical and potential changes to be adopted by fishers and socioeconomic consequences of the zero discard policy on their fishing activities. Most of them stated that these exemptions have been developed for industrial non-SSF fisheries and, in particular, for cases where selectivity is difficult to increase without disproportionate costs, or for cases where there would be disproportionate costs of handling unwanted catches. Table 1 shows that, except from NGOs, the discard obligation is seen as highly positive for the majority of the interviewees, while the adoption of exemptions to the “*de minimis*” set up on Article 15 of the Basic Regulation (Reg. (CE) N° 1380/2013) seems not to be a solution for the small-scale fishers.

Interviewees also answered questions related to how changes in the structural characteristics of fishing vessels and gears could help to reduce discards in the SSFs they know and/or they are currently working on in their daily research. This was done because the main origin of discards is related to the low amount of fishing possibilities and quotas rather than the inexistence of market demand or the selectivity of gears. Regarding changing fishing gears as a measure to reduce discards, most of the experts from different fields agree that this measure will not contribute to reduce discards.

In addition, most of the 75% of the experts answered that changes in the seafood markets could reduce discard in SSF. For example, the adoption of market oriented measures such as the promotion and valorisation of under-utilized species can help to comply with the ban. The seafood market usually does not distinguish both marketable and discarded (usually undersized) fishery products equally. An increasing awareness about the discard problem by consumers could increase their willingness to pay for sustainable fishery products.

Table 1. Average responses statements from stakeholders' perceptions towards the discard ban in EU small-scale fisheries (%)

STATEMENT/PERCENTAGE OF TOTAL	ACADEMIA		ADMINISTRATION		NGOs	
	Agree	Disagree	Agree	Disagree	Agree	Disagree
I see advantages in adopting the discard ban in SSF	75	25	75	25	25	75
Exemptions to the " <i>de minimis</i> " discards can solve the problem	25	75	0	100	50	50
Changing fishing gear characteristics could reduce discards	66.6	33.3	75	25	75	25
Changing technical features of fishing vessels could reduce discards	25	75	0	100	75	25
Changes in the handling of fish on-board could reduce discards	25	75	50	50	50	50

Source: own elaboration from interviews (this study).

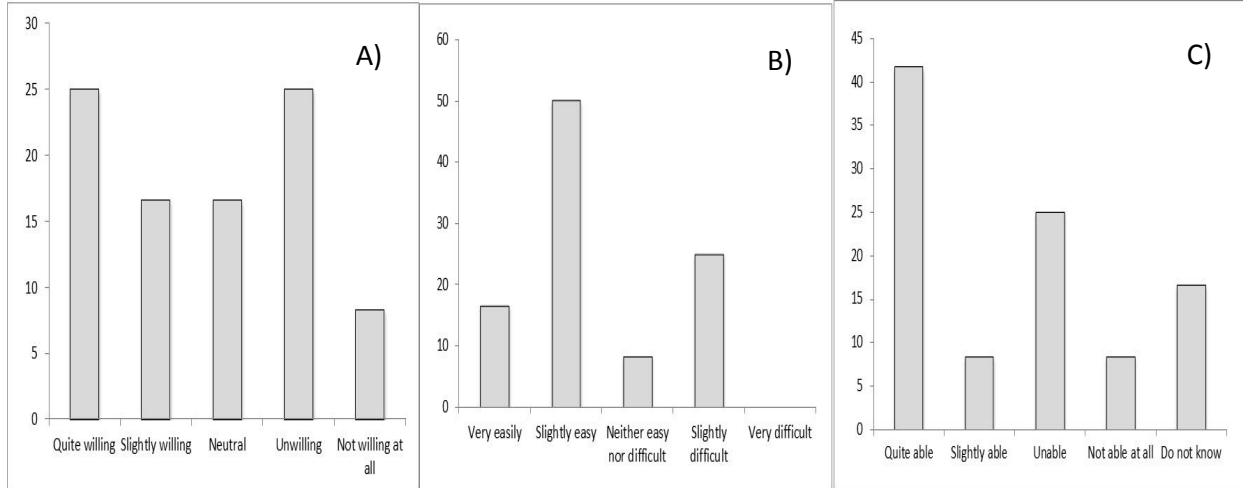
The results indicate that both academics and administration were of the opinion that changes in the technical features of fishing vessels will not help to reduce discards; while representatives of NGOs were of the opposite opinion thinking that this type of technical measure could contribute to reduce discards. The adaption to the new zero discard policy in European SSFs will lead to different socioeconomic impacts. Some of the experts provided an estimated value of the economic impacts of the zero discard policy. In Galicia, the annual direct and indirect economic losses range between €30-40 and 50 million respectively. In terms of employment, the discard ban could originate a direct and indirect loss of 7,000 jobs in the small-scale fisheries sector. In Greece, a well-enforced discard ban could reduce the production by 50% since catches are composed of around 50-60% from undersized species. The annual production of SSFs in the country is estimated to be 60,000 t with an average market price of 4 €/kg, which would generate economic losses between €100-120 thousand euros annually.

In addition, the majority of the experts believe that small-scale fishers will be willing to comply with the ban (25% "*Quite willing*" and 16.6% "*Slightly willing*"), while 25% of them do not believe that this will happen (Figure 5a). Imperfect enforcement, lack of knowledge on how to proceed, slow reaction to any change in current fishing practices, lack of preparation in ports to deal with the new landing obligation and lack of space in boats to keep all catches are some of the key factors that the EC should consider when implementing the discard ban in SSFs.

Results from Figure 5b also indicate that experts believe that fishers would be relatively willing (16.6% "*Quite willing*" and 50% "*Slightly willing*") to hold all catches (including discards) in their fishing vessels. Figure 5c also presents interesting results related to the capability to afford the setting up of a separate storage in vessel's decks. Indeed, expert's consultations show that this will be feasible for small-scale fishers ("*Quite able*", 41.6%).

Figure 5 Results from expert's consultations about the discard ban in European SSF (%):

- A)** Small-scale fishers will be able to comply the ban,
B) Small-scale fishers would be able to hold all catches (including discards) in their fishing vessels, and
C) Capability of fishing vessels to afford the setting up of a separate storage in vessel's decks.

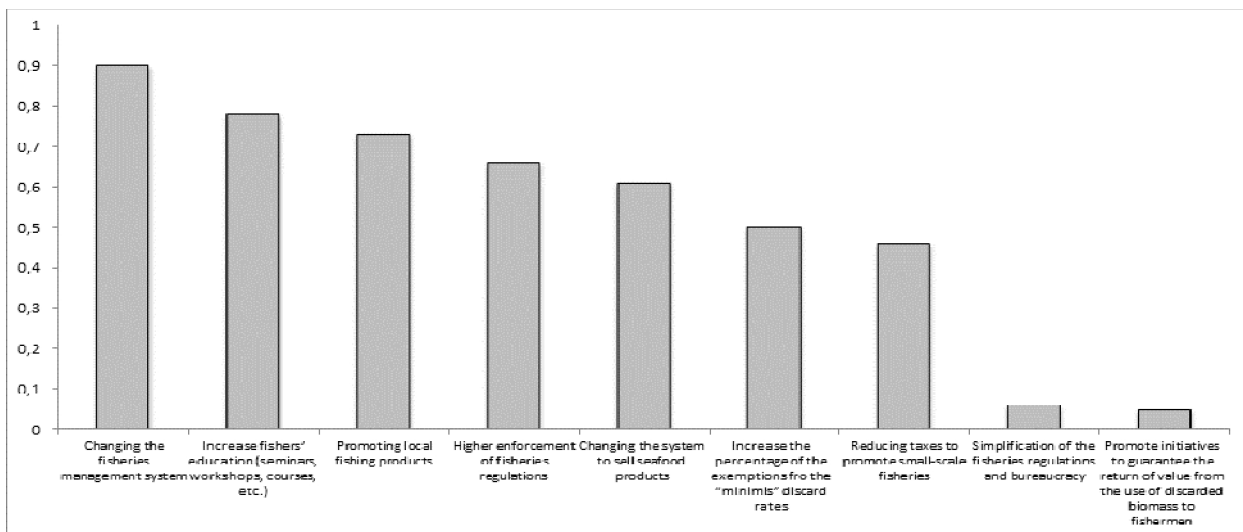


Source: authors.

Figure 6 present results on the possible incentives for compliance with the zero discard policy by small-scale fishers. According to the experts, changing the fisheries management system based on the TAC regulation would be the most important incentive to compliance.

Three other incentives receive similar scores: increase fisher's education towards the waste of fish, promoting the sale and consumption of local seafood products, and a higher enforcement of fishery regulations. Difficulties to comply with the discard ban require the adoption of a complex variety of contributors: selective gear technology and management practices, potential use of unwanted catches, and logistics for managing unwanted catches, among others.

Figure 6 Results from expert's consultations about several incentives to comply with the discard ban in European small-scale fishers



Source: own elaboration from interviews.

In addition, the expert consultation also showed that fishermen would not obtain higher economic benefits if they comply with the discard ban. The fishermen would not willingness to accept to land all catches if they consider that the landing of the discards will be used against them.

4.4. Fishermen's perceptions towards the discard ban: a case study from Galician SSF (Spain)

4.4.1. Socioeconomic characteristics of the fisheries sector

Galicia (NW Spain) is one of the regions with the highest socio-economic dependence on fishing in EU (Freire and García-Allut, 2000; Molares and Freire, 2003; Villasante, 2009; European Commission, 2014), not only due to the high level of fish production and employment but also to the strong relationships between fisheries and other sectors of the local economy (Villasante, 2012). The activity strongly contributes added value to the gross domestic product in the region.

Table 2 Main socioeconomic characteristics of the Galician fisheries sector (2014)

CATEGORY	INDICATOR	UE-27	SPAIN	% UE	GALICIA	% ESP	% UE
Fishing fleet*	Vessels	87,445	10,544	12	4,881*	46	6
	Tonnage	1,725,938	379,209	22	183,552	48	11
	Kilowatts	6,682,574	858,067	12	338,774	40	5
Production	Landings (t)	6,143,294			173,568		3
	Landings (Millions €)	6,900,000	712,669	10	451,300	63	6
	Aquaculture production (t)#	1,254,106	274,225	22	255,450	93	20
	Aquaculture production (Millions €)	3,598,955	447,361	12	183,900	41	5
Canning industry	Production (Millions €)	29,852,802	1,134,255	4	429,525	38	2
Consumption	Consumption per capita	24.5	42.9		32.4		
Employment	Aquaculture and fisheries sector	220,015	38,833	18	32,700	84	15
	Canned industry	115,661	18,324	16	8,500	46	7
Seafood trade	Imports (t)	13,395,182	1,654,500	19	633,057	8	5
	Imports (Millions €)	56,371,161	7,342,049	38	1,525,704	8	3
	Exports (t)	12,588,067	1,099,533	9	376,305	23	3
	Exports (Millions €)	46,515,720	4,225,309	9	951,000	23	2
Rents	GVA fisheries/PIB(%) **	0.2	0.2		2.4		

Source: adapted from STECF (2014), Xunta de Galicia (2015). * 1,225 vessels from auxiliary fleet of aquaculture sector are not included. **Fisheries and aquaculture. # Marine aquaculture.

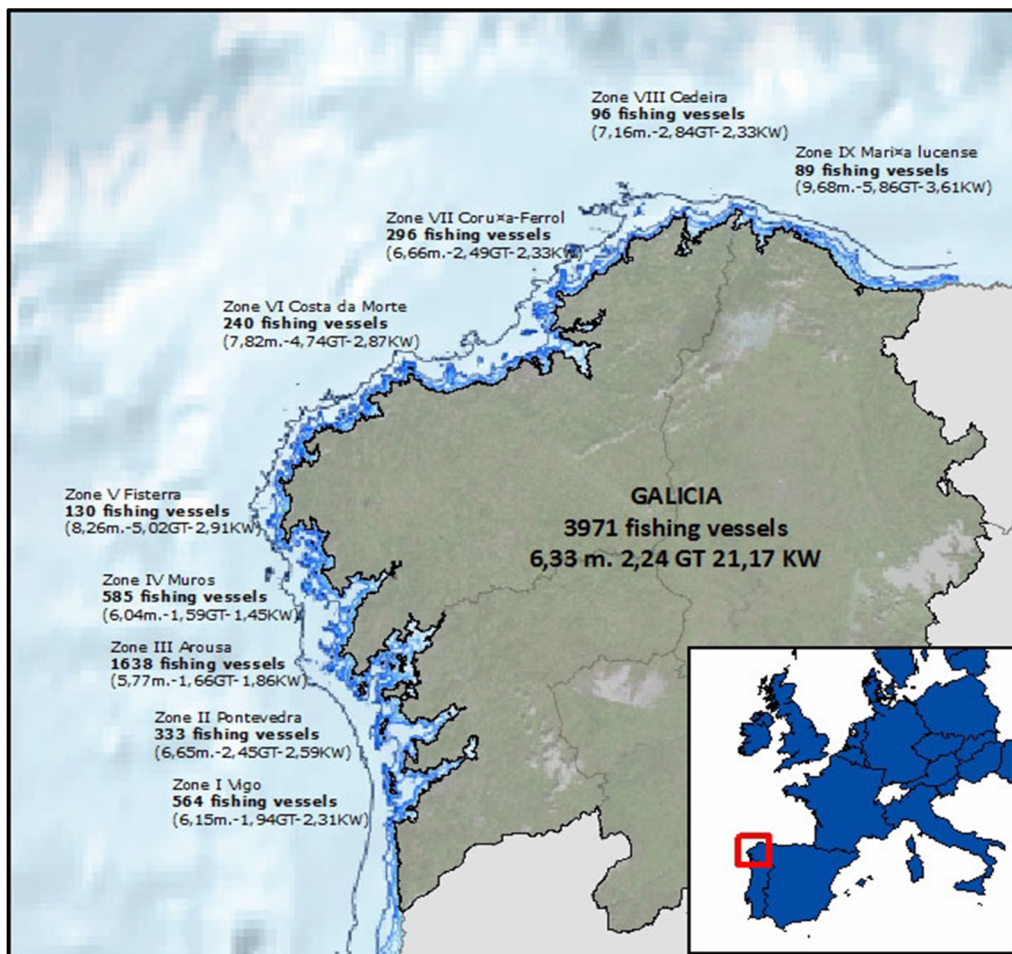
Galicia has more than 40 % of the country's fleet working out of its ports. Galicia contributes with 50 % of Spanish catches and more than 60% of total employment in the fisheries related sectors (Villasante, 2012; STECF 2014; Xunta de Galicia, 2015). Fishing and fishing related activities provide employment to a large number of the population and energises a complex economy in coastal villages and towns, some of which are totally dependent on this activity).

4.4.2. The zero discard ban in Galician SSF through the lens of marine social-ecological systems

According to the official census of the Galician fishing fleet updated in 2015, there were over 3,907 small fishing vessels operating in coastal embayments and shallow oceanic waters (Xunta de Galicia, 2015). The artisanal fleet is comprised mainly of small vessels, on average six metres in length (and usually under 12 m in length), with daily activity from Monday to Friday and an average 2.5 GT. The small-scale fishing fleet fishes with a great variety of passive gears, the so-called “*artes menores*” (traps (nasas) for octopus or crabs, hooks and lines (palangrillos), and nets such as gill and trammel (beta, trasmallo, miño) and small seines (xeito)), exploiting a diverse range of species, most of which are subject to TACs.

The characteristics of the fishing fleet which operates with “*artes menores*” correspond to the EU definition of “small-scale” fisheries: fishing vessels under 12 m operating under a daily working fishing lower than 24 h and which do not include trawl fishing gears (Figure 6). The main commercial species harvested by the Galician small-scale fishing fleet are octopus (*Octopus vulgaris*), Velvet crab (*Necora puber*) and Common prawn (*Palaemon serratus*) by using traps (“nasas”), European sole (*Solea solea*), European seabass (*Dicentrarchus labrax*) and centolla (*Maja squinado*) with trammel nets (“miños”), European hake (*Merluccius* sp), horse mackerel (*Trachurus trachurus*), pouting (*Trisopterus luscus*) and surmullet (*Mullus surmuletus*).

Figure 7 Spatial distribution of the Galician small-scale fishing vessels (2015)



Source: own elaboration from PescadeGalicia.com. In brackets the average length, tonnage and kilowatts of small-scale fishing vessels.

The artisanal fishing sector involves almost 13,000 fishers directly (5,000 are women) and more than 35,000 indirect employees. The small-scale fishing fleet operates from more than 80 towns and villages, representing over 60% of the total population employed in the fisheries sector. Table 3 presents the type of the fishing gears used to harvest the main SSF, which are able to use up to 5 of them alternately during the fishing season.

Table 3 Main commercial SSF harvested by the Galician fishing fleet

FISHING GEAR	COMMERCIAL SPECIES
"Nasas" (one type of traps)	Octopus, velvet crab, common prawn
"Palangrillo" (Longline)	European seabass, European hake, European conger
"Betas" (one type of gillnets)	European hake, horse mackerel, mackerel pouting, surmullet
"Miños" (one type of trammel nets)	European sole, European seabass, turbot, squids, anglerfish
"Linea de mano" (Handlines)	Mackerel, seabream, pouting, European seabass

Source: Macho et al. (2013) and from interviews with small-scale fishers (this study).

Due to the absence of a systematic data collection on discards in Galician waters, estimates of discard rate` were calculated by the scientific community. Vázquez-Rowe et al. (2011) calculated the magnitude of discards for some key species and found that the coastal fleet (which is composed of the trawling fleet, plus purse seining and trolling) has a discard rate of 42% and the artisanal fleet 3.6%.

Recently, Villasante et al. (2015) estimated the total removals of fisheries catches (including IUU catches, subsistence catches and discards for commercial and recreational fisheries) for the 1950-2010 period. The authors demonstrated that the discard rate for SSFs ranges between 5-18% depending on the type of commercial species harvested. However, the authors also found that the discard rate for some sedentary resources (e.g., Goose barnacle 74% and razor clam 49%) can be significantly higher than for other SSFs.

4.4.3. The discard ban in the Galician multispecific SSF

We used a case study focused on an SSF with explicit and known problems of discards. The factors considered when selecting the case study were: a) the identification of the SSFs which generate the highest amount of discards, b) the importance of the SSF related to the whole small-scale fishing fleet, and c) the importance of the SSF for the fishermen, fisheries scientists and the regional administration. By following these criteria, the gillnet gear was clearly the fishing gear which best represents the discard problem in Galicia. The fleet using gillnets comprises 1,000 fishing vessels, operating in a multispecific SSF, mainly harvesting European hake, pouting, horse mackerel and surmullet at depths of 30-140 metres and up to 8-10 miles from the coast.

Based on the *Decreto 15/2011 de Xunta de Galicia del 28 Enero*, the gillnet is a fishing gear composed of a single net panel of a maximum of 50 m (longitude), 3 m height and a mesh size between 6-8 cm. Table 4 presents the results from the questionnaires answered by the fishers, which show that the fishing gear of this multispecific fishery is mainly used in the months of April, May, June, September, October and until mid-November. According to the fishermen, the European hake is the most important species from the economic point of view, and it is found around the whole Galician coast.

Table 4 indicates that fishermen are adopting an economic strategy based on the socioeconomic diversification of their fishing operations which can vary due to the heterogeneous distribution of the economic benefits between fishermen and due to the annual variability of marine species abundance in these SSF. As a rule, fishermen combine different fishing gears over a year, targeting a wide range of species, with the objective to reduce the uncertainty in their economic revenues.

Table 4. Seasonal distribution of catches for multispecific small-scale fisheries in Galicia

	MONTHS OF THE ANNUAL FISHING SEASON											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Fishing gear	Trammel Net	Trammel Net	Trammel Net	Gillnet	Gillnet	Gillnet	Trap	Trap	Gillnet	Gillnet	Gillnet	Trammel Net
Targeted species	SOL ESE	SOL ESE	SOL ESE	HAK MAC HMAC SURM POU	HAK MACK HMAC SURM POU	HAK HMAC SURM POU	OCT VCR SHR	OCT VCR SHR	POU HAK HMAC SURM	POU HAK HMAC SURM	POU HAK HMAC SURM	SPC

Source: interviews with small-scale fishers (this study). *Acronyms used for targeted species: ESE: European seabass, SOL: European sole, HAK: European hake, HMAC: Horse mackerel, MAC: Mackerel, OCT: octopus, POU: Pouting, SHR: Shrimp, SPC: Spider crab, SURM: Surmullet, VCR: Velvet crab.

Unlike of other economic sectors (e.g., agriculture), the impossibility to develop a long-term business plan⁸ is a critical and also inherent characteristic of the fisheries sector (Hilborn and Walters, 1992). It is necessary to take this into account when adopting fishery regulations by the EC, considering that the management of Galician SSF are complex and marine social-ecological systems (Villasante, 2012) due to the fact that the diversification of fishing activities towards different species is critical to ensure the economic and financial viability of the sector.

4.4.3.1. Fishermen's perceptions towards causes for discarding

In this multispecific SSF fishermen tend to focus their economic strategy to harvest hake to obtain a high economic value for their catches. However, it is important to note that when harvesting hake other species are also harvested. Given that the hake fishery is under TAC regulation, up to 30% of catches can be made up of other species. In other words, the hake fishery is interdependent with other fisheries. Based on their local ecological knowledge, fishermen act strategically by diversifying their activities by focusing on a multispecies fishery.

Based on the results of the interviews carried out with Galician fishermen, Table 5 shows the main targeted species with gillnets and an estimated discard rate for them as well as the main causes for discarding in 2014. The reasons for discarding are the precautionary closure and the closure of the fishery due to the full harvest of the total allowed catches. The harvest of immature individuals is non-existent or very low for all of the species included in the multispecific SSFs. However, the species under TAC and quota regulations present a high discard rate which ranges between 0-50% (hake, mackerel) and/or 50-200% (horse mackerel) (Table 5).

The three most harvested species (in volume), which are present during the 12 months of the year, are horse mackerel, pouting, and surmullet, while mackerel is caught only during

⁸ Mainly due to the mobility of fishery resources and the inability to deal successfully other environmental features of marine ecosystems.

April and May due to the migratory cycle of the species in Galician waters. When the fishery is usually opened in February, the species is localized in the adjacent waters of Asturias and/or Galicia. In an average fishing season, catches of this species during these months can reach 4,000 kg per day. According to the fishermen, the discarded volume of mackerel during the 2014 year was estimated at 12,000 kg. Horse mackerel is found in Galician waters during the whole year, and is often harvested to complement the economic benefits of the hake fishery.

Table 5. Targeted species with gillnets and fishermen's perceptions towards discards

FISHING GEAR	MAIN TARGETED SPECIES	PERCEPTIONS OF DISCARDS RATE ON IMMATURE INDIVIDUALS	MANAGEMENT SYSTEM AND DISCARD RATES OF SSF BASED ON THE FISHING SEASON (2014)
Gillnets ("Betas")	Hake	Between 0-2%	Managed by TAC and mesh size. Variable discards depending on the allowed catches. Discard rate: 0-50%.
	Mackerel	Between 0-1%	Managed by TAC and mesh size. Variable and random discards depending on the allowed catches. Discard rate: 0-50%.
	Horse mackerel	Between 0-1%	Managed by TAC and mesh size. Variable and random discards depending on the allowed catches. Discard rate: 50-200%.
	Pouting	Between 0-1%	Managed by controlling fishing effort and mesh size. Discard rate: 0%
	Surmulet	Between 0-1%	Managed by controlling fishing effort and mesh size. Discard rate: 0%

Source: own elaboration from interviews with small-scale fishers.

During April, May and/or June, the fleet harvests the species with gillnets, while during September, October and November the discard problem increases because the cumulated catches approach 90% of the TAC and the regional administration informs fishermen about the precautionary closure of the fishery. Fishermen estimated that discards of this species are variable, ranging from 0-800 kg per day earlier in the year to 3,000-5,000 kg per day from September.

4.4.3.2. Fishermen's perceptions towards other impacts of discards

Fishermen perceived as highly negative the impacts of discards on marine ecosystems where they operate. Most of them perceived the discard problem as an irrational behaviour of the EU and fishermen, mainly because it represents a waste of food for human consumption that could be used by families in coastal communities, in particular those under economic and financial problems due to the economic crisis in Southern Europe. Fishermen also pointed out the high economic impacts generated by discards since they have invested economic resources to undertake their fishing activities.

4.4.3.3. Fishermen's perceptions towards the discard ban of the new CFP

The majority of the interviewees did not know any information about Article 15 of the Basic Regulation 1380/2013, while other fishermen stated that they had little general information about the discard ban. None of them have received information from their respective producer organizations nor from the Galician regional administration, even though the discard ban has been in force since January 1, 2015 for the small pelagics.

According to their perceptions, the landing obligation and the mandatory measure to annotate all catches in the electronic logbook will be very difficult and impractical during the normal process of fishing activities unless a) the regulator increases the monitoring and control of fishing vessels, and b) incentives which motivate fishermen to land discards are implemented over time. In the first case, it requires an increase of public funds from the EU to improve the monitoring and control, due to the obvious fact that, under an absence of incentives, discarding fish will be still more profitable than landing them.

In the second case, most fishermen pointed out that this measure would generate negative impacts on their household's economies because it would: (i) imply investing more time on-board to handle previously discarded fishes, (ii) put at risk the security of the fishermen at sea due to the full use of allowable storage on-board and the adverse climatological conditions, and (iii) increase the daily fishing activity in order to process the landed catches at ports.

4.4.3.4. Fishermen's perceptions towards incentives to comply with the discard ban

Most of the fishermen pointed out that the final destination of discards should be considered as an incentive to comply with the discard ban. Part of the discards (*"which is very difficult to estimate"*) is currently being used by fishing vessels working with other fishing gears such as traps (*"nasas"*) that use discards as fishing bait. Formalizing legal mechanisms to incentive this use (currently being developed under informal practices) would be an important incentive for small-scale fishers.

Other incentives to comply with the discard ban without receiving any economic aid/compensation would be that vulnerable people (e.g., households with high unemployment rates and/or residents in coastal communities with lack of potential labour alternatives) are the main beneficiaries of these catches, subject to a traceability system to guarantee the origin of the catches. Fishermen also perceive negatively the fact that discards can be used for non-human uses to feed species of aquaculture systems. On the contrary, the implementation of the *"de minimis"* measure would be applicable to this multispecific SSF and would constitute an incentive for fishermen, regardless the percentage allowable for discards.

4.4.3.5. Perceptions towards structural changes of fishing vessels needed to comply with the discard ban

According to the results from the interviews, none of the fishermen would be willing to accept to modify the structural features of their fishing vessels, even if they received public aid to cover 100% of the economic costs from the EU and/or the national/regional governments. The reasons they argued are that the hold space on-board is currently optimized and it would not be possible to expand the hold space without affecting the navigability of the fishing vessels. In addition, changing the structural characteristics of the fishing vessels would increase the weight of the vessel in the sea, which ultimately could also increase the economic costs due to the higher consumption of fuel when fishing (Figure 8).

Figure 8 Typical small-scale fishing vessel in Galicia ("beteiros")

Source: interviews with small-scale fishers (this study).

Changing the structural characteristics of the fishing vessels would also increase the weight of the vessel in the sea, which ultimately could also increase the economic costs due to the higher consumption of fuel to develop their fishing activities.

Another structural problem related to the possibility to increase the hold capacity due to the characteristics of the materials used in the small-scale fishing vessels. These fishing vessels are composed by fiberglass, which make difficult to increase the space in the hold space. Indeed, most of these vessels have already made structural changes to increase the freeboard in the hull of the vessel, prolonging the gunwale of the vessels with aluminium sheets (Figure 8). In that case, the objective was to improve the security conditions for the navigability of the vessels. Related to this, the climatological conditions of the Galician coasts increase the necessity to improve the security conditions of the vessels to avoid shipwrecks and deaths of fishermen at sea. Ultimately, any change in the structure of the fishing vessels could suppose an increase of the gross tonnage of them, with potential legal consequences that need to be analysed in detail.

4.4.3.6. Perceptions towards the exemptions to the "de minimis"

Fishermen pointed out that hat they did not receive any basic information and/or capacity building related to the landing obligation from the regional and/or national administration. However, even if they have been received it, the exemptions of «*de minimis*» will not help to reduce discards in SSF nor will be an incentive to comply the ban. Most of them stated that these exemptions have been developed for industrial and non-SSF and, in particular, for cases where selectivity is difficult to increase without disproportionate costs or there would be disproportionate costs of handling of unwanted catches.

4.4.3.7. Perceptions towards technical measures needed to deal with the discard ban

The majority of the experts consulted in this study believe that small-scale fishers would be able to comply the ban recently adopted by the new CFP. Difficulties to comply the discard ban require the adoption of a complex variety of factors: selective gear technology and management practices, potential use of unwanted catches, and logistics for managing

unwanted catches, among others. In addition, imperfect enforcement, lack of knowledge on how to proceed, low reaction to any change in current fishing practices, lack of preparation in ports to deal with the new landings and lack of space in boats to keep all catches are key factors that the EC should consider when implementing the discard ban.

The experts and small-scale fishers also indicated that changing the fisheries management system based on the TAC regulation is the most important incentive to compliance the discard ban. Other incentives such as increase fisher's education towards the waste of fish, promoting the sell and consumption of local seafood products, and a higher enforcement of fishery regulations are perceived as relevant to ensure a successful implementation of the discard ban.

5. CONCLUSIONS

Little attention has been given by the scientific community to discards in European Union SSF. This is mainly due to the fact that the problem was mainly concentrated in industrial fisheries, while SSFs were generally thought to have lower discard rates than industrial fisheries.

To date there been no systematic review of discards to analyse their environment, social and economic impacts on SSFs. Such a review can support a decision-making framework by determining which critical factors may affect the success of implementing the discard ban in European SSF. A total of 3,924 scientific papers have been published on discards during the 1950-2014 period, of which only 164 papers focused on SSFs. A total of 3,760 scientific papers have been published on discards during the 1950-2014 period, of which 3,760 are related to industrial fisheries and only 164 papers focused on SSFs.

The discard rate in the North Atlantic SSF is, in general, low. The literature research carried out in this study found that the discard rate for the Galician SSF (Northwest of Spain) generally confirms this empirical observation, although depending on the type of the harvested commercial species. The commercial species subjected to the TAC regulation show discard rates higher than those species managed by a combination of the fishing effort and mesh sizes, and indeed discard rates can be as high as seen in industrial fisheries. In the Mediterranean Sea, artisanal gears show high discard rates (e.g., in Balearic Islands and Andalusia). Discards from the artisanal fishery in the Gulf of Cadiz may have also experienced an increase from the 1990s to 2010.

The majority of measures to reduce discards have been introduced in large-scale fisheries. The effectiveness of a discard ban in industrial fisheries is still unclear mainly because discard data is not methodically collected by fisheries authorities. It should be borne in mind that measures linked to tradable quotas, which have been partially successful in reducing discards in large-scale fisheries may be less suitable in SSFs. Additionally, empirical evidence that transferable quota systems alone (e.g., ITQs, ACEs) contribute to discard reduction is still lacking. ITQs can result in fishing rights being concentrated among a few large companies, increasing economic efficiency but reducing the social value of the fisheries, an aspect that is crucial in the context of SSFs.

Although discards are generally considered to be a bigger issue for large-scale fisheries than for SSF, comparison of Atlantic and Mediterranean case studies suggests that discard rates may be generally high in the Mediterranean despite the high importance of SSFs in the latter area. The monitoring of compliance with a discard ban is typically based on-board observer coverage of fishing activity, again something unsuitable for fleets comprising very numerous small boats. The use of on-board camera systems may represent a viable alternative. However, the high logistical, surveillance and monitoring costs of introducing a discard ban for SSF could be a reason to not extend the discard ban to these fisheries.

Exemptions to the “*de minimis*” discards to solve the problem in the small-scale fleet

Fishermen also pointed out that hat they did not receive any basic information and/or capacity building related to the landing obligation from the regional and/or national administration. However, even if they have been received it, the exemptions of «*de minimis*» will not help to reduce discards in SSFs nor will they be an incentive to comply the ban. Most of them stated that these exemptions have been developed for industrial and non-

SSF and, in particular, for cases where selectivity is difficult to increase without disproportionate costs or there would be disproportionate costs of handling of unwanted catches.

Most of experts and fishermen also stated that these exemptions were mainly developed and implemented for industrial fisheries and, in particular, for fisheries in which the improvement of the selectivity would be difficult to achieve without disproportionated economic costs such as those related to the handling of discards on board.

The extent of the discard problem with the hold capacity on small-scale vessels

According to the results from the interviewees, none of the fishermen would be willingness to modify the structural features of their fishing vessels, even if they receive public aids to cover 100% of the economic costs from the EU and/or the national/regional governments. The reasons they argued are that the space of hold on-board are currently optimized and it would not be possible to expand them without affecting the navigability of the fishing vessels. Changing the structural characteristics of the fishing vessels would also increase the weight of the vessel in the sea, which ultimately could also increase the economic costs due to the higher consumption of fuel to develop their fishing activities.

Another structural problem related to the possibility to increase the hold capacity due to the characteristics of the materials used in the small-scale fishing vessels. These fishing vessels are composed by fiberglass, which make difficult to increase the space in the hold. Indeed, most of these vessels have already made structural changes to increase the freeboard in the hull of the vessel, prolonging the gunwale of the vessels with aluminium sheets. Related to this, the climatological conditions of the Galician coasts increase the necessity to improve the security conditions of the vessels to avoid shipwrecks and deaths of fishermen at sea. Ultimately, the majority of fishermen stated that any change in the structure of the fishing vessels could suppose an increase of the gross tonnage, with potential legal consequences that need to be analysed in detail.

Furthermore, fishermen also point out that small-scale fishing vessels hold their catches on board in boxes classified by species and size, and the potential increase of these boxes could increase the insecurity conditions of the vessels, in particular in Galician coasts where the weather conditions could strongly increase the risks on board.

Possible incentives for non-compliance by small-scale fishers to discard

The majority of the interviewees did not know any information about Article 15 of the Basic Regulation 1380/2013, while other fishermen stated that they had little general information about the discard ban. None of them have received information from their respective producer organization nor the Galician regional administration in spite of the discard ban is in force since January 1, 2015 for the small pelagics.

According to their perceptions, the landing obligation and the mandatory measure to annotate them in the electronic logbook will be very difficult and unpractical in the real functioning of fishing activities unless a) the regulator increases the monitoring and control of fishing vessels, and b) incentives which motivate fishermen to land discards are implemented over time. In the first case, it requires an increase of public funds from the EU to improve the monitoring and control due to the fact that under an absence of incentives discarding fish will be still more profitable than landing them. In the second case, most of fishermen pointed out that this measure would generate negative impacts on their household's economies because it would: (ii) suppose to invest more time on-board to hand

discarded fishes, (ii) put at risk the security of the fishermen at sea due to the full allowable storage on-board and the adverse climatological conditions, and (iii) increase the daily fishing activity in order to process the landed catches at ports.

Potential change of the technical measures to facilitate the landing obligation for the small-scale fleet

The majority of the experts consulted in this study believe that small-scale fishers would be able to comply the ban recently adopted by the new CFP. Difficulties to comply the discard ban require the adoption of a complex variety of factors: selective gear technology and management practices, potential use of unwanted catches, and logistics for managing unwanted catches, among others. In addition, imperfect enforcement, lack of knowledge on how to proceed, low reaction to any change in current fishing practices, lack of preparation in ports to deal with the new landings and lack of space in boats to keep all catches are key factors that the EC should consider when implementing the discard ban.

The experts and small-scale fishers also indicated that changing the fisheries management system to a one not based the TAC regulation is the most important incentive to compliance the discard ban. Other measures/incentives such as increasing fisher education about the waste of fish, promoting the selling and consumption of local seafood products, and a higher enforcement of fishery regulations are perceived as relevant to ensure a successful implementation of the discard ban.

6. RECOMMENDATIONS

The new CFP aims to reduce/eradicate discards in European SSFs and the main solution to achieve this goal is by making it compulsory to land all commercial species subjected to catches limits, and some of species managed by minimum catch size. However, the heterogeneous ecological, socioeconomic and institutional characteristics of SSFs in European waters raise concerns over the prospects for successful implementation of the discard ban.

In the light of the participatory research performed in this study, it is necessary to take into consideration a number of key recommendations that are critical for the progress of the new CFP to reduce/eradicate the discard problem, and to ensure the sustainable exploitation of SSFs as well as the socioeconomic viability of them in Europe.

The European Parliament and the European Commission should take into account the following general and preliminary recommendations in relation to landing obligation which are presented from the literature review and the participatory research done with scientific experts and fishermen in the selected case studies:

- To consider the economic and social contribution of SSFs to local/regional economies as a priority to ensure the maintenance of coastal population and reduce the high levels of unemployment in other economic sectors;
- To consider an exemption from the TAC regulations for SSFs due to the fact that this is the main regulatory factor which motivates discards in these fisheries. Alternatives such as effort regulation and gear restrictions could be considered to the current TAC regulation;
- If the TAC system is retained, to consider the environmental, economic and social factors instead of historical catches when managing SSFs because the magnitude of discards is directly correlated with the fisheries management system based on TACs. Maintaining the historical catches as the key criterion to allocate quotas could create social conflicts in coastal communities due to the unequal distribution of catches;
- In case it is not possible to change the TAC system, to consider the exemption of the application of the discard ban for the SSF due to the generally low discard rate until the measure is fully implemented in industrial fisheries. In case of the above recommendation is not considered, it would be necessary to contemplate the exemption of legal sanctions in case of non-compliance of the discard ban by small-scale fishers, at least during a transitory period to allow them to design adaptive strategies to the new regulation under the guidelines of the EC;
- The majority of measures to reduce discards have been introduced in large-scale fisheries. The effectiveness of a discard ban in industrial fisheries is still unclear mainly because discard data is not methodically collected by fisheries authorities. Measures linked to tradable quotas, which have been partially successful in reducing discards in large-scale fisheries may be less suitable in SSFs;
- To carefully consider that implementing the discard ban for SSFs could create high logistic, monitoring and economic costs for both fishers and regulatory/management bodies;
- To stimulate the cooperation of the SSF sector with scientific and institutional organizations, which is considered an essential driver for success in this process. If significant progress is achieved in a short time, this will be an opportunity to recover

trust and reputation and to claim for the support of citizens to their activity, for example, through increasing the willingness to pay for sustainable seafood products.

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ANNEX 1: QUESTIONNAIRE FOR THE ONLINE EXPERT CONSULTATION ON THE DISCARD BAN IN EUROPEAN SSF

As part of a report requested by the European Parliament, we are conducting a questionnaire to gather information on discards in EU small-scale fisheries. The new CFP has introduced a new provision on the landing obligation. That means that all catches of regulated species must be landed and counted against quotas of each member State according to a precise schedule starting in 2015 and ending in 1 January 2019.

Your response is crucial, as it will help us better inform the European Parliament. Your answers will be confidential and will never be traced to you at any time. The questionnaire should take less than 20 minutes. Please bear in mind that there are no "right" or "wrong" answers.

Background information on the new Common Fishery Policy (CFP)

The new Common Fishery Policy (CFP) Regulation (EU) N° 1380/2013 of the European Parliament and of the Council of 11 December 2013 (Basic Regulation) has introduced a new provision on the landing obligation. That means that all catches of regulated species must be landed and counted against quotas of each Member State according to a precise schedule starting in 2015 and ending on 1 January 2019.

Point 11 of Article 15 of the Basic Regulation establishes that *"for the species subject to the landing obligation as specified in paragraph 1, the use of catches of species below the minimum conservation reference size shall be restricted to purposes other than direct human consumption, including fish meal, fish oil, pet food, food additives, pharmaceuticals and cosmetics"*. Those catches under minimum conservation reference size must be stored in a separate way on-board and must be handled on ports separately as to prevent them going to human consumption. Artisanal vessels are by nature of small size and are short in storage capacity of the catch, thus the new rules for landing can have negative effect on their economic performance.

SECTION A-EXPERIENCE ON SMALL-SCALE FISHERIES

1. Currently, you work for (please provide full description of your affiliation):

-University:

-Administration:

-Fishing industry:

-Other (please specify, e.g., ONGs, Regional Advisory Councils, etc.):

2. How long have you been working on small-scale fisheries?

<5 years___ 5-10 years___ more than 10 years___

3. Please provide information about the small-scale fishery for which you are more experienced and/or you have more knowledge to contribute with the objectives of this survey

-Location (country and ICES area) (e.g., Spain and ICES area IXa):

-Name of common species (e.g., hake, mackerel):

-Main fishing gear used in a usual fishing season (e.g., trawl):

-Average length of a standard fishing vessel (e.g., 5-10 m):

-Average registered tonnage of a standard fishing vessel (e.g., 25-50 GT):

-Average age of fishermen (e.g., 35-45 years):

-Type of fisheries management system (e.g., TURF, TAC, ITQ, etc.):

-Value of catches (average last 5 years):

SECTION B - REGULATION OF DISCARDS UNDER THE NEW COMMON FISHERIES POLICY

4. Do you believe that the new landing obligation was the most important measure to be adopted by the European Commission for the 2015-2019 period?

Yes___ No___ Please provide your comments to justify why?

5. Do you see advantages in implementing a discard ban in the small-scale fisheries you work?

☐ Yes (proceed to 5.1) ☐ No (proceed to 5.2)

5.1. Which advantages can you think of? 5.2. Why not?

6. Which difficulties do you foresee to comply with the ban?

7. In your opinion, what are the most economic and social impacts of the discard ban (please scale your answer from the Low importance=1 to High importance=5)

☐ Economic losses of the fisheries sector 1□ 2□ 3□ 4□ 5□

☐ Economic losses of other economic sectors which provide/demand good and services to the small-scale fisheries sector

1□ 2□ 3□ 4□ 5□

☐ Financial losses/problems to continue with fishing activities 1□ 2□ 3□ 4□ 5□

☐ Loss of direct and indirect employment 1□ 2□ 3□ 4□ 5□

☐ Reduction/loss of the economic activity 1□ 2□ 3□ 4□ 5□

☐ Emigration of people from coastal communities 1□ 2□ 3□ 4□ 5□

☐ Loss of cultural values associate to fishing activities 1□ 2□ 3□ 4□ 5□

☐ Other impacts (please specify): 1□ 2□ 3□ 4□ 5□

8. Would you are able to provide an estimate of annual economic losses due to the direct (e.g., reduction of catches volume) or indirect (e.g., adaptation of the fishing vessel, change of seafood market, etc.) impacts of the discard ban? (Please, if possible, provide a range of economic losses – e.g., €1-2 millions)

9. Would you are able to provide an estimate of the loss of employment due to the direct or indirect impacts of the discard ban?

10. Are there any other real labour alternatives in which small-scale fishers can be employed in case of abandonment of the activity?

Yes___ No___ Please provide more information about them:

10.1. Are these activities related to small-scale fisheries? Yes___ No___

10.2. In your opinion, could small-scale fishers have similar economic revenues to maintain their welfare? Yes___ No___

11. When the discard ban is implemented, how willing are you to comply with the ban?

☐ Quite willing ☐ Slightly willing ☐ Neutral ☐ Unwilling ☐ Not willing at all

11.1. (If unwilling or not willing) What should be changed to make small-scale fishing activity comply with the ban?

Do you believe that changing the fishing gear characteristics of your fishery could reduce your discards?

☐ Yes (proceed to 11.1.1) ☐ No (proceed to 11.1.2)

11.1.1. Which changes can you think of?

11.1.2. Why not?

12. In your opinion, which incentives do you think are needed to reduce discards practices? (Choose all that apply) (Please scale your answer from the Low importance=1 to High importance=5)

- | | |
|--|----------------|
| <input type="checkbox"/> Changing the fisheries management system | 1□ 2□ 3□ 4□ 5□ |
| <input type="checkbox"/> Reducing taxes to promote small-scale fisheries | 1□ 2□ 3□ 4□ 5□ |
| <input type="checkbox"/> Changing the system to sell seafood products | 1□ 2□ 3□ 4□ 5□ |
| <input type="checkbox"/> Higher enforcement of fisheries regulations | 1□ 2□ 3□ 4□ 5□ |
| <input type="checkbox"/> Increase the percentage of the exemptions from the "de minimis" discard rates | 1□ 2□ 3□ 4□ 5□ |
| <input type="checkbox"/> Promoting local fishing products | 1□ 2□ 3□ 4□ 5□ |
| <input type="checkbox"/> Increase fishers' education (seminars, workshops, courses, etc.) | 1□ 2□ 3□ 4□ 5□ |
| <input type="checkbox"/> Other: _____ | 1□ 2□ 3□ 4□ 5□ |

13. Do you believe that the exemptions for the "de minimis" discards set in the Basic Regulation can solve the problem for small-scale fisheries?

Yes___ No___ Please provide your comments to justify why?

Example for the Southern waters.

"By way of derogation from Article 15(1) of Regulation (EU) No 1380/2013, the following quantities may be discarded:

(a) for blue whiting (*Micromesistius poutassou*), up to a maximum of 7% in 2015 and 2016, and 6% in 2017, of the total annual catches in the industrial pelagic trawler fishery targeting that species in ICES zone VIII and processing that species on board to obtain surimi base;

(b) up to a maximum of 7% in 2015 and 2016, and 6% in 2017 for albacore tuna (*Thunnus alalunga*) of the total annual catches in the albacore tuna directed fisheries using midwater pair trawls (PTM) in ICES zone VIII;

(c) up to a maximum of 5% in 2015 and 2016, and 4% in 2017, of the total annual catches in the pelagic trawl fishery for anchovy (*Engraulis encrasicolus*), mackerel (*Scomber scombrus*) and horse mackerel (*Trachurus* spp.) in ICES zone VIII;

(d) In the purse seine fishery in ICES zones VIII, IX and X and in CECAF areas 34.1.1, 34.1.2 and 34.2.0 targeting the following species: up to a maximum of 5% in 2015 and 2016, and 4% in 2017, of the total annual catches of horse mackerel (*Trachurus* spp.) and mackerel (*Scomber scombrus*); and up to a maximum of 2% in 2015 and 2016, and 1% in 2017, of the total annual catches of anchovy (*Engraulis encrasicolus*)" (<http://ec.europa.eu/transparency/regdoc/rep/3/2014/EN/3-2014-7540-EN-F1-1.Pdf>)

You can also check the rest of "de minimis" discards for the rest of European waters at the end of the survey.

14. In your opinion, what technical measures could help to flexibilize the discard ban and the "de minimis" discards?

15. When the discard ban is implemented, how will small-scale fishers be able to hold all the catch in the fishing vessels you know?

- ☐ Very easily ☐ Slightly easy ☐ Neither easy nor difficult ☐ Slightly difficult ☐ Very difficult

16. Do you believe that small-scale fishers you know will be able to afford the setting up of a separate storage in your vessel's deck by your own means?

- ☐ Quite able ☐ Slightly able ☐ Neutral ☐ Unable ☐ Not able at all

17. Do you believe that changes in the handling of fish on-board could reduce discards in small-scale fisheries?

- ☐ Yes (proceed to 17.1) ☐ No (proceed to 17.2)

17.1. Which changes can you think of?

17.2. Why not?

18. Do you believe that changing technical features of fishing vessels could reduce your discards?

- ☐ Yes (proceed to 18.1) ☐ No (proceed to 18.2)

18.1. Which changes can you think of?

18.2. Why not?

19. Do you believe that changes in the seafood markets could reduce discards in small-scale fisheries?

- ☐ Yes (proceed to 19.1) ☐ No (proceed to 19.2)

19.1. Which changes can you think of?

19.2. Why not?

20. What other changes can you think of that could reduce discards in European small-scale fisheries?

PERSONAL INFORMATION

To conclude, please answer the following questions on your personal background. Please bear in mind that this questionnaire is confidential and your information cannot be traced to you at any time. Please provide this information, so we can fully evaluate your answers.

1. Gender: ☐ Male ☐ Female **2. Contact** (email and/or telephone number):

3. What is your highest level of education?

☐ Primary ☐ Secondary ☐ Tertiary ☐ University

4. Do you have specific training in small-scale fisheries and/or discards?

☐ Yes **4.1. In which topic?**

☐ No

6. Lastly, we would like to know your opinion about this particular questionnaire (choose all that apply).

☐ Interesting ☐ Informative ☐ Too long ☐ Boring ☐ Indifferent

☐ Other: _

Other comments and/or suggestions (please we would much appreciate whether you provide us any other comments related to this survey that could help to us to improve it):

The questionnaire is finished.

Thank you very much for your time – your effort is much appreciate!

ANNEX 2: QUESTIONNAIRE FOR FISHERMEN ON THE DISCARD BAN IN EUROPEAN SSF

FICHA DE LA ENTREVISTA

CÓDIGO BUQUE	
FECHA	
HORA INICIO	
HORA FIN	
LUGAR	
ENTREVISTADOR	

RESUMEN

LA PROBLEMÁTICA DE LOS DESCARTES EN LAS PESQUERÍAS ARTESANALES EN EL CALADERO NACIONAL CANTÁBRICO-NOROESTE.

Unidad de información: Armadores artesanales del Caladero Cantábrico-Noroeste, región Galicia.

ESTRUCTURA DEL CUESTIONARIO:

- A) FICHA ARMADOR
- B) FICHA BUQUE Y TRIPULACIÓN
- C) FICHA PESQUERÍAS
- D) DESCRIPCIÓN ECONÓMICA BÁSICA DE LA PESQUERÍA (PRODUCCIÓN)
- E) CARACTERÍSTICAS DE LAS PESQUERÍAS, DE SU GESTIÓN Y LAS ESPECIES PRESENTES
- F) SOBRE LAS PRINCIPALES CAUSAS DE LOS DESCARTES EN LAS PESQUERÍAS QUE SE CITAN
- G) SOBRE LAS PRINCIPALES BARRERAS PARA DESEMBARCAR LOS DESCARTES
- H) SOBRE LOS INCENTIVOS PARA DESEMBARCAR
- I) CAMBIOS EN LA REGULACIÓN PARA MEDIDAS TÉCNICAS DE DESCARTES
- J) SOLUCIONES APORTADAS POR EL SECTOR PARA EVITAR LOS DESCARTES

A) FICHA ARMADOR

A01. ¿Cuántos años lleva trabajando como pescador?

A02. ¿Cuántos años tiene?

A03. ¿Procede de una familia de pescadores?

A04. ¿Es usted el propietario/copropietario de la embarcación?

A05. ¿Cuántos años lleva como armador?

A06. ¿Qué rol tiene en la embarcación?

B) FICHA BUQUE Y TRIPULACIÓN

B01. Eslora total (m.)

B02. Arqueo de registro bruto (GT)

GT legales	
GT reales	

B03. Potencia motor principal (CV)

CV legales	
CV reales	

B04. Fecha de entrada en servicio del buque.

B05. ¿Cuántos tripulantes trabajan habitualmente (todo el año) en su embarcación?

B06. ¿Existe algún tipo de relación parental entre el armador y alguno de los tripulantes?

B07. Número de tripulantes en función de la pesquería.

C) FICHA PESQUERÍAS

*Descripción de las principales pesquerías a las que se dedica (tendencia de los últimos cinco años):
Artes/Especies/Ciclo anual de pesca.*

Partimos del supuesto de que estas pesquerías son mixtas. Todas las especies pueden compartir todo el año el mismo ecosistema aunque con diferentes abundancias dependiendo de la época.

- C01. ¿Cuáles son las principales artes de pesca que emplea a lo largo de todo el año?**
- C02. ¿Cuáles son las principales especies objetivo y acompañantes asociadas a los artes de pesca de la pregunta anterior?**
- C03. Días de faena efectivos a lo largo de todo el año.**
- C04. Horas diarias de trabajo (ruta y faena).**
- C05. ¿A cuántas millas de la costa, aproximadamente, se encuentran sus caladeros habituales?**

D) DESCRIPCIÓN ECONÓMICA BÁSICA DE LA PESQUERÍA (PRODUCCIÓN)

- D01. ¿Qué es lo que más valora para decidir vender en una lonja u otra (incentivos)? Orden de importancia.**

Mejor precio	<input type="checkbox"/>
Cercanía	<input type="checkbox"/>
Mejores servicios	<input type="checkbox"/>
Horarios más favorables	<input type="checkbox"/>
Venta en negro	<input type="checkbox"/>
Otro:	<input type="checkbox"/>

- D02. Indique, por orden de importancia económica, las principales pesquerías a las que se dedica a lo largo del ciclo anual de pesca.**
- D03. Valore económicamente, en % aproximado de todos los ingresos anuales, las pesquerías a las que se dedica a lo largo del ciclo anual de pesca.**
- D04. Estimación de la captura (Kg) anual de las especies principales a las que se dedica: (año bueno, regular y malo)**

ESPECIE	Kg. AÑO BUENO	Kg. AÑO REGULAR	Kg. AÑO MALO
Merluza			
Caballa			
Jurel			
Otra			

D05. De las especies referenciadas, ¿cuál es la que tiene un comportamiento de precio en primera venta con mayor variación y cuál más estable?

D06. Señale cuáles son los principales meses (en caso de que exista un patrón anual) en los que las especies referenciadas adquieren los valores más altos y más bajos durante el año.

E) CARACTERÍSTICAS DE LAS PESQUERÍAS, DE SU GESTIÓN Y LAS ESPECIES PRESENTES

E01. Identificar en los últimos años los meses en los que las pesquerías a las que se dedica están abiertas o cerradas.

E02. Una vez que se agota el TAC de cada pesquería, ¿cuál es la estrategia que usted toma?

EJEMPLOS DE OPCIONES

Continuar en la pesquería gestionada por TAC

Continuar en otra pesquería de un TAC no agotado

Cambiar a una pesquería no gestionada por TAC

Otras

E03. Identifique los meses en los que las principales especies a las que usted se dedica están presentes en sus zonas de pesca de manera más abundante y más escasa.

E04. Ordene por importancia de captura (kg) las especies capturadas.

E05. Ordene por importancia económica las principales especies capturadas.

E06. Indique los principales motivos por los que desea evitar la captura de las especies principales.

E07. Indique las principales estrategias que utiliza para evitar la captura de las especies principales.

EJEMPLOS DE OPCIONES

Cambiar de pesquería

Cambiar de arte de pesca

Cambiar a otra zona con menos probabilidad de capturar la especie a evitar

No hacer nada

E08. Grado de éxito evitando la captura de una especie.

RESPUESTAS POSIBLES

Con frecuencia

Algunas veces

Pocas veces
Casi nunca

E09. Indique, por orden de importancia (Kg), las principales especies que descarta.

F) SOBRE LAS PRINCIPALES CAUSAS DE LOS DESCARTES EN LAS PESQUERÍAS QUE SE CITAN

F01. Indique el nivel de descartes de las principales especies, en % sobre la captura total.

F02. Indique, por orden de importancia, los motivos por los que usted descarta las especies principales.

EJEMPLOS DE OPCIONES
Bajo valor comercial
Agotamiento del TAC (cierre de la pesquería)
Sistema de gestión de la cuota (diaria)
Cuotas diarias muy bajas
Talla mínima
Otros

F03. Indique el porcentaje de veces que alcanza la cuota legal estipulada.

F04. Indique el porcentaje de veces que sobrepasa la cuota legal estipulada.

F05. Indique los Kg que descarta usted de cada una de las especies principales por motivos relacionados con el límite de cuota o agotamiento anual del TAC.

F06. Indique el % de veces que usted descarta cada una de las especies principales por motivos relacionados con el límite de cuota o agotamiento anual del TAC.

F07. ¿Cómo cree que se podría reducir o evitar el problema de los descartes? ¿Qué medidas adoptaría usted?

Eximir a la flota artesanal de esta obligación	<input type="checkbox"/>
Ampliar el TAC para pesca artesanal	<input type="checkbox"/>
Cambiaría la gestión basada en TAC por una gestión basada en el esfuerzo	<input type="checkbox"/>
Mínimis más amplios	<input type="checkbox"/>
Otros	<input type="checkbox"/>

G) SOBRE LAS PRINCIPALES BARRERAS PARA DESEMBARCAR LOS DESCARTES

G01. ¿Conoce o ha oído hablar de la nueva normativa que ha entrado en vigor este año sobre la obligatoriedad de desembarcar todos los descartes?

G02. ¿Qué ventajas tiene para usted la aplicación de la norma de desembarcar todos los descartes?

G03. ¿Es de fácil aplicación para usted esta norma?

G04. ¿Cuáles son las principales dificultades para la aplicación de esta normativa en la flota artesanal?

Es más barato tirar los descartes por la borda	<input type="checkbox"/>
El barco no está preparado para almacenar los descartes	<input type="checkbox"/>
Miedo a la vigilancia	<input type="checkbox"/>
Otros	<input type="checkbox"/>

G05. Cuando captura inmaduros, sobrepasa la cuota de una especie o está la pesquería cerrada por agotamiento del TAC, ¿qué hace con el pescado capturado?

Tirarlo por la borda	<input type="checkbox"/>
Desembarcarlo y notificarlo como descarte	<input type="checkbox"/>
Desembarcarlo y venderlo en negro	<input type="checkbox"/>
Traspararlo a otra embarcación que esté en condiciones de legalizarlo	<input type="checkbox"/>
Consumo doméstico	<input type="checkbox"/>
Almacenarlo (frío/sal)	<input type="checkbox"/>
Carnada en otras pesquerías	<input type="checkbox"/>
Regalarlo	<input type="checkbox"/>
Otros	<input type="checkbox"/>

G06. En caso de que decida no almacenar los descartes, ¿cuáles son las principales razones por las cuales no lo hace? Ordene por importancia.

No dispongo de espacio a bordo	<input type="checkbox"/>
La vigilancia es flexible	<input type="checkbox"/>
Me generaría mayores costes económicos (más tiempo de manipulación)	<input type="checkbox"/>
No gano nada con desembarcarlos (carezco de incentivos)	<input type="checkbox"/>
Si los desembarco nos lo quitan de la cuota para el año que viene (nos castigan)	<input type="checkbox"/>
Son todo problemas	<input type="checkbox"/>
Otros	<input type="checkbox"/>

G07. Con la actual política de descartes (obligatoriedad de desembarque), ¿cómo afectará a la flota artesanal?

G08. ¿Qué opina usted sobre el desperdicio de pescado derivado de los descartes? (pérdida económica, de tiempo, de esfuerzo, de alimento, etc.)

G09. ¿Qué tipo de medidas serían necesarias para mejorar la concienciación del sector en relación a la prohibición de descartes?

H) SOBRE LOS INCENTIVOS PARA DESEMBARCAR

H01. ¿Qué tendría que cambiar la Administración (UE) para motivar que usted desembarcase los descartes en estas pesquerías. Ordene por importancia.

Incrementar las exenciones de mínimos anuales por especie	<input type="checkbox"/>
No penalizar los descartes sobre las cuotas futuras	<input type="checkbox"/>
Que el precio de los descartes en la pesca artesanal sea similar al precio de las mismas especies (en igualdad de calidad)	<input type="checkbox"/>
Reducir los impuestos en la pesca	<input type="checkbox"/>
Otros	<input type="checkbox"/>

H02. ¿Cree que las exenciones de mínimos son suficientes para animarle a desembarcar los descartes?

H03. ¿Qué nivel de mínimos cree que serían razonables para la pesca artesanal?

I) CAMBIOS EN LA REGULACIÓN PARA MEDIDAS TÉCNICAS DE DESCARTES

I01. ¿Cuánta es la capacidad aproximada de almacenaje de pescado de su embarcación? (Kg/l/m3/cajas)

I02. ¿Cuántas veces suele completar ("sellar") la bodega por buenas capturas?

I03. ¿Cuáles son los criterios para estibar el pescado (seguramente en cajas) que luego va a desembarcar? (Especie, tamaño, etc.)

I04. Como usted sabe, de acuerdo a la normativa europea que exige desembarcar en puerto todas las capturas de especies reguladas por TAC y con talla mínima legal, obliga a almacenar estos descartes de forma separada de las capturas comerciales. ¿Por regla general y atendiendo a su capacidad de bodega y al volumen de captura diario más habitual, sería un problema para usted almacenar estos descartes?

I05. ¿Estaría dispuesto a realizar cambios estructurales en su embarcación para ampliar su capacidad de bodega?

I06. ¿Qué motivos tendría para no realizar estos cambios estructurales?

Coste económico	<input type="checkbox"/>
Limitación estructural del barco	<input type="checkbox"/>
Otros	<input type="checkbox"/>

I07. ¿Cuál sería el coste económico estimado para adaptar su embarcación?

I08. En caso de que recibiera subvención pública para realizar estos cambios en su embarcación, ¿lo haría?

I09. Aún con subvención pública, ¿cuál sería la razón por la que no realizaría estos cambios?

J) SOLUCIONES APORTADAS POR EL SECTOR PARA EVITAR LOS DESCARTES

Pregunta abierta. Conversación con el pescador.

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