European Parliament

DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES

FISHERIES

TECHNICAL MEASURES IN THE ATLANTIC AND THE NORTH SEA – WORKING WITH STAKEHOLDERS TOWARDS MEANINGFUL REVISION

WORKSHOP

IN-DEPTH ANALYSIS

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

AUTHORS

IMARES Wageningen UR: Marloes Kraan, Ruben Verkempynck, Nathalie A. Steins

RESPONSIBLE ADMINISTRATOR

Marcus Breuer
Policy Department B: Structural and Cohesion Policies
European Parliament
B-1047 Brussels
E-mail: poldep-cohesion@europarl.europa.eu

EDITORIAL ASSISTANCE

Lyna Pärt

LINGUISTIC VERSIONS

Original: EN

ABOUT THE PUBLISHER

To contact the Policy Department or to subscribe to its monthly newsletter please write to: poldep-cohesion@europarl.europa.eu

Manuscript completed in October 2015

This document is available on the Internet at:
http://www.europarl.europa.eu/studies

European Parliament

DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES

FISHERIES

TECHNICAL MEASURES IN THE ATLANTIC AND THE NORTH SEA – WORKING WITH STAKEHOLDERS TOWARDS MEANINGFUL REVISION

WORKSHOP

IN-DEPTH ANALYSIS

Abstract

This report gives an overview of existing technical measures (TM) in the Atlantic and North Sea and a reflection on the need for and process of their revision in light of two core revisions of the CFP, the landing obligation and regionalisation. To achieve positive results, more is needed than a 'TM clean up'. The approach taken in the Dutch case studies presented in this report is recommended as part of an inclusive TM revision process in Europe.

IP/B/PECH/IC/2015-138 October 2015

PE 563.405 EN

CONTENTS

LIST OF ABBREVIATIONS

TM Technical Measures

TAC Total Allowable Catch

CFP EU Common Fisheries Policy

DAS Days at Sea

MCRS Minimum Conservation Reference Sizes

MLS Minimum Landing Sizes

RBM Results Based Management

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Background

The Common Fisheries Policy (CFP) of the EU has recently been overhauled. In December 2013, the European Parliament and the Council agreed on a comprehensive CFP reform. It is now enshrined in a new legislative framework, the so-called 'new CFP basic Regulation' (Regulation (EU) No 1380/2013). As far as the conservation of marine biological resources is concerned, it repeals and replaces the former 'basic fisheries management framework', laid down by the Council in 2002 (Regulation (EC) No 2371/2002).

In the follow-up to the CFP reform, the European Commission is gradually issuing new legislative proposals aiming to align the partly outdated EU Regulations from before 2013 with the new CFP. One of the major post-reform projects of the European Commission is the general overhaul of the set of existing rules for technical measures.

The Commission announced a new legislative proposal for a general technical measures Regulation for the late autumn of this year. This new Union Regulation shall replace the old general framework Regulation for technical measures from 1998 (Council Regulation (EC) No 850/98).

Aim

The aim of the present study is to provide an in-depth analysis on the existing technical measures (TM) in the Atlantic and the North Sea performing three functions: (1) review of the main existing TM; (2) present an assessment and evaluation of (a) the TM in view of new CFP objectives (elimination of discards and ecosystem management); (b) the regionalisation aspect of the new CFP and (c) the simplification of CFP governance; and (3) conclusions and recommendations.

Results

Technical measures (TM) influence where, when and how marine resources are exploited, and therefore **impact fishing activity in many ways**. Besides supporting stock and ecosystem management, they can contribute positively to establishing a level playing field. For these reasons, they are considered to be a useful tool for the management of marine resources.

Since the 1980ies the number of **TM in the EU have grown exponentially**. These TM are aimed at targeting the structure of fishing gears and how to operate these; defining zones and/or periods where fishing can be restricted; specifying measures to reduce the impact of fishing activities on the marine ecosystem; and imposing minimum landing sizes on caught commercial resource. The current set of TM for the Atlantic and the North Sea are, however, not unanimously successful.

The general objective of **TM affecting the structure of fishing gears** is to avoid catches that are unwanted. These TM tend to focus on mesh sizes. The huge diversity in fisheries has resulted in numerous exceptions to mesh size regulations, provided fishermen comply with the catch composition rules that reflect the specificity and species mix of that fishery. Catch composition rules can be very restrictive for certain fisheries and may induce obligatory discarding. While static gears are also regulated by mesh size and catch composition rules, there are no regulated prescriptions on the deployment of pots, traps, hooks, or other passive gear that are not a net in the North Atlantic and the North Sea.

TM imposing spatial and temporal restrictions on fishing activities are mainly aimed at protecting particular species or for protection of marine habitats. It is difficult to effectively quantify the performance of these measures. While some closures appear to have been beneficial, some are maintained simply because they at least contribute to some extent to decreasing fishing pressure. For some current closures, evaluations suggest they could be more effective if they were adapted to changing patterns in the distribution of stocks and fishing patterns.

TM regulating minimum landing sizes (MLS) are closely related to TM affecting the structure of fishing gears. Many MLS are complemented by common market standards for a certain fisheries, where species are defined in size categories to be adhered to when products are landed. For some species there is a mismatch between MLS and maturity indicators. Increasing the MLS to match maturity size to protect juveniles of target species is ineffective without adjusting the selectivity patterns of the fishing gears accordingly, as these fish would appear in the catches and become prone to discarding.

While the aforementioned TM in general are aimed at regulating the direct operational management of the fisheries in relation to the fish stocks, some include ecosystem management components. These include TM aimed at reducing non-commercial by-catch or protect spawning or nursery grounds. Management measures directly targeted at protecting vulnerable marine habitats or protected, endangered and threatened species are generally taken outside the scope of the Common Fisheries Policy. **An evaluation of technical measures as part of ecosystem conservation is outside the scope of this study**.

With the introduction of the landing obligation the need to evaluate the TM has become more urgent than ever. **TM that force fishers to discard or limit the possibilities to innovate are in direct contrast to the main aim of the landing obligation:** creating incentives towards more selective fishing practices. For the landing obligation to be successful, the abolishment of such rules is one of the prerequisites. **Compliance with rules** that remain after the revision, is a fundamental factor in fostering a real change of TM, for instance towards **results based management.**

However, more is needed than only a ‘spring cleaning’. Only if the changes to the TM are embedded in a greater shift in European fisheries governance, they will have positive social, economic and ecological outcomes. Real meaningful change requires four key changes. One, it implies a move from centralised governance to regional management. Second, it requires a greater co-management role for stakeholders. Third, it needs a focus on adaptive and **results based management** that is, a focus on outcome rather than the measures themselves. And finally, it requires that rules are set contextually, fitting the practice of fishing, per fishery, season, area etc.

These more general issues with respect to the various types of TM currently in operation, are also illustrated by the **case studies of the Dutch demersal fleet in chapter 4** of this this report. These studies are relevant as an example of how technical measures can be re-assessed in the light of the reformed CFP. TM were evaluated by scientists in close cooperation with stakeholders, who have in-depth knowledge of the practice of fishing and whole acceptance of rules and regulation is crucial for the success of TM. In this process many TM were identified that should be revised to increase selectivity, reduce discards and foster innovation. Some existing rules are even regarded as counterproductive to the CFP objective of reducing discards. Tables 3, 4 and 5 provided an assessment of the different

TM in relation to a revision due to the landing obligation. A number of these TM also apply to North Sea demersal fisheries by other Member States.
Our **literature and case study analysis** reaffirms that the current set of TM in the EU are too complex, difficult to understand, control and enforce. With the revision of the CFP and the introduction of the landing obligation, the need for a re-evaluation of EU's technical measures has become more urgent. The current TM regulations are not effective in preventing catches of unwanted species and in some cases hinder innovations towards more selective gear and management strategies. They should be adapted to the context of specific fisheries with measures devised at regional levels. There is wide stakeholder support (NGO's, Member States, fishing industry) for fundamental change of the TM. The main question is *how to change the TM*; which is strongly linked to the question how to organise it (governance).

In this light, the process described in the **Dutch case study** is an illustration of how policy-makers, fishermen and representatives worked jointly on evaluating the technical measures for the North Sea demersal fishery. Nevertheless, the case study should be seen as a theoretical study as success can only be measures after the proposed changes have been introduced. This inn fact applies to any revision of the technical measures before the landing obligation is implemented. This is also why **adaptive management** is so important as part of the operational implementation of the landing obligation and revised TM. Adaptive management includes monitoring of the effects of the revisions on the catch composition, socio-economics impacts and compliance; it also demands that rules and regulations can be changed swiftly on the basis of the monitoring results. As part of this process, it should be clear how the landing obligation will be implemented in practice and how enforcement and control will be effectuated.

A governance framework of **regionalised** and **results-based management**, demands a focus on joint fact finding, **joint** problem solution and joint responsibilities. This requires a **change of culture** for all actors; managers, scientists and the industry. The approach taken in the Dutch case study is recommended as a tool to foster an inclusive TM revision process in Europe. Even though time is short and the sense of urgency is high, we recommend a careful stakeholder-oriented process over a fast centralised process. After all, outcomes that can count on stakeholder support and fit the everyday reality of the fisheries will in the end be the best investment in responsible management of our fisheries and marine ecosystem resource.

1. INTRODUCTION

1.1 Structural and methodological aspects

First a brief **overview** of the main TM in the Atlantic and the North Sea is given (Chapter 2).

Then follows some general reflections on the need for and process of **revision of the TM** in the light of two core revisions of the CFP: (i) the landing obligation and (ii) regionalisation (Chapter 3). These chapters have been written based on a desk study of available literature.

Then follows analysis based on **two case studies** conducted by IMARES Wageningen UR (hereafter: IMARES), which included interviews with fishermen and joint discussions of TM by industry and government stakeholders, to be used as an illustrative case (Chapter 4).

The methodology applied in these studies is briefly described here. In the first report (Kraan *et al.,* 2014) a **quick scan** was done of the technical measures (Council Regulation (EC) No. 850/98) in relation to the landing obligation:

- Which rules ***should*** *be* removed? – because they will be in **direct** contrast with the landing obligation;
- Which rules **could** be removed? – because they cause discarding and thus are **indirectly** in contrast with the landing obligation.

The outcomes of this quick scan were partly based on a short series of in depth **interviews** we held with 6 innovative **demersal fishermen in the Netherlands** in order to get a better understanding of the rules and regulations that cause discarding practices. These interviews also shed light on how innovation in the fishing fleet – which is needed to prepare for the landing obligation – is impacted by rules and regulations. Furthermore, we were interested in the role fishermen saw for the fishing industry to contribute to management – in the light of increased stakeholder participation as aimed for with the regionalisation of the CFP.

In the second report (Kraan *et al.,* forthcoming) we have done an **analysis** of the current technical measures (TM) relevant **for the Dutch demersal fishing sector** (Council Regulation (EC) N0 850/98; Council regulation (EC) 2056/2001; Council regulation (EC) 3440-1984) based on **expert judgement** of scientists, policy officers and a fishermen representative following three questions:

- Which rules will impact on selectivity?
- Why was the rule developed, what does it aim to regulate?
- Can it be removed when the landing obligation will be implemented?

Then, we developed an extensive table of all relevant articles (for the demersal fleet) – 82 articles in total (out of 87), which have been clustered in 12 topics:

1. Percentage rules;
2. Length of the beam;
3. Mesh size;
4. Undersized fish;

5. One net rule / storage of the net at sea;
6. Net construction (twine);
7. Panels;
8. Electric fishing;
9. Plaice box;
10. Processing on board;
11. Scientific research;
12. Zonation.

Topics 1,3,4,8 and 10 were already discussed in the Kraan *et al.,* 2014 report, so in the **current report we focus on the remaining** topics (2, 5, 6, 7, 9, 11, and 12).

The procedure followed was as follows. Scientists of IMARES did a first assessment per article whether or not the rule could be removed when the landing obligation was in place. An extra column was developed to assess what would happen if the landing obligation was not complied with and the rule would be cancelled. A second column indicated whether in the current science-industry research, to prepare for the landing obligation, these rules currently impacted on the research. This table then was discussed with the policy officers of the ministry and the fisheries representative.

Prime attention was given to **Council Regulation (EC) No 850/98.** This was done in two sessions, the first was held at the *ministry in September 2014*, the second was held at the PO office with the *fisheries representative in April 2015* and via email with the *ministry in September 2015*. One of the policy officers (P. Roos – who had just retired) and the fisher representative (G. Meun) have been working on this topic for more than thirty years and together have a wealth of knowledge on when and why the rules were introduced and on how they currently impact on the fleet.

This consultation process, whereby policy officers, fisher representatives and scientists *together* discuss the rules and regulations with respect to implications for management, fishing and research, has proven to be very useful.

1.2 Limitation of this report

The time period between commissioning of this report to IMARES and the delivery date was just over one workweek. In a vast region of the Atlantic and the North Sea, many different types of fisheries take place: pelagic and demersal, small scale and large scale, artisanal and industrial. The TM that are part of their governing framework, are sometimes similar but more often fishery and region specific. Assessing the TM for each of these fisheries in this vast region - which would also require the input of expertise of scientists, policy makers and fishermen representatives knowledgeable about those specific fisheries - was not viable in the short time frame allowed for this report. Thus, choices had to be made. This report therefore presents a process undertaken in the Dutch demersal fleet and it is meant as an illustrative case. It should be noted that its conclusions could only be seen in the context of a specific situation.
Due to the aforementioned limitations, an exploration of new rules and TM for the Atlantic and the North Sea, and how/if it should be integrated in a new general EU framework was not undertaken. However, we do propose methods for the development of new measures and the structuring of those measures in a framework based on the lessons learnt in the Dutch demersal fishery case study.

2. OVERVIEW OF THE TECHNICAL MEASURES OF THE NORTH EAST ATLANTIC AND NORTH SEA

KEY FINDINGS

- **Technical measures impact** fishing activity at the level of when, how and where it can take place.
- **TM in the North East Atlantic and North Sea** have known a **long history with many revisions**. Since the 1980ies, the number of TM in the EU have grown exponentially.
- In the EU, **TM are aimed at targeting** the structure of fishing gears and how to operate these; **defining** zones and/or periods where fishing can be restricted; **specifying** measures to reduce the impact of fishing activities on the marine ecosystem; and **imposing** minimum landing sizes on caught commercial resources.
- Current **TM have not been unanimously successful** in meeting their objectives in the North East Atlantic and North Sea.
- The **general objective of TM** affecting the structure of fishing gears is to avoid catches that are unwanted. These TM tend to focus on mesh sizes. The huge diversity in fisheries has resulted in numerous exceptions to mesh size regulations, provided fishermen comply with the **catch composition rules** that reflect the specificity and species mix of that fishery. Catch composition rules can be very restrictive for certain fisheries and may induce obligatory discarding.
- While **static gears** are also regulated by mesh size and catch composition rules, there are no regulated prescriptions on the deployment of pots, traps, hooks, or other **passive gear** that are not a net in the North Atlantic and the North Sea.
- **TM imposing spatial and temporal restrictions** on fishing activities are mainly aimed at protecting particular species or for protection of marine habitats. It is difficult to effectively quantify the performance of these measures. While some closures appear to have been beneficial, some are maintained simply because they at least contribute to some extent to decreasing fishing pressure. For some current closures, evaluations suggest they could be more effective if they were adapted to changing patterns in the distribution of stocks and fishing patterns.
- **TM regulating minimum landing sizes (MLS)** are closely related to TM affecting the structure of fishing gears. Many MLS are complemented by common market standards for a certain fisheries, where species are defined in size categories to be adhered to when products are landed. For some species there is a mismatch between MLS and maturity indicators. Increasing the MLS to match maturity size to protect juveniles of target species is ineffective without adjusting the selectivity patterns of the fishing gears accordingly, as these fish would appear in the catches and become prone to discarding.
- **TM in the CFP** are generally aimed at fish stock conservation, but **may include ecosystem management components**.

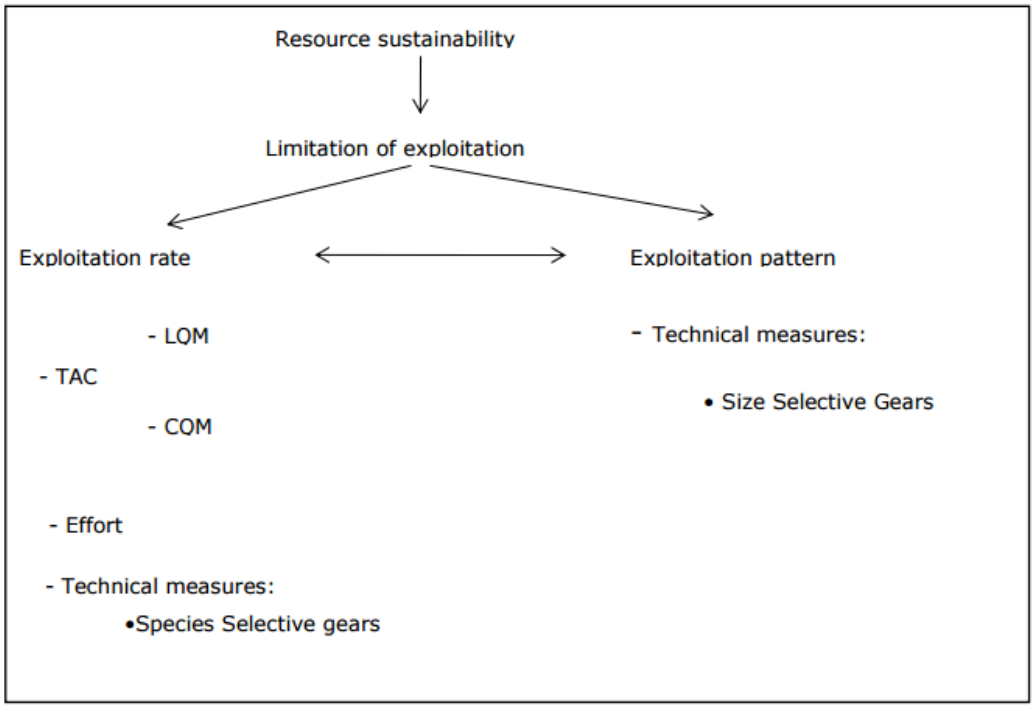
2.1 The use of Technical measures

One of the **basic tasks of fisheries management** is to regulate the amount and composition of fish species caught. The rules in fact centre around two general goals; first making sure that reproduction of commercially exploited fish stocks is not jeopardised and secondly minimizing negative impacts on the marine ecosystem (STECF, 2012).

Scientifically one can say that the exploitation of the fish stocks is limited in two ways; by looking at the **exploitation rate** (the proportion of fish being removed) and the **exploitation pattern** (selectivity) (see **Figure 1**). **Technical measures can both impact** the exploitation rate and the pattern, influencing *when*, *how* and *where* fishermen can fish. TM regulate aspects in relation to: the design and characteristics of the gear; minimum landing sizes; and spatial and temporal measures (seasonal closures, limited/closed areas) (STECF 2012).

Next to technical measures, **other measures** are also in place regulating the exploitation rate of fish stocks such as via input (i.e. days at sea (DAS) or horse power limitations) and output controls (i.e. total allowable catches (TACs)).

Figure 1: Management measures for regulation of exploitation pattern and exploitation rate



Source: STECF 2012:15.

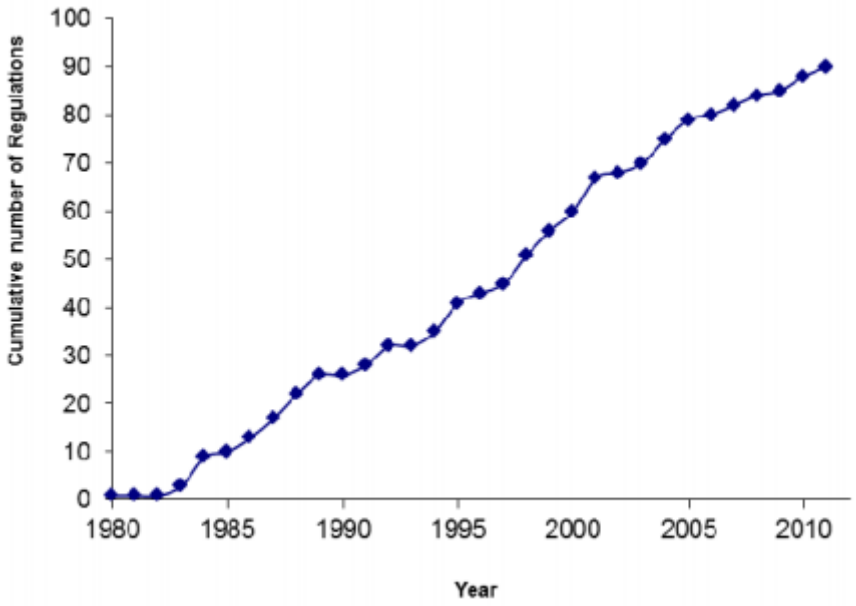
2.2 Technical measures in the North East Atlantic and the North Sea

TM have a **long history** in the North East Atlantic and North Sea. Records exist from as early as **1376**, when mesh sizes were discussed in the English Parliament (Burd, 1986 in STECF 2012:17). The real take off of the development of TM were raising concerns in the **first decades of the 20th century** in relation to the greatly increased efficiency of the steam powered fishing vessels in the North East Atlantic. A series of International Conventions on technical measures for the protection of juvenile fish were held, forming the base of formal management frameworks and regulations:

- International Convention for the Regulation of the Meshes of Fishing Nets and the Size Limits of Fish" (**1937**);
- Draft Convention Relating to the Policing of Fisheries and Measures for the Protection of Immature Fish (**1943**);
- Convention for the Regulation of Meshes of Fishing Nets and the Size Limits of Fish (**1946**) (STECF 2012).

In **1963**, the North East Atlantic Fisheries Commission (NEAFC) was formed, under whose guidance a number of TM were developed between **1964-1974**. The first technical measures regulation for EU fisheries in the North East Atlantic and the North Sea was introduced in **1980** under regulation (EEC) No. 2527/80, prior to agreement of the first CFP in 1983 (STECF 2012:18). Since the **1980ies** the number of TM for the whole EU have grown exponentially (see **Figure 2**).

Figure 2: Cumulative number of Technical measures introduced since 1980 in the EU



Source: STECF 2012:18.

The technical measures for the North East Atlantic and the North Sea were first regulated in 1980 under Regulation (EEC) No. 2527/80. Since 1980 these were amended 37 times and replaced four times (see **Table 1**).

Table 1: Overview of Regulations for TM for the NEA and NS, the amendments and replacements from 1980-2012.

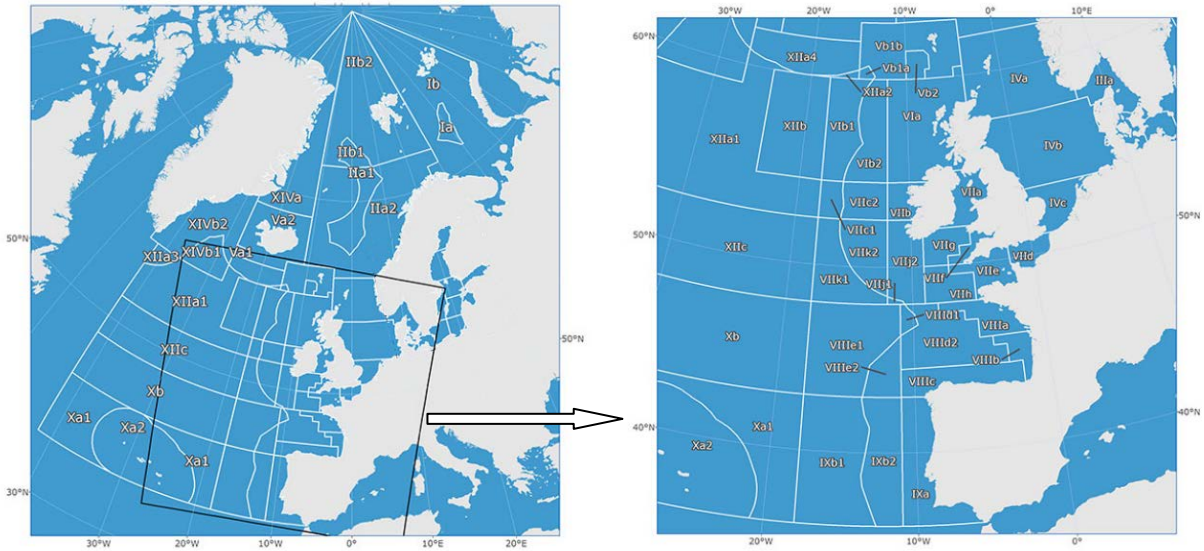
Year	Regulation No.	Amendments	About
1980	Regulation (EEC) No. 2527/80		Definitions of areas, mesh size, catch composition regulations, minimum landing sizes, prohibitions on certain gears, closed area/seasons, gear restrictions, the legal basis for the establishment of emergency measures
1983	Regulation (EEC) No 171/83	Consolidated the measures of Regulation (EEC) No. 2527/80	
		Amended 6 times; including amendments in relation to accession of Spain and Portugal in 1985	Included specific regional provisions in certain fisheries (i.e. restrictions on the length of beam trawls, changes in mesh sizes, new closed areas)
1986	Regulation (EEC) No 3094/86	Repealing and replacing Regulation (EEC) No 171/83	Contains all the elements of Regulation (EEC) No 171/83, plus all of the amendments plus several new elements on scientific research and restocking and transplantation
		Amended 19 times	Increasing minimum mesh sizes or introducing new minimum landing sizes or closed areas/gear restrictions plus new elements such as: allowing the use of selective gears as derogation from MMS (4056/89 & 345/92); mitigation measures to reduce bycatch of marine mammals & seabirds (2251/92); detailed rules for the use of static nets (MMS and catch composition rules) (3071/95).
1997	Regulation (EC) No. 894/97	Replaced Regulation (EEC) No 3094/86 and its associated amendments	
		Amended once	Regulation (EC) No. 1239/98 - introducing more restrictive measures on the use of driftnets following global debates on the use of such gears
1998	Regulation (EC) No. 850/98	Replaced Regulation (EC) No. 894/97 as the measures contained a number of inconsistencies and were unduly complex	First real attempt to adapt technical measures to the diversity of fisheries and the need for homogeneous rules across regions. New measures to improve the selectivity of towed gears by applying detailed rules on the construction of fishing gears (e.g. cod end circumference, twine thickness), making the use of square mesh panels mandatory in certain fisheries, additional closed areas/seasons and gear restrictions as well as maintaining the legal architecture for emergency measures and the development of local measures for inshore fisheries within MS territorial waters
		Amended 10 times	

Source: Table developed by authors based on STECF (2012).

Technical measures of relevance for the North Sea and the Atlantic are also found in a number of other Regulations including Regulations 2549/2000 & 2056/2001 (cod measures), 494/2002 (hake measures) and 812/2004 (specific ecosystem protection measures on cetaceans) (STECF 2012).

Since the Treaty of Lisbon went into force in 2009, the Council adopted Regulation (EC) No 1288/2009 to ensure that the temporary technical measures (before 2009 taken up under the Fishing Opportunities Regulation) would remain in place. These transitional technical measures were extended in 2011 under Regulation (EU) No 579/2011 until 31 December 2012 (STECF 2012). Recently, the EU adopted Regulation (EU) No 227/2013 to definitely incorporate these measures into Regulation (EC) 850/98 (DG MARE 2014).

Figure 3: Map of the North East Atlantic (FAO Area 27) showing the ICES statistical areas



Source: http://www.fao.org/fishery/area/Area27/en (adapted by author).

2.3 An overview of the current technical measures for the North East Atlantic and the North Sea

Above we explained how TM affect the fishing activity by influencing when, where and how commercial fish resources are exploited at sea and how fishing activities interact with the marine ecosystem. Current TM included in relevant regulations (i.e. CFP basic Regulation (EC) No. 2371/2002 and the revision of Article 7 of the new Basic Regulation) have the following intentions:

- Targeting the **structure of fishing gears** and how to operate these;
- defining **zones and/or periods** where fishing can be restricted;
- specifying measures to reduce the impact of fishing activities on the **marine ecosystem**; and
- imposing **minimum landing sizes** on caught commercial resources.

The following sections present a general overview of the technical measures contained in the EU legislation for the North Atlantic and the North Sea.

2.3.1 Technical measures affecting the structure of fishing gears

These TM mainly focus on the structure of fishing gears. Measures found in Regulation (EC) No. 850/98 and other relevant Regulations somehow largely concentrate on active towed bottom gears (trawls, seines, etc.). However, the structures of passive gears are also regulated. The **general objective** of these measures is to **avoid unwanted catches**. They are intended to regulate and promote the use of selective (for species and size) fishing gears.

2.3.1.1 Active gears

In **towed gears** fish enter the net and usually end up at the back of the net where they get caught in a netting bag, i.e. the cod end. The size of the meshes in the cod end and how they are held open or can be actively opened by the fish, determine how small fish escape through the meshes and larger fish can be retained. This means that the selectivity of the net is largely, but not only, determined by how this cod end is constructed, by defining its mesh size, twine thickness, cod end circumference, etc.

Mesh size (in the cod end) is the most important factor determining the selectivity pattern of active gears, but it is not the only factor. However, in many Regulations the focus is mainly set on mesh sizes and they are used to determine the definition of métiers in the Data Collection Framework. The métier concept associates vessels and gear characteristics (i.e. horse power range and mesh size) and target fisheries (species, areas, and periods). In practice, fishing vessels use more than one mesh size range and specific combinations of mesh sizes are permitted with associated conditions that determine a related catch composition.

There is a **huge diversity of fisheries** in Western waters and thus there are also numerous exceptions whereby the mesh sizes are often smaller of bigger than the “standard” meshes as defined in the métiers in the Regulations. Vessels are, for instance, allowed to use smaller mesh sizes during 24 hours for target species they cannot catch with the regulated “standard” mesh size, as long as they comply with the catch composition rules that reflect the specificity and species mix of that fishery. There is even a legal obligation to discard any catches in excess of the permitted percentages within the designated catch composition. **Catch composition rules can be very restrictive** for certain fisheries.

TM also regulate other factors determining selectivity in the gear configuration. These include measures for mesh shape, twine thickness, cod end circumference, attachments to the cod end, and mesh sizes in other parts of the gear. Technical measures regulate these parameters and influence the performance of towed gears accordingly. Also square mesh panels and sorting grids, or other net adaptions aimed at reducing unwanted catch, are introduced in some Regulations (DG MARE 2014).

2.3.1.2 Passive gears

Contrary to active gears, somehow **passive gears are much less regulated** than towed gears. Some say this is because their configuration is much more straightforward and they are more selective than trawls in general. However, they are also regulated by mesh sizes and catch composition rules. There are very few other measures on other characteristics of static nets. There is a general ban on the use of driftnets for targeting certain species and static nets are not allowed in waters at depths greater than 200m. In the full EU legislation for the North Atlantic and the North Sea, there are no regulated prescriptions on the deployment of pots, traps, hooks, or other passive gear that are not a net.

2.3.1.3 Performance of technical measures affecting the structure of fishing gears

TM affecting the structure of fishing gears are appropriate in some instances (for some target species), but not always (not for species caught during the same fishing operations). While sometimes fishing activities target a specific stock (mainly pelagic fisheries), the majority of EU fisheries use towed gears that target a mixed composition of species and catch a broad range of species, including commercial by-catch fish. The latter often is equally important for the fishery as these species increase the landed value of the total catch.

For a certain target species the **selectivity pattern** and of the regulated gear and mesh size may be appropriate. At the same time, it may be inappropriate for many other associated species that are caught with the same gear. However, if mesh sizes are increased to protect undersized individuals of those associated species, the marketable value of landings in the fishery would be reduced because of losses in the catches of the main target species (Quirijns *et al.*, 2007).

Catch compositions also introduce an apparent compliance issue under current technical measures when fishing activities are confronted with exhausted fishing opportunities. Although it is not quantifiable, it has been seen that **TM regulating towed demersal gears** may induce obligatory discarding of both undersized and marketable fish species as a consequence of MLS and catch composition rules (DG MARE 2014).

2.3.2 Time and area closures

The purpose of measures spatially and temporally restricting fishing activities are **mainly for protection of particular species** either directly or indirectly or for protection of marine habitats. TM imposing such spatial and temporal restrictions on fishing activities for such protection are commonly used in EU legislation.

Closures intended for the protection of particular species commonly overlap with a spawning or nursery areas where that particular species is more vulnerable to fishing activities. Sometimes, only vessels using gears that target such particular species are restricted from the area but other vessels could still be allowed in the area. When the closures are intended to protect a sensitive habitat, the closure is usually permanent and all gears are restricted from operating in that area.

Real-time closures are a recent concept in EU legislation that introduced the possibility of closing areas to fishing activities as soon as relatively high abundances of vulnerable (juvenile) species are caught by fishing vessels in those areas. A trigger level of the proportion of vulnerable species in the catches is set before closures occur. They are generally closed for a limited period and obligate fishing vessels to “move on” to other grounds and additionally fine-tune quota uptake in multi-species fisheries.

It is **difficult to effectively quantify** the performance of TM imposing closures. This being said, some closures appear to have been beneficial. For others, the main recommendations from relevant scientific bodies such as ICES and STECF are to maintain them simply because they contribute to some extent to decreasing fishing pressure on (overexploited) stocks. For some current closures, evaluations suggest that they could be more effective if they were adapted to changing patterns in the distribution of stocks and fishing patterns (DG MARE 2014).

2.3.3 Minimum landing sizes

Minimum landing sizes (MLS) are another important concept within the current technical measures and they are closely related to TM affecting the structure of fishing gears. They lie at the basis of another disposition of the EU legislation that actually impose discarding. At the moment, there are ca. 35 species of commercial importance that hold a MLS.

When any given species caught on board holds a MLS, it is illegal to retain it on board and land or sell it when it is smaller than the MLS. However, it is not illegal to catch the individuals of that species that are smaller than the MLS. In case species under the MLS are caught they have to be returned to sea right away. This way, MLS are supposed to act as an incentive for the fishermen to rig their gear in a way that undersized fish are not caught in the first place, e.g. by choosing an appropriate mesh size.

MLS are not only defined for the species themselves, but also for different presentations in which they may be found on board (i.e. whole or tailed). Along with the **definitions** of the MLS, the TM also define how the organisms should be measured. Many MLS are also **complemented** by common market standards for a certain fishery, where species are defined in size categories to be adhered to when products are landed.

In general, **MLS remain fairly stable**. The most recent increase in MLS was seen in 2001, for plaice. Member States can, however, adopt higher MLS than those stipulated in EU legislation, for their national fleet. Also, many local producers' organisations make arrangements for their local market, inducing higher MLS.

MLS have in general been set as a **compromise between (a) size,** resulting from the selectivity characteristics of the most common gears targeting a certain species, and **(b) market forces** demanding that species, without necessarily taking important biological characteristics into account. This explains the mismatch between MLS and maturity indicators for some important commercial species where the MLS has been set below the size at first maturity. As it stands now, it would be ineffective to increase the MLS to try to match maturity size to protect juveniles of target species without adjusting the selectivity patterns of the fishing gears accordingly, as these fish would appear in the catches and become prone to discarding (DG MARE, 2014).

2.3.4 Ecosystem measures

For fishers and fishery managers, the health of the target stock is often the most important driver in management. Fishing activities can, however, not be seen in isolation from the ecosystem in which they take place. While the TM in general are aimed at regulating the direct operational practices of the fisheries in relation to the fish stocks, **some of the aforementioned types of TM include ecosystem management components**.

Technical measures affecting the structure of the fishing gear are aimed at reducing unwanted by-catch. Such measures do not only relate to the target stock and commercial, but also to **reducing non-commercial by-catch** of fish, sharks and rays, benthic fauna, marine mammals and birds. For example regulation 812/2004 lays down requirements to use acoustic deterrent devices or pingers in gill net fisheries to avoid harbour porpoise bycatch. Fisheries TM relating to time and area closures also have a strong ecosystem component, in that they aim to **protect spawning or nursery grounds** or other assemblies of juvenile fish. Some examples in the Atlantic and North Sea are the Plaice Box, the Shetland Box and the Norway Pout Box

Measures such as the above are also (or will be) included in **ecosystem conservation regulations** that are **outside of the scope of the CFP**, such as the Natura 2000 network. Many Member States around the North Sea have already established, Natura 2000 sites under national jurisdiction in their 12 miles zone. Examples include temporal area closures for fisheries during the foraging season of migrating seabirds, closed areas to protect nursery and resting grounds for seals and closures of vulnerable habitats for (bottom) trawl fisheries. **Natura 2000** management plans for sites designated outside the 12 miles zone, are currently under the development, an example being a joint Dutch, German and United Kingdom management initiative for the Dogger Bank. Another example is the 2003 closure to deep-sea bottom trawling of the cold-water corals of the Darwin Mounds to the north west of Scotland in 2003 (EU Habitats Directive). As part of the European **Marine Strategy Framework Directive**, indicators defining Good Environmental Status are being developed that also relate to fisheries. These include descriptor 3 on commercially exploited fish and shellfish species; descriptor 4 on marine food web indicators; descriptor 6 on seafloor integrity and descriptor 11 on underwater noise. An evaluation of technical measures as part of nature conservation is **outside the scope of this study**.

3. ON THE REVISION OF THE TECHNICAL MEASURES

KEY FINDINGS

- **TM are an important tool** in the toolbox of fisheries managers. Besides supporting stock and ecosystem management, they can contribute positively to establishing a level playing field.
- The current set of TM in the EU are **too complex, difficult to understand, control and enforce**. With the revision of the CFP and the introduction of the landing obligation, the need for a re-evaluation of EU's technical measures has become more urgent.
- The current TM Regulations are **not effective** in preventing catches of unwanted species and in some cases **hinder innovations towards more selective** gear and management strategies. TM should be adapted to the context of specific fisheries with measures devised at regional levels.
- There is **wide support** (NGO's, Member States, fishing industry) **for fundamental change** of the TM.
- The **question is how** to change the TM; which is strongly linked to the question how to organise it (governance).
- For positive results, **more is needed than only a cleaning up** of the TM in relation to the landing obligation. For the change to be meaningful – to have positive social, economic and ecological outcomes - the change of the **TM needs to be embedded in an overall change of fisheries governance** within the EU. This change implies a move from the centre to the region with a greater role for stakeholders; with a focus on **adaptive and results based management** (focus on outcome rather than the measures themselves); and with contextual rule setting, fitting the practice of fishing, per fishery, season, area etc. All this will require a **change of culture** for all actors; managers, scientists and the industry, with special attention to the different drivers of all stakeholders.
- The challenge lies in the fact that **this governance change is fundamental** - and even more so, combined with another revolutionary change: the landing obligation - while **time is short**.
- The **success of the landing obligation** is strongly linked to (i) the abolishment of TM that force fishers to discard, (ii) the removal of nitty gritty rules with no clear link to outcomes and which often in effect limit the possibilities for fishermen to innovate; and (iii) compliance with remaining TM rules. A real change of TM (for instance towards results based management) is only possible if the landing obligation is complied with.

3.1 A governance shift for technical measures

By defining how, when and where fishing vessels can interact with the marine environment TM are important tools in the toolbox of fisheries managers. From a scientific perspective, TM are relevant and can contribute to managing fisheries. Also TM contribute positively to

establishing a uniform set of technical rules across the EU fisheries by defining common rules applicable to all fishing vessels exploiting the same resources in the same areas (DG MARE, 2014). However, the European Commission has indicated that the current set of TM are too complex, difficult to understand, control and enforce (European Commission 2014a).

In the consultation document on the development of a new framework for technical measures in the reformed CFP (European Commission, 2014a), a couple of challenges have been indicated and it is suggested, as a way of starting the debate[1], to let the new approach to TM focus on the following **four principles**:

1. **simplification** and enabling regionalisation;
2. creation of **incentives** for the industry to take more responsibility;
3. elimination, reduction and avoidance of **unwanted catches**;
4. minimisation of the **ecosystem** impacts of fishing gears.

Related to these 4 points, the consultation document poses 12 questions for consultation, which took place between 24 January and 16 May 2014 to which Advisory Councils, Member States administrations, civil society organisations, industry organisations, interest groups, stakeholder organisations and a couple of individuals (general public) responded (European Commission 2014b). The paragraph summarising the general comments is illustrative of the current situation:

> *"There is general support across stakeholders and Member States for the broad approach outlined in the consultation paper (i.e.* ***move away from micro-management*** *and towards a* ***regionalised, results-based approach****). It is clear that the* ***complexity*** *of the current Regulations and their multiple amendments should serve as an* ***example of "what not to do"****. Many respondents also point to* ***enforcement issues*** *with the current Regulations and the* ***lack of compliance*** *with the complex rules. The current Regulations are highlighted as having produced a range of* ***unintended consequences*** *that have in fact* ***forced fishermen to discard*** *and run counter to the principal objective of the measures (i.e. to protect juveniles). There is a generalised, clear message that this should not be repeated in any new framework for technical measures, given the* ***change of approach*** *(i.e. principle of management by result) within the new CFP and the introduction of the landing obligation. There is overwhelming support for a* ***complete overhaul*** *of technical measures not limited to just a re-casting or cleaning-up of the current measures"* (European Commission 2014b) [the bold highlights are of the authors of this report, showing the main points of critique with the current situation and what should be done].

With the revision of the CFP and the introduction of the **landing obligation**, the need for a **re-evaluation of EU's technical measures** has become more urgent. Yet there are **other reasons why** this is a good idea;

- the precise effectiveness of technical measures (rule per rule) can hardly be quantified;

[1] The document clearly states: The sole purpose of this consultation is to collect relevant evidence and information from stakeholders to help the Commission develop its thinking in this area. This document does not necessarily reflect the views of the European Commission, and should not be interpreted as a commitment by the Commission to any official initiative in this area.

- overall the TM prove not to be effective in achieving the overarching objective of reducing unwanted catches;
- the introduction of TM has suffered from implementation error either by being formed as a result of political negotiation or by the fact that they were developed in laboratories under idealised circumstances. However, this is not the case for all TM;
- many rules can be seen 'catch-up' regulation in response to previous responses by fishers to Regulations as a 'technological and regulatory arms race';
- the rules have become so detailed and complex that many struggle with understanding them;
- some rules seem to be focused on regulatory design elements rather than on desired outcomes;
- many TM are impossible or difficult to control;
- many rules and Regulations are not supported by industry;
- lack of flexibility;
- the decision making process is not fully transparent and does not take into account stakeholder input (STECF 2012; Suuronen and Sardà 2007; Kraan *et al.* 2014, DG MARE 2014).

The key question is *how* to do this in practice. In volume 2 of DG MARE's study (2014) **five policy options** are presented and evaluated:

1. *Baseline situation*;
2. *Consolidation and simplification* of technical measures rules: No use of regionalisation, consolidation and simplification of TM rules;
3. *Splitting common and regional rules*: No change in existing technical measures but splitting between common and regionalised measures;
4. *TM framework*: Extensive use of regionalisation, simplified and minimal framework Regulation, reduced technical measures;
5. *TM through regionalisation*: No technical measures in framework Regulation (objective based management).

The **main differences** between the 5 scenarios for policy options are listed in **Table 2**.

Table 2: Policy options for a governance shift in the field of Technical measures

(1) Baseline	(2) Consolidation and simplification	(3) Splitting common and regional rules	(4) TM framework	(5) TM through regionalisation
• No change in governance of TM; • Omnibus Regulation (alignment of LO; including MCRS replace MLS); • Multiannual plans not in short term.	• No change in governance of TM; • a level of simplification of the current TM; • deletion of redundant articles; • incorporation of recent changes; • one single Regulation.	• Change in the governance structure; • elements of simplification included under option 2; • Split between: – a set of common rules for all fishermen under a co-decision Regulation; – the creation of separate Commission Acts containing existing regionally specific rules (Regionalisation, Commission led). => It would represent a substantive change in governance but little or no change in the substance of the current rules.	• A (slim!) framework Regulation with a limited set of common rules (e.g. definitions, prohibited gears or fishing methods, conservation reference sizes); • relevant permanent ecosystem measures (closed area's); • basic standards such as reference gears, selectivity baselines, or targets. • the framework would be adopted under the ordinary legislative procedure; • Regionalisation via Multiannual plans; • for the time being work with regional annexes as part of the framework.	• Substantive change in governance; • speedy development of regionalised, tailor-made multiannual management plans; • MS and stakeholders can choose between prescriptive rules at a regional level or results based management approach where outputs rather than the inputs are managed; • implemented through a Commission delegated/implementing act; • maintain the existing TM as amended in the baseline scenario & repeal them as plans are adopted.

Source: Table by author based on DG MARE 2014:37-40.

The DG MARE study continues with a qualitative evaluation of the five scenarios; describing "the potential expected direction of change (i.e. will things get worse, stay the same, or get better under the different options) in terms of key evaluation questions (e.g. acceptability, effectiveness), and criteria (e.g. on economic, social, environmental and administrative costs and burden)" (DG MARE, 2014:42).
As a result of the analysis, **options 4 and 5** have been identified as the **preferred options**, since they:

- address the **shortcomings** of the current TM in terms of effectiveness, coherence and acceptability;

- are most likely to produce **impacts** on sustainability of exploitation;
- will contribute to a decrease in **administrative costs** and burden;
- will likely result in **simplification** of the rules; and
- will have **increased acceptability**, due to the involvement of the fishing industry in the development of the rules.

Option 4 has the slight preference over 5 due to less risk of delayed regionalisation (DG MARE 2014). Also the outcomes of option 2 are evaluated to be the same of option 1 (status quo); which are negative.

Based on the current study, it has become clear that positive results are only to be expected if the **change of the TM is embedded in an overall change of governance** in the EU; from the centre to the region with a greater role for stakeholders; with adaptive management; results based (focus on outcome rather than the measures themselves); with rules as much as possible contextual (fitting the practice of fishing, per fishery, season, area etc.).

The **main shortcoming of the TM Regulations** is that they are not effective in preventing catches of unwanted species. Fisheries in the North East Atlantic have an average discard rate of 13% (Kelleher 2005). In the North Sea this is up to one third of the total weight landed; with the main fleet segments contributing to discarding being the flatfish beam trawl fishery targeting sole and plaice, otter trawls targeting Nephrops and demersal fish otter trawl fisheries targeting cod, haddock and whiting (Catchpole *et al.,* 2005). Yet these fisheries are all "*heavily regulated by a set of EU technical measures that includes prescriptions on fishing gears (mesh sizes, use of additional selectivity devices like square mesh panels) and seasonal or permanent closures of certain areas with high densities of juveniles individuals like the plaice box*" (DG MARE, 2014:9).

From discards research we know that discard rates are highly variable between gears and or regions (Uhlmann *et al.,* 2013). Thus "*EU technical measures should be adapted to the context of specific fisheries with measures devised at regional levels instead of using the current centralised top-down approach to better take into account regional specificities*'"(DG MARE, 2014:9).

3.2 Results based management

Option 5 provides a choice for Member States and stakeholders to work with prescriptive rules at the regional level or with a more results based framework. The latter has been subject of study of the STECF in 2013. In such a case the need for TM would be minimal as it is expected that fisheries will minimise unsalable catches and focus their exploitation patterns towards catch compositions that are economically viable. However, compliance with the landings obligation is critical; if this is not the case there will be negative unintended consequences due to free-rider effects; unless the ban is adequately controlled and enforced (STECF, 2013).

Another challenge, which has been highlighted, is that with RBM there is a need for catch-based targets (with still need for scientific work on setting such targets and how it can all work out), whereby the industry then can make choices as to how to reach those targets. This is however dependant on understanding of the goals at an individual business level and goal setting that is achievable (STECF 2013). It should not be forgotten that such a change in driving the system, from a top-down system to bottom-up system with

considerable responsibility being shifted from management to fleet cannot be done overnight. It will require a change of culture for all actors; managers, scientists and the industry, with special attention to the different drivers of all stakeholders.

Furthermore in the current system technical Regulations are used also as a given, as a way to define fleets (mesh size and gear type) – as a basis for management. The main management 'button' is the exploitation rate (e.g. TAC), whereas there are also opportunities to use the exploitation pattern as a management tool (an issue which also needs more research). Practically this will, however, have implications for how to describe the different management units if gear characteristics will become variable (STECF, 2013).

Concluding, the need for change is broadly felt. The TM need change for many reasons, but this has become more urgent with the introduction of the landing obligation. It is clear that for the change to be meaningful (e.g. to have positive social, economic and ecological outcomes) more is needed than only a cleaning up of the TM in relation to the landing obligation. A change in governance structure towards more regionalisation is needed, with a good reassessment of the TM in the different regional seas.

The challenge, however, lies in the fact that this governance change is fundamental – and even more so combined with another revolutionary change: the landing obligation itself - while time is short. In addition, the success of the landing obligation is strongly linked to (i) the abolishment of TM that force fishers to discard, (ii) to the removal of nitty gritty rules with no clear link to outcomes and which often in effect limit the possibilities for fishermen to innovate; and (iii) compliance with remaining TM rules. A real change of TM (for instance towards RBM) is only possible if the landing obligation is complied with.

4. CASE STUDIES OF THE DUTCH DEMERSAL FLEET

KEY FINDINGS

- Studies in preparation for the revision of the TM in light of the landing obligation for the demersal fleet in The Netherlands are relevant as an example of **how technical measures can be re-assessed in the light of the reformed CFP**. In these studies, TM were evaluated by scientists in close cooperation with stakeholders, who have in-depth knowledge of the practice of fishing and whole acceptance of rules and Regulation is crucial for the success of TM.
- The **studies for the Dutch demersal fleet identified many TM** that should be revised to increase selectivity, reduce discards and foster innovation. Some existing rules are even counterproductive to the CFP objective of reducing discards. Tables 3, 4 and 5 provided an assessment of the different TM in relation to a revision due to the landing obligation. A number of these TM also apply to North Sea demersal fisheries by other Member States.
- The **process described** in this case study, where policy makers, fishermen and representatives discuss the technical measures together **proved to be very useful**. As part of the revision of the TM, this approach should be adopted for other fisheries and regions.
- **Any revision** of the technical measures **before that the landing obligation is implemented** can in fact be regarded as a **theoretical exercise**. Adaptive management (see chapter 4) is needed as part of its operational implementation.

4.1 A stakeholder-oriented approach to revising the technical measures

This chapter describes the outcomes of **two studies**, which recently have been undertaken and are taking place in the **Netherlands** as a preparation for the revision of the technical measures in the light of the landing obligation. They focus on the **demersal fleet**. For two reasons, these studies can prove to be relevant as an example of how technical measures can be re-assessed in the light of the reformed CFP.

Firstly, as many technical measures have been developed for preventing the catches of juvenile fish of commercial fish species, improve selectivity and reduce discards (STECF, 2012), it is likely that the introduction of the **landing obligation will impact the technical measures**. Secondly, the approach taken in these studies is **stakeholder oriented**. The measures have been evaluated by scientists in close cooperation with fishermen, industry representatives and policy officers. This is a valuable approach as the industry has in-depth **knowledge** of the practice of fishing, and their **acceptance of rules** and Regulations is crucial for the success of TM (Suuronen *et al.*, 2007). At the same time, there is still a need for **objective scientific proofing** of the functionality of (new) gears.

In these studies the **focus has been on the core TM Regulation (850/98)** to limit the scope of the research. In some cases reference is made to other Regulations such as the cod recovery plan (2056/2001). In the next section we will describe all the rules and

Regulations that should be changed because they force fishermen to discard, which is not allowed anymore under the landing obligation and the rules and Regulations that could be changed as they contribute to discarding.

4.2 Technical measures that should be changed due to the landing obligation

In this section we will give an **overview of articles** or parts of the text of **Regulation (EC) No. 850/98 that need to be changed** because they force fishermen to discard or contribute to discarding.

In general all articles or parts of the text referring to catches 'retain(ed) on board' need to changed. With the landing obligation all catches of regulated species will need to be retained on board. The more detailed remarks are listed in **Table 3**.

Table 3: Overview of all articles that should be changed because of the landing obligation

Title	Chapter	Article	Comment
II	I	4.4 Catches retained on board and taken in each of the regions or geographical areas mentioned in Annexes I to V, X and XI **may not be landed** unless their percentage composition complies with conditions laid down in the relevant Annex.	'May not be landed' is in contrast to the landing obligation
		7.5 Notwithstanding paragraph 1(a), the **retention on board** of any quantity of crustaceans of the genus **Pandalus** caught with any demersal towed net having a mesh size lying in the range 32 to 54 millimetres shall be **prohibited**, unless the net is equipped with a square-meshed panel or window having a mesh size equal to, or greater than, 70 millimetres.	'Retention on board of Pandulus prohibited is in contrast to the landing obligation.
	II	15.1 Quantities of marine organisms caught in excess of permitted percentages specified in Annexes I to VII, X and XI **shall be returned to the sea** prior to return to port.	'Shall be returned to the sea' is in contrast to the landing obligation for those species under Regulation.
III		19.1 Undersized marine organisms shall not be retained on board or be transhipped, landed, transported, stored, sold, displayed or offered for sale, but **shall be returned immediately to the sea**. *Also holds true for the articles 19.2, as it refers to 19.1.*	'Shall be returned immediately to the sea' is in contrast to the landing obligation for those species under Regulation.
V		32.1 The carrying or use on board a fishing vessel of **equipment, which is capable of automatically grading by size or by sex herring or mackerel or horse mackerel,** shall be **prohibited**.	This equipment might be allowed when the landing obligation is in place. [Note: if income from processing of juvenile fish exceeds costs, this might create negative incentives regarding selectivity.]

Title	Chapter	Article	Comment
VII		42.1 The carrying out on board a fishing vessel of any **physical or chemical processing** of fish to produce fish-meal, fish-oil, or similar products, or to tranship catches of fish for such purposes shall be prohibited. This prohibition shall not apply to the processing or transhipment of offal.	This equipment might be allowed when the landing obligation is in place. [Note: if income from processing of juvenile fish exceeds costs, this might create negative incentives regarding selectivity.]

Source: Author, based on Kraan et al., 2014:12-14.

4.3 Technical measures that could be changed due to the landing obligation

In the next table an overview is presented of all **articles that could be changed because they cause discarding practices** in some way, and are therefore in contrast with the landing obligation.

All of these articles identified refer to the **percentage composition rules**, which regulate what is retained on board but not what is caught. The original intention of such rules was to **classify fishing activity** into broad métiers for management purposes and not as a means of controlling fishing mortality (STECF 2012:44). In practice, however, these rules have resulted in fishermen **discarding parts of their catch** on day 1 of the fishing trip (as the rules are per 24 hours), whereas at the end of the fishing trip they would not have exceeded the equivalent of 5 days times catch per 24 hours.

Table 4: Overview of all articles that could be changed because of the landing obligation

Title	Chapter	Article	Comment
II	I	4.4 Catches retained on board and taken in each of the regions or geographical areas mentioned in Annexes I to V, X and XI may not be landed unless their **percentage composition** complies with conditions laid down in the relevant Annex.	Percentage composition rules, especially in mixed fisheries often in practice contribute to discarding.
		4.5 The **percentage** of target species and of other species shall be obtained by aggregating all quantities retained on board, or transhipped, of target species and other species as set out in Annexes I to V.	Percentage composition rules, especially in mixed fisheries often in practice contribute to discarding.
		5.1 The **percentages** referred to in Annexes I to V, X and XI shall be calculated as the proportion by live weight of all marine organisms on board after sorting or on landing.	Percentage composition rules, especially in mixed fisheries often in practice contribute to discarding.

Title	Chapter	Article	Comment
	II	15.2 At all times prior to return to port, the **percentage** of target species as defined in Annexes I to VII, X and XI retained on board shall be at least half of the minimum **percentages** of the target species referred to in the said Annexes.	Percentage composition rules, especially in mixed fisheries often in practice contribute to discarding.
		15.3 After the first 24 hours of a fishing voyage has expired, the **minimum percentage** of target species as set out in Annexes I to VII, X and XI shall be met at the time of the daily completion of the logbook in accordance with conditions laid out in Article 6 of Regulation (EEC) No 2847/93.	Percentage composition rules, especially in mixed fisheries often in practice contribute to discarding.
IV		*Articles 20-29 discuss special provisions relating to fishing for certain marine organisms, including **percentages** of catch composition.*	Percentage composition rules, especially in mixed fisheries often in practice contribute to discarding.

Source: Author, based on Kraan et al., 2014:15.

In addition to the above mentioned more obvious rules that need to be changed in the light of the landing obligation, we discuss the other rules in **Table 5** below. We tried to establish the **reason why these rules were introduced** and then considered **whether or not they would be needed** when the landing obligation was in place (see the methodology section for how we have done this).

It should be noted that we reasoned from the ideal typical situation that the **landing obligation would be fully complied with** by the fishing industry. It is also important to reiterate that the scheme below is filled in with the **Dutch demersal fleet** in mind. It is likely that the outcomes and context will be different for other fleets and countries.

Table 5: Overview of other rules and discussion on whether they should be kept or not

Topic	Articles	Background	Remove? y/n
Length of the beam	29.2a-f, 30.1	These rules (max 12 m beam) have been introduced with support of the Netherlands in the 1980ies. The Netherlands at that time had to reduce fleet capacity, next to scrapping part of the fleet three other measures were proposed at the national level: maximising the length of the beam at 12 m, maximising engine power at 2000HP and banning electric fishing. These were national rules at first and became EU rules later (in order to ensure a level playing field). The reason why fishermen were increasing their beam length was to catch more fish. Due to the need to limit the capacity this was reduced. As a reaction fishermen started to increase the weight of their gear, this lead to an increased oil consumption. The fishermen ended this in the early years of 2000 when the oil price increased. Less chains and lighter were used, the sumwing was developed and the pulse gear became important again (also see Haasnoot, 2015). The max 4.5-meter beam has probably been developed by the EU commission as a means to limit fishing activity in the spawning and nursery areas. Netherlands and Germany have exempted the shrimp fishery from these rules (as this fishery is managed at the national level) and developed a licence system, creating room for shrimp fishermen to have longer beams (max 9m per beam), whereas eurocutters (vessels <300HP) fishing sole and shrimp are limited to max 9 m. Some fishermen catching both shrimp and sole can use 9m beams, but then more than 50% the previous year should be shrimp catches.	**Y, possible**; by removing this rule, fishermen can increase the length of their beam and catch more fish in shorter time, with less fuel, making them more efficient. This need not be a problem as quota is limiting. Lowering towing speed may need to be considered. There is a technical limit to the length of the beam. The longest was 17.60m (was a vessel with 3200 HP). Currently tests are being done in the UK with beams of 14 m. Effect studies on Catch per Unit of Effort for target and non-target species and swept area should be included as part of such tests. For eurocutters the beam probably cannot be longer than 2x9m, as a technical limit. Removing this rule was not discussed.

Topic	Articles	Background	Remove? y/n
Net construction	6.1	This rule has been introduced because fishermen started to use increasingly more meshes in the cod end, so that the meshes became longer and were less open, so the selectivity decreased. However the reason why fishermen do this in the beam trawl fishery is to prevent the cod end from spinning (the beam trawl fishes quit fast). By increasing the meshes at the top of the cod-end, there is less pull on the top.	**N,** as it decreased the selectivity. **Y**, in some fisheries fishermen need a bit more flexibility due to the fishing practice, but care has to be taken that selectivity is not substantially decreased.
	6.2	This is the so-called ballooning-rule. In the Dutch fisheries this rule works counterproductive. Fishermen want to lose some benthos and juveniles and can accomplish this by increasing the number of meshes from the front to the end.	**Y,** as it will likely increase the selectivity in Dutch demersal fisheries. Recommendation is to verify this with scientific observations.
	9.1	The reason that this rule is there, is to prevent fishermen to use meshes that become too narrow. Rules like this can block innovation (such as finding new net material that performs better).	**Y/N**, rules like these prevent that fishermen use meshes that will be too closed and become non-selective. Rules can block innovation. If the landing obligation is complied with fully in principle there is no need for these detailed rules.
	16	The reason that this rule is there, is to prevent fishermen to block their nets. Rules like this can block innovation (such as using sorting grids and sieve netting.	**Y/N** rules like these prevent that nets become non-selective. Rules can block innovation. Only if the landing obligation is complied with fully there is no need for these detailed rules.
	5.1 iv	Fishermen in the NL would like to make their net from Dyneema (lighter) and the cod end from Nylon (as it is more flexible than Dyneema). This rule blocks that. Possibly to make it easier for the inspection agencies. No reason can be thought of that impacts the selectivity. Blocks innovation.	**Y**

Topic	Articles	Background	Remove? y/n
	5.1 v	This rules in inconvenient for flyshoot and twinrig fisheries. This rule was probably introduced for the benefit of the inspection agencies. Is linked to having more than one net on board with different mesh sizes. Fishermen would like to be more flexible and change their nets at sea when the fishery asks for it. But this is not possible.	**Y**
Panels	7.1a, b, 7.2a-e, 7.3, 7.4, 7.5	In the Commission Regulation (EC) No. 2056/2001 the *may be* have often been changed in *must* and the at least 80mm in 90mm (i.e. 7.1a in 850 -> 2056 article 4.5). The idea of many square net panels is to let undersized roundfish escape better, yet research has shown that escape panels in the top of the net, works for whiting and haddock but less so for cod. For cod lowering the headline was more effective, a measure that fishermen at a certain point took voluntarily. Some detailed rules (i.e. 7.4 and 7.5) have entered legislation because of political negotiation.	**Y, N** The idea of having square mesh panels in nets is good in itself. Such panels can be useful to select particular roundfish (whiting, haddock) but are less effective on flatfish, depending on mesh size (Van Marlen, pers.comm.). However, the detailed descriptions in the TM are overly prescriptive and the rules become an end in itself instead of directed to positive outcomes. The working of square mesh panel is dependent on many factors. It is much more effective to have fishermen and gear technicians come up with good solutions per métier, per goal.
Plaice box	29.1a-c, 29.3,4,5	The plaice box was installed to protect juvenile plaice, and juvenile sole was expected to profit as well. "*Contrary to the expectation, plaice landings and biomass declined. (...)Currently catches of both plaice and sole from within the PB are lower than in the late 1980s and the exemption fleet often prefers to fish outside the Plaice Box alongside much larger competitors. It is concluded that the observed changes are most likely related to changes in the North Sea ecosystem, which may be related to changes in eutrophication and temperature*" (Beare *et al.,* 2013).	**Y,** the goal of the PB was to protect juvenile plaice, as they are not present in the PB anymore and the North Sea plaice stock is doing extremely well, there is no real reason to keep the PB.

Topic	Articles	Background	Remove? y/n
Zonation	30.2a	This area has been described as an exemption on the general idea to have two main mesh sizes: 120 + above the 56°, and 80 below. The Netherlands pushed for an in between area where 100 was allowed, to fish with the beam trawl at the Doggerbank with (but only if bycatch of cod is less than 5%).	**Y, N** see minimum mesh size discussion with fishers above. One could argue that if the landing obligation is fully complied with, fishermen can make the optimum choice themselves.
Scientific research	43	It is good to keep a provision that rules don't apply for situations of scientific research. Increasingly fishermen will need to experiment themselves (as is the case now in preparation for the landing obligation), this should however always be guided by scientists to ensure for proper monitoring and analysis.	**N,** although good definition of scientific research should be made.

Source: Author, based on Kraan and Molenaar, forthcoming.

In conclusion, policy makers and fishery representatives agreed that technical measures that could foster more selectivity should be kept and if possible up-dated and that room should be made in the framework for the quick adaption of demonstrated improvements to fishing gear.

4.4 Interviews with fishermen about rules blocking innovation and contributing to discards

The fishermen we have interviewed gave **eight examples** of rules and Regulations that either **block innovation** or **(in)directly contribute to discards**.
Two examples were mentioned of how current **regulations block gear innovations**. **First**, Dutch fishermen have been experimenting with **separator panels** in the 80mm beam trawl net, to separate sole from plaice, in order to get rid of the undersized plaice whilst retaining the sized sole. The ideal mesh size for that panel was 4 cm but this size was prohibited in panels, it should be 8 cm. The fishermen wanted it to be 4 cm in order to prevent it from being blocked which happens with the 8 cm. Using 4 cm, the net is so small that not a lot gets in. Another separator panel that was tried out in the beam trawl fishery resulted in a discards reduction of up to 26% without significant loss of revenue (Van Marlen, 2013). However, once the experimentation period was finished, the fishermen had to remove the panels as their exemption license had terminated and the panel was not allowed under current TM. This also prevented further introduction in the fleet.

The **second** example mentioned is the precise descriptions of the **square mesh panels**. More flexibility with applying them would make it easier for fishermen to experiment (Kraan *et al.,* 2014).

Fishermen also highlighted **five examples** of rules that have **contributed (in)directly** to discarding:

- One net rule;
- Minimum mesh size;
- Cod recovery plan and days at sea limited for TR 120+;
- % Regulations;
- Ballooning.

A **first example of a rule (in)directly contributing to discarding** is the one net rule. Fishermen explained that the **one net rule** forced them to make the choice to use 80 mm mesh over 120 mm. Because they are not allowed to have a 120 mm (for cod) and 80 mm (for flatfish) on board, they have to go back to port to change nets to pursue the 80 mm fishery if they do not succeed in finding cod. If it would be possible to carry and use two nets they would start with the 120 mm mesh and change if they were unsuccessful without having to return to the harbour (van Helmond *et al.,* in prep.).

Second, the **sole fishery** in the Netherlands with **beam trawls and pulse trawls** using 80 mm nets is an example of a mixed fishery, which will struggle with the landing obligation (Verkempynck et al., forthcoming). The bycatch of undersized plaice and dab in the sole directed fishery is considerable (Quirijns and Pastoors, 2014). Preventing the catch of plaice (MMS 27 cm) would mean that a mesh size of 100+ would be needed, but then most of the marketable small size sole (MMS 24 cm), which is an important part (in size and value) of the current catch, will be lost (see also Quirijns and Hintzen 2007). The fishermen explained in the interviews that if the **mesh size rule** would be cancelled, they could fish sole with a mesh size of 75 mm instead of 85 mm as they now often do. While

the rule is 80 mm, to be compliant during inspection, fishermen often have to use a bit larger nets at first, as during initial use they shrink to the legal size. As a consequence, the current situation is that many fishermen (out of bad economic circumstances and/or out of competition with co-fishermen) often use illegal net applications such as blinders, meaning that many *de facto* fish with much smaller mesh sizes (i.e. 50 mm) than the allowed 80 mm. The fishermen reason that by lowering the minimum mesh size, the fishermen could legally make a choice for a net that is suitable to retain most of the sizeable sole (most likely just less than 80 mm) (Kraan *et al.,* 2014).

> As a fisherman explains: *"It is a small difference, but it will be accepted much easier, which will rid us from all those malpractices that people invent to keep the sole in the cod end. You will be rid of all those forbidden net adjustments, it will also be easier for the inspection agencies"* (Kraan *et al.,* 2014:22).
>
> One of the fishermen realizes that this is not a simple message: *"but yeah, ..., how should you.... you should be able to have confidential conversations with Euro-parliamentarians and explain to them 'Guys, this is the reality in the sector'"*(Kraan *et al.,* 2014:22).

It should be noted that other fishermen we spoke as part of our research about the landing obligation expressed the **importance of the social context for compliance**. Technical solutions are only real solutions if they are accepted by the fisher group as a whole (Trapman *et al.,* forthcoming, see also Suuronen *et al.,* 2007). Also it is important to evaluate the **level of compliance with the landing obligation**. In the Netherlands the measure is highly contested, with many fishermen opposing the idea of a landing obligation and thus expressing that they will not (and can't) comply (Kraan and Verweij forthcoming).

The **third example** of how TM can contribute to discarding has been mentioned elsewhere (Kraak *et al.,* 2013), and that is the limitation of days at sea (DAS) for so-called TR gears using 120+ mesh. This limitation is related to the cod recovery plan. In the Dutch context, where there are plaice directed fisheries with TR gear (twinrig and flyshoot), this rule works as perverse incentive for fishermen to fish with a smaller mesh to catch plaice which increases their discards. If they would choose the 120+ mesh for the directed plaice fishery with otter trawls, the DAS allocation associated with it would not be sufficient to catch their plaice quota (Kraan *et al.,* 2014). This same perverse incentive also applied to other North Sea fisheries that use the TR gear for other fisheries than cod.

The **fourth example** fishermen gave was that of the **percentage catch composition** rules (discussed above already).

The **last example** fishermen gave was the '**ballooning' rule** (Article 6(3) of Regulation (EC) 850/1998). In the Dutch fishery it means in practice that fishermen fish less wide in the back end of their nets in order to make the proper connection with the 80mm cod ends, as described in the rules. If this rule would not be there, they would use wider meshes in the net, resulting in less discards.

> As a fisherman explains: *"So now they [the fishermen] are all changing the net here [pointing at the link between net and cod end]. But in the past they would all have a mesh size of 100mm here, with a cod end of 80mm, but now because of this rule they are all changing the 100mm into 80mm. So they all decrease the size of their meshes because it has to be one on one the same amount of meshes. These are all stupid examples."*(Kraan *et al.,* 2014:27)

The fishermen would like to change this as they think it would improve the flow of water through the net, better quality fish and will protect the net better (less tear). Studies into these effects are not known. In addition to this it appears that control agencies in the United Kingdom and the Netherlands read the rules differently resulting in conflicts of interpretation.

5. GENERAL CONCLUSION

Technical measures (**TM) impact fishing activity on many levels**, influencing where, when and how marine resources are exploited. Therefore they are a necessary tool for the management of marine resources. However, current TM have not been unanimously successful in meeting their objectives.

The current **TM are in real need of revision** as they are too complex, often ambiguous, sometimes counterproductive and hindering innovations, difficult to control and enforce. The **landing obligation makes the revision even more urgent**. There is wide support for a fundamental change of the technical measures.

The **success of the landing obligation** is strongly linked to (i) the abolishment of TM that force fishers to discard, (ii) the removal of nitty gritty rules with no clear link to outcomes and which often in effect limit the possibilities for fishermen to innovate. **Compliance with rules** that remain after the revision, is a fundamental factor in fostering a real change of TM, for instance towards **results based management**.

To achieve positive results, more is needed than only a cleaning up of the TM in relation to the landing obligation. For the change to be meaningful – to have positive social, economic and ecological outcomes - the change of the **TM needs to be embedded in an overall change of fisheries governance** within the EU. This change implies a move from the **centre to the region** with a **greater role for stakeholders**; with a focus on **adaptive and results based management** (focus on outcome rather than the measures themselves); and with **contextual rule setting**, fitting the practice of fishing, per fishery, season, area etc.

In this context, the process described in the **Dutch case study**, where policy makers, fishermen and representatives discuss the technical measures together, **proved to be a very useful**. Nevertheless, the case study should be seen as a theoretical study. In fact, any revision of the technical measures before that the landing obligation is implemented can merely be seen as a **theoretical exercise**. **Adaptive management** is needed as part of its operational implementation, tuning the rules and regulations as part of continuous joint evaluation. This requires monitoring of the effects of the revisions on the catch composition, socio-economics impacts and compliance. Additionally, it is important to know **how the landing obligation will be set in practice** and how **enforcement and control** of the landing obligation will be effective in the future.

In a governance framework of **more regionalised and results-based management**, **joint** fact finding, joint problem solution and joint responsibilities, are key. All this will require a **change of culture** for all actors; managers, scientists and the industry. As part of the revision of the TM, the approach taken in the Dutch case study is recommended for other fisheries and regions as part of an **inclusive TM revision process in Europe**. While time is short and the sense of urgency is high, a **careful process** with outcomes that have the support of the **stakeholders** and fit the **operational situation in the fisheries** will ultimately be the best investment in sound management of our fisheries resource. In this process, it is important **not to focus narrowly on conservation of fish stocks, but also to take into account wider ecosystem management considerations**. Ultimately this will require a further tuning and integration of fisheries policy and nature and environment policies.

6. REFERENCES

- Beare, D, Rijnsdorp, A, Blaesberg, M, Damm, U, Egekvist, J, Fock, H, Kloppmann, M, Röckmann, C, Schroeder, A, Schulze, T, Tulp, I, Ulrich, C, Van Hal, R, van Kooten, T, Verweij, M. (2013*), Evaluating the effect of fishery closures: Lessons learnt from the Plaice Box*. Journal of Sea Research 84: 49-60.
- Catchpole, T, Feekings, J, Madsen, N., Palialexis, A., Vassilopoulou, V., Valeiras, J., Garcia, T., Nikolic, N., Rochet, M.-J., 2014, *Using inferred drivers of discarding behaviour to evaluate discard mitigation measures*. ICES Journal of Marine Science, 71:1277-1285.
- DG MARE (2014), *A study in support of the development of a new Technical conservation measures framework within a reformed CFP. Lot 2: Retrospective and prospective evaluation on the common fisheries policy, excluding its international dimension.* Final report. Project number: ZF1455_S02. http://ec.europa.eu/information_society/newsroom/cf/mare/itemdetail.cfm?item_id=17475
- European Commission (2014a), Consultation Document. Development of a new framework for technical measures in the reformed CFP. http://ec.europa.eu/dgs/maritimeaffairs_fisheries/consultations/technical-measures/documents/consultation-paper-tm_en.pdf
- European Commission (2014b), Consultation Summary. Reporting on the results of the public consultation on the development of a new framework for technical measures in the new CFP.http://ec.europa.eu/dgs/maritimeaffairs_fisheries/consultations/technical-measures/contributions/
- Haasnoot, T. (2015). *Lessons learned from the transition towards an innovative fishing technique – A case study on the introduction of the pulse trawl technique in the Dutch flatfish fishery*. Master's Dissertation ENP-80436, Wageningen University
- Kelleher, K., 2005*, Discards in the world's marine fisheries. An update*. FAO Fisheries Technical Paper. No. 470. Rome, FAO. 2005. 131p.
- Kraak, S, (et al), (2013), *Lessons for fisheries management from the EU cod recovery plan*. Marine Policy 37:200-213.
- Kraan, M. (2014), *Imagine all the people; Implications of an increasing role of stakeholders (fishers) in fisheries governance and research*. Keynote speech at the FAO in Rome on 6 March 2014. http://www.imr.no/prosjektsiter/fdi/presentations/en
- Kraan, M, Pastoors, M, Verroen, S, Nijman R. (2014), *Herziening GVB: gevolgen voor Technische Maatregelen (TM)*. Rapport C032.14. IMARES. https://www.wageningenur.nl/nl/Publicatie-details.htm?publicationId=publication-way-343532353637
- Kraan, M, Molenaar, P. (forthcoming), *Voorbereiding herziening technische maatregelen in verband met de aanlandplicht*. IMARES report.
- Kraan, M, Verweij, M. (forthcoming), *Implementing the landing obligation in the Netherlands; an analysis of the gap between fishery and the ministry*. In P. Holm, M. Hadjimichael and S. Mackinson, (eds.) Bridging the gap: Collaborative research practices in the fisheries. Springer.

- STECF (2012), Different principles for defining selectivity under the future TM regulation (STECF-12-20). Edited by Norman Graham and Hendrik Doerner. JRC Scientific and Policy Reports. http://stecf.jrc.ec.europa.eu/documents/43805/432011/2012-11_STECF-12-20+Defining+selectivity+under+TM+regulation_JRC76897.pdf
- STECF (2013), Different principles for defining selectivity under the future TM regulation (STECF-13-04). Edited by Norman Graham and Hendrik Doerner. JRC Scientific and Policy Reports. http://stecf.jrc.ec.europa.eu/documents/43805/501879/2013-04_STECF+13-04+-+Defining+selectivity+under+TM+regulation_JRC81584.pdf
- Suuronen, P, Sardà, F. (2007), *The role of technical measures in European fisheries management and how to make them work better*. ICES Journal of Marine Science, 64:751-756.
- Trapman, B, Kraan, M. (forthcoming) *Aanpassingen visserijgedrag en –techniek*. IMARES report.
- Quirijns, F, Hintzen, N. (2007), *Effect van de maaswijdte op de vangstsamenstelling in de boomkorvisserij*. IMARES report C122/07.
- Quirijns, F, Pastoors, M. (Eds) (2014), *Discard Atlas of North Sea fisheries*. IMARES report.
- Uhlmann, S., van Helmond, A., Stefansdottir, E.,Sigurðardottir, S., Haralabous, J., Maria Bellido, J., Carbonell, A., 2014. *Discarded fish in European waters: general patterns and contrasts*. ICES Journal of Marine Science, 71: 1235–1245.
- Van Helmond, A.T.M., Ch. Chen, B. Trapman, M. Kraan, J.J. Poos (in prep.), Creating incentives for a catch quota management system. Manuscript in preparation.
- Van Marlen, B. R. Bol, K. Groeneveld, R. Nijman, G. Rink, E. Buyvoets (2013). *Vermindering discards door technische aanpassingen in de netten (VIP-VDTN)*. IMARES report C127/13.
- Verkempynck, R., Machiels, M., van der Reijden, K., van Overzee, H., (forthcoming) Discarding in the Dutch demersal fleet: results from the national monitoring programme. CVO report.