

Deliverable D7.4

DiscardLess

Strategies for the gradual elimination of discards in European fisheries

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Good practice for implementing discard policies elsewhere

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Executive Summary

This report presents and discusses experience with implementing discard policies based on four lines of work. First, a comparative examination was conducted of selected cases worldwide where discard bans have been implemented. This work focused on the cases of Norway, Chile, New Zealand and the EU. Second, bycatch management practices were examined more broadly and globally. Third, experiences with first year of the EU's Landing Obligation (LO) were examined for the Baltic and Pelagic fisheries after the first of application of the LO. These cases potentially offer valuable lessons for discard management in the context of the LO with regard to cooperation with stakeholders, cooperation between member states and the design and implementation of discard mitigation strategies. Fourth, innovative management approaches to support the implementation of the landing obligation are presented and discussed, drawing on results from task 4.4: "The manager's story". The detailed outcomes of the first three listed lines of work are publically available as publications or reports, and their main findings are summarised and integrated in this report. With a basis in the four lines of work, the authors propose nine general recommendations for good practice for discard governance.

This document represents the final version of deliverable 7.4 of the DiscardLess project, and reports from task 7.2 "Good practice with implementing discard policies elsewhere". A draft version of this deliverable had been submitted in February 2018.

Box 1: Report Highlights

- An effective implementation of discard bans requires high levels of at-sea monitoring and effective control, and/or strong incentives and general industry acceptance.
- It is often not possible to assess and evaluate the specific impacts of the discard bans due to a lack of adequate discard data and due to difficulties of disentangling the effect of the ban from supporting measures.
- The first 12 months of the LO for Baltic and pelagic fisheries showed that communication between players at various levels, institutional adaption and regulatory responsiveness are critical factors in implementation success and in stimulating creative solutions.

Box 2: The approaches followed

- Reviews of the management and governance of discards and bycatch from a number of cases around the world, building on academic literature, regulatory documents and interviews with key persons
- Summary and analysis of the first year of the landing obligation (DiscardLess Policy brief 1 and a viewpoint article), building on regulatory documents, scientific reports, meeting observations, publically available meeting minutes, published scientific literature and interviews with key persons.

Box 3: How can these results be used and by whom?

- Reviews of the experience with discard bans and bycatch management around the world are relevant to policy makers and higher level stakeholders as they seek to build on previous successes and avoid past mistakes with the implementation of the LO in Europe.
- The question of what has happened in first applications of LO is of interest to all groups of stakeholders from local to Member States and to the EU level.
- Within the DiscardLess project, outcomes of Task 7.2 informs the work with developing Discard Mitigation Strategies (Task 7.3) and the work with developing regional recommendations for the implementation of the landing obligation (Task 7.4).
- The work committed to the task that this deliverable reports from includes the following published works, where more detailed information is available:
 - A published article on the implementation of discard bans in selected countries around the world (Borges et al., 2016).
 - A policy brief on the first year of the LO prepared in cooperation with Task 7.4 (Fitzpatrick and Nielsen, 2016)
 - A viewpoint article in ICES Newsletter series on the first year of the LO (Borges, 2016).
 - A published book chapter presenting a global perspective on bycatch management approaches (Karp et al., 2019)

Box 4: Recommendations for good practice for implementing discard policies

1. Clarify and widely communicate the goals of the discard policy.
2. Facilitate the involvement of stakeholders in developing and implementing the policy
3. The planning and implementation timelines require careful consideration. Implementing a discard ban as a 'grand scheme' of changes in policy and regulation in over a short period of time will require extensive preparations and foresight in order to be likely to succeed. Countries considered to have implemented successful discard policies have generally done so pursuing an adaptive and incremental approach over long time spans.
4. Recognize discard ban as an element in a package of management measures within a wider policy.
5. Align the discard policy with industry incentives and foster a culture of compliance.
6. Ensure effective monitoring, control and enforcement.
7. Draw on results based management principles: set specific targets and monitor achievements, but refrain from micro-management the process.
8. Support innovation throughout the process from policy development to implementation.
9. Evaluate the policy and be ready to adapt the approach taken.

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1 Introduction

Discarding is the practice of returning catches to the sea and happens for a variety of reasons. The basic reason is an incomplete ability to fish selectively for the desired species and sizes of fish. Particularly in mixed fisheries, this leads to the catch of undesirable catch segments, which may be discarded for regulatory or economic reasons. Discarding is influenced by biological, technical, economic and social aspects, and these factors are often entangled in practice (Feekings et al, 2015; Frost et al., 2015; Viðarsson, 2015; Johnsen and Eliassen, 2011, Jennings and Kaiser, 1998). In many countries, in particular economically less developed countries, where coastal communities are characterized by poverty and where fish is an important resource for subsistence, there are little or no discards because there are actually no unwanted catches; all resources are used for human consumption, or in some cases, are used in aquaculture feed (Karp et al., 2019).

A recent global assessment of discards provided an estimate that discards amount to about 10% of catches worldwide, representing about 10 million tonnes annually (Zeller et al. 2018). This assessment builds on and is close to an earlier comprehensive assessment (Kelleher, 2005). While discarding trends differ between the major ocean basins, the overall picture is that discarding generally increased from the 1950s and until it reached a peak around 1990 after which it has steadily declined. The great majority of discards (> 90%) are generated within national EEZs (Zeller et al. 2018), rendering national

discard policies as well as international cooperation of key importance for discards management. Zeller et al. (2018) find that the global level of discards has declined since 2000 due to declining industrial catches, increased management focus on discards, increases in gear selectivity, and a higher utilization of previously discarded bycatches, in part driven by an increased demand for fish protein and polyunsaturated marine fats in aquaculture feed (Naylor et al., 2000, 2009).

A policy for minimizing discards may be introduced for different reasons. A common goal for such policies is to reduce waste of living marine resources, as discarded organisms, depending on type of species and fisheries, typically have low post-discard survival. Another common goal is to reduce mortality of commercial and/or non-commercial species. This goal is only achieved if the discard policy and its supporting measures contribute to reduce the prevalence of unwanted catches, e.g. through fishing strategies and increased gear selectivity. Finally, discard bans may be motivated by an expectation that it will lead to a reduction of unaccounted mortality from unobserved discards.

As reformed in 2013 the Common Fisheries Policy (CFP) introduced an obligation to land all catches (landing obligation; LO) of specific fisheries and species. The stated specific objectives of the LO are to “...gradually eliminate discards, on a case-by-case basis, taking into account the best available scientific advice, by avoiding and reducing, as far as possible, unwanted catches, and by gradually ensuring that catches are landed.” Further, in cases where unwanted catches cannot be avoided, the CFP shall ensure the “...best use of unwanted catches, without creating a market for such of those catches that are below the minimum conservation reference size” (Art 2.5, EC 2013).

The introduction of the Landing Obligation (LO) represented a radical change from the previous policies, by which it was obligatory to discard individuals below the minimum landing. Shortly after the reformed CFP was adopted, the fishing industry voiced strong concerns over the LO, arguing that it will severely compromise the economic sustainability of fisheries. The main reason for the industry concerns was and remains the so called “choke species” problem. Following Zimmermann et al., a (2016), a *choke species* “...is a species for which the available quota is exhausted (long) before the quotas are exhausted of (some of) the other species that are caught together in a (mixed) fishery”. Other problems with the LO in the view of the fishing industry concern the time and labor required for handling unwanted catches, costs of landing unwanted catches, and negative impacts on boat or crew safety (Fitzpatrick and Nielsen, 2016). In turn, environmental NGOs have also criticized the LO, arguing that it lacks proper control, and that the quota uplifts that have been granted to ease the implementation of the LO for the fishing industry will compromise stock sustainability or delay recovery to MSY levels. Researchers have expressed concern with regard to a number of issues, including its impact on the quality of data used in fish stock assessments (Borges 2016) and its impact on ecosystems (Heath et al., 2014).

The purpose of the project task that this report contributes to, is to support the implementation of the LO by reviewing practices for implementing discard policies in places other than the DiscardLess case studies. The report presents and discusses experience with implementing a discard policies based on four lines of work. First, a comparative examination was conducted of selected cases worldwide where discard bans have been implemented. This work focused on the cases of Norway, Chile, New Zealand and the EU (Borges et al., 2016). Second, bycatch management practices were examined more broadly and globally (Karp et al., 2019). Third, experiences with first year of the EU's Landing Obligation (LO) were examined for the Baltic and Pelagic fisheries after the first of application of the LO (Fitzpatrick and

Nielsen, 2016, Borges. 2016). These cases potentially offer valuable lessons for discard management in the context of the LO with regard to cooperation with stakeholders, cooperation between member states and the design and implementation of discard mitigation strategies. Fourth, innovative management approaches to support the implementation of the landing obligation are presented and discussed, drawing on results from task 4.4: “The manager’s story”. The detailed outcomes of the first three listed lines of work are publically available as publications or reports, and their main findings are summarised and integrated in this report. With a basis in the above mentioned lines of work, the authors propose nine general recommendations for good practice for discard governance.

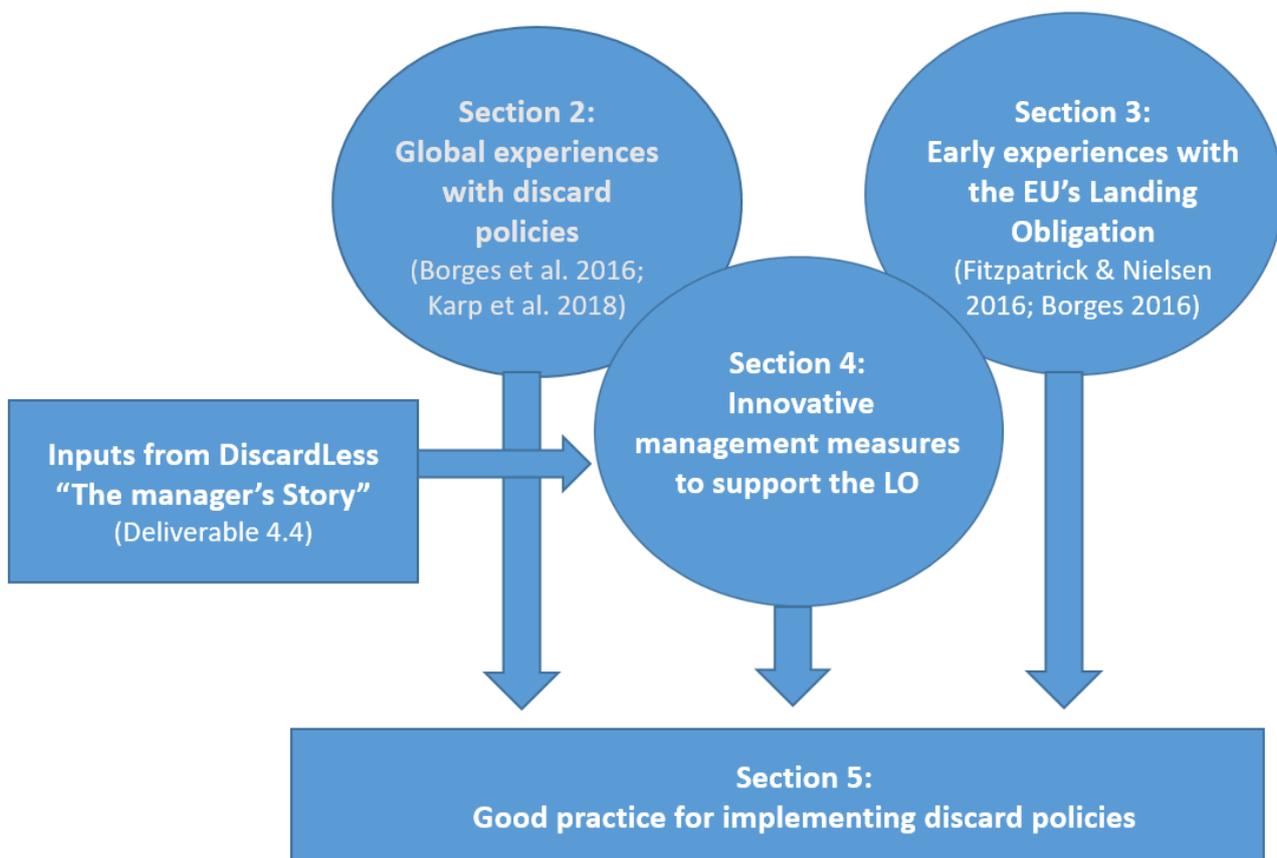


Figure 1: Illustration of the approach and structure of this report (see text below for explanation).

The report is structured as follows (figure 1): Section 2 presents experiences with a) implementing discard bans in selected countries and b) bycatch management practices around the world. Section 3 addresses early experiences with the introduction of the landing obligation in the EU, namely with regard to Baltic and Pelagic fisheries. The LO was applied to these fisheries from 01.01.2015, representing the first application of the LO. Section 4 presents and discusses innovative management approaches to reduce discarding. This work draws on outcomes from task 4.4: “The manager’s story”. With a basis in the above-mentioned work, section 6 proposes general recommendations for good practice for discard governance, representing a concluding summary of this report.

2 Experiences with discard policies around the world

A number of reviews have been written describing tools, strategies and policy initiatives to mitigate bycatch and discards globally (Hall and Mainprize, 2005), regarding specific types of fisheries (Gilman, 2011) or countries (Johnsen and Eliassen, 2011; Gullestad et al., 2015), or management approaches (Arnason 2014), or regarding the use of unwanted materials that would otherwise be discarded (Clucas, 1997). All discard mitigation approaches have their strengths and weaknesses (Sigurðardóttir et al., 2015), and what constitutes the most appropriate approach is a complex and context specific question.

The reviews on discard issues contribute to making existing knowledge relevant for the identification of discard mitigation more readily available and searchable for different purposes. In the absence of a single and globally optimal discard policy, the review of existing approaches contributes with general insights as well as a toolbox of approaches that can be utilized in some combination. In the context of the EU's landing obligation and the Discardless case studies, a case specific discard mitigation strategy will be developed as a synthesis by the end of the project.

The DiscardLess project has earlier contributed with two extensive reviews on discard mitigation practices. First, Feekings et al., 2015 provided:

- a comprehensive overview of the technical, biological and environmental, legislative and social and economic causes of discarding.
- a comprehensive overview of approaches to avoid discards through enhanced gear selectivity, approaches to change the spatio-temporal distribution of fishing (real time closures) or by regulatory approaches such as adjusting the minimum landing size (MLS) or deploying catch quota management (with electronic monitoring) rather than management based on landing quotas.
- A review of the importance of incentive based management (see also Frost et al., 2015b) and stakeholder involvement in discard mitigation initiatives.

Second, Viðarsson et al. (2015) provided an overview of discard bans as they are implemented with accompanying measures in Iceland, Norway, the Faroe Islands, Alaska, Canada, and New Zealand. A common feature of these cases is that it is difficult to estimate the concrete effects of the bans. Within these cases, similar sets of measures have been taken to reduce the prevalence of discarding (increasing selectivity and temporal area closures) and to reduce the incentives for discarding. Regulatory measures to avoid discarding include measures that provide quota flexibility, such as options to purchase additional quota to cover bycatches, or options for landing and selling undersized fish. Discard bans are enforced with at sea control, electronic monitoring, observers on-board and at ports with different levels of coverage involved. A common feature is the difficulty of estimating the effects of the discard ban. Viðarsson et al. (2015) also reviewed practices of handling and utilizing unwanted catches, in particular in Iceland and Norway.

2.1 Review of discard management practices worldwide

A broad and global review of discard management practices (Karp, et al. 2019) was conducted by DiscardLess project members in cooperation with other experts in the management of discards managed around in the world. The abstract of the resulting chapter represents a contribution to this report and the chapter can be freely accessed and read in full². In this section, we present the chapter abstract to provide a brief recap of its focus, along with selected insights from the chapter with a particular relevance for the European LO.

Strategies used throughout the world to manage fisheries discards – lessons for implementation of the EU Landing Obligation

Abstract

In many countries, policies regarding reduction of unwanted catch and discards are crafted in response to concerns regarding accountability, conservation, and waste as well as scientific needs to fully account for all sources of fishing mortality. It is important to note, however, that unwanted catch is minimal and most, or all, of the catch has value in some fisheries. Utilisation rates are very high, and discarding is generally not of concern in such fisheries which occur primarily, but not entirely, in developing countries. Where unwanted catch and discards are a concern, legislation may be prescriptive, as can be seen in the EU Landing Obligation (LO), and programmes established in e.g. Norway, Iceland, Argentina, Chile and New Zealand. Elsewhere, legislative language is intended to minimize un-wanted catch but allows for some flexibility in developing strategies and solutions, as in the USA. The effectiveness of these approaches depends on many factors and all require effective cross-sectoral collaboration. Also essential is a comprehensive monitoring and control system which insures regulatory compliance and collection of adequate data to address scientific and management information needs. In this chapter, we evaluate the effectiveness of discard and unwanted catch reduction approaches under diverse legislative systems in different parts of the world, with reference to emerging practices under the LO. We consider the importance of finding the balance between top-down and bottom-up processes and look carefully at different governance/regulatory frameworks (e.g. input controls, output controls, quota management and transferability, cooperative/collaborative management), factors which encourage or discourage innovation and collaborative problem solving, monitoring and accountability. This is accomplished through case studies from selected fisheries around the world.

Keywords: Discards • Full retention • Utilisation • Unwanted catch • Selectivity • Avoidance

Selected key points:

² https://link.springer.com/chapter/10.1007/978-3-030-03308-8_1

- Bycatch and discard management is very complex and highly contextual, in terms of technical interactions in the fisheries, management, the degree and approach taken to of monitoring and control, and compliance culture. Accordingly, there is no single or simple answer to what makes a discard policy work.
- Experiences in a number of examined countries highlight the importance of stakeholder involvement, including consultation with authorities, modification of regulations based on stakeholder feedback, and stakeholder initiatives for improving selectivity or reducing discards in other ways.
- Inflexible quota mechanisms exacerbate choke species problems. Conversely flexible quota mechanisms (allowing for pooling, transfer or leasing) represent an important resource for reducing choke problems in quota regulated fisheries subjected to a discard ban.
- The examined fisheries differ greatly in regard to the extent of and approach for compliance monitoring. In many countries, the availability and or quality of discard data is problematic, making it difficult to assess impacts of the discard policy.
- A successful discard policy requires balancing of top down approaches (legislation and control) with bottom up approaches, involving stakeholders to enhance buy-in in policy measures and increase acceptance and compliance in the long term. Some fisheries have implemented discard bans successfully through strong control, allowing for demonstrable reductions in discards over relatively short time periods. Others have achieved improved bycatch management and a reduction of discards through a gradual change in the mind-sets, with more flexible regulative frameworks and less at sea control. For countries deploying the latter approach, it has taken decades to make the discard ban work.
- European member states display cultural diversity, and therefore what constitutes an appropriate balance between top down and bottom up measures may differ between member states. The implementation timeline for the LO is relatively short, and so far the monitoring of the discard ban has not tended to be strong.

2.2 Review of discard bans in Norway, Chile, New Zealand and the EU

Borges, Cocas and Nielsen (2016) published a review of the implementation of discard bans in Norway, Chile, New Zealand and the EU. This work is a main contribution to task 7.2 that this text reports from and is freely available at: <https://doi.org/10.1093/icesjms/fsw065>

The main issues of the discard policy examples chosen were assessed generally as well as in the specific context of Balanced Harvest by addressing six questions:

- 1) what are the goals of the discard ban?
- 2) what is it illegal to discard (species, sizes) and when and by whom (season/time/fishery)?
- 3) were there any technical measures (compulsory or not) introduced together with the ban?
- 4) was the ban associated with (increased) compulsory at-sea monitoring?
- 5) what are the sanctions for violating the ban, and is there any (at-sea) control?
- 6) is there an analysis of the impacts of the ban and what are the results?

The main findings of this research include the following points:

- The scope of discard bans is often limited to main commercial species, although usually they can be extended to include more ecosystem components;
- The implementation of discard bans requires high levels of at-sea monitoring and effective control, and/or strong incentives to fish more selectively, neither of which applied to most cases examined.
- In general, the aim of a discard ban is to achieve more selective fisheries for the sizes and species targeted by the fisheries. Accordingly, the aims of discard bans tend to be in conflict with the rationale of balanced harvest³.
- The extent to which a discard ban contributes to achieve balance depends on how the ban is defined and implemented in practice, on the extent to which it promotes selective fishing, and on the relative importance of the ecosystem benthic and megafauna components.
- In the cases examined, it was not possible to assess and evaluate the specific impacts of the discard bans due to a lack of adequate discard data and/or as in the case of the EU and Chile, that the discard ban was only recently implemented.

3 Early experiences with the landing obligation

3.1 The first year of the landing obligation: policy brief on Baltic and pelagic fisheries

The DiscardLess project started in 2015, which is the same year that the LO was first applied, namely to pelagic and Baltic fisheries. These cases are not case studies in the DiscardLess project, but a study of these cases was conducted in order to gather information on the early experiences with the LO of potential use elsewhere. This study was conducted in synergy with task 7.4 and was written and reported as the first annual policy brief of project (Fitzpatrick and Nielsen, 2016).

The empirical material for this research includes a collation of documents with information of relevance for the implementation of the LO in Baltic and pelagic fisheries (policy documents, STECF reports, materials from the BSAC and the PELAC, etc.) as well as results from around 15 interviews with NGOs representatives, Commission staff, AC and PO representatives and Commission staff. The main conclusions were as follows:

- There is some evidence of the LO having a negative impact on scientific knowledge of discarding behaviour and quantities and a reduction in observer coverage.
- An assessment of whether the LO is having a significant impact on reducing fishing mortality or economic performance of vessels could not be made at this early stage. However, after the first 12 months of the LO in Pelagic and Baltic fisheries the doomsday scenario envisaged by some had not occurred.

³ The article conceptualises balanced harvest as “a strategy that distributes fishing pressure across the widest possible range of trophic levels, sizes, and species, in proportion to their natural productivity (reducing fishing pressure where it is excessive)”.

- Pelagic industry representatives feel that improved use of *de minimis* and interspecies flexibility could resolve some of the industry's main problems.
- Baltic industry and NGOs alike are frustrated with a slow and inflexible governance process regarding technical innovations.
- In the Baltic a combination of quota swaps, national quota redistribution, improved selectivity and spatio-temporal avoidance may prevent serious choke issues.
- NGO representatives expressed concern that control and monitoring regimes for the LO are insufficient.
- The first 12 months of the LO have shown that communication between players at various levels, institutional adaption and regulatory responsiveness will be critical factors in implementation success and in stimulating creative solutions.
- Overall, the key feature of improved discard management is the learning process and the ability for the regulatory system to respond quickly where changes to discard plans are necessary and justified. The new framework proposal for a technical regulation may provide for the necessary flexibility and responsiveness and may stimulate creativity among industry to contribute to improved management through a results based management approach. The Baltic and pelagic cases indicate that institutional evolution can occur within the context of regionalization, but if it happens too slowly there is a risk of loss of credibility and trust in the process.
- Baltic and pelagic fisheries are significantly less complex than those that follow on the implementation timeline indicating that these cases were well chosen as a testing ground. The two year control derogation regarding "serious infringements" in the Omnibus regulation has also contributed to taking some of the conflict out of the introduction of the LO.

The full policy brief is available at <http://www.discardless.eu/deliverables/entry/year-1-of-the-landing-obligation-key-issues-from-the-baltic-and-pelagic-fis>

The many changes have happen to contexts of the implementation of the LO in the Baltic and pelagic fisheries since the policy brief and viewpoint articles referred to above were published in 2016. As the Baltic and pelagic fisheries are not included in the DiscardLess project as case studies, it is beyond the scope of this work to provide an updated account of the LO in these two cases. However, a limited account of recent issues relating to the LO in these cases will be provided in the final DiscardLess policy brief (D7.7). A recent analysis of the landing obligation in the Baltic is also available in Valentinsson et al. (2019)⁴

⁴ https://link.springer.com/chapter/10.1007/978-3-030-03308-8_10

3.2 Year one of the landing obligation in Europe

In addition to the policy brief, an opinion piece about the first year with the LO was published in 2016 as a feature article on the ICES newsletter (Borges, 2016). From the analyses performed it seems that fishing operations in the European Union have not changed significantly after one year of the LO. In some fisheries unwanted catch was simply reduced by setting the MCRS below the previous MLS. The landing obligation has, however, clearly diminished the knowledge of discarding behaviour and quantities. Its underlying objective of reducing unwanted catch by focusing fisheries selectivity has not been achieved, while it has yet to be assessed whether fishing mortality has increased or not. Concerns were also raised regarding the future quality of ICES advice as it is shifting from advice on landings to advice on catches. There is some evidence of the LO having a negative impact on scientific knowledge of discarding estimates through a reduction in the acceptance of observers onboard vessels. An assessment of whether the LO is having a significant impact on reducing fishing mortality could be made at this early stage.

The viewpoint article can be accessed here: <http://ices.dk/news-and-events/news-archive/news/Pages/One-year-on-the-landing-obligation-in-Europe-.aspx>

4 Innovative management measures to support the landing obligation

The LO has created a need for that actors on all levels of fisheries governance, from fishers to member state administrations, find solutions to reduce discarding, and to implement the LO without undermining the economic sustainability of the fisheries. Motivated by this need, the task that this deliverable contributes to, has examined discard management practices in countries that have implemented a discard ban and/or effective bycatch management approaches (Section 2). Also addressing this need, the Environmental Defense Fund published an EU Discard Reduction Manual (McIlwain, 2015) in 2015. Drawing on good practice around in world, the Discard Reduction Manual⁵ provides an excellent, accessible and well-structured overview of a broad suite of tools and approaches to help industry and managers in EU member states to meet the requirements the landing obligation in TAC managed fisheries as well as in fisheries managed through effort limits and minimum size limits. Concerning the former, the Discard Reduction Manual guide covers a number of measures to enable a smart use of quotas, including interspecies flexibility, banking and borrowing (inter annual flexibility), industry operated quota risk pools, or buffer quotas set aside by member states with the purpose of incentivizing good fishing practice while ameliorating ensuing choke species issues, deemed value systems (see below) and transferability of quotas. In addition, the Discard Reduction Manual includes a selection of approaches to improve selectivity and facilitate avoidance, as relevant to TAC regulated fisheries as well as fisheries managed through fishing effort limits and minimum conservation reference size. Each choke species situation is different from others, there is no general approach to ameliorate

⁵ The EU Discard Reduction Manual is available here: <https://www.edf.org/oceans/eu-discard-reduction-manual> (last visited 11.02.19).

choke situations (Prellezo et al., 2018), highlighting the need for a comprehensive toolbox of measures, such as that presented with the Discard Reduction Manual. The NWWAC analysed the issue of choke species by developing a Choke Mitigation Tool, which identifies choke situations for key stocks. This tool also helps to assess qualitatively what mitigation tools, included those listed in Article 15 of the CFP, are appropriate for individual stocks and to what extent they can mitigate choke situations.

This section presents and discusses selected innovative management measures regarded to have a potential to support the implementation of the landing obligation. The section complements the Discard Reduction Manual and the Choke Mitigation Tool as it utilises insights from the DiscardLess deliverable D4.4. “the managers story”, published scientific literature and relevant documents. The “manager’s story” provides an account of managers’ perspectives on measures or tools managers consider to have a potential to support the implementation of the Landing Obligation and a reduction of discards. While a broad menu of potential approaches are available, for instance as described in the Discard Reduction Manual, it is important to understand how managers see opportunities and constrains in relation to such approaches.

Following report D4.4, the term “managers” here encompasses anyone who is responsible for designing or implementing management measures with an emphasis on discards. This includes policy makers at EU level, national level administrators and groups of stakeholders to whom some significant responsibility for quota management has been delegated. In this report, “innovative measures” means measures that have not been taken into use in the context of the European landing obligation, and that represent a significantly different approach compared to the established practice. The focus on this report is on measures that in this sense represent innovation in terms of the management approach, and where management can play a role. For example, this excludes technical innovations to improve the selectivity of fishing gears, but includes regulatory approaches that enable and incentivize the use of selective gears. Managers can be typically be working in member state administrations or POs.

The general perspective portrayed in the “manager’s story” is that choke species issues is the main concern with the LO, and that the main approach to avoid them is by using existing measures to reduce the risk of choke species situations. The NSAC ranked these measures in an order of priority such that avoidance of unwanted catches through increased selectivity and changes fishing behavior represents the “first best” approach to implement the Landing Obligation, followed by a suit of available policy measures made available by the LO, including survival exemptions, TAC and quota adjustments, *de minimis*, inter-species and inter-annual flexibility and additional technical measures. In general, the manager’s story describes that that the latter measures, notably exemptions based on *de minimis* and high survival, have been used by most of the member states considered, although these have not been used by the fishers. The implementation of the LO obligation is generally characterized by inertia relating to concrete measures, and the development is incremental. Also, the manager’s story points to that a lack of control of the LO is critical. More selective fishing gears have been tested in many of these member states, but these do not in themselves represent innovative management measures in the specific sense addressed here. In the following, we will present and discuss selected applied or considered management measures addressed in the “manager’s story”.

Quota related measures

On an international level, two quota swap workshops held in 2016 represent a potentially important collaborative management initiative by member states to ameliorate choke situations. Swaps have been shown to constitute a powerful mechanism for adapting fishing possibilities at a member state level, and should therefore be used further, although swaps alone cannot resolve choke situations in cases where here the TAC for a species is insufficient to prevent that it becomes a choke species (Prellezo et al., 2018).

Nationally, some member states have implemented new quota related approaches to ameliorate choke species problems. As such, Ireland has implemented a “Quota balancing” system for its pelagic fisheries. This system permits fishers to overshoot their quota in a given year, which will be paid back in the subsequent fishing period, which the repayment scaled up depending on the degree of overfishing. In effect, this is national version of a banking and borrowing approach (see e.g. McIlwain, 2015). Managers in Ireland also considered that an end of year quota banking and borrowing mechanism could contribute to ameliorate choke species issues expected for haddock in the Celtic sea.

Fully document fisheries with CCTV and catch quota management

The Fully Documented Fisheries (FDF) concept involves a complete documentation of all catches of regulated species to verify that vessel quotas and the LO is upheld. In order to satisfy the requirements of an FDF, adequate monitoring frameworks must be established to monitor and ensure compliance. These may include methods of self-sampling, reference fleets, on-board observers and Remote Electronic Monitoring (REM) with Closed-Circuit Television (CCTV) (Mangi et al., 2015). The REM approach presents a cost effective alternative to observer based methods of monitoring, increasing transparency in fishing practice, improving the confidence held by the consumer and enabling more comprehensive data flows (James et al., 2019). Catch quota management with CCTV can be seen as an approach to Results Based Management on a vessel level, involving a reversed burden of proof, and where increased documentation of responsibilities is compensated with deregulation or other positive incentives (Nielsen et al., 2016).

Catch quota management with CCTV was first trialled during the pilot phase first in Denmark and the UK (2009 – 2015) and subsequently in Germany, Sweden and The Netherlands. The underlying approach during these trials was straight forward: Fishermen that recorded all of their catches, in alignment with their quota holdings, received a top – up of their quota respective to the general discard level of the specific stock in question. REM fishing generated improved selectivity of fishing gear and a reduction of discarding. The introduction of the Landing Obligation in 2015 since these trials is given by the Common Fisheries Policy (CFP) of 2013, which encompasses a change at a fundamental level in how EU fisheries handle their catches.

Reservations about REM arise as a result of ethical concerns for such surveillance to be implemented, if enough incentive can be offered to the users to comply and how the manifestation of distrust between managers and industry can be avoided (Plet-Hansen et al., 2017). A means to circumvent this is by keeping REM participation voluntary. The success exhibited during the trial stages for REM are based

on results from fishermen who volunteered to take part. Those that are able to provide good quality catch data through more extensive monitoring and surveillance in the form of REM with CCTV are incentivised to do so because of the quota top – up they receive as a result Plet-Hansen et al., (2017) also notes the possibility for keeping ownership of the collected video footage with the fishermen to minimise the risk of mishandling of the data and it then becoming a tool for discrediting the fishing industry, further empowering participators. Furthermore, confidence that industry members have towards REM measures can greatly depend on their previous experience with it, those having operated with it in the past expressing more receptiveness towards it. Important aspects when considering using REM involve the practicality of its use, how susceptible it may be to technological failure (e.g. erroneous species recognition), its effectivity, and aspects relating to the data harvest component, such as accessibility to the data and how it can translate to improve market acceptance of the resource.

With the uptake of REM in European fisheries, annual estimates made on total removal (necessary for the introduction of the CQM scheme) from each stock will be expected to be associated with less uncertainty. This will enable the margin that exists between allocation keys of quota and reported catches to narrow. Relative balance between EU nations of their quotas however may add to this mismatch again thus, the new CQM scheme will demand a complex quota - swapping system to accommodate for this (Kindt-Larsen et al., 2011). Quota swapping has been a tool used frequently by quota holders to compensate the cost of not being able to catch their target. But as the new CQM does not reflect documentation of landings, as it has previously, new total catch quotas that associate with more flexibility during the phasing in period may enable a smoother transition (Kindt-Larsen et al., 2011).

Catch quota management with REM appears to have a potential to incentivize a reduction of discarding and to improve monitoring and compliance in relation to the LO. This is important, as compliance with the LO is generally regarded to be currently weak (Borges et al., 2018). In the final conference of the DiscardLess project 31.01.19 in Copenhagen, the Danish Minister of Foreign Affairs gave a speak that expressed a very strongly support for FDF with REM (CCTV). She noted, however, that Denmark would not implement this unilaterally due to concerns of maintaining a level playing field for the fisheries. This position closely matches that of UK manager's expressed in deliverable 4.4 "the manager's story". In turn, the other addressed European countries did not appear to favour the use of REM. One possibility mentioned in Copenhagen was to begin with using CCTV for information purposes only rather than control. It was also mentioned that the industry may be more interested FDF and CCTV if it is linked to a relaxation of technical measures. Ultimately, FDF could involve free gear selection, an approach that has been shown to have a potential to reduce discarding without compromising economic performance (Mortensen et al., 2017).

Deemed value

Choke species have been raised as a primary concern with the LO since fishers may be forced to forgo catches of important target species if they have insufficient quota to cover incidental catch of a choke species, and may thus be incentivized to discard choke species illegally when unobserved. A potential means to mitigate this issue is to allow fishers to continue fishing for the target species and land the

catch of the choke species but eliminate any incentives to target the choke species. This might be done by requiring forfeiture of the choke species catch or by allowing the fishers to sell the catch but requiring them to pay a fine or “deemed value” for the landed catch.

Deemed values are a fine or fee paid per kilogram of catch landed in excess of quota (Sanchirico et al. 2006). They were introduced in New Zealand as part of the catch balancing system for the quota management system to provide a means to legally land catch in excess of quota and reduce incentives to discard illegally. Deemed values are typically set close to, but below, the market price of the fish leaving a small profit margin sufficient to cover the costs of landing the fish but insufficient to incentivize targeting it. In New Zealand, where deemed values have been used for many years, landings of some species have been allowed to exceed TACs through the use of deemed values. Reforms in policies for setting deemed values introduced in 2007, which ramped up individual deemed value rates with increased use, increased deemed values when the TAC was exceeded, and sought to better balance the TACs of target and bycatch stocks. This resulted in reductions in overall use of deemed values (Mace et al. 2015, Stewart and Leaver 2016). A bioeconomic analysis (Holland and Herrera 2006) suggests that increasing Deemed Values above landed fish price in response to TACs being exceeded can control risk of overexploitation. However, when deemed values rise to well above the value of landed fish incentives to discard illegally increase.

Since deemed values could allow a sector to exceed their overall quota, it may be necessary to hold back quota to cover catches landed with deemed value to ensure fish stocks are not overexploited. In cases where unused quotas of the choke species are available from other sectors the deemed value revenues might be used to finance a quota swap or compensate sectors with unused quota.

30 years after the QMS was introduced in New Zealand, the success of the deemed value system as a tool to build on stewardship among resource users and support fish stocks has been uncertain. Hersoug (2018) outlines the difficulties faced to establish good incentives relating to discarding. Rather than encouraging quota holders to look to the long-term benefits, enabling the buying and selling of annual catch entitlements (ACE) as a form of buffer against unexpected over catch meant that new quota holders lost focus of long-term gains and focused more towards meeting their targets. In the Auckland East Snapper region (Yang, 2011), a differential deemed value system can mean that ACE may have been purchased earlier in the season by a quota holder who anticipated over catch and decided to sell it when it became no longer needed later in the season. In a competitive market the price to purchase this ACE then may no longer have offered a viable alternative to the deemed value cost. Thus, as a last resort, fishers with over catch turn to old habits and a hold on discarding cannot be ensured. Ultimately, the delicate balancing act of fining fishers enough for their over quota catches to encourage better fishing practice while not over-charging to make landing discards too costly (and thus motivate towards discarding) appeared to be difficult to reach in the long-term in New Zealand. Selectivity was improved initially after the discard ban but by 2007 discarding was considered again to be widespread (MRAG 2007). Presently, this has motivated new advances in New Zealand’s management toolbox, to enforce mandatory electronic monitoring aboard all commercial fishers, expect to come into force by January of 2019.

In Iceland and Norway illegal catches must be landed, but the income from selling these catches is forfeited, except for a small part that the fisher is allowed to retain in order to make it worthwhile for

the fisher to land the catches (Gezelius, 2008). This system constitutes an element in the overall discard management approach in these Nordic countries, which are generally regarded to have implemented workable discard management policies and associated implementation systems.

Real time incentives

Real time incentives (Kraak et al., 2012, 2014, 2015) is a fisheries-management approach based on allowances of fishing-impact credits. The Fishing impact credits are a single currency through which management of fishing mortality rates of multiple species and ecosystem impacts is pursued. Fishers can fish where and when they want and spend their allocated RTIs according to spatiotemporally varying tariffs set by managers. The RTI spending rate is determined by the time spent in areas with different tariffs.” Real-time incentives was not addressed explicitly in the Manager’s story, expect that managers in Scotland regard this as an exploratory approach, still far from practical implementation. This suggests that further testing and *in-situ* experience with real time incentives is needed before it is regarded a viable approach by managers.

5 Good practice for implementing discard policies

With a basis in the previous sections, we propose nine recommendations for good practice when implementing discard policies. As what constitutes effective strategies for minimising discard is highly context dependent, the recommendations are generic and concern the governance aspects of implementing discard policies. This also makes the recommendations complimentary to the toolbox of specific measures provided by e.g. the EU Discard Reduction Manual (McIlwain, 2015). Some of the recommendations resemble principles of good governance (CEC, 2001), but that does not detract from their relevance in the context of the LO. The recommendations represent what we judge to constitute transferable lessons in this respect, and comprise a concluding summary of this report.

1. Clarify and widely communicate the goals of the discard policy

A discard ban may be introduced for a number of reasons, and the main goals and the priority assigned to different objectives are often not made clear (Borges et al., 2016). In the case of the LO, it might be difficult to explain to fishermen how the restrictions that prevent the use of catches below the minimum conservation reference size from human consumption is consistent with the rationale of avoiding a waste of resources. It may also be challenging to explain how retention of individuals below the minimum conservation reference size is consistent with and promotes resource suitability. Further, unless the objectives of discard bans are clarified, it is difficult to arrive at the most effective strategy and compilations of measures to achieve the goals. Lack of clarification of objectives also makes it

difficult to evaluate the extent to which the policy is achieving its objectives, and it becomes difficult to address potential trade-offs with objectives of other policies (see also Borges, et al., 2018).

A high number of stakeholder consultations on the subject of the LO have been performed at an EU level as well as on a member state level, and this has contributed to create awareness about the LO. In addition, other organisations with important roles in European fisheries governance (such as Advisory Committees, POs, or environmental NGOs) have initiated countless meetings and workshops on issues relating to the LO with the aim of finding workable solutions to implement the LO. Yet the goals and implementation process remain poorly understood by many fishers, and legitimacy of this policy has been questioned as a result (de Vos et al. 2016, Karp et al. 2019). Despite intense communication and planning efforts regarding the LO, researchers from the DiscardLess project have met several fishermen that were not aware of the LO (cf. e.g. Deliverable D2.4), reflecting the continued importance of investing in communication work. Clear clarification and communication of the policy goals will contribute to achieve industry support for the discard ban, and to support outcomes of the discard policy.

2. Facilitate the involvement of stakeholders in developing and implementing the policy

The first year of the LO demonstrated that the communication between players at various levels, and institutional adaption and regulatory responsiveness are critical factors in implementation success and in stimulating creative solutions. Among other things, governmental agencies and POs have been informed about the new regulations, arranged information meetings with fishermen, and developed guidelines⁶, the ACs and regional groups of member states proposed discard plans, member states have held meetings about quota swaps and other measures to accompany the LO, and survivability studies and research projects on gear selectivity have been initiated. The ACs have appointed sub-groups dedicated to work with issues relating to the LO. Consequently, the LO has stimulated a wealth of activity, including new types of cooperation, such as between industry organisations and control agencies. In the final conference of the DiscardLess project 31.01.19 in Copenhagen, several stakeholders overserved that a positive aspect of the LO is that it has stimulated cooperation and innovation on all levels to find solutions to reduce discarding and to find workable implementation solutions.

3. An incremental and adaptive approach to implementing a discard ban is favourable to implementing a 'grand scheme' over a short period of time, as the latter will require extensive preparations and foresight in order to be likely to succeed.

⁶ For instance: <https://www.gov.uk/government/publications/demersal-landing-obligation-discard-ban-2017-north-sea-and-north-western-waters> (last visited 28.02.18)

Aspects relating to the timelines and scope of a discard ban are crucial. In Chile, an ambitious discard ban was planned to be implemented over a relatively short time span. However, the ban was soon abandoned as it met strong industry resistance. In Norway and Iceland, quite limited discard bans were introduced to begin with, and were subsequently expanded in scope over a long time period. This made it possible to build up experience and implement associated measures and adjustments as needed. The gradual development of the discard policy and associated measures granted the industry time to adjust to the changes, which it eventually came around to support in general.

Analysing governance aspects of the LO, de Voss et al. (2016) wrote that:

The main barriers to the implementation of the discard ban seem to be: short implementation time scale, the absence of anticipation of the impact of this regulation on fishers (impact and adaptation of the labour onboard) and the lack of preparedness of POs and auctions or any other actor in charge of the valorization or storage of the previously discarded catches.

In the case of the Baltic, the control regulation associating the LO (i.e. the Omnibus) was not in place until half a year after the LO officially applied to the demersal fisheries, creating uncertainty about the regulations in place. At the same time, the e-logbooks had not been supplied with the functionalities required to register unwanted catches. Further, in line with the above quote from de Voss et al. (2016), the infrastructure to handle and process unwanted catches on shore was not sufficiently developed in many cases. Altogether, this gave a confused start for the LO in the Baltic, which members of the Baltic AC accept have caused a lack of legitimacy and credibility for the LO as viewed by the fishermen.

It must be recognized that fisheries management in the EU faces particular challenges because of the statutory requirement that the overall responsibility for the management remains on a European level. Together with a complicated legislative process and adherence to the principle of a “level playing field” for the fishing industry in different member states, this limits the extent to which the policies and regulations can be adapted. The LO is included in the CFP, which is subjected to a programmed review and revision every 10 years. It must be acknowledged however, that the LO includes a number of measures to enable flexibility and this has created some room for manoeuvrability. Further, starting with the simpler cases of pelagic and Baltic fisheries, the phased introduction of the LO allows for building up an experience base to facilitate the implementation on other cases. On the whole, however, the timeline for the LO appears ambitious, and this may be problematic, as it may constrain opportunity to adapt policies, regulations and practices in order to satisfy the LO.

4. Recognize the discard ban as an element in a package of management measures within a wider policy.

A discard ban will alone have little prospects of reducing the prevalence of unwanted catches. To be effective, it must be associated with measures to increase the selectivity of fishing and or promote avoidance of unwanted catches through changes in behaviour (e.g. by way of real time closures), measures to increase the alignment between the actual catches and what one is entitled to catch (e.g. through quota flexibility mechanisms), and by creating an infrastructure for handling and utilising the

unwanted catches that cannot be avoided (Gullestad et al., 2015). The reliance on a broad range of accompanying measures makes it both challenging to implement a discard ban and to evaluate its effect.

5. *Align the discard policy with industry incentives and foster a compliance culture*

To be effective, a discard policy must take the incentives of operators into account. One cannot expect the industry to land all catches if this is strongly in conflict with economic incentives. The effective implementation of a discard ban cannot rely on control and enforcement measures alone, but it must be accepted by the majority of the actors on the ground (Johnsen and Eliassen, 2011). The following quote by the NCAC draws attention to the link between the perceived legitimacy and rationale of the LO in the view of the industry and compliance, and points to risks for the LO in this regard.

Where fishermen consider the rules and management arrangements to be broadly fair, rational and proportionate, there will be a higher probability that those rules will be adhered to; whether they are quota limits, technical measures or monitoring requirements. Unfortunately, many fishermen in the North Sea do not consider the landing obligation to be fair, rational and proportionate and do not support it, which has implications for levels of compliance. There will be a need for common and agreed rules, broadly supported by fishermen, with effective and proportionate sanctions against those who do not comply, to act as a deterrent to illegal activities. The NSAC is strongly supportive of additional measures to encourage compliance with the landing obligation, such as the development of training and information packs/workshops at various ports (NSAC 2016).

An element of the Norwegian approach is that illegal catches must be landed, but the income from the sales is forfeited, except for a small part to make it worthwhile for the fisher to land these catches (Gezelius, 2008). This system is essentially very similar to the deemed value system in New Zealand if they are effectively giving up most but not all the value of the catch forfeited. Deemed values are generally set below the landed value of the catch. In the case of the LO, the requirement that catches below minimum conservation reference size cannot be used for human consumption may make it costly for fishermen to land them.

6. *Ensure effective monitoring, control and enforcement*

Borges et al 2016, found that discard bans often are weakly monitored in practice. Weak control and enforcement involve a risk that the ban becomes undermined in practice, which in turn could undermine its legitimacy and authority (see also point 5). Weak monitoring makes it difficult to evaluate the effects of a discard ban. Technological progress with remote electronic monitoring systems appear to represent an opportunity for cost effective monitoring, but this will require that ways are found to facilitate industry acceptance (Plet-Hansen et al., 2017). The LO signals a quite strong stance with regard to

motoring and control⁷, but this has not been followed up in practice at this stage where the LO has been implemented with a 2-year derogation regarding “serious infringements” in the Omnibus regulation. In a recent study, 80% of 30 interviewed Danish fisheries inspectors did not judge it possible that the LO could be controlled and enforced, indicating that these issues may be critical to the LO (Plet-Hansen et al., 2017).

7. Draw on results based management principles: set specific targets and monitor achievement, but refrain from micro-management of the process

Preparing for the reform of the CFP, the Commission launched the notion of Results Based management (RBM): “instead of establishing rules about how to fish, the rules focus on the outcome and the more detailed implementation decisions would be left to the industry. Public authorities would set the limits within which the industry must operate, such as a maximum catch or maximum by-catch of young fish, and then give industry the authority to develop the best solutions economically and technically” (EC, 2009). Consistent with this idea, a basic principle of the landing obligation is that all catches (with certain exceptions) are accounted for by quotas. Accordingly, the CFP has in effect shifted from landing quota management towards catch quota management (Mortensen, et al. 2017). Combined with the notion of fully documented fisheries, catch quota management provides fishermen with incentives to minimise catches below the minimum conservation reference size. Ultimately, this could involve free gear selection, combined with video-based monitoring systems (Mortensen et al., 2017).

8. Support innovation all the way through to authorized implementation

A key industry concern with the early stage of implementing the landing obligation in the Baltic was the inflexibility created by certain technical regulations for T90 trawls, which dated back to before the 2014 reform of the CFP. In 2015, Swedish fishermen developed and proposed an alternative codend for T90 trawls. Researchers at the Swedish University of Agricultural Sciences (SLU Aqua) confirmed that the proposed design improved selectivity in cod fisheries, but the technical regulations for T90 trawls prevented the industry from using the revised design (or from modifying their gears in order to enhance selectivity). This created significant frustrations as revising these regulations through a co-decision process would be slow and cumbersome.

In July 2016, a multiannual plan for cod, sprat and herring in the Baltic was adopted. This plan allows the Commission to adopt joint recommendations from member states, i.e. utilizing the regional process of the reformed CFP. The trawl design of the Swedish fishermen was subsequently permitted by way of

⁷ “For the purpose of monitoring compliance with the landing obligation, Member States shall ensure detailed and accurate documentation of all fishing trips and adequate capacity and means, such as observers, closed-circuit television (CCTV) and others” (EC, 2013)

a delegated act⁸. BSAC has in 2018 requested a modification of the regulation for the alternative for T90, but the Commission declined this request with reference to decisions made by BALTFISH. Exchanges between BSAC and the Commission on this issue in 2018 reflect were misunderstandings or disagreements between the actors involved in the regional processes. This example shows the need for a regulatory process that allows innovations to be taken into use more rapidly, and that the regional process may provide an important pathway for this to happen, although the use of this pathway may raise new challenges. It is consequently important that a fast track process for new technical regulations is enabled through the regional process with the upcoming framework for technical regulations (Eliassen et al., 2018).

9. Evaluate the policy and be ready to adapt the approach taken

For the cases of discard bans examined by Borges et al., (2016) no concrete analysis and evaluation of the effect of the discard ban was available, either due to a that the information on discard was insufficient or that the discard ban was too recent to be evaluated. A complicating factor here is the fact that the discard bans are accompanied by a range of supporting measures, effectively expanding the scope of the analysis and evaluation from the discard ban to the package of measures in which it is included (see point 4). However, an evaluation is necessary in order to enhance systemic learning by detecting problems and taking correcting measures (Argylis and Schön, 1978, Nielsen and Holm, 2007). In the context of the LO, the annual reports by member states provide useful information on the implementation of the LO⁹. At a later stage it would be natural to expect that the impact of the LO on fish stocks, ecosystems and the fisheries will be assessed by the STECF and/or ICES.

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⁹ https://www.asktheeu.org/en/request/access_to_member_state_documents_2#incoming-13777

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