Thrown Away

How illegal discarding in the Baltic Sea is failing EU fisheries and citizens

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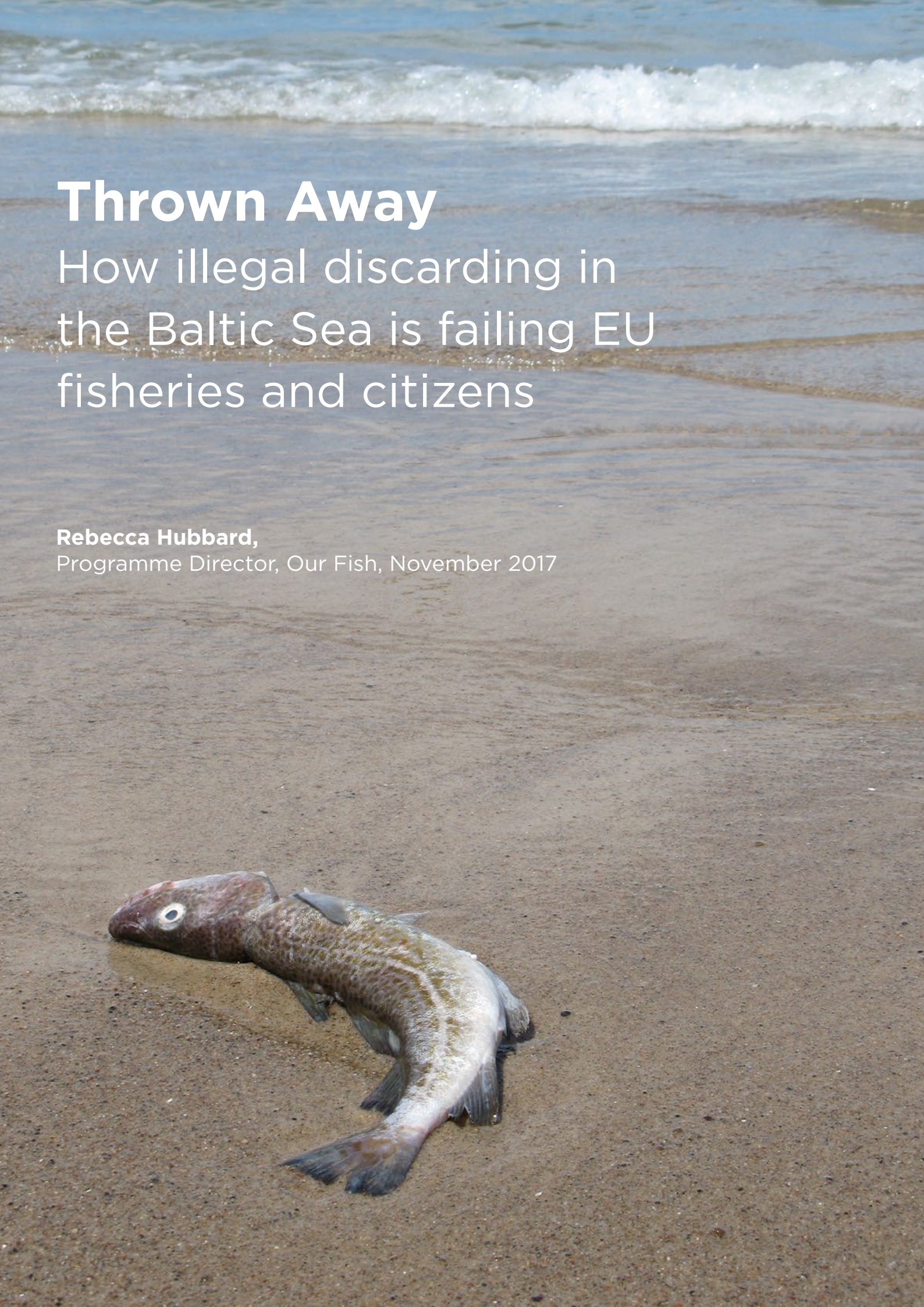

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1. Executive summary

Discard (verb): get rid of (someone or something) as no longer useful or desirable.

Each year, more than 124,000 tonnes of fish are discarded in EU fisheries (Catchpole et al., 2017).

Discard levels vary throughout EU fisheries, ranging from 1%, to over 60% of the catch. Considered a major problem, particularly in mixed fisheries, discarding threatens endangered species, wastes resources, and increases fishery costs and impacts on food webs (Catchpole et al., 2017).

This blatant waste of natural resources, at a time when there is growing awareness of their finite supply, has sparked public outcry. During the reform of the Common Fisheries Policy, between 2010 and 2013, over 870,000 people took action - signing petitions, emailing politicians, using social media and participating in public events, calling for an end to discarding fish in European waters (Fish Fight, 2014).

Following the reform, the EU's Landing Obligation (LO) was introduced in 2013, to eliminate discards and drive change in fishing practices – avoid catching unwanted and non-valuable fish, incentivise improvements in selectivity, count everything that is caught, and promote ecosystem-based management (European Union, 2013). All catches of all species that have a Total Allowable Catch (TAC), and Mediterranean species that have a minimum landing size, caught in European waters or by European fishing vessels, now have to be landed and counted against quota. The LO is being phased in by species and fisheries - starting with pelagic fisheries and Baltic Sea fisheries in 2015, and intended to be in place in all EU waters by 2019.

In the two and half years since the Landing Obligation was introduced in the Baltic Sea, has anything changed? Is discarding still taking place? Are catch and discards being reported? This report examines publically available evidence regarding compliance with the Landing Obligation in the Baltic Sea.

Implementation of the Landing Obligation

European and national institutions have made some effort to implement the LO in Baltic Sea fisheries. A number of measures have been pursued, including provisions for specific exemptions, flexibility mechanisms in TACs, reducing minimum size, and carrying out pilot studies on gear selectivity. The results, however, have so far been poor:

- The reduction in Minimum Conservation Reference Size for eastern Baltic cod has resulted in a worsening of fishing selectivity, through the incentivising of commercialization of smaller size eastern cod, and has had no apparent effect on reducing discard rates.

- Baltic cod has 'survival' exemptions from the LO for certain passive gear types (considered likely to survive after catch and release) but these account for only 3% of total discards.

- Efforts to improve selectivity of demersal trawlers – vessels responsible for 97% of discards of Eastern Baltic cod in 2016

- have been pursued in pilot projects, but application at a commercial level has been slow.

- Many of the flexibilities provided for in the CFP Article 15 have yet to be used, while quota swaps to help deal with changes in landings of different species - which have been encouraged and predicted to increase by the European Commission - have instead decreased since 2014.

- The best way to reduce unwanted catch is to avoid catching these fish in the first place. Three areas in the Baltic Sea have been closed in summer months to protect spawning and juvenile cod. However no move-on rules have been implemented that may help reduce unwanted catch.

- One of the important requirements of the Common Fisheries Policy (CFP), and of the LO in particular, is to record fishing activity more comprehensively, and consequently improve the quality of data used for scientific stock assessments. Reporting and documentation of discards under minimum size, has been minimal to non-existent in the Baltic Sea.

Monitoring and control are key to the successful implementation of a discards ban, however beyond the dissemination of information to fishers about the LO, Member State Governments have decreased monitoring and enforcement efforts, rather than increasing them.

- The European Court of Auditors concluded that fisheries data collected under the EU Control Regulation was incomplete and unreliable, and combined with the lack of reporting of discards in the Baltic Sea, can only increase the uncertainty in catch reporting since the LO took effect.

- The European Fisheries Control Agency and national control agencies have invested heavily in at-sea inspections with catch profiling (last-haul analysis) to assess the level of compliance with the LO, however, these techniques cannot be used by enforcement authorities to prosecute individual fishers for illegal discarding.

- LO compliance can only be directly evaluated at sea. Yet instead of increasing in the Baltic Sea after the LO came into effect, at-sea inspections appear to be decreasing from 25% of fishing vessels for 2016 to 9% for the first half of 2017.

- No Member State has attempted to use electronic monitoring to monitor and enforce the LO, despite successful pilot projects and recommendations to do so by researchers and EU enforcement officials.

- Increased refusal rates of at-sea observer programmes are reducing the quality of data available to scientists.

All evidence reviewed suggests that compliance with the LO is almost non-existent in the Baltic Sea. Discarding continues for all species, but particularly regarding unreported illegal cod discards.

In 2018 and 2019, illegal discard figures are set for another dramatic increase if monitoring and enforcement do not improve, as the first strong year class of western Baltic cod in over a decade joins the population. This year class could help rebuild and safeguard the future of this heavily overfished stock, or it could be squandered.

To end discarding, and implement the Landing Obligation in the Baltic Sea and in other EU waters such as the North Sea, there is a clear need to increase at-sea monitoring and enforcement, and start prioritising quota for fishing vessels that comply with the law.

Our Fish recommends that responsible authorities at national and EU level:

a) Initiate electronic monitoring programmes, starting with demersal mixed trawl fisheries, to improve data collection and compliance rates, and gather evidence of suspected violations;

b) Continue to assess LO compliance levels via last-haul analysis and at-sea inspections, while ensuring a level playing field between fisheries and sea areas;

c) Record refusal rates of at-sea observers by fishing vessels and any situation that has prevented an observer to document discards;

d) Allocate TAC adjustments to national fishing fleets that have high at-sea monitoring coverage or can demonstrate that they are complying with the LO; and

e) Reallocate quota at a national level to those vessels that can demonstrate they are operating in compliance with the LO. This would initiate a race to the top, so that fishers who practice transparency and follow the rules are rewarded for best practice.

Conclusion

EU citizens expect their national governments and EU authorities to uphold the laws they have signed up to. The failure of governments to properly implement the discard ban in the Baltic Sea not only jeopardises the sustainability of fish stocks, undermines scientific advice, perpetuates a waste of valuable resources and limits the economic prosperity of the industry, it exposes the EU seafood supply chain to

unprecedented levels of illegal behaviour. The beneficiaries of EU's fish stocks – EU citizens and consumers – are being led to believe by governments that we now have socially, environmentally and economically sustainable fisheries management - when in fact, it's just business as usual.

Ultimately, the governments of EU Member States must establish, as a matter of urgency, effective monitoring and enforcement programs that will ensure an end to wasteful and illegal discarding, and commence reallocation of quota to those in the fishing industry who are doing the right thing by complying with the law.

2. The EU Landing Obligation (LO)

Discarding part of the catch at sea is a well-known practice in most fisheries worldwide, but in the past has largely been unregulated in most fishery jurisdictions (Borges, 2017). In the European Union (EU) waters, prior to 2015, the practice of discarding part of the catch at sea was legal. The main cause of discarding is low or no economic value of catches. Discards due to management measures such as minimum landing sizes, total allowable catches (TAC) and quota limitations, and by-catch restrictions were also common occurrences in EU waters (Borges, 2015).

Discarding is considered to be major problem, particularly in mixed fisheries, as it threatens endangered species, wastes resources, as well as increasing fishery costs and impacts on food webs (Catchpole et al., 2017. Following the reform of the Common Fisheries Policy (CFP) in 2013, the EU introduced a Landing Obligation (LO) to eliminate discards and drive change in fishing practices, in order to avoid catching unwanted and non-valuable fish, incentivise improvements in selectivity, count everything that is caught, and promote ecosystem based management (European Union, 2013).

The reformed Common Fisheries Policy Article 15 states (European Union, 2013):

All catches of species which are subject to catch limits and, in the Mediterranean, also catches of species which are subject to minimum sizes … caught during fishing activities in Union waters or by Union fishing vessels outside Union waters in waters not subject to third countries'

sovereignty or jurisdiction, … shall be brought and retained on board the fishing vessels, recorded, landed and counted against the quotas where applicable …

The Landing Obligation applies to all species that have a TAC, and to Mediterranean species that have a minimum landing size (MLS), caught in European waters or by European fishing vessels. Landings above quota or below the minimum size must now be landed, but cannot be marketed for human consumption (to incentivise more selective catches and avoid creating a market for small fish). The LO is implemented progressively by species and fisheries, starting with pelagic fisheries and fisheries in the Baltic Sea in 2015, and to be completed by 2019. All retained catch, including below minimum conservation reference size (MCRS, previously known as MLS), and discards under exemptions (see below) must be documented.

The phasing-in of the LO from 2015 till 2019, has and continues to be, carried out in line with regional 'discard plans', prepared according to proposals from the relevant coastal Member States, which set out which species and fisheries are to be included in each year. It was also agreed that full enforcement of the LO (including the 'points' system for non-compliance) would be postponed until 1 January 2017 (Regulation (EU) 2015/812; European Union, 2015), in order to allow fishers to adapt to this significant change in their fishing operations.

2.1. LO exemptions

Article 15 of the CFP includes four possible exemptions from the LO: i) species for which fishing is prohibited; ii) high post-discard survival; iii) the 'de minimis', i.e. difficulty in increasing selectivity or disproportionate cost of handling unwanted catches; and iv) predator-damaged fish (added to Art. 15 through Regulation (EU) 2015/812). There are also cases where discarding of TAC species, or MLS species in the Mediterranean Sea is allowed, namely when there is a risk to crew members (e.g. by opening the net of a large haul before hauling). Protected species, as well as species under the high survival exemption, need to be returned to sea immediately. All other species can continue to be discarded. Finally, catch under the exemptions are not counted against quota, but need to be recorded.

Requests to the European Commission for Art 15 exemptions must be supported by independent scientific data and are evaluated by the Scientific, Technical and Economic Committee for Fisheries (STECF), the Commission's independent scientific advisors.

The LO also allows for quota flexibility, whereby 10% of quota can be 'borrowed' or 'banked' for the following year (inter-annual flexibility). Likewise, if a vessel has no quota for a bycatch species, over-quota catch can be landed and counted against up to 9% of the quota for the target species of the fishery, if the non-target species is within safe biological limits (inter-species flexibility). The purpose of this is to reduce the probability of fishers being required to land fish for which no quota is available, while ensuring the sustainability of the stocks in question.

2.2. Additional LO associated measures

Since 2015, with the implementation of the LO extending to more regions, species and fisheries, several other management measures have been adopted that were not specifically detailed in the CFP Article 15. These were:

i) A reduction of minimum sizes. MLS were reduced when converted to MCRS to allow for catch to be sold for human consumption (and obtain a higher value) that was otherwise not allowed.

ii) AC increases. TACs were adjusted with the discarded fraction of the catch of the fisheries under the LO.

iii) TAC suppressions. TACs for one or more species were removed from the TAC & quota regulations so that these stocks were no longer under the LO.

iv) Inclusion in protected species list. Some of the stocks where a TAC was deleted were instead listed under a catch prohibition.

3. Baltic Sea Discard Plan

As stated above, the phasing in of the LO from 2015 till 2019 is to be detailed in specific 'regional discard plans', with limited duration, while the regional multi-annual management plans (MAPs) continue to be developed and agreed by European Institutions.

In this context, the Baltic Sea Discard Plan was adopted in October 2014 following a proposal from the coastal Member States (Denmark, Germany, Estonia, Latvia, Lithuania, Poland, Finland and Sweden), and runs from 1 January 2015 for three years (Commission Delegated Regulation (EU) 1396/2014; European Commission, 2014). It sets out how the LO is to be phased in in the Baltic, as follows:

- All herring, sprat, salmon and cod to be retained from 1 January 2015;
- All plaice to be retained from 1 January 2017;
- High survival exemptions: salmon and cod taken with trap-nets, pots, fyke nets and pound nets;
- Minimum conservation reference size for cod set at 35 cm (reduction from MLS 38 cm)

Salmon damage by seal predation is accounted for in the "predators damage fish" LO exemption introduced by Regulation (EU) 2015/812.

Since the adoption of the Baltic Sea discard plan, a Multi Annual Plan for the Baltic Sea region has also been adopted (Regulation (EU) No 2016/1139; European Union, 2016). This legislation has specific provisions linked to the implementation of the LO in its Art 7, empowering the EC to adopt LO exemptions through delegated acts, MCRS, and documentation of catches.

4. Measures taken to implement the LO in the Baltic Sea

Several management measures have been taken to implement the LO in the Baltic Sea since 2015. This section considers the list of actions that are available and have already been used, providing background information and assessing their possible effectiveness.

4.1. Minimum Conservation Reference Size (MCRS)

In a discard ban, minimum 'landings' sizes can continue to make a legal distinction between undersize catch and larger size grades, in order to promote protection of juveniles, improve selectivity and avoid creating a market for undersize fish. In the LO, fishers do not receive full market value for catch under the minimum conservation reference size. The undersize catch cannot be used for human consumption and must be discounted from the respective species quota.

In Europe, under MCRS discards represent 11% of total catch (around 44,000 tonnes) corresponding to 30-40% of total discards (Catchpole et al., 2017). Considering that these smaller fish (under MCRS) can be of market value and/or their quota is limited, there is a strong incentive to avoid following the LO and selling it illegally or discarding it.

In Europe under MCRS discards represent 11% of total catch (around 44,000 tonnes), i.e. 30-40% of total discards for demersal fisheries.

Baltic cod minimum size was decreased from 38 cm to 35 cm with the introduction of the LO in 2015. Since catches of eastern Baltic cod are of particularly low sizes (2016 catch was: 38-44 cm (45% in numbers), 35-37 cm (21%) and 30-34 cm (15%)), the reduction of the minimum size automatically decreased unwanted catch. However, it also decreased fishing selectivity by incentivising commercialization of smaller size eastern cod, while there was no apparent reduction in discard rates.

For western Baltic cod, the automatic reduction of unwanted catch with the decrease in minimum size was accompanied by weak recruitment in 2014 and 2015 (i.e. there were very few juveniles in the system), which reduced discard rates. However, in 2016 western Baltic cod had its strongest year class in over a decade, which means there will be many thousands of juveniles vulnerable to non-selective trawling and discarding in 2018 and 2019. Selective fishing, targeting cod over 38 cm, will help safeguard the stock and increase growth of this critically overfished stock.

Very low quantities of cod under MCRS have been landed for both stocks (ICES, 2017a,c).

The reduction in Minimum Conservation Reference Size for eastern Baltic cod has resulted in a worsening of fishing selectivity by incentivising commercialisation of smaller size eastern cod, and had no effect on reducing discard rates.

"We should change the EU policy with regard to the protection of fish resources. The present one is ineffective. The decision to decrease in the MCRS to 35 cm has been completely irrational."

Marek Gróbarczyk, Minister for Maritime Economy and Inland Waterways, Poland[1].

A strong year class for Western Baltic cod offers hope for rebuilding this chronically overfished stock, however it is at risk from ongoing discarding of fish under minimum size.

Regarding other species in the Baltic Sea with MCRS, undersize discarding of LO species continues, with little change in species discard rates over the 2014-2016 period (ICES, 2017c).

4.2. LO exemptions

The possible LO exemptions are detailed above (Section 2.1). Requests for LO exemptions must be backed up with scientific data and independently assessed by STECF. STECF notes, however, that it does not have sufficient guidance as to what constitutes either 'high survivability' or 'disproportionate cost', and they also have concerns about variability in survival and the design of studies supposedly providing scientific or economic support for exemption requests (STECF, 2016).

Nevertheless, Baltic cod has high survival exemptions for certain gear types (see above) but it does not appear that these contribute significantly to discards; in 2016, 97% of discards of Eastern Baltic cod were estimated to come from active gears (trawls and seines) rather than passive gears such as those with exemptions (ICES, 2017a).

There have been significant concerns regarding some exemption requests in other areas (e.g. high survival for sole in some North Sea fisheries; ClientEarth, 2015), but not for any in the Baltic particularly. Zimmerman et al. (2015) emphasise that it is preferable to spend time and money trying to reduce unwanted catch rather than trying to obtain exemptions (e.g. in relation to Baltic plaice), since the former provides sustainability benefits, while the latter does not.

4.3. Gear selectivity

Efforts to reduce unwanted catch in the Baltic have focused on research to improve the selectivity of fishing gear. Both Denmark and Sweden have projects to fast-track development, testing and introduction of more selective gears. Sweden has a 'Secretariat for Selectivity', based at Sweden's Agricultural University (Sveriges lantbruksuniversitet; SLU)[2] which has completed 38 projects since 2014, with 7 running currently; the Swedish administration is in the process of spending 38 million kronor (€3,887,000) on selectivity projects. Denmark has established a similar project to allow fishers to bring forward ideas for fast-track testing. Several of their current projects relate to the Baltic cod fishery, e.g. a grid to exclude flatfish, a more size-selective cod-end (Feekings, 2017). German scientists have also been evaluating options to improve selectivity, particularly in relation to plaice; they estimate that some relatively low-cost modifications could reduce bycatch of under-size plaice by as much as 80% (Zimmerman et al., 2015).

Government staff involved in these projects from these countries note a variety of issues that have hindered the development of more selective gear:

these are: i) cumbersome, top-down procedures for verification and validation of new gear types or configurations; ii) difficulties moving from gear development to commercial production and iii) EU technical regulations which limit fishers' flexibility to try out different gears and gear configurations (Feekings, 2017; Larsson, 2017; BALTFISH/BSAC/EFCA, 2017).

Nevertheless, trawlers were responsible for 97% of discards of Eastern Baltic cod in 2016 (ICES, 2017a) and receive the majority of Baltic cod quota in both Germany and Denmark (Our Fish & NEF, 2017a; 2017b). New gears have been proposed from January 2018, and it will be important to assess whether discards are significantly and adequately reduced as a result (Baltfish, 2017).

After millions of euros of investments into new gears, if illegal discarding by demersal trawlers continues in 2018, such substantial investment should be reviewed and quota should be reallocated to vessels that comply with the law.

4.4. Quota swaps

In the context of a full retention policy, the mismatch between quota availability and realised catch can be minimised by quota swaps. Member States can swap quota between them, and most Member States also have systems for swapping quota between vessels within the country, although to highly variable extents (e.g. in the Baltic there is active quota-trading within Denmark and Sweden but in Poland it is very limited; Carpenter and Kleinjans, 2017).

Options for both inter-annual and inter-species quota flexibility have also been brought into the reformed CFP to support implementation of the LO, as described in Section 2.1 above. However, STECF (2017) reports that no Member States have so far taken advantage of the inter-species quota flexibility, although some (six) have used the inter-annual flexibility. This is also reported by the European Commission (Veits, 2017) that stated that many of the flexibilities provided for in the CFP Art 15 have yet to be used, and quota swaps (that have been encouraged and predicted to increase by the EC) have instead decreased since 2014.

Quota swaps can provide increased flexibility for adapting to the LO, but Member States are using them even less than before the LO came into force.

4.5. Fisheries closures

Under a discard ban, the mismatch between quota availability and realised catch can be exacerbated when the quota for a stock is exhausted, especially for stocks with a TAC of zero (Borges, 2017b). There have been some fishery closures in the Baltic Sea. For example, in Germany there has been a ban on directed commercial salmon fishing in the Baltic since 2015, because the entire German quota is required to cover salmon

bycatch from the cod fishery, since this cannot now be discarded.[3]

4.6. Avoidance measures

The best way to reduce unwanted catch is to completely avoid catching it in the first place, compared to improving gear selectivity (i.e. fish caught that go through a selectivity device are often injured anyway) or by discarding afterwards. Fishers may be able to change the way they fish, in order to avoid unwanted catch by changing fishing area, gear deployment time and depth, haul duration, and also by avoiding juvenile and spawning areas, amongst others (Reid, 2017). Avoidance of specific fishing grounds can be voluntary or made compulsory via temporary or permanent closed areas.

In this context, the Baltic Sea holds three areas that are closed in the summer months[6], to protect spawning and juvenile cod. Although the impact of these areas on discard rates is difficult to assess without a reference period and a significant time-series, it is likely that these closures may have decreased the undersize catch of cod.

There are however no move-on rules in the Baltic, i.e. obligation to change fishing ground when a particular catch threshold is reached, although they have been proposed in other areas, as part of the solution for species currently managed via zero or very low TACs when they enter the LO (e.g. some skate species)[5].

4.7. Catch documentation

One of the important requirements of the CFP, and of the LO in particular, is to record fishing mortality more comprehensively, and consequently improve the quality of data used for scientific stock assessments (European Commission 2013). Member States are obliged to document all catches under the LO exemptions, and discards need to be reported in logbooks. Additionally, at-sea observer programmes are used for scientific data collection under the obligations of the Data Collection Framework, particularly for the collection of information on discards.
However, reporting and documentation of discards under exemptions has been minimal to non-existent in Baltic Sea fisheries. Furthermore, observer programmes have been severely hampered by an increasing refusal rate for observers to board, and at the same time significantly dissimilar discard rates have been reported between different agencies (ICES, 2017c; STECF, 2017).

Reporting and documentation of discards under exemptions has been minimal to non-existent in the Baltic Sea.

5. Efforts to monitor and enforce the LO in the Baltic Sea

Landing obligation compliance can only be directly evaluated at sea. This section considers the range of tools available to monitor and enforce the LO and evaluates how effectively they are being used in the Baltic.

5.1. Guidance and education

The first step taken by most government agencies regarding the implementation of the LO was to disseminate information, namely on species and fisheries covered, applicable exemptions, and changes to minimum sizes, among many others, to fishers through industry meetings, information notes and through government websites (STECF, 2017). Enforcement agencies have issued guidance concerning the LO on reporting and compliance related measures. For example, the Danish AgriFish Agency and the Swedish Agency from Marine and Water Management both have dedicated webpages with guidance on the LO in the Baltic: how to report discards and below minimum size landings in the logbook and landings declarations, as well as storage of under-size catch[6]. Most Member States have also provided specific training and dedicated workshops for inspectors on control and enforcement elements of the LO, usually facilitated by EFCA (STECF, 2017).

5.2. Catch reporting

The EU Control Regulation requires all vessels with an overall length of 10 metres or more to submit a set of documents, electronically or on paper. This includes logbooks, landing declarations, and sales notes for quantities over the set threshold. However, there are significant catch reporting discrepancies between different reporting systems, raising doubts on the reliability, comprehensiveness and comparability of the catch data available. The European Court of Auditors concluded that fisheries data collected under the Control Regulation was incomplete and unreliable (ECA, 2017).

Fisheries data collected under the Control Regulation is incomplete and unreliable.

In this context, and as noted above, the lack of reporting of discards in the Baltic Sea, associated to a decrease in the availability of vessels participating in observers programmes, can only increase the uncertainty in catch reporting since the LO took effect.

5.3. Catch profiling

There are indirect methods of evaluating compliance with the LO, such as catch profiling, where enforcement teams use various sources of data to develop a picture of the profile of the catch (species and size) expected in the absence of discarding, for comparison with actual landings. The main means of catch profiling in the Baltic is 'last-haul' (LH) analysis, where inspectors on board a fishing vessel record the entire contents of a single haul.

The problem with catch-profiling techniques, from an enforcement point of view, is that deviation of a landing from the expected catch profile is not evidence of wrongdoing. Therefore, enforcement authorities cannot use catch-profiling techniques to sanction individual fishers for illegal discarding, although it is useful for risk assessment and compliance levels.

Despite this drawback, last-haul inspections have been used extensively in the Baltic since the LO was introduced for demersal fisheries (2015), to determine compliance levels, and for risk assessments

of fisheries. According to the EFCA, there have been 618 last-haul inspections in the Baltic Sea between 2014-2016 (217 in 2016; EFCA, 2017a,b).

If last-haul data cannot be used by enforcement authorities as evidence for punitive action against illegal discarding, why are so many resources going into this form of monitoring, whilst methods that can collect evidence are not utilised at all?

5.4. At-sea inspections

The European Fisheries Control Agency (EFCA) reports that, as part of the Baltic Sea Joint Deployment Plan, 1499 at-sea inspections were carried out in 2016. This corresponds to 1418 days at sea of enforcement vessels deployed in the Baltic Sea (between national, 1043, and JDP, 375, committed means), as well as 202 aircraft flights, with 55 suspected infringements reported (3.7%; EFCA, 2017b).

As of 30th June 2017, 556 inspections were carried out at sea (394 days at sea) and 95 aircraft flights, with 24 suspected infringements reported (4.3%; EFCA, 2017c). Although most of the infringements were related to data reporting and recording (52% and 62% in 2016 and June 2017, respectively), it is unclear how many were specifically associated to the LO.

Taking into account that the total EU Baltic Sea fleet included 5947 vessels in 2016 (ICES, 2017d), 25% and 9% of the fishing vessels in the Baltic Sea were inspected in 2016 and the first half of 2017, respectively.

In the Baltic Sea, 25% of fishing vessels were inspected at-sea in 2016, while 9% of the vessels were inspected by July 2017.

5.5. Electronic Monitoring (EM)

Electronic Monitoring (EM) is the recording of catches and discarding at sea by a system that usually combines closed circuit television (CCTV), GPS and winch sensors, with posterior analysis of the recorded data onshore. EM is recommended by Hedley et al. (2015) and Catchpole et al. (2017) to monitor and enforce the LO; and has also been evaluated by EU enforcement officials as the method most likely to be effective to control the LO, alongside on-board compliance observers (Scheveningen Group, 2015; Plet-Hansen et al., 2017).

Electronic Monitoring has been used in the EU mainly in demersal fisheries, known as fully-documented fisheries (FDF), with the main objective to estimate discards, while at the same time pilot-testing for a full discard ban. Fishers were incentivised to accept electronic monitoring by receiving additional cod quota, and all cod catches (above and below MLS) were accounted for in the quota. Results show that fishers under FDF improved their

selectivity significantly, reducing their unwanted catch of juvenile cod; an effect also shown in other fisheries outside the EU (McElderry, 2014 in Catchpole et al., 2017). It also demonstrated its potential for monitoring compliance with the LO with similar discard rates with the ones estimated by observer programmes, which are considerably more expensive (see below; Kindt-Larsen et al., 2011). The drawback is that with some very mixed catches, such as demersal flatfish fisheries, it is more difficult to obtain suitable footage (particularly if fish have to be identified by size as well as species). However, improvements to the accuracy of EM data are already underway, which could address these issues (Catchpole et al., 2017). Nevertheless, no Member State has attempted to use electronic monitoring to monitor and enforce the LO, except for some trials, according to STECF (STECF, 2017).

No Member State has attempted to use electronic monitoring to monitor and enforce the LO, despite successful pilot projects and recommendations from researchers and EU enforcement officials.

5.6. On-board observers

EU countries, as part of their Data Collection Framework (DCF) sampling plans, have scientific observer at-sea programmes for their commercial fisheries. The data provided by these programmes are used by ICES to estimate discards. These observers are, however, on board fishing vessels for scientific purposes rather than compliance, but through the DCF there is a legal requirement for EU vessels to allow observers on board. Nevertheless, observers in the EU continue to embark only with the permission of skippers. This means that, in a context where illegal discarding is widespread, the more that the observers are perceived as having an enforcement role, the more likely skippers are to refuse to have them on board, reducing the quality of information available to scientists.

Refusal rates of observers on-board by skippers are monitored as part of the DCF. In Denmark they remain low (because observers agree to not release findings to control agencies) but they have increased in Sweden and Germany since the start of the LO. Reportedly, Sweden was only able to conduct five out of 24 planned observer deployments on cod vessels in the Baltic in 2016 and was unable for the first time to provide reliable discard estimates to ICES, although fishers and the government are reportedly in negotiation regarding the situation[7]. ICES also note that in the eastern Baltic there have been problems with scientific observers gaining access to fishing vessels since the LO was introduced (ICES, 2017c). STECF has expressed concern that increased refusal rates are reducing the quality of data available to scientists, and has requested more information on observer refusal rates from member states (STECF, 2016).

Nevertheless, Member State enforcement officials have ranked on-board observers above electronic monitoring

in its suitability for LO compliance (Scheveningen Group, 2015; Hedley et al., 2015; Plet-Hansen et al., 2017), the only difference being staff costs and the availability of human resources.

Increased refusal rates on at-sea observer programmes are reducing the quality of data available to scientists.

6. Evaluating compliance with the LO in the Baltic Sea, 2015-2017

The European Fisheries Control Agency (EFCA) carries out assessments of fisheries regarding the risk of non-compliance with the LO, based on catch profiling derived from last-haul analysis of at-sea inspections data. EFCA classified Baltic Sea cod trawl fisheries as high risk, particularly the fisheries targeting western Baltic cod stock. Plaice was also considered a potential risk for discarding from 2017 onwards, but data are not yet available to evaluate this. Other fleets and species (herring, sprat, salmon) were considered to have a medium or low risk (EFCA, 2017b; Figure 1).

EFCA and Member State fisheries control agencies rely predominantly on the last-haul analysis to evaluate compliance with the LO, and have been focusing on Baltic cod fisheries since 2017. As expected, the data from the last-haul show that the proportion of cod catch under MCRS present at hauls inspected at-sea, is

Figure 1. EFCA risk assessments for LO non-compliance by species, gear-type and area for the Baltic Sea. Left to right: i) cod and plaice, large-mesh otter trawl; ii) cod and plaice, large-mesh Danish seine; iii) cod and plaice, gillnet and longline; iv) sprat and herring, small-mesh otter and pair trawl; v) herring and sprat, medium-mesh otter and pair trawl; vi) sprat and herring, otter and pair trawl; vii) herring and salmon; gillnet and trammel nets; viii) salmon gillnets; ix) salmon longline; x) salmon fixed gears (EFCA, 2017b).

	2015	2016	2017 to March	2017 to March
Stock	<MCRS catch (last-haul inspection)	<MCRS catch (last-haul inspection)	<MCRS catch (last-haul inspection)	<MCRS landings (reported)
W. Baltic cod	7.0 %	6.5 %	3.7 %	1.5 %
E. Baltic cod	9.8 %	11.9 %	10.9 %	2.4 %

Table 1. Baltic cod: catch below minimum conservation reference size (MCRS) as estimated from last-haul analysis between 2015-2017 (Jan-Mar) as compared to reported landings below MCRS (Jan-Mar 2017); discard rates are in % by weight (EFCA, 2017a).

significantly higher than the proportion reported in logbooks and landings declarations (Table 1) - providing evidence that illegal discarding continues in the Baltic Sea cod fisheries. At national level, according to the 2016 annual report of the Danish AgriFish Agency - which includes fisheries control and enforcement - no infringements of the LO have yet been detected, but they 'consider that violations of the LO might take place' (Danish AgriFish Agency, 2017).

The ICES working group for Baltic fisheries (WGBFAS) and the ICES Baltic salmon and trout assessment working group (WGBAST) also evaluate all the available data on landings and discards from Baltic fisheries each year (ICES, 2017a,b). They note that discards of the pelagic LO species (herring and sprat) have historically been, and continue to be negligible and/or poorly sampled. For salmon, discarding is mainly of seal-damaged fish, which is permitted under one of the LO exemptions (although it should be reported). ICES estimated discards of under-size salmon at 1,548 individual fish across the entire Baltic Sea in 2016. Plaice only entered the LO in 2017, so no data are available to evaluate discards as yet, but around half of plaice catches were discarded in 2016, accounting for over 2.5 thousand tonnes.

Finally, regarding cod, ICES reports that while the proportion of under-size catch landed is very low, discard rates estimated are about ten times higher; i.e. 90% of unwanted catch of cod is still being discarded by demersal trawlers, contrary to the LO. These discards cannot be accounted for under the high survival exemption, because it applies only to some passive gears (gears that do not move in the water – e.g. fixed nets), while ICES report that 97.4% of discards (2016) came from active gears (gear towed through the water, which would be overwhelmingly demersal otter trawls in this case; ICES, 2017a).

Contrary to the LO, 90% undersize catch of Baltic cod is still being discarded. Over 20.3 million Baltic Sea cod was discarded illegally in 2015 Over 11.5 million Baltic Sea cod was discarded illegally in 2016

A discarded undersize Baltic cod is estimated at 330 grams, but from an economic perspective, the value of fish is not static, and that fish could be worth several kilos in the future. It is therefor

	2014	2015	2016	2016
Stock	ICES % discard	ICES % discard	ICES % discard)	<MCRS landings (reported, according to ICES)
W. Baltic cod	9.7 %	5.1 %	2.4 %	~0.5 %
E. Baltic cod	25 %	14.5 %	11.0 %	~1 %

Table 2. Baltic cod: reported under-size landings as compared to estimates of actual discards by ICES from data collected by scientific observers for 2015 and 2016, as well as estimates of pre-LO discard rates (2012-14); discard rates are in % by weight (ICES, 2017a,c,d)

useful to refer to discarded fish in numbers rather than in tonnes. In 2015 6,774 tonnes of eastern and western Baltic cod were discarded, totalling over 20.3 million fish (ICES 2017a). In 2016 3,776 tonnes of eastern and western Baltic cod were discarded, totalling over 11.5 million fish (ICES 2017a).

Comparing EFCA and ICES estimates for Baltic cod discards, it is interesting to note that the proportion of under-size catch of eastern Baltic cod from EFCA last-haul analysis is consistent with ICES' estimates of discards, which is based on at-sea observer programmes. However, since 2015 western Baltic cod ICES discard rates estimates are lower than EFCA, and may result from a reluctance of skippers to show true discarding behaviour (Table 2).

Nevertheless, it appears from the figures of Tables 1 and 2 above that there has been a reduction in discarding since 2014. This is also a result reported by ICES on Baltic Sea discards globally (ICES, 2017d). It is not likely, however, that this is a direct result of the LO, taking into account the low level of under-sized catch reported landed (Table 1). Rather, as discussed in section 4.1, the reduction in the minimum size for cod has reduced discards by automatically transforming the smaller fish that were formally discarded into commercially valuable landings, particularly for eastern Baltic cod. There is also no evidence that selectivity has improved, in fact rather the contrary; the reduction in the minimum size may have resulted in reduced selectivity, according to ICES (ICES, 2017c).

Finally, the European Commission has the obligation to report annually on the implementation of the LO to the European Parliament and to the Council on the basis of reports submitted by Member States, Advisory Councils, EFCA and others; according to the requirements set out in Regulation (EU) 2015/812. The first (2016) report relating to 2015 activities revealed important discrepancies and a striking lack of data. The second report, based on STECF analysis of Member States reports (STECF, 2017), showed that discards landed are still in small quantities, there are issues with reporting and there is a lack of data about discard rates and comparative data for quantitative analysis (European Commission, 2017a).

7. Discussion and Conclusions

For the last two and a half years, European and national institutions have made some effort to implement the landing obligation in Baltic Sea fisheries. The measures included provisions for specific exemptions, flexibility mechanisms in output controls, relaxing of existing technical measures, and pilot studies, amongst others (see for example De Vos et al., 2016). However, all evidence reviewed above suggests that compliance with the LO by demersal trawlers is almost non-existent in the Baltic Sea. Discarding seems to be continuing at roughly the same rates since the minimum size was reduced, clearly demonstrating that unreported illegal discarding of cod continues. The European Commission confirmed recently that, "effective control and enforcement is lacking in MSs (member states). Despite strong indications of non-compliance, the traditional control means applied (inspection) are mostly unable to confirm infringements and ensure enforcement of the LO" (European Commission, 2017b).

Compliance with the LO is almost non-existent in Baltic Sea fisheries.

The ultimate objective of the EU Landing Obligation is to increase selectivity and reduce unwanted catches, by circumventing potential discards and avoiding unnecessary waste of fish resources. Nevertheless, many of the policy measures taken are in contradiction to this objective, by removing the incentive to avoid unwanted catches or improve selectivity. This was the case of the decrease in the MCRS, where a portion of the catch was automatically shifted to the desired catch category, but did nothing to improve selectivity, and in fact may have contributed to a decrease in selectivity to include more juvenile catches in some fisheries.

A decrease in Minimum Conservation Reference Size has led to a decrease in selectivity.

Efforts to improve selectivity of demersal trawlers – vessels responsible for 97% of discards of Eastern Baltic cod in 2016 - have been pursued in large research projects. These vessels also receive the majority of Baltic cod quota in both Germany and Denmark, so if selectivity improvements do not deliver adequate results, the appropriateness of quota allocation to these vessels needs to be reviewed and updated to ensure compliance with the LO (Our Fish & NEF, 2017a & b).

The implementation of a discard ban requires high levels of at-sea monitoring and effective control. Borges et al. (2016) studied four nationwide discard bans (including the EU Landing Obligation) and observed that in all cases studied, an increase in existing at-sea monitoring programmes was necessary. For poor (or even absent) monitoring and control, discard bans may in fact increase discards, due to associated management measures that strongly limit fishing activity and incentivise discarding, such as TACs and ITQs.

It is clear that surveillance and enforcement efforts need to increase significantly, in order to ensure compliance with the LO in Baltic Sea and EU fisheries. This can only be achieved by increasing at-sea presence on-board fishing vessels, and notably by increasing already existing schemes of at-sea inspections, observer programmes and initiating fisheries wide Electronic Monitoring programmes. The latest has also been recently advised by the EC: "EM technology has proven to be effective in the control and enforcement of the LO in certain fisheries. And, if applied on a risk basis, could certainly prove to ensure the levels of control and enforcement necessary" (European Commission, 2017b).

Electronic Monitoring technology has proven to be effective in the control and enforcement of the LO in certain fisheries.

In conclusion, since the LO is already having a negative impact on scientific knowledge regarding discarding behaviour and quantities, and is causing a reduction in observer coverage (Fitzpatrick and Nielsen, 2016), the increase in at-sea monitoring has the added advantage to increase both programs' reliability and effectiveness.

8. Recommendations

To end discarding and properly implement the Landing Obligation in the Baltic Sea, as well as other EU waters such as the North Sea, there is a clear need to increase at-sea monitoring and enforcement, and start prioritising quota for fishing vessels that comply with the law. Our Fish recommends that responsible authorities at national and EU level:

a) Initiate electronic monitoring programmes, starting with demersal mixed trawl fisheries, to improve data collection and compliance rates, or gather evidence of suspected violations;

b) Continue to assess LO compliance levels with the last-haul analysis and at-sea inspections, while ensuring a level playing field between fisheries and sea areas;

c) Record refusal rates of at-sea observers by fishing vessels and any situation that has prevented an observer from documenting discards;

d) Allocate TAC adjustments to national fishing fleets that have high at-sea monitoring coverage or can demonstrate that they are complying with the LO; and

e) Reallocate quota at a national level to those vessels that can demonstrate they are operating in compliance with the LO, creating a race to the top, so that fishers who are transparent and follow the rules are rewarded for best practice.

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