MAKING THE LANDING OBLIGATION WORK:

Tackling Europe's Bycatch Crisis Through Fisheries Transparency

ENVIRONMENTAL JUSTICE FOUNDATION

Protecting People and Planet

OCEANA

CONTENTS

List of Abbreviations

LO: Landing Obligation
EU: European Union
AI: Artificial Intelligence
REM: Remote Electronic Monitoring
CCTV: Closed-Circuit Television
WTO: World Trade Organization
IUU: Illegal, Unreported and Unregulated
RFB: Regional Fisheries Body
CFP: Common Fisheries Policy
MCRS: Minimum Conservation Reference Size
MS: Member State
TAC: Total Allowable Catch
RTC: Real-Time Temporary Closure
STECF: Scientific, Technical and Economic Committee for Fisheries
EC: European Commission
FDF: Fully Documented Fishery
EMSA: European Maritime Safety Agency
RPAS: Remotely Piloted Aircraft System
EFCA: European Fisheries Control Agency
SFPA: Sea-Fisheries Protection Authority
EEZ: Exclusive Economic Zone
RFMO: Regional Fisheries Management Organization
FCR: Fisheries Control Regulation

Executive summary

The EU's landing obligation (LO) is intended to reduce waste, encourage selective fishing and improve the catch information used to manage stocks. For catches within the LO scope, fishers must retain, record and land catches, including bycatch, and count them against quota where applicable, subject to defined exemptions. More than a decade after the obligation was phased in, and seven years after it became fully applicable, these objectives have not been achieved.

The problem is not simply that discarding continues. Discards include catches released lawfully under exemptions as well as illegal or unreported releases, so scientific estimates of discards and associated fishing mortality cannot by themselves establish non-compliance. The central weakness in governing LO compliance is the lack of reliable, independently verifiable information about what was caught, retained, released and landed. Missing or poorly estimated mortality can bias quota uptake and stock assessments, weaken confidence in advice and intensify "choke" problems in mixed fisheries whereby the smallest quota species in a mixed fishery is exhausted.[1]

The European Commission's (EC) 2025 supporting study found local successes but no clear large-scale reduction in discarding, with average rates falling by less than two percentage points. It identified weak monitoring and enforcement, operational complexity, economic constraints, limited uptake of selective techniques and extensive use of exemptions as persistent barriers. In individual fisheries, scientific estimates demonstrate disappointing results: for example, almost half of Irish Sea haddock catches were estimated to have been discarded in 2022–2024, while the estimated ratio of discards for eastern English Channel plaice approached four-fifths in 2025. These figures are not direct measures of illegality, but they underline the scale of unwanted catch and the aforementioned documentation gap.

This briefing organises implementation around a simple three-step sequence:

(1) avoid unwanted catch; (2) document what cannot be avoided; and (3) create credible consequences when rules are breached.

All three stages are crucial for improving fisheries transparency in the European Union (EU), facilitating sustainable fisheries management and helping to safeguard the long-term health of marine ecosystems. The analysis draws on Principles 9 (i.e., Data access), 7 (i.e., Traceability) and 2 (i.e., Sanctions transparency) of the Global Charter for Fisheries Transparency, a set of 10 Principles aimed at addressing some of the pressing and complex problems in fisheries management, and on practice in EU and neighbouring jurisdictions.

Environmental Justice Foundation (EJF) and Oceana's analysis reveals a number of key findings.

First, bycatch avoidance must remain the priority. Sorting-grid trials in the Irish Sea Nephrops fishery reduced unwanted catches of whiting by 77–87%, haddock by 91–92% and cod by up to 100% in some configurations. A 52 mm square-mesh codend tested in the north-western Mediterranean allowed around 90% of undersized hake to escape albeit with short-term income losses before delivering longer-term benefits. These results support the need for fishery-specific technical bycatch mitigation measures, appropriate investment and quota-allocation incentives. Cooperative sampling, bycatch-alert systems and properly governed Real-Time Temporary Closures (RTCs) can support a more responsive approach to bycatch avoidance. Emerging artificial intelligence (AI) tools developed for bycatch reduction appear promising, and should be used as prototypes until their performance has been independently validated at operational scale.

Second, data on catches and associated bycatch/discards must be verifiable. Inspections, patrol vessels, observers, logbook checks and landing controls remain essential tools, but do not capture all activity. Remote electronic monitoring (REM), including onboard cameras combined with position and gear sensors, can provide a more complete record in high-risk fisheries. In Denmark's Kattegat programme, for example, recorded undersized cod bycatch increased by 878% after cameras were installed. This data does not necessarily show that actual bycatch rose. It demonstrates how a large proportion of bycatch was likely previously undocumented and unreported, and how REM makes fisheries activities truly observable. From 10 January 2028, EU vessels of 18 meters or more that pose a high risk of LO non-compliance must carry REM, including closed-circuit television (CCTV). This framework now needs transparent risk criteria that cover the most discard-prone vessels (including bottom trawlers). It also needs interoperable standards, proportionate data review, reliable maintenance and safeguards for privacy, security and due process. Drones can support targeted surveillance, but cannot normally show catch handling inside a vessel and are not a substitute for onboard monitoring.

Third, deterrence requires public visibility and consistent accountability. Member States (MS) should publish comparable information on monitoring coverage, control effort, infringements and sanctions. Published final decisions explaining the reasons for the outcome would make enforcement data more accessible, as Irish and Icelandic examples show, but publication must respect personal data, appeal rights and procedural status. Cross-border checks, whereby official monitoring, inspection, and surveillance activities are conducted by neighbouring countries or regional authorities, should also connect vessel identity, final enforcement decisions and public-support records. The World Trade Organization (WTO) Agreement on Fisheries Subsidies, which aims to eliminate illegal, unreported and unregulated (IUU) fishing, and to prohibit state subsidisation that contributes to overcapacity and overfishing, applies only after a qualifying final affirmative determination (that is, the point at which, a coastal Member State, flag state or final listing by a regional fisheries body (RFB) makes a final finding of IUU fishing). An infringement of the LO, such as failing to retain a catch worth less than 1,000 euros, is not automatically considered a determination of IUU fishing under EU law.[2] Increased transparency across borders should make it easier to assess whether public grants are in line with WTO, EU and national rules and not given to serious offenders.

This report recommends that EU Member States and the European Institutions:

- Make bycatch avoidance the first line of implementation through fishery-specific selectivity plans, transparent incentives, cooperative data collection and properly governed real-time alerts and closures;
- Fully implement the Fisheries Control Regulation's 2028 REM framework on time, using transparent risk criteria that cover the most discard-prone vessels of 18 meters or more, and common minimum standards for installation, data review, privacy, evidence handling and interoperability;
- Publish a comparable annual LO control dashboard and more systematic case-level decisions of LO non-compliance, subject to legal safeguards;
- Connect enforcement and subsidy databases across borders and apply due diligence before public funds are awarded or retained; and
- Evaluate success against measurable outcomes: a reduction in unwanted catch, improved catch documentation and reporting, increased selectivity, REM uptake, improved data quality, increased enforcement response and stock-level effects on sustainability.

The LO remains a necessary part of EU fisheries management, but it has been treated too often as a rule about what happens after fish are caught. Its success depends on decisions made earlier (such as where vessels fish, what gear they use and what information about bycatch hotspots is shared). It also depends on whether catch handling can be verified later.

A durable solution to the problems of bycatch, unreported fishing and widespread waste of wild-caught fish therefore has three connected elements: help fishers avoid unwanted catch; document catches in a proportionate and trustworthy way; and make enforcement and public-support decisions transparent enough to be scrutinised. None is sufficient alone. Together, they can improve the evidence used to sustainably manage fish stocks, reduce unfairness between compliant and non-compliant operators, and make the LO work. Doing so will help save Europe's fish stocks, protect the livelihoods of thousands of fishers and ensure a healthy ocean for all.

1. Introduction

As the European Union (EU) looks ahead, with the forthcoming Vision 2040 for fisheries and aquaculture and ongoing discussions on the future of the Common Fisheries Policy (CFP),[3] it faces a fundamental challenge: how can Europe sustainably increase seafood production[4] and reduce its dependence on imports (which account for around 70% of EU seafood consumption[5]) while at the same time there is severe man-made pressure on its marine ecosystems? IUU fishing and other unsustainable practices continue, distorting scientific assessments and threatening the livelihoods of more than 600 million people globally.[6]

In this context, the widespread waste of wild-caught fish associated with discarding, returning of unwanted catches to the sea, remains a particular challenge. An estimated 9.1 million tonnes are discarded annually worldwide, including around 1.7 million tonnes in European fisheries, representing 23% of total catches.[7] These estimates illustrate the scale of unwanted catches and the associated waste of marine resources.

The EU sought to address this challenge through Article 15 of the CFP Regulation, which introduced the Landing Obligation (LO). Phased in from 2015 and fully applicable since 2019, the LO requires catches within its scope to be retained on board, recorded, landed and counted against quota where applicable - subject to defined exemptions. Furthermore, catches below the applicable minimum conservation reference size (MCRS)[8] may not be used for direct human consumption. By reducing waste, encouraging more selective fishing and improving catch information, the LO is intended to support the environmental and socio-economic objectives of the CFP and contribute to the EU's broader international commitments under Sustainable Development Goal 14.[9] Several neighbouring countries, including Norway and Iceland, have also established similar discard bans or catch-retention requirements, providing relevant experience.

The LO implementation is a fundamental task for EU MS as highlighted by the Court of Justice of the European Union: ensuring "accurate and comprehensive information and data on fishing opportunities" is a prerequisite for MS to effectively monitor quota use and to achieve the CFP objectives set out in Article 2.[10] However, LO implementation has been uneven and the measures needed to make it work in practice have not yet been deployed at the scale required. The 2025 EC's supporting study on the LO found local improvements but no clear large-scale reduction in discarding,[11] while the CFP evaluation identified insufficient discard data, ineffective monitoring and enforcement, limited industry buy-in and extensive reliance on exemptions as continuing challenges.[12]

The limited progress to date is reflected in recent scientific estimates of discarding that show high and, in some instances, increasing, discard ratios in certain European fisheries. In the Irish Sea, nearly half of the haddock catches, much of which is taken as bycatch in the demersal Nephrops fishery, were estimated to be discarded between 2022 and 2024.[13] In the eastern English Channel, the estimated discard ratio for plaice increased from less than one in five in 2006 to almost four in five in 2025 driven by high catches of juvenile fish[14] (see Figure 1). These situations have been likened to a "waste crisis", as the premature deaths of young demersal fish are "limiting the population's reproductive capabilities."[15]

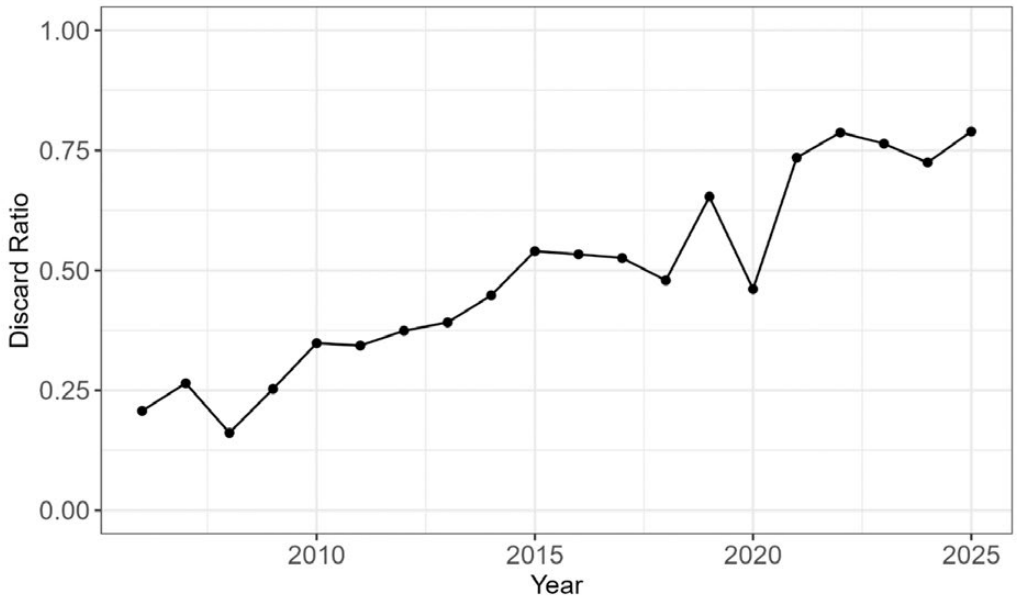


Figure 1: Estimated discard ratio for plaice in eastern English Channel, 2006-2025

Data source: ICES 2026 advice on fishing opportunities, catch, and effort for plaice in eastern English Channel.[16]

This report argues that EU MS can address these implementation gaps and that the objectives of the CFP's LO remain achievable, provided that implementation is supported by greater transparency throughout the fisheries management system. It examines available and potentially cost-effective transparency measures aligned with three of the ten principles of the Global Charter for Fisheries Transparency, focusing on access to fisheries data and participation in decision-making; robust control systems and traceability; and transparency concerning vessels, sanctions and public support.[17]

The report first describes the challenge of unwanted catch and discarding in EU fisheries and the risks that incomplete catch information creates for fishing mortality estimates, quota accounting and fisheries management. Drawing on examples from across Europe, including non-EU countries, it then illustrates how greater transparency and improved access to information can help fishers avoid bycatch, strengthen quota accountability, reduce waste, and provide a clearer picture of total fishing mortality. These measures can help to sustain fish stocks, protect fishers' livelihoods, and contribute to attaining the environmental and socio-economic objectives of the CFP. The report concludes with a set of recommendations for EU institutions and MS aimed at making the LO more workable, credible and effective in practice.

2. Widespread discarding of fisheries catches at sea in the EU

Discarding has long been a structural weakness in EU fisheries management. It is particularly acute in mixed demersal fisheries where vessels catch different species together, including juveniles below MCRS, low-value or damaged fish, species for which fishers have insufficient quota, prohibited species, or other unwanted catch.[18] Before the EU's LO, much of this catch could be returned to the sea, often dead or unlikely to survive, rather than landed, creating waste at sea, and leaving part of fishing mortality poorly documented.[19]

Historical data compiled in the 2014 Discard Atlas of North Sea Fisheries show the scale of the challenge that the LO inherited.[20] In the North Sea demersal fisheries, an estimated average of 40% of the total catch by weight was discarded between 2010 and 2012, with discards up to 90% for dab.[21] Table 1 below illustrates the scale of the problem of discards that the LO was designed to address. These figures predate full implementation of the LO and cannot be used to assess current compliance; they do, however, demonstrate why the LO needed to be accompanied by better catch documentation, more selective fishing practices and effective control.

Table 1: Average landings and reported discard by species in North Sea demersal fisheries, 2010-2012

Species	Average landings (tonnes)	Average reported discards (tonnes)	Discard ratio
Plaice	64,513	48,464	43%
Dab	6,545	67,407	91%
Whiting	13,848	10,558	43%
Haddock	27,431	7,099	21%
Cod	23,580	4,182	15%
Saithe	33,646	3,698	10%
Hake	6,066	2,045	25%
Sole	11,248	1,722	13%
Norway lobster	15,922	1,035	6%
Lemon sole	2,924	848	22%
Total	221,865	148,765	40%

Source: adapted from the 2014 Discard Atlas of North Sea fisheries[22], Table 3.1-2. The discard ratio is the proportion of total catch discarded by weight.

Against this historical baseline, the EC's recent 2026 CFP evaluation and the 2025 study supporting the evaluation of the LO provide a more recent assessment of implementation.[23] They found that, despite some local improvements, implementation remains weak.[24] Discarding continues, particularly in mixed fisheries, and available evidence does not show a clear overall reduction in discard rates since its entry into force in 2019. The supporting study found that average discard rates decreased by less than 2%, with significant variation across regions, species and fleets. It also found no marked increase in the uptake of more selective fishing techniques.[25]

The evaluations identify several reasons for this limited progress. The supporting study concludes that the LO "has not yet reached its potential" and that progress has been hindered by "insufficient control and enforcement, operational complexity, regional disparities, and economic feasibility". It also points to weak incentives to change fishing behaviour, limited uptake of selective gears, high handling and storage costs, insufficient market outlets for unwanted catches, and widespread reliance on exemptions and flexibility mechanisms.[26] The EC's CFP evaluation similarly highlights insufficient discard data, ineffective monitoring and enforcement, low industry buy-in and the proliferation of exemptions as key factors limiting implementation.[27] While certain (so-called de minimis) exemptions allow discarding, as per article 15(5) of the CFP Regulation, all such discards should be recorded in the logbook. However, configurations on "many" EU vessels currently facilitate unrecorded discarding (see Section 3.2 and Figure 2 below).[28]

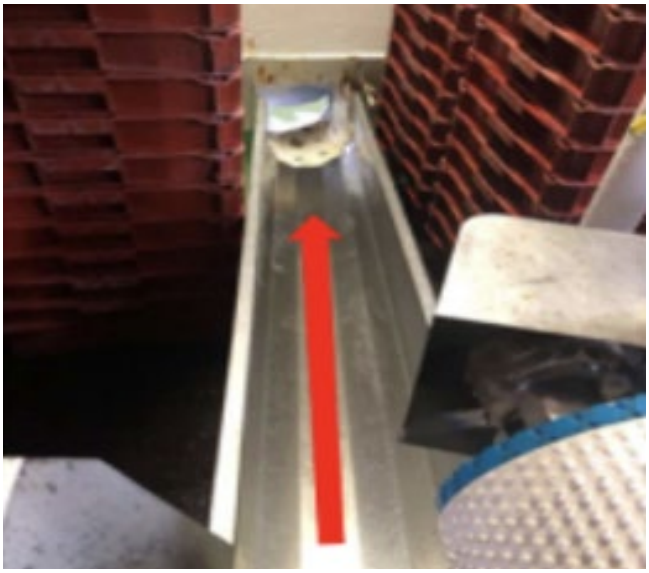


Figure 2: Demersal vessels sorting belt.

"Many demersal vessels are configured to discard 100% of catch by default–only the portion of the catch that is removed from the "belt" is kept" – DG MARE D4 (2024).

The scale and composition of discarding also remain difficult to assess as a result. Scientific estimates draw on observer programmes, sampling and other data sources, but underreporting, limited at-sea monitoring and opaque accountability can still leave important gaps in information on catches, releases and mortality. These gaps can create a damaging feedback loop for fish stocks and fishers. In mixed fisheries, unwanted catches of a species for which quota is exhausted can create "choke" situations, requiring vessels to stop fishing even where quota remains for their target species. Where fishers lack viable selective alternatives and face high costs for retaining, storing and landing unwanted catches (including catches below the MCRS, which cannot be used for direct human consumption), the incentive not to retain or report catches can increase.[29] If those catches are not properly documented, quota accounting and scientific advice may be weakened, putting future fishing opportunities and the objective of sustainably increasing EU seafood production at risk.

The concern is not simply the quantity of fish discarded, but also the consequences of incomplete catch information for quota accounting and scientific advice. Fishing opportunities are generally set through total allowable catches (TACs), which are intended to limit the amount of fish that can be harvested from commercial stocks each year on the basis of scientific assessments.[30,31] However, the effectiveness of TACs is often compromised by two critical issues: unaccounted mortality and the practice of "topping up" catch.[32,33] Where catches are discarded illegally, underreported or not independently verified, actual removals may exceed what is reflected in landings data, quota uptake and scientific assessments. This includes unaccounted mortality where fish are caught but not retained (for example due to being undersized, non-target species, or in excess of quota), and often die without being properly reported or counted against the TAC. The process is worsened by the practice of "topping up", whereby fishers land additional fish to compensate for those discarded. This creates a double burden on fish populations. First, discarded fish die without being counted. Second, additional fish are landed to offset losses, pushing total removals even higher than the quota system was designed to allow. High or poorly documented discard rates can thus undermine stock sustainability, distort catch data and weaken the scientific basis for TACs and long-term management decisions. This lack of data is compounded by a continued reliance on traditional inspections at-sea, which alone are insufficient to deter discarding;[34] and by opacity in efforts to control and sanction this wasteful practice, which does not contribute to building a culture of compliance among fishers.[35]

Over time, widespread undocumented discarding and a failure to address its root causes risk serial depletion of fish stocks, as stocks are subjected to excessive fishing mortality that is not seen in official data.[36] This is not sustainable for conserving biodiversity or ensuring "the profitability of the fishers" as Commissioner Kadis has also noted.[37]

3. A transparency framework for EU fisheries management and securing the CFP's goals

The Global Charter for Fisheries Transparency sets out 10 policy principles developed by the Coalition for Fisheries Transparency.[38] These principles address transparency gaps in fisheries management and aim to help MS collect information on fishing activities. The relationship between the LO's main implementation weaknesses and the relevant charter principles can be summarised as follows.

On vessel information, Principle 2 emphasises transparency on sanctions as a means of strengthening accountability. It recommends that governments "publish comprehensive and up-to-date lists of fishing vessel licences (including key vessel information), authorizations, subsidies, official access agreements, and sanctions (for fisheries and labor offenses)."[39]

On fishing activity, Principle 7 underlines traceability. It recommends "robust control systems that ensure seafood is legal and traceable from boat to plate, conforming to relevant catch management measures and making key data elements of those measures publicly available."

On fisheries management, Principle 9 underlines access to data and participation in its collection and use. It recommends that states "publish all collected fisheries data and scientific assessments in order to facilitate access to information for small-scale fishers, fish workers, indigenous communities, industry associations, and civil society in developing fisheries rules, regulations, subsidies, fisheries budgets, and decisions on access to fisheries resources" and "make these processes, policies, and decisions easily accessible to the public and enforcement agencies."

The report applies these three principles to key problems identified in the CFP evaluation report: the lack of data on discards and the associated problem of fisheries management - bycatch; the lack of effective monitoring of discards during fishing activity; and the lack of deterrence even when undocumented discarding is identified and infrequently sanctioned. Table 2 provides concrete examples of how transparency solutions can help tackle each problem in a European context.

Table 2: From implementation gaps to transparency solutions

Implementation Gaps	Operational objective	Transparency Solutions	Charter principle
High or unpredictable unwanted catch	Avoid or reduce them before they enter the net or are brought on board	Selective gears and evidence; cooperative sampling; real-time bycatch alerts; transparent closure rules	Principle 9
Lack or limited oversight at sea and deficient data on bycatch and discards	Create a verifiable record of fishing activity	Risk-based REM; sensors; targeted inspections; complementary aerial surveillance	Principle 7
Weak or poorly understood deterrence	Demonstrate that rules are applied fairly and consistently	Comparable control reporting; reasoned publication of final decisions; vessel and subsidy due diligence	Principle 2

Transparency is not an end in itself and must be applied proportionately. Commercially sensitive location data need protection; crew privacy must be respected; scientific programmes may require a firewall from enforcement; and publication cannot replace a fair investigation or the right of appeal. The objective is therefore access to information for a defined purpose, supported by clear governance rules, rather than unrestricted disclosure of every dataset.

3.1. Avoid unwanted catch before it occurs

The most effective way to reduce discards is to help fishers avoid unwanted catch in the first place.[40] Applying Principle 9, this section examines selective gears, incentives, participatory data-sharing, real-time information tools and RTCs. When scaled, they could reduce unwanted catches, protect fish populations and fishing opportunities, and make the LO work in practice.

3.1.1. Driving 'smart', selective fishing

The LO has stimulated extensive research and testing of measures to improve selectivity, in particular more selective fishing gears.[41] As the Scientific, Technical and Economic Committee for Fisheries (STECF) has stressed, avoiding unwanted catch through improved selectivity or other means should be "the primary focus" of LO implementation.[42]

STECF has found that gear modifications tested in the Celtic and Irish Seas, the west of Scotland and the English Channel have been "shown to reduce the level of unwanted catches" and that reductions "in many cases are significant". These include square-mesh panels, larger codend mesh sizes, SELTRA devices[43] and sorting grids. In the Irish Sea Nephrops fishery, vessels targeting Nephrops also catch whiting, cod and haddock. These species can "choke" the fishery if their quotas are exhausted while vessels still have quota for Nephrops. STECF reports that this fleet catches most of the whiting taken in the Irish Sea and discards almost the entire catch. Trials reviewed by STECF found that sorting grids could reduce unwanted catches of whiting by 77–87%, haddock by 91–92%, and cod by up to 100% in some configurations.[44]

In the north-western Mediterranean hake fishery, a tested net with 52 mm square-mesh codend allowed 90% of undersized hake to escape.[45] It increased the estimated retention length[46] to 22.2 cm, above the 20 cm minimum conservation reference size. The study projected short-term income losses of 27% overall, followed by longer-term recovery after around two years and an increase in yield per recruit after four years.[47] Uptake nevertheless appears limited without clear economic incentives.[48]

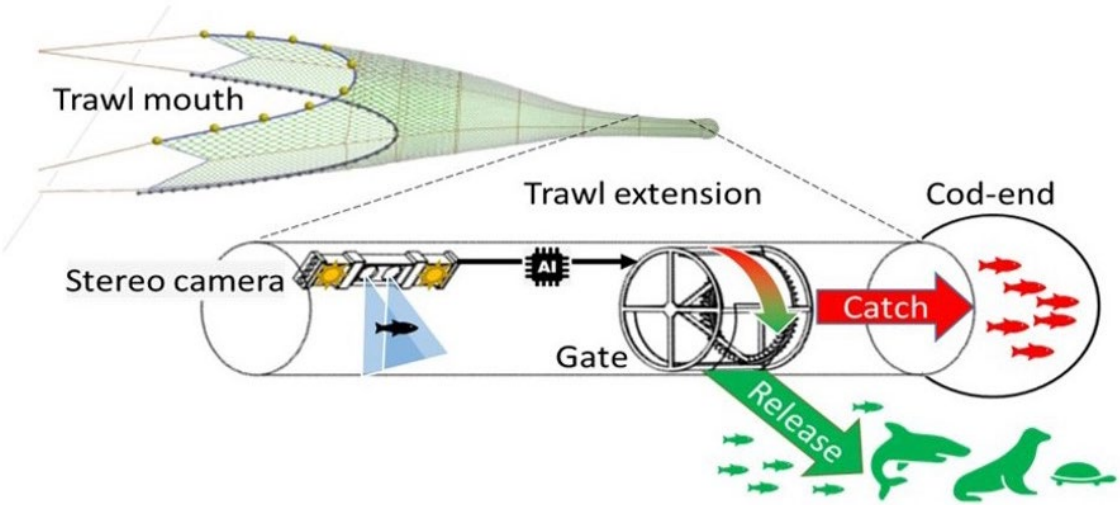
3.1.2. Align innovation and incentives with avoidance

The availability of technologies to reduce bycatch does not necessarily guarantee uptake. Article 17 of the CFP Regulation requires MS to use transparent and objective criteria, including environmental performance, when allocating fishing opportunities.

MS can therefore use the allocation of fishing opportunities, whether based on quota or fishing effort, to encourage and reward verified selective practices and fishing techniques with lower rates of unwanted catches. Available assessments indicate that several MS, including Denmark, France, Greece, Malta and Sweden, already use environmental criteria, such as the fishing gear employed, when allocating fishing quotas.[49]

AI assisted tools may further improve selectivity.[50] Smartrawl is an innovative underwater robotic device designed to identify, size and sort catches using stereo cameras and AI. During trials, a computer-controlled gate automatically released non-target species or undersized fish while retaining the intended catch[51] (see image below). If independently validated and successfully scaled, such tools could help demersal fishers reduce unwanted catches and discards while improving the survival prospects of released fish.

Together, these examples show that existing and emerging measures can reduce unwanted catches when they are well designed and adapted to the fishery. Practical support, effective incentives and proper use of funding through the European Maritime, Fisheries and Aquaculture Fund (EMFAF) are needed to promote wider uptake.



Source: Marine Guardian[52]

3.1.3. Build trusted, participatory data systems

Effective LO implementation requires the participation of fishers. Timely and reliable information on catch composition, discards and bycatch can help both fishers and fisheries managers identify where and when bycatch, and therefore "choke" risk, is highest, adjust their fishing patterns and avoid areas with high levels of unwanted catch. For managers, better information can improve stock assessments and support adaptive management measures. When this data is not collected, shared, or analysed promptly, opportunities to reduce unwanted catches, improve scientific knowledge, and enhance fisheries management are lost.

Norway, which has operated a discard ban since 1987,[53] provides an instructive example of collaborative data collection. In 1996, the Institute of Marine Research (IMR) established the Norwegian Reference Fleet[54] with the fishing industry in response to concerns about data gaps and the accuracy of cod stock assessments.[55] High-seas and coastal vessels now provide biological and operational data, including fishing effort, catch composition, and bycatch.[56] Fishers are incentivised to adhere to the sampling protocol through financial compensation and by recognising the value of their data for fisheries management.[57] An agreement between fishers, IMR and the authorities restricts the data to scientific purposes rather than enforcement, encouraging honest reporting.[58] Although the programme is considered valuable for evidence-based fisheries management,[59] its size has been relatively modest, comprising about 16 high-seas vessels and about 22 coastal vessels in 2019.[60]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Recent technologies are emerging that, if scaled, could enable fishers to more easily collect and share bycatch data, to do so in a participatory way, and therefore adopt smarter, more-informed fishing patterns that avoid bycatch.

In Scotland, skippers, producer organisations, and scientists have developed the Bycatch Avoidance Tool using mapping (BATmap).[61] This is a pioneering digital system aimed at tackling illegal discards and reducing unwanted catch in mixed fisheries. Participating vessels log and share data on catches of "choke" species in real time.[62] When agreed thresholds are exceeded, the system automatically alerts vessels in the network, enabling them to avoid high-bycatch areas, adjust their fishing practices,[63] and reduce the risk of premature fishery closures.[64]

Emerging catch-identification technologies offer another source of timely data. Norway's Catch ID system[65] uses automated image recognition, machine learning, and onboard sensors to identify and document species, sizes, and quantities in real time. Catch ID enables more informed decision-making during fishing operations, allowing for the release of non-target or undersized species before they are brought on board.[66] Comparable systems include Wageningen University and Research's Fully Documented Fisheries project, CATCHWAM,[67] in Dutch demersal fisheries. Automated catch can help meet LO and logbook requirements, as well as reduce administrative burdens. Cameras used to collect scientific information on catch composition should however complement rather than replace cameras used to monitoring LO compliance (section 3.2.).

3.1.4. Advancing real-time closures as an adaptive response

Alongside participatory data collection tools and 'smarter', more selective gears, RTCs can help fishers avoid areas where juveniles and other unwanted catches are concentrated. They can reduce pressure on stocks while allowing fishing to continue more efficiently elsewhere.[68]

In the North Sea[69] and Iceland,[70] RTCs can be triggered when on-board inspections or observers detect large differences between the declared catches in the logbooks and those observed during sea inspections.[71] The affected area may be closed, fully or partially, for 14 days, with a possible seven-day extension. During the closure, only specified gears, such as pelagic trawls, may be permitted. These measures can limit further juvenile mortality and protect future stock productivity.[72]

A key advantage of RTCs is that they can be activated when and where unwanted catches are detected. Effective implementation depends on reliable bycatch data and the capacity to communicate closure coordinates, duration and applicable restrictions to fleets and control authorities in near real time.[73,74] Use of RTCs remains limited in the EU, with pilot projects in Denmark, Sweden, Belgium, the Netherlands and France.[75] Denmark's 2025 Agreement on the Future of Fisheries nevertheless proposes exploring camera requirements in areas where fisheries face particular challenges from juvenile bycatch, in line with Article 20 of the CFP Regulation.[76] If adopted, such measures could improve reporting of undersized catches, as demonstrated by the Danish Kattegat Nephrops project (Box 1), and provide data for more responsive management, including RTCs.

Box 1: Denmark's success with cameras to boost reporting of depleted cod bycatch

Denmark required cameras on vessels in the discard-prone Nephrops fleet,[77] to improve information on bycatch of undersized cod and support the recovery of depleted cod stocks. After cameras were installed, reported bycatches of undersized cod increased by 878%, illustrating the effect of greater observability on catch reporting. Reporting dropped by 54% when vessels exited the shallower Kattegat Bay for the deeper Skaggerak Strait, and the mandatory cameras automatically switched off, although other factors, including fishing depth, may also have contributed.[78]

Smarter, more selective gears and timely, participatory data systems are both needed and increasingly within reach. Reference fleets and proven gear modifications can be combined with tools inspired by BATmap and CatchID to help fishers and managers respond quickly. The more these digital tools are rolled out at scale, and the more their data are integrated into broader ocean observation and information systems, including the European Digital Twin of the Ocean and OceanEye,[79] the greater their potential value for fisheries management. Together these measures can inform fishing decisions, support RTCs and reduce both conservation and "choke" risks.

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3.2. Make catches verifiable at sea

3.2.1. Advancing robust catch-to-plate traceability

The LO can deliver its intended benefits only if the requirements to retain, record and land catches within its scope, and count them against quota where applicable can be effectively monitored and verified. This remains a persistent challenge because unlawful or undocumented discarding can occur far from shore and out of sight of inspectors.[80] Reliable "eyes on the water"[81] combining technology with risk-based inspection, are therefore needed. This reflects Principle 7 of the Global Charter for Fisheries Transparency and the EU legal framework, which requires effective risk-based controls against IUU fishing,[82], dissuasive penalties,[83] adequate technical, financial and human resources for fisheries control,[84] and accurate information on fishing activities and quota uptake.[85]

This section examines how European states use conventional controls, REM and remotely piloted aerial systems such as drones to control, detect and deter illegal and undocumented discarding. It also explains the limitations of each tool and why they are complementary.

3.2.2. Conventional controls remain necessary

Conventional controls remain important but cannot close the LO observability gap on their own. Aerial surveillance by crewed aircraft cannot continuously observe fishing operations and is constrained by cost, weather and operational availability.[86] At-sea inspections provide only brief snapshots of fishing operations and capturing discarding in the act is challenging.[87]

Risk-based observers can monitor a larger part of a trip but cover only a limited share of activity due to practical, safety and resource constraints.[88] Data cross-checks and landing inspections cannot fully compensate for these shortcomings. The 2022 "fish spill incident" involving the Lithuania-flagged distant water freezer trawler *Magiris* illustrates the difficulty: inspectors could not confirm whether the observed spill was intentional, even if cameras were installed on board.[89]

Conventional controls can nevertheless deliver results. Norway has developed methods for gathering evidence that meets domestic judicial standards. Reportedly, "approximately half a dozen captains/companies are fined annually."[90] Scientific data from the Norwegian Reference Fleet[91] also indicate comparatively low discard rates in parts of the coastal cod fishery, around 0.55% of total catch weight between 2012 and 2018.[92]

EC audits[93] indicate that LO controls have often been limited or ineffective across several MS. In contrast with the high discard rates observed by scientists and the lack of reporting of catches of potential "choke" species (table 1 and section 2), the EC's audits conducted in 2017, 2020 and 2022 found that authorities detected or confirmed very few LO infringements, in particular for illegal and undocumented discarding. In the Netherlands, the EC's audit covering 2015-2019 found "very low rates of discards recorded by Dutch operators" despite earlier scientific estimates suggesting very high average discard rates on Dutch vessels active in the North Sea.[94] The EC's auditors noted "the absence of any detected infringements in relation to illegal discarding of catches at sea," evidencing ineffective controls.[95] They reached similar conclusions for Belgium,[96] Spain,[97] and Lithuania,[98] and found that Ireland[99] and France[100] had detected "very low"[101] number of infringements to date "despite strong indications of widespread non-compliance"[102] with the LO.

The audits also found that MS could do more to establish effective controls at sea. For Lithuania, the EC noted that measures such as REM have not been implemented "to limit the occurrence of the risks of non-compliance."[103] In response, Lithuania noted a range of measures, including deployment of inspectors and observers based on risk assessment, drones, and the installation of REM on board of highest-risk fishing vessels, but "only once EU legislation has been established."[104]

3.2.3. REM & drones contribute to closing the observability gap

REM combines cameras, gear sensors and GPS/VMS data to provide a continuous, verifiable record of fishing operations. International experience shows that REM can document catch, bycatch and discards more comprehensively than traditional observers, supporting enforcement of rules such as the LO, better quota management and stronger supply chain traceability.[105] It can be a more effective and cost-efficient solution, particularly in mixed fisheries.[106]

MS were already required to deploy "all adequate means"[107] to enforce the CFP. The 2013 CFP reform expressly referred to CCTV as well as other technologies as means to ensure "detailed and accurate documentation of all fishing trips" and also to deter illegal and undocumented fishing trips.

This did not lead to widespread use of REM that includes CCTV, leaving a substantial enforcement gap. In 2018, the EC therefore proposed mandatory REM for vessels posing a high risk of non-compliance with the LO. Following negotiations, the revised Fisheries Control Regulation requires union fishing vessels of 18 meters or more that pose a high risk of non-compliance to install REM systems, including CCTV, by January 2028.[108] The fleet segments classified as "high risk" must still be determined through implementing acts adopted by the EC.[109]

European jurisdictions like Scotland and Denmark have meanwhile tested REM and explored incentives for voluntary and mandatory uptake and broader political commitments (Boxes 2 and 3). These examples show REM can support LO implementation by improving detection, reducing reliance on intermittent inspections, and strengthening quota data. It can also support the identification of bycatch hotspots and inform measures to avoid "choke" species scenarios, consistent with tools such as BATmap. Experience further indicates that REM can reduce some costs for authorities and operators (Box 4).


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Box 2: Scotland, a REM pioneer in Europe

Scotland's experience shows that REM can improve catch and discard data, strengthen compliance, and reduce reliance on resource-intensive enforcement.[110] In 2008, Scotland pioneered REM in Europe through its Fully Documented Fishery (FDF) scheme for North Sea cod, combining onboard cameras and sensors with quota incentives. This reduced reliance on "last haul"[111] inspections, which require a vessel to cease fishing and return to port after a monitored final haul to verify retained catch against quota rules, but are slowing down fishing operations and provide limited insight into behaviour across the full trip.[112] Indeed, for example, last haul inspections may miss "the share of the smaller fish still larger than MCRS".[113] Scotland has rolled out REM to fishing vessels active in its waters in 2024 and 2026,[114] which applies also to relevant EU vessels fishing in its waters.[115]

Box 3: The Danish REM pilot programmes

Denmark's Kattegat trials illustrate the operational and compliance benefits of REM. Pilot programmes in 2022-2023 combined REM with selective-gear measures, improving catch monitoring while giving fishers greater operational flexibility.[116] Danish authorities have indicated that continuous monitoring can remove the need for "last haul" inspections. The programme recorded 11,333 kg of cod catch, compared with total Danish cod landings from the Kattegat of 19 tonnes in 2022 and 21 tonnes in 2023, illustrating REM's ability to uncover undocumented catches and improve estimates of fishing mortality.[117] Building on this experience, Denmark's 2025 Agreement on the Future of Fisheries provides that, by 2029, at least 90% of landings by Danish commercial fishing vessels should come from vessels equipped with REM and cameras. Progress will be reviewed in 2027, with the aim of achieving fully documented Danish commercial fisheries by 2033 at the latest.[118]

Box 4: Costs of REM versus costs of traditional inspection tools

Upfront costs can be a barrier, but REM can be cost-effective once installed. A 2018 Commission assessment estimated that modernised fisheries control and ICT systems could reduce administrative burdens and save MS authorities around €157 million over five years.[119] In Scotland, estimated costs for demersal vessels are €7,600-€8,000 for hardware, €2,300-€2,900 for installation, and about €1,200 a year for operation.[120] In Denmark's Kattegat programme, the total upfront cost for 12 vessels was approximately €183,000, around €15,600 per vessel, including hardware, licences and installation. Installation took two to three days without loss of fishing time, and maintenance costs totalled €39,000-€52,000 between 2022 and 2024. Robust evidence on the cost of large-scaled video review remains limited, and targeted public support is likely to be needed for initial investment,[121] although the application of AI to streamline this process in other global fisheries is being explored.[122]

As Scotland and Denmark move towards wider mandatory REM use, systems across EU and UK jurisdictions should be sufficiently interoperable and aligned to avoid unnecessary costs.[123] Timely EU implementation is also important to prevent fragmented control standards, "control shopping" (see in Section 3.3)[124] and hidden overfishing (which could lead to stock collapse).

The EU's REM mandate for vessels of 18 meters or more was estimated to cover less than 6.7 percent of the EU fleet.[125] Aerial drones could, to an extent complement monitoring by helping to detect illegal discarding and bycatch, including on the remainder of the fleet, particularly in coastal waters. In 2025, the European Maritime Safety Agency (EMSA) operated nine simultaneous remotely piloted aircraft system (RPAS) missions across 11 EU/EEA MS, supporting more than 20 national authorities and the European Fisheries Control Agency (EFCA). RPAS were also deployed from all three EFCA patrol vessels.[126] In 2022, the Icelandic Directorate of Fisheries revealed significant levels of unreported discarding that conventional controls had not captured, demonstrating the value of aerial surveillance to uncover otherwise hidden practices.[127]

Drones can identify suspected quota violations and provide evidence for investigations (Box 5), but they cannot continuously observe onboard catch handling or verify every discarding event. Battery life, harsh marine conditions, and airspace restrictions also constrain their range, endurance, and offshore use.[128] They are therefore not a standalone solution for large-scale or offshore monitoring. REM, by contrast, combines onboard cameras and sensors to create a continuous verifiable record and is better suited to monitor LO compliance on vessels operating farther from shore.[129]

Box 5: Quota accountability and enforcement via drones in Iceland

In 2025, a drone operated by Icelandic authorities filmed crew on a 9.58 metre vessel, *Njörður BA-114*, using tools to release and discard 36 fish from quota-regulated species, including cod, haddock, and plaice.[130] The operator did not dispute the facts, and the authority concluded from the video evidence that the conduct was intentional.[131]

In 2024, an Icelandic fisheries-control drone filmed quota-regulated fish flowing overboard through the scupper of the 21.95 metre Danish seiner *Ásdís ÍS-2*. A week later, a surveillance drone filmed 62 roundfish and 11 flatfish going overboard from the same vessel. Because the drone could not see catch handling inside the decked vessels, an onboard inspection was necessary. Inspectors found that the sorting area allowed fish to pass directly via the scuppers ("At the end of the sorting line, there is a removable white plastic bar that can be easily opened") or through inaction ("On deck, fish can run unimpeded through the scuppers on either side and fall into the sea."). Although the operator maintained that the releases were accidental, the authority concluded that the vessel's configuration enabled non-compliance. Treating the repeated offence as a major violation, it suspended the vessel's commercial fishing and seine-fishing licenses for two weeks.[132]

These cases show how aerial footage or onboard cameras, combined where necessary (e.g., on closed-deck vessels) with targeted inspections, can provide evidence of non-compliance, including where a vessel's configuration facilitates discarding. They also illustrate that the value of video evidence depends on the legal framework. Article 2(2) of Iceland's Act No. 57/1996 requires all catch brought up in fishing gear to be retained and landed unless explicitly exempted. Violations may lead to administrative measures, including licence suspension or formal warnings, as well as to criminal penalties irrespective of intent or negligence.[133]

These experiences are relevant to the EU, where many demersal vessels reportedly use sorting systems that direct fish towards overboard discharge unless the retained catch is manually removed from a conveyor.[134] Such configurations create a structural enforcement challenge. On closed-deck vessels, aerial surveillance alone cannot verify onboard handling and must be combined with at-sea inspection and/or continuous onboard REM. Vessels equipped with such sorting systems should be considered at elevated risk of non-compliance with the LO and should therefore fall within the scope of the EU's REM mandate for vessels of 18 meters or more from January 2028. The same should apply to vessels that use gears that are prone to get bycatch. After all, 92% of all recorded discards come from bottom-contacting gear groups.[135] Considering the limitations of drones and the EU REM mandate that only covers a small part of the EU fleet, evidence-based targets at national level for expanding voluntary or risk-based REM (see Box 3) should be considered in line with obligations of MS to ensure adequate means for effective oversight of the rules of the CFP, including the LO.

That said, REM also raises practical and governance challenges. Effective implementation will require a clear legal framework, independent oversight, and transparent procedures for reviewing footage and acting on evidence; technology alone cannot guarantee compliance.[136] Installing REM has upfront costs (Box 4), but targeted public funding can support fishers, as Denmark's roll-out illustrates. The EMFAF[137] may cover up to 100% of eligible fisheries-control costs, subject to national plans and coordination.[138] To secure buy-in safeguards for data security, crew privacy, and prevention against misuse of footage are essential.[139] Successful deployment of REM therefore depends on adequate enforcement capacity, practical incentives,[140] and funding and clear political commitments. It also relies on transparent governance, including clear reporting on the sanctioning effort when LO non-compliance is detected.

3.3. Strengthen deterrence and accountability

Transparency about enforcement and sanctions is essential to building a "culture of compliance," a key objective under the CFP.[141] If responsible operators believe that failures to report catches or count them against quota are not adequately detected and sanctioned, their incentive to comply is weakened. Inconsistent control across jurisdictions can also encourage "control shopping", while sanctions that are neither visible nor dissuasive


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may fail to prevent repeated offences, for example, repeated underreporting of undersized sole catches by the same vessels.[142]

European experience points to three ways of strengthening trust and accountability: providing data on control and sanctioning efforts (3.3.1.) publishing reasoned final decisions on LO non-compliance and where legally permitted, vessel identities (3.3.2.), and improving transparency on sanctioning across borders, in particular for vessels receiving public subsidies (3.3.3.).

3.3.1. Data on the aggregate control effort

MS receive substantial EU funding to monitor and enforce CFP rules, including the LO. Yet transparency about the use and results of this funding has been limited.[143] MS have generally reported aggregate information on controls and inspections to the EC every five years.[144] Although these reports have revealed implementation challenges,[145] stakeholders have had little information about how control strategies are adapting, for example, whether Germany is shifting from conventional inspections toward more innovative tools, like REM or drones, to monitor LO compliance.[146]

The 2023 reform of the FCR and the implementing act adopted in late 2025 require more frequent and detailed reporting. Five-year reports must now include the number of vessels required to use REM under Article 13 of Regulation 2023/2842, and the number using this technology 'voluntarily'.[147] MS must also publish annual data by 30 June of each year on the "existing resources available for control and inspections", including the number of inspection vessels, remotely piloted aircraft, as well as "other control and inspection means."[148] They must report the number and type of detected and confirmed infringements, including serious infringements, per each type of infringement[149] including information about "the legal basis of the infringement."[150] Although "other control and inspection means" is not defined, annually reporting the number of vessels using REM would be consistent with the purpose of these rules.

Effective implementation of these reporting requirements would allow enforcement authorities to demonstrate their LO control effort and enable parliamentarians, the media and broader civil society to assess whether it is adequate. Comparable data would also make it easier to identify recurring offences that threaten science-based stock management, such as unreported discarding of quota species, and to determine whether resources should shift from conventional controls to more effective tools.

3.3.2. Systemic transparency on individual enforcement decisions

MS authorities sometimes publish enforcement successes of individual cases of non-compliance with LO-related rules. For instance, convictions involving concealed undersized "black fish"[151] or the apprehension of a foreign vessel for suspected discarding.[152] In many cases, however, names of the vessels or individuals remain anonymous.[153] Ireland's Sea-Fisheries Protection Authority (SFPA) has been more systematic in identifying vessels when reporting recent enforcement of requirements to retain, report and count catches against quota (Table 3):

Table 3: Ireland's transparency on recent enforcement success on the landing obligation

Case (vessel / party)	Flag	Year / where	Offence & Status	Penalty / Outcome	Related information
Puenteareas Uno	France	2025, Irish EEZ;	Landing obligation breach – failure to retain quota species onboard. Guilty plea.[154]	EUR 10,000 fine + EUR 35,000 forfeiture of catch & gear[155]	According to press reports of evidence presented at trial, EFCA and SFPA officers witnessed crew members discarding fish back into the sea via a 'discards belt' during an at-sea inspection launched from the EFCA patrol vessel Ocean Guardian. [156]
Astrid	France	2025, Irish EEZ;	Landing obligation breach – failure to retain quota-managed sea-fish onboard. Guilty plea.[157]	EUR 12,500 fine + EUR 30,000 forfeiture of catch & gear[158]	According to an SFPA press release, officers from the EFCA patrol vessel Ocean Guardian witnessed crew discarding fish species back into the sea via a pipe attachment.[159] Judge Helen Boyle found the skipper's unfamiliarity with current regulations 'highly unsatisfactory', and criticised his practice of recording catches only at the end of each night at sea.[160]
Andromeda	UK	2024, Irish EEZ;	Landing obligation breach; failure to record legal discards; and no stowage plan. Guilty plea.[161]	EUR 17,500 fine + EUR 26,888.56 forfeiture of catch & gear[162]	According to press reports on court proceedings, officers observed crew sorting catch on a conveyor belt, segregating certain catches by species and size, and discharging them through a funnel device back into the sea. Approximately 30-50 kg of catch (including hake, megrims and haddock) were discarded in this way over 30 minutes.[163] Only quantified at-sea observation in the dataset.

Outside the EU, Iceland shows how systematic publication of individual enforcement decisions can support compliance with a discard ban. Since 1996 Iceland has required all catch brought up in fishing gear to be retained and landed unless an exemption applies.[164] As under the EU LO, the rule is intended to ensure that catches are accounted for against quota. In Iceland, public disclosure of decisions on sanctions was already required[165] but since July 2022, the Directorate of Fisheries publishes online all its administrative decisions on the suspension of commercial fishing licences and the revocation of weighing permits.[166] In practice, this is a policy of "naming and shaming".[167] Box 5 (in Section 3.2.3 above) describes how this approach applied in the *Njörður BA-114* and *Ásdís ÍS-2* cases.

Detailed decisions summarising the evidence, reasoning and sanction can deter non-compliance and clarify the behaviour expected of operators. As Viðar Ólason, Director of Surveillance at Iceland's Directorate of Fisheries noted in this regard, "When everyone can see the data, compliance improves."[168] In the *Njördur* case, the authority explained that inaccurate catch reporting undermines sustainable stock management and reminded fishers that released catch must be recorded by estimated weight (kg).[169] In the *Ásdís ÍS-2* case, it found that a vessel's configuration facilitating discarding could establish "at least negligence."[170]

This systemic transparency on these individual sanctions – indicating why they matter and detailing causes of non-compliance – could be broadly relevant to the EU and LO enforcement: as noted above, inaccurate reporting of discards is a widespread issue in the EU. Implementing lessons from this Icelandic example could mean publishing decision reasoning that unreported discarding at significant amounts is a serious offence with destructive long-term effects, including for fishers' own interests[171] (beyond recent examples from Irish[172] and Dutch authorities[173]). That said, any published information should clearly identify the procedural status of the case, the evidence, legal basis, sanction and reasoning, and should be updated following an appeal.

3.3.3. Cross-border transparency on subsidised vessels

The WTO Agreement on Fisheries Subsidies, adopted in June 2022, prohibits subsidies to vessels or operators engaged in IUU fishing, where a competent coastal State, flag State, or Regional Fisheries Management Organization (RFMO) has made an affirmative determination.[174] Article 8 also requires MS, to the extent possible, to provide information on subsidised vessels.[175] Cross-border sharing of enforcement and subsidy information can therefore help prevent public support from benefiting vessels determined to have engaged in IUU fishing related to non-compliance with discard bans. The *Andromeda* case (Box 6) illustrates how such cooperation can operate between EU and UK authorities.

This case illustrates the risks of subsidising vessels determined to have engaged in serious fishing offences and the value of transparent subsidy allocation. If information on subsidy recipients, conditions, and compliance histories were systematically disclosed and easily accessible across borders, authorities could apply existing rules more effectively, including the WTO prohibition on subsidising IUU fishing. This would also reduce opportunities for control shopping between EU and non-EU jurisdictions.

EU Member State authorities should therefore share comprehensive, up-to-date information on fisheries subsidies and vessel-specific enforcement, in line with applicable WTO transparency obligations, and data-protection rules. This would strengthen accountability, deter situations where public funds support unsustainable practices, and help redirect public funds toward the adoption of bycatch-avoiding technologies.


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Box 6: Cross-border transparency to support enforcement and deter 'control shopping'

An Irish court made an affirmative determination that the UK-registered *Andromeda* vessel had engaged in offences characterised as IUU fishing activity, including failure to retain and record catches as required under the LO. Officers from the EFCA patrol vessel *Ocean Guardian* testified that they had seen approximately 30–50 kg of hake, megrim, and haddock discarded via a funnel device over 30 minutes in the Irish exclusive economic zone in May 2024.[176] In its coverage of this case, The Guardian reported that Scottish authorities were considering revoking about €186.000 in public grants awarded to the operator for gear and onboard freezing upgrades; however, there is no further reporting or published information from authorities on revocation.[177]

4. Conclusions

The CFP Landing Obligation, fully in force since 2019, remains one of the EU's most important tools for reducing wasteful and unsustainable fishing practices, improving the accuracy of fisheries data and ensuring that fishing mortality is accurately reflected in fisheries management decisions. Yet, its implementation continues to fall short of its objectives. Available evidence suggests that illegal and undocumented discarding persists, particularly in mixed demersal fisheries where unwanted catches and "choke" risks remain persistent challenges.

This briefing indicates that the objectives of the Landing Obligation remain achievable, provided implementation is supported by greater transparency throughout the fisheries management system. The principles set out in the Global Charter for Fisheries Transparency provide a practical framework for delivering on the intended objectives of the provision, including through improved access to fisheries data, more effective monitoring and control, stronger public accountability, and greater participation by fishers in data collection and management responses.

A central lesson is that the most effective way to make the Landing Obligation work in practice is to help fishers avoid unwanted catches before they occur, and that the economic incentives support this shift. More real-time area closures, gear selectivity measures like the Smartrawl project, real-time and industry-led bycatch reporting systems, such as BATmap, collaborative data collection models, such as the Reference Fleet, and catch-identification technologies, such as CATCH, show how dynamic, data-driven approaches can reduce bycatch and/or improve compliance. These tools not only empower fishers to adapt their practices but also provide regulators with the evidence needed to enforce the Landing Obligation effectively. However, their uptake is likely to remain limited unless fishers are supported and rewarded for adopting practices that reduce unwanted catches, juvenile mortality and "choke" risks. This includes using the allocation of fishing opportunities, public funding and other incentive structures to reward more selective and lower-impact fishing.

At the same time, preventative tools cannot replace effective control. Traditional control methods, including at-sea inspections and logbook checks in port, are valuable to support detecting and deterring illegal discarding and to gather accurate bycatch data. However, illegal discarding persists, and REM, including onboard cameras and sensors, offers a scalable solution to support traditional tools by providing continuous, verifiable oversight of fishing activities. Countries like Denmark and Scotland have demonstrated that REM can reduce discard rates and improve quota management. The EU's revised FCR now mandates REM for high-risk vessels, but its success will depend on rigorous implementation, clear governance frameworks, and targeted public funding to offset initial costs. Furthermore, aerial drones can complement vessel-based monitoring by helping to detect illegal discarding and bycatch, particularly in coastal waters. Iceland has demonstrated the effectiveness of using drones to identify suspected quota violations and provide evidence for investigations.

Transparency in enforcement is equally critical. Iceland's approach of publicly disclosing information on sanctions for non-compliance, has been found to be effective in fostering a culture of compliance. By contrast, the EU's patchy enforcement record marked by underreporting and inconsistent sanctions, weakens the LO's credibility. The new requirement for MS to annually report on their control efforts, including the use of REM and drones, is a step forward. However, public access to this data is essential for holding governments and industry accountable.

Ultimately, the Landing Obligation's success depends on more than regulatory ambition; it requires political will, industry cooperation, and public scrutiny. By embracing transparency, leveraging technology, and enforcing robust sanctions, the EU can turn the Landing Obligation into a powerful tool for sustainable fisheries, protecting marine ecosystems, securing livelihoods, and ensuring the long-term viability of Europe's fishing industry.

5. Recommendations

To deliver the objectives of the Landing Obligation, we call on EU institutions and Member States, particularly flag Member States to:

1. Avoid bycatch, eliminate illegal discarding and reduce "choke" risks through better selectivity, data collection and transmission;

- Invest in secure and interoperable real-time bycatch data-sharing systems (such as BATMAP), to enable fishers to avoid bycatch hotspots and adapt fishing behaviour during operations, while providing managers with timely information to address emerging bycatch hotspots, discard and "choke" risks;
- Expand the use of real-time closures (RTCs) in areas where high concentrations of juvenile fish or "choke" species are detected. Closures should be based on clear catch-composition thresholds and reliable evidence, rapidly communicated to affected vessels and control authorities, limited in duration and evaluated for possible displacement effects;
- Support collaborative data collection on catches and discards between fishers, scientists and fisheries managers, building on models such as the Norwegian Reference Fleet. Such programmes should improve catch estimates and the quality of scientific advice, strengthening trust in management decisions, while establishing clear rules on data quality, confidentiality, access and use;
- Increase investment in and uptake of proven selective fishing gears and practices, including fishery-specific mesh-size changes, sorting grids and other gear modifications that reduce unwanted catches before they occur. Continue supporting emerging AI-assisted technologies, such as Smartrawl, while requiring independent validation of their performance under commercial fishing conditions;
- Incentivise and reward verified selective fishing practices through preferential access to fishing opportunities. Member States should give greater weight to selectivity criteria, increase transparency on how allocation criteria are applied and periodically assess whether allocation decisions are delivering the intended environmental outcomes, adjusting them where necessary;
- Support the development and deployment of catch-identification technologies capable of providing timely and accurate information on catch composition, subject to independent validation, common data standards and interoperability with electronic logbooks and other fisheries information systems;
- Identify areas and fisheries facing particular challenges related to juvenile bycatch or "choke" species, with a view to introducing requirements for the use of cameras and/or other monitoring technologies that could improve onboard catch information and support targeted avoidance measures.

2. Strengthen oversight at sea through cost-effective digital monitoring;

a. For vessels of 18 meters or more presenting a high risk of non-compliance with the LO:

- Prioritise the timely adoption of implementing rules identifying the fleet segments presenting a "high risk" of non-compliance with the LO, including bottom trawlers. Risk classification should be based on transparent and objective evidence, including vessel characteristics, such as bottom-contacting gears prone to bycatch and catch-sorting equipment that facilitates discarding. The rules should ensure that covered vessels have functioning REM systems by January 2028;

- Develop a clear national REM implementation plans setting out what vessels are covered, the timetable for procurement, installation and testing, minimum technical and interoperability standards, system maintenance and functioning requirements, data review and enforcement procedures, information and training for fishers, safeguards for data protection and crew privacy, and targeted public support for transition costs.

b. For all other vessels:

- Establish evidence-based national targets for expanding voluntary or risk-based REM beyond the vessels covered by the EU mandate. Progress should be assessed using meaningful indicators, including operational monitoring coverage and, where appropriate, the proportion of landings originating from effectively monitored vessels;

- Consider complementary tools, such as drones and other surveillance technologies to cost-effectively monitor LO compliance, particularly in coastal areas.

3. Prevent control shopping and strengthen deterrence with transparency on enforcement and sanctions;

- Publish annually, by 30 June each year, comparable annual information on the implementation and enforcement of the LO in line with the revised Fisheries Control Regulation and implementing acts. This should include the number and proportion of REM-equipped vessels (mandatory and voluntary[178]) and rates on REM system-functionality; other control and inspection resources; the numbers of detected, investigated and confirmed infringements (by type); the numbers of enforcement actions and sanctions; and relevant appeal outcomes. Data should distinguish between LO's requirements, such as failure to retain catches, inaccurate recording and reporting of catches, and failure to count them against quota where applicable.

- Systematically publish final decisions in significant cases of non-compliance with the LO, including vessel names where lawful and proportionate. Published information should clearly identify the procedural status of the case, the evidence, legal basis, sanction and reasoning, and should be updated following an appeal. Improve cross-border exchange of vessels data on fisheries subsidies. Before awarding or maintaining public support, authorities should assess relevant final infringements under the applicable EU, national and WTO rules. Grants should be suspended, recovered or withdrawn where the relevant legal conditions are met. Where possible, recovered or otherwise available funds should support bycatch avoidance, improved monitoring and transparency measures.

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