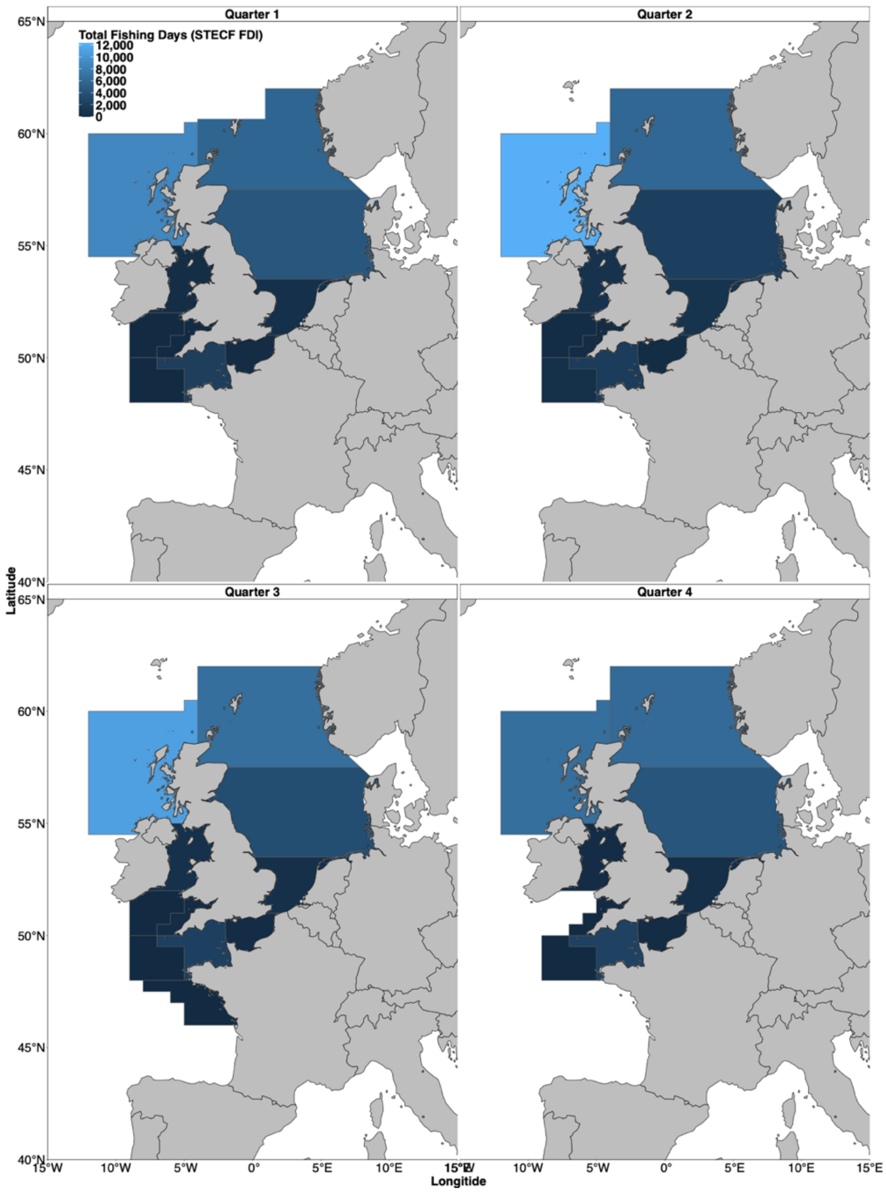
An estimation of UK Discards



Delivered by

MARFISHECO
FISHERIES · CONSULTANTS

March 2025

Executive Summary

Discarding, returning unwanted or non-compliant catch to the sea, remains one of the most persistent challenges in sustainable fisheries management. In the UK, despite regulatory commitments to reduce bycatch and improve reporting, discards continue to occur, often unreported and poorly quantified. This lack of data poses serious risks to marine biodiversity and undermines effective stock assessments and fisheries management. To address this knowledge gap, this analysis provides a comprehensive desk-based assessment of UK discards to date, drawing on both observer-derived discard estimates from the Scientific, Technical and Economic Committee for Fisheries (STECF) Fisheries Dependent Information (FDI) database and global gear-specific discard rates developed by the FAO and Gilman et al. (2020).

Findings reveal a consistent downward trend in total UK discard volumes between 2014 and 2020. Discard-to-catch ratios similarly declined, suggesting potential improvements in selectivity, though limited observer coverage complicates interpretation. When broader fleet coverage is included using the Gilman et al. (2020) approach, discard volumes are higher, but the same, dominant patterns in discarding persist. Across both approaches, bottom-contact gears, particularly bottom otter trawls (OTB), beam trawls (TBB), and bottom pair trawls (PTB), consistently contribute most to UK discards. Spatial and seasonal analyses indicate discard risk is largely concentrated in northern UK waters (notably the North Sea and west of Scotland).

Compared to other countries in the EU, the UK's discard performance is mixed. While its fleet-wide discard-to-catch ratios are moderate, gear-specific ratios for certain segments, especially beam trawls, gillnets, and scallop dredges, are notably higher than those of regional counterparts. These findings highlight the need for more targeted monitoring, enhanced observer and remote electronic monitoring (REM) coverage, and gear-focused mitigation strategies. Priority actions include improving discard data collection across fleet segments, targeting high-discard gears and hotspots, and engaging in cross-border learning to accelerate progress. Strengthening these efforts is essential if the UK is to meet its obligations under the Marine Strategy Framework Directive and achieve Good Environmental Status in its marine waters.

Table of Contents

Introduction

Wild fisheries are one of the leading drivers of biodiversity loss in the ocean and represent one of the most significant human pressures on marine ecosystems.[1,2] A major component of this impact is bycatch and resultant discards, the practice of returning unwanted or non-compliant catch to the sea, often damaged, dying or dead. Discards occur for a variety of reasons: economic inefficiency, quota restrictions, size regulations, or limited market value.[3–6] Regardless of the driver, discards pose a serious threat to fish populations, non-target species, and overall ecosystem health. If not accurately documented, discards also compromise the integrity of fisheries data, undermining the validity of fisheries stock assessments and effective management.

In recognition of the negative consequences of discards, the European Union (EU) introduced a Landing Obligation (LO) in 2013 under the Common Fisheries Policy.[7] This regulation requires fishers to land all catches of species subject to quotas or minimum conservation reference sizes, with the goal of eliminating discards by incentivizing greater selectivity and gear innovation and improving catch reporting for better stock assessments.[7,8] However, the implementation of the LO has been inconsistent across Member States and fleet segments. Despite its formal enforcement, discarding continues, often illegally, and comprehensive, reliable data on its extent is still lacking. [9]

While the United Kingdom (UK) was previously subject to these EU rules, the departure from the EU has marked a shift in how fisheries are managed domestically. Through the Fisheries Act 2020, the UK has established its own legislative framework for fisheries management, reaffirming core sustainability principles.[10] Central to implementing this framework is the Joint Fisheries Statement (JFS) which sets out the policies that the UK fisheries authorities will pursue to deliver the Fisheries Act's objectives, including avoiding and reducing bycatch and ensuring accurate recording when it occurs.[10] In parallel, the UK remains bound by domestic marine environmental obligations under the Marine Strategy Regulations 2010 (MSR). These regulations, which originally transposed the EU Marine Strategy Framework Directive (MSFD) into UK law, require the Secretary of State to take the necessary measures to maintain or achieve Good Environmental Status (GES) in UK marine waters, a goal that cannot be met without significant reductions in the adverse effects of fishing.[11]

Despite these commitments, meaningful monitoring and incentives for discard reporting are still lacking. Because discarding is technically prohibited, except under narrow exemptions[*], many fishers have little incentive to report what is not legally allowed. As a result, discard data remains sparse and inconsistent, undermining efforts to assess and manage impacts effectively. This data gap is increasingly problematic as stakeholders across the seafood system, including certification schemes, retailers that align their seafood sourcing guidelines with certification scheme standards, and those developing the new series of Fisheries Management Plans (FMPs), demand credible evidence of bycatch and discard mitigation.[12,13]

[*] Narrow exemptions include high survivability exemptions (limited discarding permitted when scientific evidence demonstrates discarded species have high likelihood of survival) and de minimis exemptions (limited discarding permitted if further improvements in gear selectivity are deemed technically or economically unfeasible).

This report provides a foundation toward addressing that knowledge gap in quantifying UK discards. Using the best available data and methodologies, we assess historic and current levels of discards in the UK fleet and explore spatio-temporal patterns in fishing efforts as proxy for discard risk. Two core approaches were used to estimate UK discards:

1. Analysis of the Scientific, Technical and Economic Committee for Fisheries (STECF) Fisheries Dependent Information (FDI) Discard Estimates: Leveraging discard estimates from the STECF FDI dataset, based on observer-derived data across relevant UK fleet segments.
2. Estimation of discards using the Gilman et al. (2020) approach: Applying gear-specific discard rates to UK landings data in the STECF FDI as outlined by Gilman et al. (2020), to generate estimated discard levels across relevant UK fleet segments.

These approaches were used to explore the following:

1. Data Availability: Evaluation of how well different vessel lengths, gear types, and years are represented in the STECF FDI discard estimates and landings data to reveal any limitations that exist with wither approach.
2. Annual Discards: Quantification of annual discards through time (as total weight in tonnes and as a ratio of discards-to-catch) from the UK fleet. This was examined aggregated and disaggregated by vessel length and gear type to establish a baseline understanding of discard levels across the UK fleet and recognize key fleet segments to prioritize in discard mitigation efforts and strategies.

Using the STECF FDI Discard Estimates approach only[*]:

1. Spatial-Temporal Patterns in Fishing Effort: Exploration of where and when fishing effort is highest amongst the primary gear types contributing the most discards across the UK fleet, recognizing seasonal and regional trends to further clarify discard mitigation efforts of key fleet segments to prioritize.
2. Comparative Context: Benchmarking UK discards against those of other countries in the EU, including aggregated total annual discards-to-catch ratios and disaggregated by gear types.

[*] Given the limitations with the Gilman et al. (2020) approach, particularly the use of pre-defined gear-specific discard rates applied to total catch, we used the STECF discard estimates derived from observer data to guide the analysis of spatial-temporal patterns in fishing effort and comparison of the UK's fleet against those of other countries.

Data Availability and Methodological Approaches

The UK does not have a designated fisheries discards dataset or monitoring program with publicly available data (to the best of our knowledge). At present it is only collected through sparse observer programs, although the advent of REM may change the amount of discarding data available in the near future. Nevertheless, such data available to a species resolution will still likely require significant technological development and agreement with industry stakeholders who are still of mixed opinions about wider REM roll-out.[14] Consequently, while multiple approaches could be considered to quantify discards, even in the currently data-poor context, this study adopted two approaches to quantify discard levels across the UK fishing fleet: 1) using STECF FDI[15] discard estimates derived from observer data and 2) applying pre-defined, standard gear-specific discard rates to total landings data as outlined by Gilman et al. (2020).

The STECF FDI and Discard Estimates

The STECF is a key advisory body to the European Commission, responsible for providing independent scientific advice on fisheries management and policy. One of its major data resources is the FDI database, which collates fleet-based data submitted by EU Member States (and, prior to Brexit, the UK). This dataset includes detailed information on landings, effort, and discards, primarily gathered through onboard observer programs.[15]

Discard estimates in the STECF FDI are derived from onboard observer programs, where trained observers record catch and discards during fishing operations, typically disaggregated by gear type, vessel size, and area of operation. The data collected by observers are extrapolated to estimate discards for the broader fleet segment (e.g., by gear type, vessel length and area), using statistical methods that account for sampling effort, total fishing effort, and landings data, aiming to produce discard estimates for each respective fleet segment.

Gilman et al. (2020) Discard Estimates

Gilman et al. (2020) conducted a comprehensive global review of fisheries discards with the aim of quantifying discard rates by gear type across the world's commercial fisheries.[16] Recognizing that direct observer-based data were sparse and inconsistently reported across regions and fleets, Gilman et al. synthesized available literature and national datasets to develop standardized, gear-specific discard rate estimates. These rates were expressed as the proportion of total catch that was discarded for each major fishing gear category (Figure 1,Table 2).

From these derived discard rates, Gilman et al. developed a global discard database providing a foundational tool for estimating discards in fisheries or regions where direct observation was lacking. By linking gear types to typical discard patterns, the approach offered a practical solution for broad-scale assessments of discard levels, particularly for countries or fleets with limited monitoring capacity.

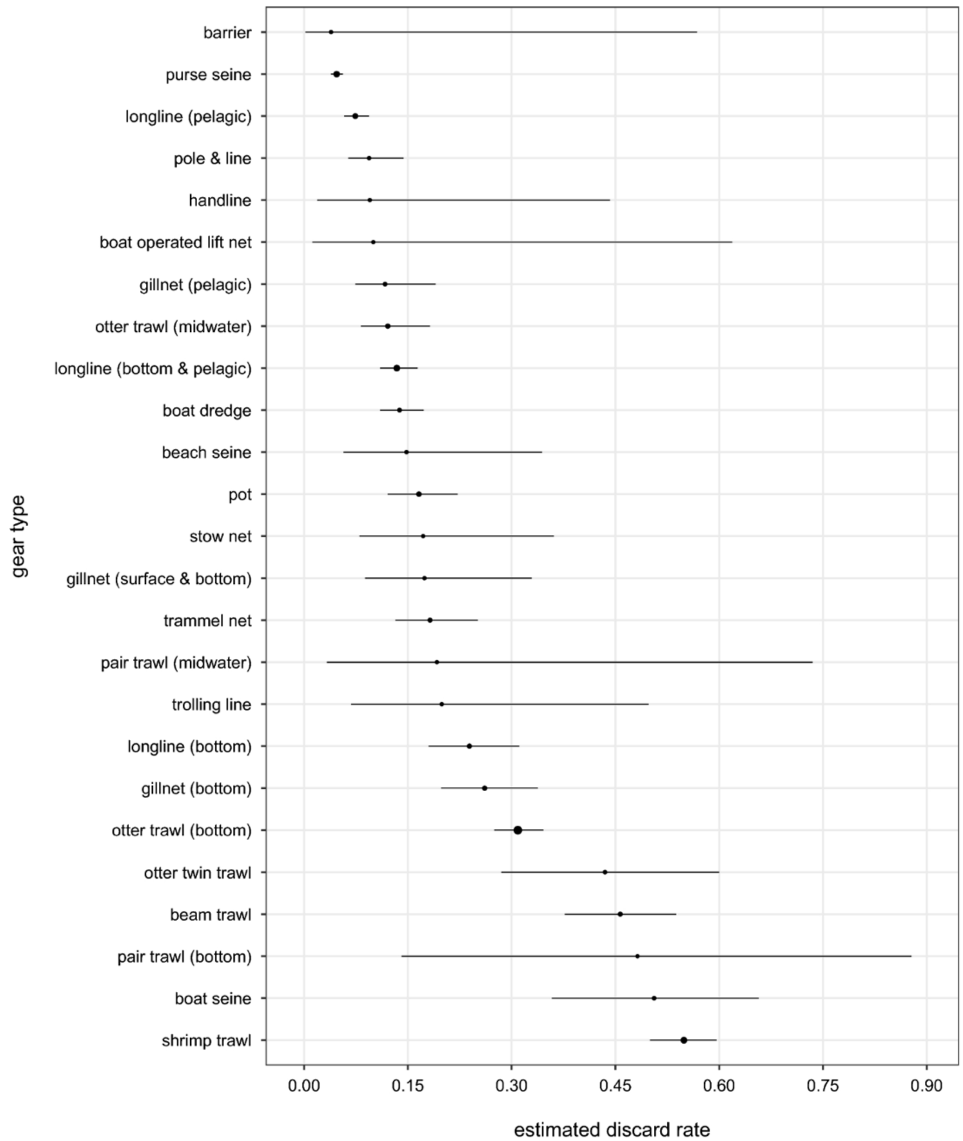


Figure 1. Mean gear-specific discard rates and 95% credible intervals, in tonnes of discards per total catch. This size of the circle for the mean is proportional to the sample size. Source: Gilman et al. (2020).

Both the STECF FDI and the Gilman et al. (2020) approach rely on the STECF FDI ladings (STECF FDI and Gilman et al. (2020) approach) and discards records (STECF FDI approach only) and they each have inherent strengths and limitations based on their design and data origins. While STECF estimates are grounded in direct observations from onboard programs, they suffer from limited coverage. In contrast, the Gilman et al. (2020) method offers broad applicability across the fleet but relies on generalized global discard rates (Table 1).

Table 1. Comparison of the two approaches (STECF FDI discard estimates and discard estimates derived from Gilman et al (2010) discard rates) used to quantify UK discards. The two approaches are compared against multiple criteria.

Criteria	STECF FDI Discard Estimates	Discard Rates from Gilman et al 2010
Estimation Approach	Discard estimates are derived from direct observations of discard events in the UK fleet. Estimates reflect actual discard behavior, including effects of mitigation or compliance efforts.	Discards are estimated as fixed proportions of catch. This assumes a direct relationship between catch and discards, which may overestimate discards in fleets where mitigation measures have reduced discard rates or where catch does not scale with discarding.
Fleet coverage	Discard estimates are limited to vessels with observer coverage. However, they are based on actual UK data and are representative of those specific fleet segments.	Gear-specific discard rates can be applied across the entire fleet, offering full coverage. However, they are derived from global averages and may not reflect the specific characteristics or discard mitigation practices of the UK fleet.
Data Recentness	Discard estimates are only available for years with active observer programs, making them temporally relevant but potentially inconsistent across years.	Discard rates can be applied across time periods even when no observer program is active. However, discard rates may be outdated or not reflect recent changes in gear selectivity or regulations.
Level of Specificity	Discard estimates are based on detailed, direct observations, allowing for high resolution estimates by gear, vessel size, and region.	Discard rates are assigned to broad gear categories, which may mask variability within fleet segments or regions.

To meaningfully assess UK discards, it is essential to analyse both the STECF FDI and Gilman et al. (2020) approaches, which currently offer the most practical options for desk-based estimation in the absence of extensive field data. This report evaluates both approaches to clarify their implications for estimating UK discards and to inform future improvements in methodology and targeted data collection.

Methods

For both discard estimation approaches, data availability was examined to evaluate how well different vessel lengths, gear types, and years are represented in the STECF FDI, considering the distinct characteristics of each approach. For the STECF FDI discard estimates, the proportion of landings records in the STECF FDI with corresponding discard records (provided with zero and non-zero values) were compared to landing records with unknown or confidential discard records. Since the Gilman et al. (2020) approach does not rely on observed discard data, data availability was evaluated by examining the proportion of landings records in the STECF FDI across vessel lengths, gear types, and years. This evaluation helps provide insights into the representativeness of the underlying data used in each method.

Results

Data Availability of STECF Discard Estimates in STECF FDI

Discard estimates derived from the observer program are limited across the UK's fishing fleet for the entire temporal span (2014-2020) of the STECF FDI. Across the 7 years, only 17.61% of UK fleet landing records have corresponding discard records with non-zero values, while an additional 0.94% have discard values recorded as zero. This means that for approximately 78.88% of UK fleet landing records, discard values are unknown. Across all the different vessel length categories recorded in the STECF FDI, the proportion of UK fleet landing records with associated discard data provided with non-zero values remains below 30% (0-12m: 11.01%, 12-18m: 27.00%, 18-24m: 26.24%, 24-40m: 23.85%, and Over 40m: 18.13%) (Figure 2).

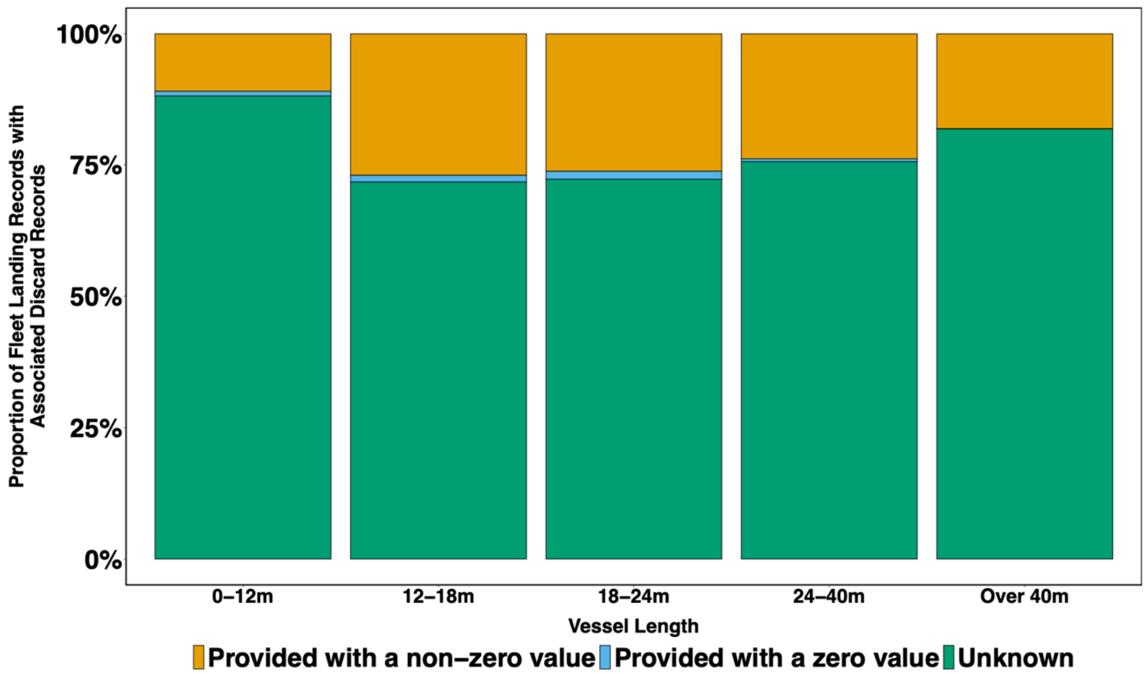


Figure 2. Proportion of UK fleet landing records with associated discard data by vessel length form 2014-2020. Colours denote representation of discard data ordered from top to bottom: provided with a non-zero value (orange), provided with a zero value (blue), and unknown (green). Source: STECF FDI, 2024.

Among the 29 different gear types, 17 gears had landings records with associated zero or non-zero discard records. Pair seines (SPR) had the highest proportion of fleet landing records with associated non-zero discard data (50%), followed by anchored seines (SDN) (46.99%) and twin otter trawl (OTT) (42.54%) (Figure 3). Bottom otter trawl (OTB) (26.28%) and anchored set gillnets (GNS) (6.59%), in the STECF FDI. Other gear types have limited (<5%) or no associated discard data.

Figure 3. Proportion of UK fleet landing records with associated discard data by gear type from 2014-2020. Colours denote representation of discard data ordered from top to bottom: provided with a non-zero value (orange), provided with a zero value (blue), and unknown (green). Source: STECF FDI, 2024.See Table 2 for gear type code definitions.

Between 2014 and 2020 (inclusive), the proportion of fleet landing records with associated discard data containing non-zero values remained below 25%. The highest representation occurred in 2019 (21.13%), while the lowest was in 2020 (11.18%) (Figure 4).

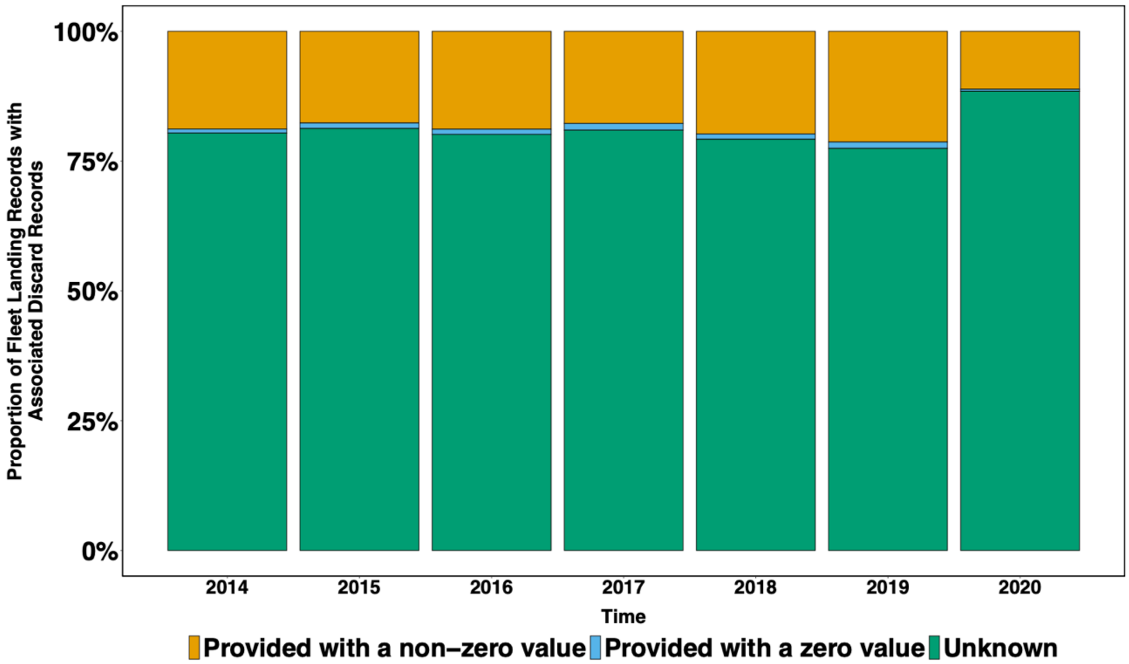


Figure 4. Proportion of UK fleet landing records with associated discard data by year. Colours denote representation of discard data ordered from top to bottom: provided with a non-zero value (orange), provided with a zero value (blue), and unknown (green). Source: STECF FDI, 2024.

The STECF FDI discard estimates, derived from observer programs, offer a data-driven but highly limited snapshot of discarding across the UK fleet. Across the STECF FDI, discard estimates are available for only a small fraction of landings records (under 20% with non-zero discard values), and coverage is uneven across vessel sizes, gear types, and years. This lack of representative observer coverage introduces significant uncertainty and may bias discard estimates derived using the STECF FDI toward fleet segments more likely to be monitored and associated with discard estimates. As a result, the outputs derived from this approach, while grounded in real observations, must be interpreted with caution due to incomplete and inconsistent coverage.

Estimation of Discards using Gilman et al. (2020) applied to the STECF FDI.

Just over half (50.34%) of UK fleet landing records (number of rows in the STECF FDI) come from vessels 0-12m in length, indicating that small-scale vessels dominate the STECF FDI (Figure 5). Vessels 12-18m (15.33%), 18-24m (16.38%), and 24-40m (14.7%) in length each contribute similarly, accounting for 15-16% of STECF FDI landings records. The lowest representation in records comes from vessels over 40m (3.25%).

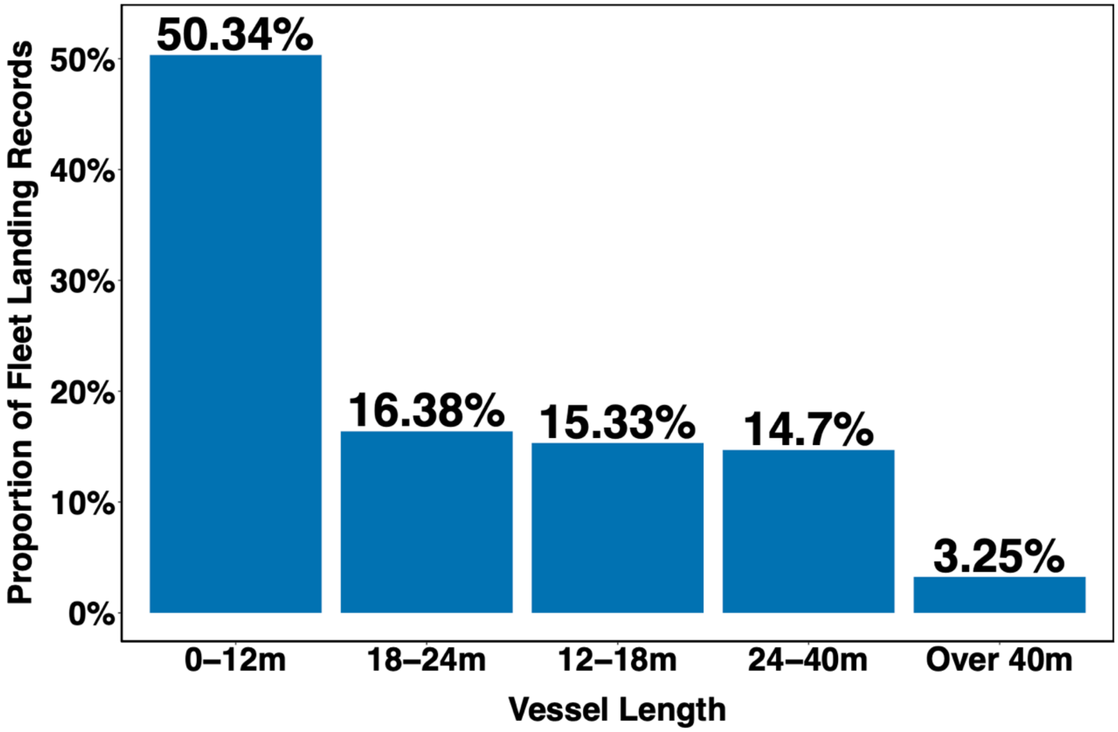


Figure 5. Proportion of UK fleet landing records by vessel length. Source: STECF FDI, 2024.

OTB are the most represented gear type in UK landings records (number of rows in the STECF FDI), accounting for 36.81% of the UK fleet landing records, followed by GNS (23.95%), OTT (7.27%), and beam trawls (TBB) (7.15%) (Figure 6). All remaining gear types each make up less than 4% of the total UK fleet landing records, with many contributing less than 1%, and a few nearing 0%.

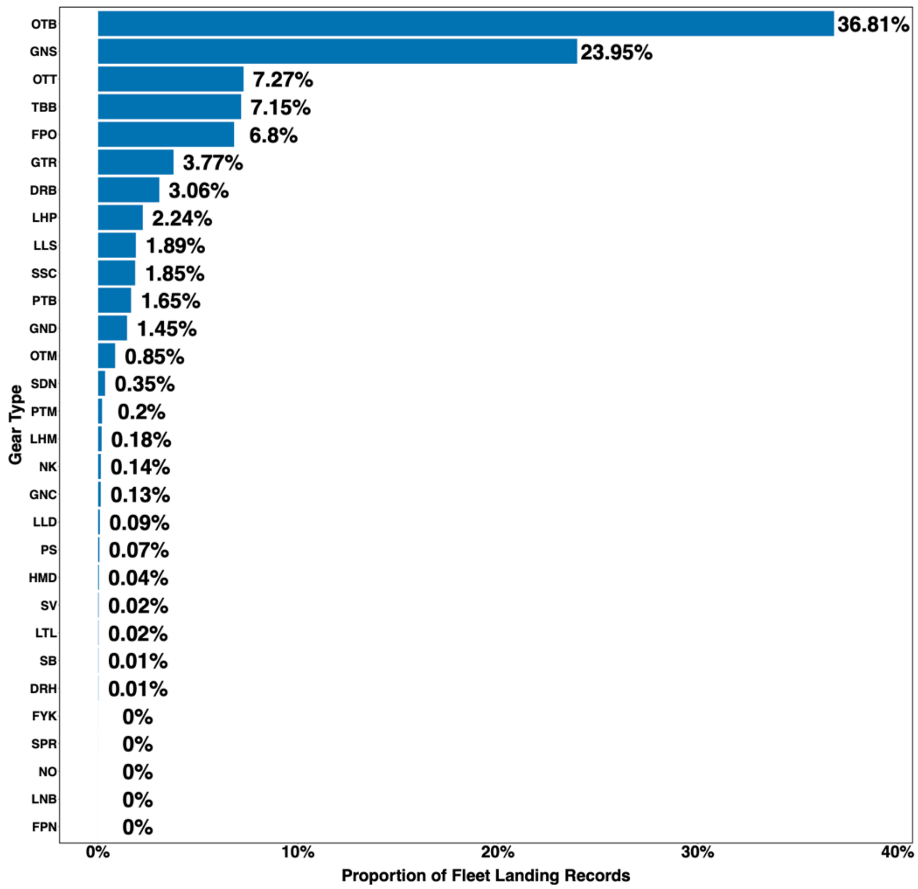


Figure 6. Proportion of UK fleet landing records by gear type. Source: STECF FDI, 2024

The proportion of UK fleet landing records (number of rows in the STECF FDI) remains relatively even across years, albeit with a slight downward trend, with annual proportions ranging between 11.47% and 16.43%**.** The highest proportion of fleet landings records occurred in 2014 (16.43%), and the lowest in 2020 (11.47%) (Figure 7).

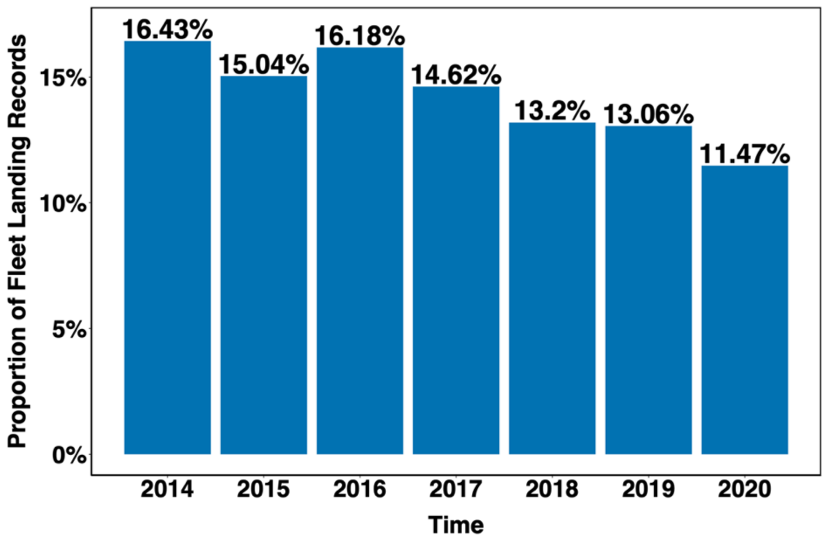


Figure 7. Proportion of UK fleet landing records by year. Source: STECF FDI, 2024.

Applying gear-specific discard rates from Gilman et al. (2020) to UK landings provides broad coverage across the fleet and enables estimation in the absence of direct observation. However, these globally derived rates may not reflect the specific discard behaviors or mitigation practices of UK vessels and fishing contexts. The results of discard estimates derived from STECF FDI using the Gilman et al. approach may therefore over- or under-estimate[*] true discard levels for specific fleet segments and are unable to capture temporal changes due to policy or behavioral shifts in the UK fleet.

Conclusion

Assessing the availability of data for estimating discards in the UK fleet reveals critical limitations with both methodological approaches. Neither the STECF discard estimates derived from observer programs nor the Gilman et al. (2020) method offers a fully accurate picture of discard levels across the UK fleet. While observer-derived data from STECF provide fleet-specific, direct observations, coverage is limited and uneven, varying significantly by vessel length, gear type, and year.

Conversely, the Gilman et al. (2020) approach enables broader fleet coverage by applying generalised gear-specific discard rates to UK landings data. However, these rates are based on global averages and may not reflect current UK-specific practices, particularly where mitigation efforts have been implemented. Moreover, this approach assumes a fixed discard-to-catch relationship, potentially leading to further inaccuracies in discard estimations.
Since both approaches are constrained by their respective limitations, the estimates provided in the following sections of this report should be interpreted as indicative baselines rather than precise values. Comparing the two methods does highlight key steps that could improve the UK's ability to estimate discards accurately across its fishing fleet.

[*] Because Gilman et al. use standardised discard rates, the only way to establish if an estimate is over or under the real discarding rate is to compare the Gilma-derived values with real observer coverage-derived estimates.

Annual Discards

Introduction

With an understanding of the strengths and limitations of the available data and approaches that can be used to estimate UK discards, the STECF FDI can now be used to quantify annual discards across a range of gear types. While each estimation method presents distinct caveats as noted in the previous section, calculating annual discards offers a valuable starting point for establishing a baseline understanding of discard levels across the UK fleet. This baseline is critical for informing future data collection efforts, monitoring, management, and discard mitigation strategies.

Methods

STECF FDI Discard Estimates

For the STECF FDI discard estimation approach, the analysis was restricted to landing records with corresponding discard records, including both zero and non-zero discard values. From these records, aggregated total annual discards were derived for the period 2014-2020, both in volume (tonnes) and as a discard-to-catch ratio. The discard estimates were then calculated by vessel length and gear type (i.e., disaggregated). The aggregated time series offers an overview of discards across the UK fleet (for the fleets with associated discard estimates), while disaggregated series helps identify vessel length classes and gear types associated with higher discard levels, thereby informing both the targeted analyses presented in subsequent sections of this report and identify fleet segments that should likely be focused on for future discard mitigation strategies.

Estimation of Discards using Gilman et al. (2020) Methodology

For the Gilman et al. (2020) discard estimation approach, some preliminary data preparation and manipulation were required before aggregated and disaggregated annual discards for the period 2014-2020 could be developed.

The gear-specific discard rates from Gilman et al. (2020) are provided as general FAO-defined gear categories, which do not always directly correspond to gear types within the STECF FDI. As a result, gear types in the STECF FDI were categorised to their closest matching FAO gear categories. For each record in the STECF FDI, discard volumes (in tonnes) were calculated by multiplying the corresponding gear-specific Gilman et al. (2020) discard rate by the corresponding landings. In cases where a gear type found in the STECF FDI corresponded to multiple FAO gear types, the mean discard rate across the multiple FAO gear types was used to estimate discards for that record (Table 2). From this point, the same methodology used in the STECF FDI discard estimates approach was applied to derive aggregated and disaggregated annual discard estimates for the 2014–2020 period.

Results

STECF Discard Estimates

Based on the STECF FDI discard estimates, discards in UK commercial fisheries that have associated discard records peaked in 2016 at just under 65,500 tonnes, then declined steadily each year, reaching its lowest level in 2020 at just over 25,000 tonnes (Figure 8). Landings (limited to records corresponding discard records) remained relatively stable from 2014 to 2015, then increased gradually, peaking in 2018 at just under 117,000 tonnes. This was followed by a sharp decline between 2019 and 2020, reaching its lowest levels in 2020 at just over 66,000 tonnes.

Figure 8. Total annual discards (in grey) and landings (in orange) from the UK fleet from 2014-2020 based on STECF FDI discard estimates and landings data, respectively. Total annual landings shown include only those records that have corresponding discard data (provided with zero and non-zero values).

The temporal patterns observed in total annual discards and landings highlights the discard-to-catch ratio for the whole UK fleet shows a clear decline over time (Figure 9). The ratio peaked in 2016, indicating more than half of the total catch of vessels with associated discard values was being discarded. From 2017 onwards, the ratio dropped sharply, reaching its lowest point in 2019 at 0.37, before a slight increase in 2020. This trend suggests a potential reduction in discard levels relative to landed catch for the fleets with associated discard estimates, although it could also reflect other variables that may have changed over time such as observer coverage (see Figure 2, Figure 3, Figure 4) and resultant discard estimates.

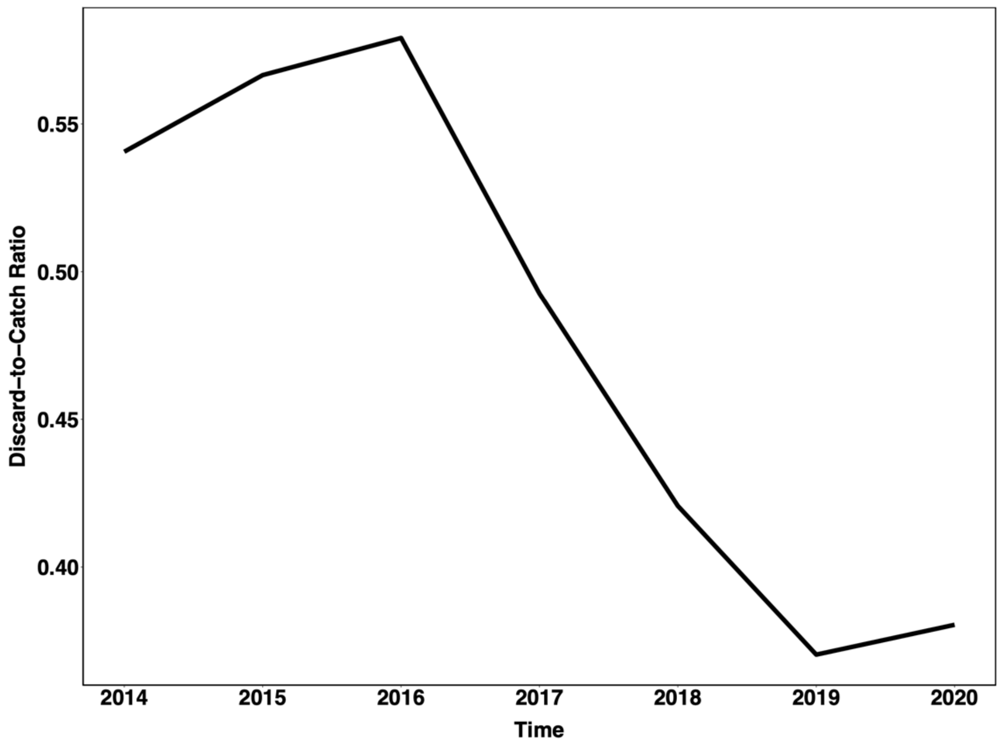


Figure 9. Total annual discards-to catch-ratio for the UK from 2014-2020 based on STECF FDI discard estimates and landings from fleets with associated discards records.

According to the STECF discard estimates, most of the total annual discards derived from observer coverage data comes from vessel categories 18-14m and 24-40m, followed by 0-12m and12-18m (Figure 10). Vessels over 40m contribute minimal discards through time. These patterns are likely to be driven by observer program coverage and thus availability of data rather than the true fleet-wide representation of discards.

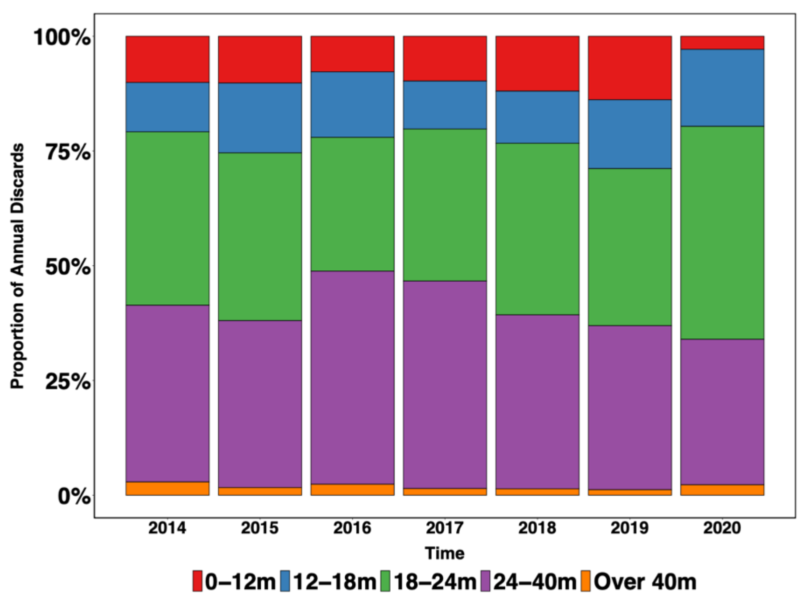


Figure 10. Proportion of total annual discards by vessel length from 2014-2020 based on STECF FDI discard estimates. Colours correspond to vessel size classes from smallest (top) to largest (bottom).

The majority of total annual discards for fleet segments that have associated discard estimates from the STECF FDI come from five main gear types: OTB, TBB, OTT, bottom pair trawl (PTB), and scallop dredges (SSC) (Figure 11A and Figure 11B). While the relative proportions of discard contributions from these gears remain relatively consistent, minor fluctuations are evident. For example, the proportion of annual discards from bottom otter trawls appears to decrease from 2014-2017, before increasing again thereafter. The consistent dominance of a select number of gear types suggests that targeted discard mitigation measures in these fleets could have a large impact on overall discard levels across the UK fleet.

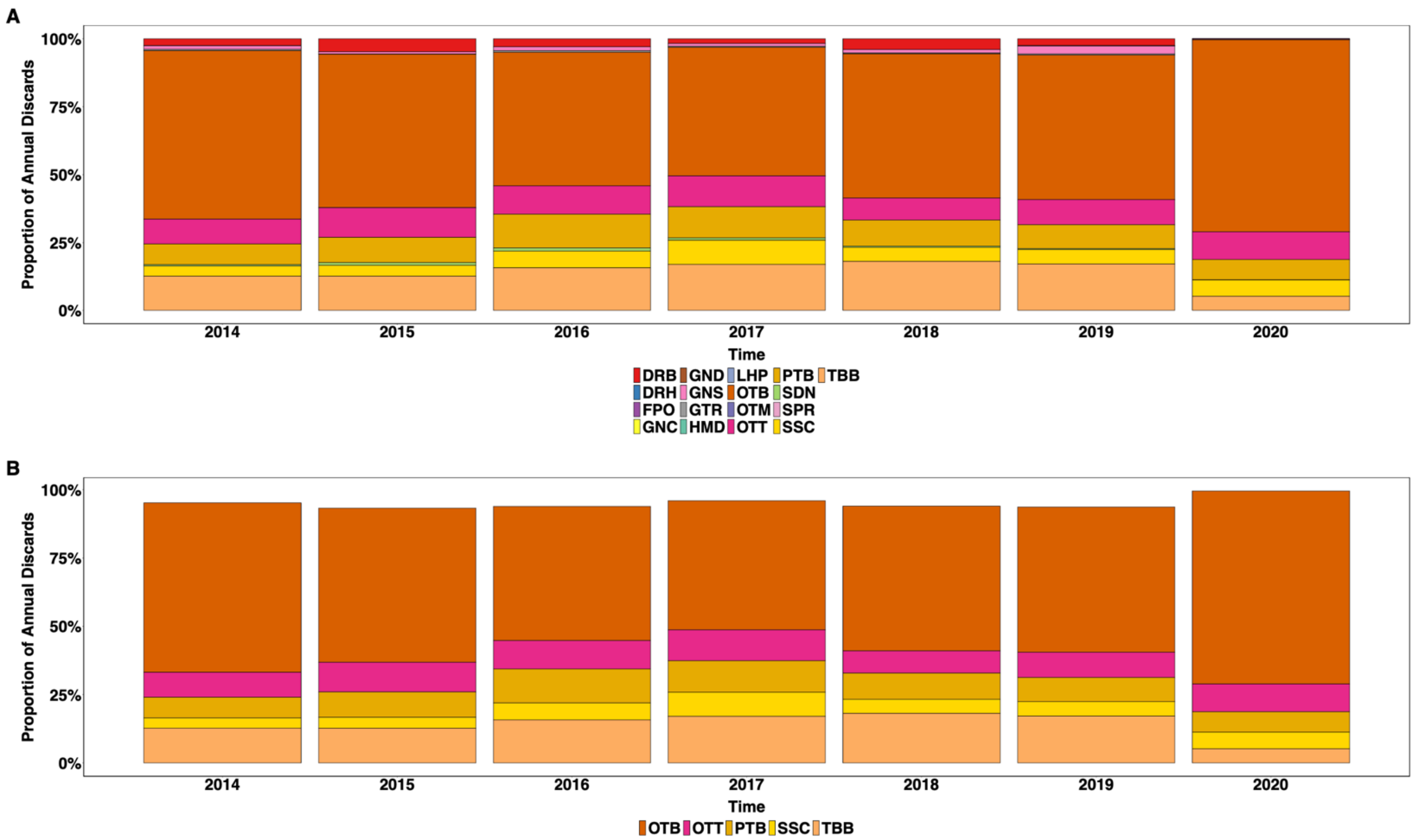


Figure 11. Proportion of total annual discards by gear type from 2014-2020 based on STECF FDI discard estimates. Panel A shows proportion of total annual discards across all gear types while panel B shows proportion of total annual discards across high discard gear types. Colours denote gear types ordered from top to bottom (DRB to TBB for Panel A) (OTB to TBB for Panel B).

Among the five main gears recognized to contribute most (99.53% in 2020) to UK discards with associated discard records, OTB shows the highest overall volumes in landings (limited to records corresponding to discard records) and discards (Figure 12). Landings increased from 2014 to 2018 before dropping sharply in 2020, while discards steadily declined over the period. OTT**,** PTB, SSC, TBB, exhibit relatively lower and stable trends, with slight decreases in both landings and discards after 2017. For total annual discards and landings for all gear types refer to Figure 27 (Annex).

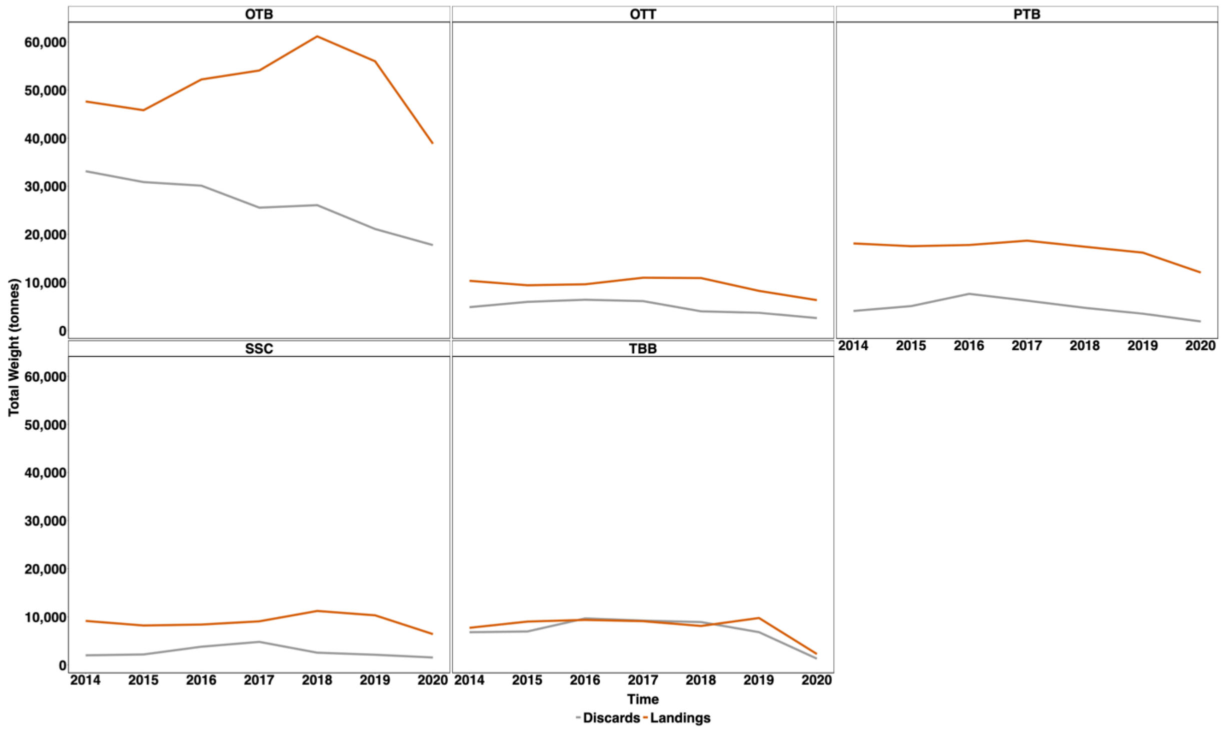


Figure 12. Total annual discards (in grey) and landings (in orange) by gear type from the UK fleet from 2014-2020 based on STECF FDI discard estimates and landings data, respectively. Gear types visualised include bottom otter trawl (OTB), twin otter trawl (OTT), bottom pair trawl (PTB), scallop dredge (SSC), and beam trawl (TBB). Total annual landings shown include only those records that have corresponding discard data (provided with zero and non-zero values).

Given the differing trends in total annual discards and landings through time across the high-discard gear types, the discard-to-catch ratio exhibits distinct patterns across the gear types through time (Figure 13). TBB shows the highest discard-to-catch ratios overall, exceeding 1 in multiple years (2016-2018) meaning that for every tonne of retained catch there is an equivalent tonne of discards. Beam trawl also show a notable decrease after 2018 to its lowest ratio in 2020 at 0.57. For OTB, the ratio shows a steady decline from 0.70 in 2014 to 0.38 in 2019, indicating a reduction in discards compared to retained catch, before slightly increasing again in 2020 to 0.46. OTT displays more fluctuation between 0.5 and 0.4. SSC and PTB show relatively low discard-to-catch ratios through time with a gradual rise in the ratio in 2017 at 0.53 and 2016 at 0.43 respectively, then a consistent decline through 2020. These trends suggest gear-specific differences in data coverage across these fishing fleets, discard practices, selectivity, and / or data reporting accuracy. In some cases, particularly for beam trawls, the high ratios imply a substantial proportion of catch is being discarded, which may warrant targeted mitigation measures. For total annual discard-to-catch ratio for all gear types refer to Figure 28 (Annex).

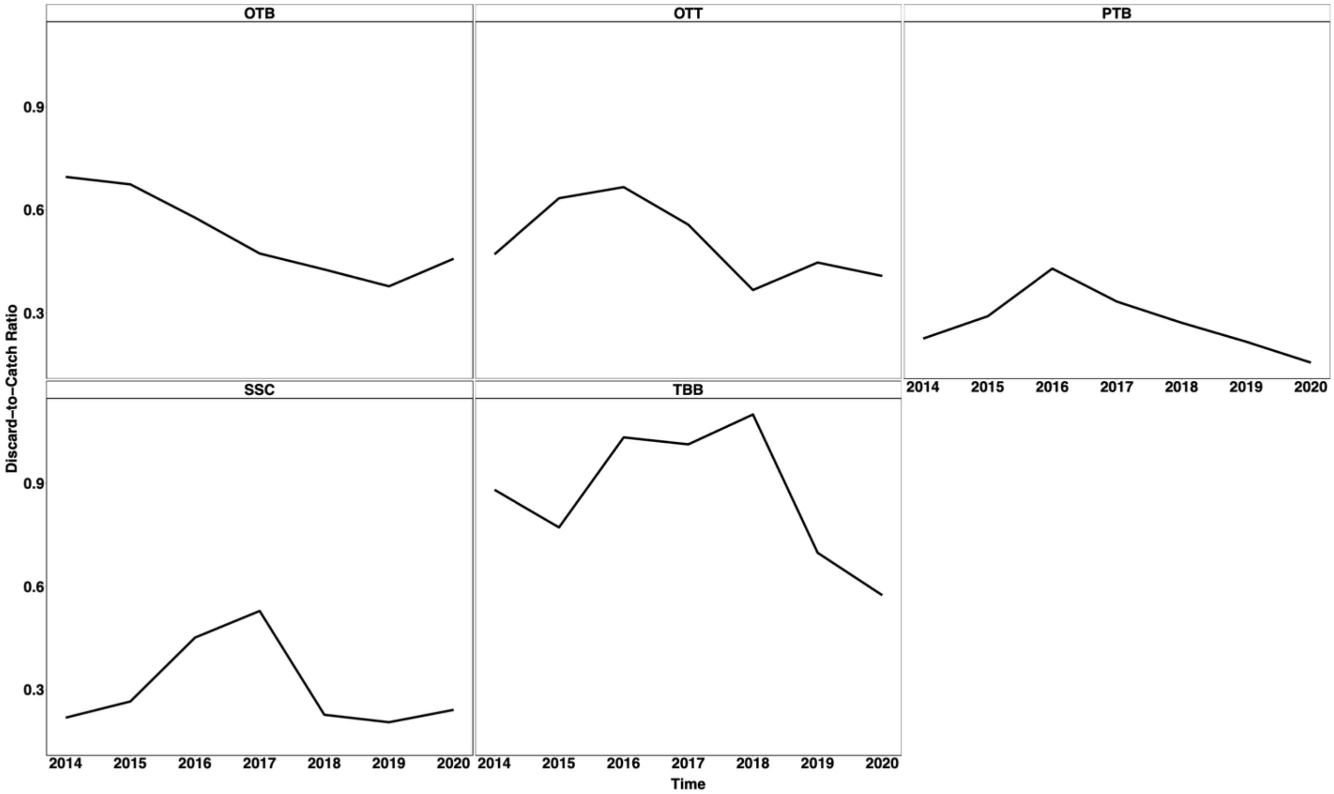


Figure 13. Total annual discards-to catch-ratio by gear type from 2014-2020 based on STECF FDI discard estimates and landings data. Gear types visualised include bottom otter trawl (OTB), twin otter trawl (OTT), bottom pair trawl (PTB), scallop dredge (SSC), and beam trawl (TBB).

Estimation Discards using Gilman et al. (2020) Methodology

When applying gear-specific discard rates Gilman et al. (2020) to STECF FDI UK landings data, total annual discards and landings are substantially higher than that derived from STECF FDI discard estimates and landing data (Figure 14). This is because the Gilman et al. (2020) approach applies fixed, gear-specific discard rates to all UK landings - meaning the higher catch volumes directly translate to higher discard estimates – whilst the STECF FDI approach only considers landings and discard rates for those fleets that have associated observer discard estimates.

Using the Gilman et al. approach, total UK discards show a moderate decline from about 150,400 tonnes 2014 to 137,400 tonnes in 2015, followed by a temporary increase through 2017 at 147,800 tonnes, and then a sharp, continuous decrease, ultimately reaching the lowest point in the time series in 2020 of 121,800 tonnes (Figure 14A and Figure 14B). This trend in discards broadly mirrors the pattern observed in landings, which exhibit a general decline from about 783,250 tonnes in 2014 to 626,700 tonnes in 2020 (Figure 14B).

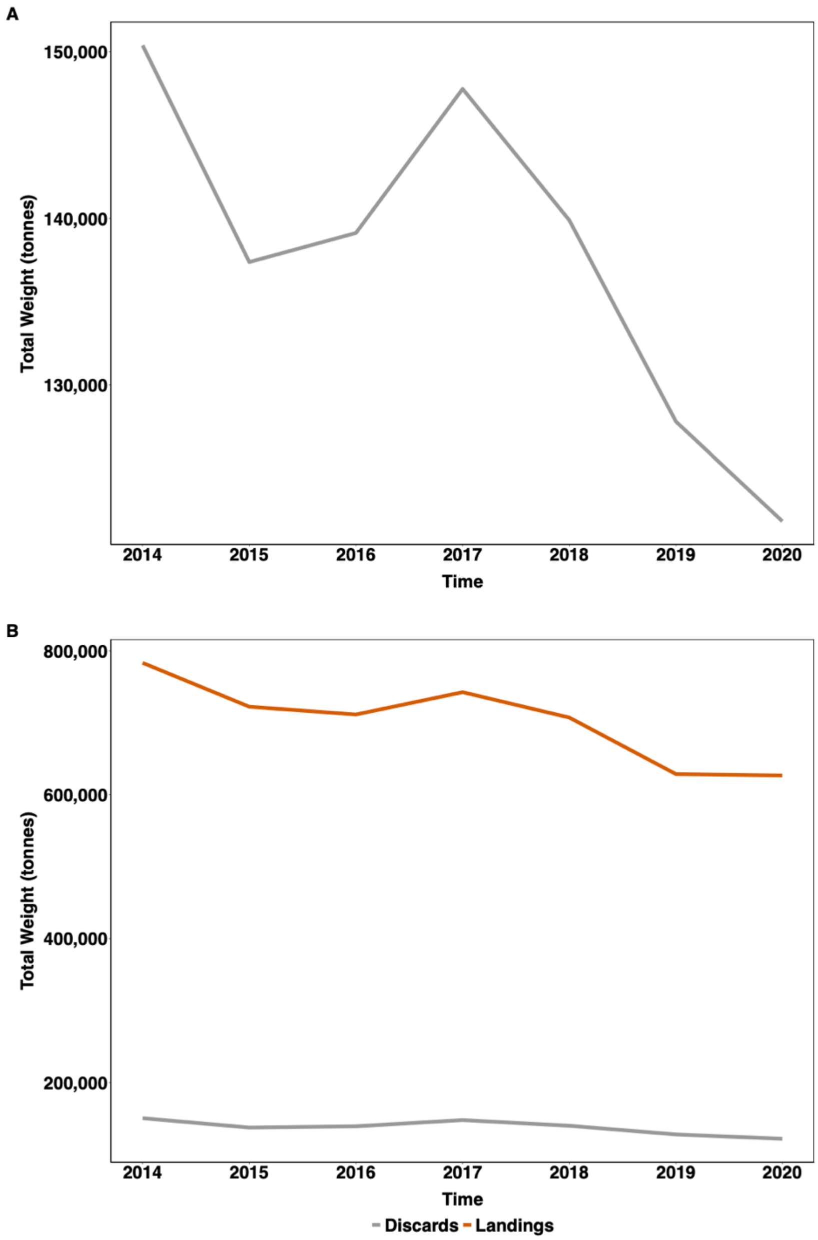


Figure 14. Total annual discards (A and B) and landings (B) based on applying gear-specific discard rates to STECF FDI UK landings data as outlined by Gilman et al. (2020). Total annual discards (in grey) and landings (in orange) are distinguished by color.

According to the Gilman et al. (2020) approach, the discard-to-catch ratio remains relatively stable throughout the time series, ranging between 0.190 and 0.203, indicating that approximately 19–20.5% of the total estimated catch was discarded each year across the whole of the UK commercial fishing fleet (Figure 15). This ratio is lower than that derived from STECF FDI discard estimates and landings data. The discrepancy is likely because the Gilman estimates are calculated across all UK gear types which include gears that have very low discard rates whilst the STECF FDI discard estimates are focused on the high-discard gears.

The discard ratio for the whole UK fleet declined slightly from 2014 to 2015, then increased steadily, peaking in 2019 at 0.2, before dropping sharply in 2020 to 0.19. These fluctuations likely reflect changes in total landings and the distribution of total catches per fishing gear.

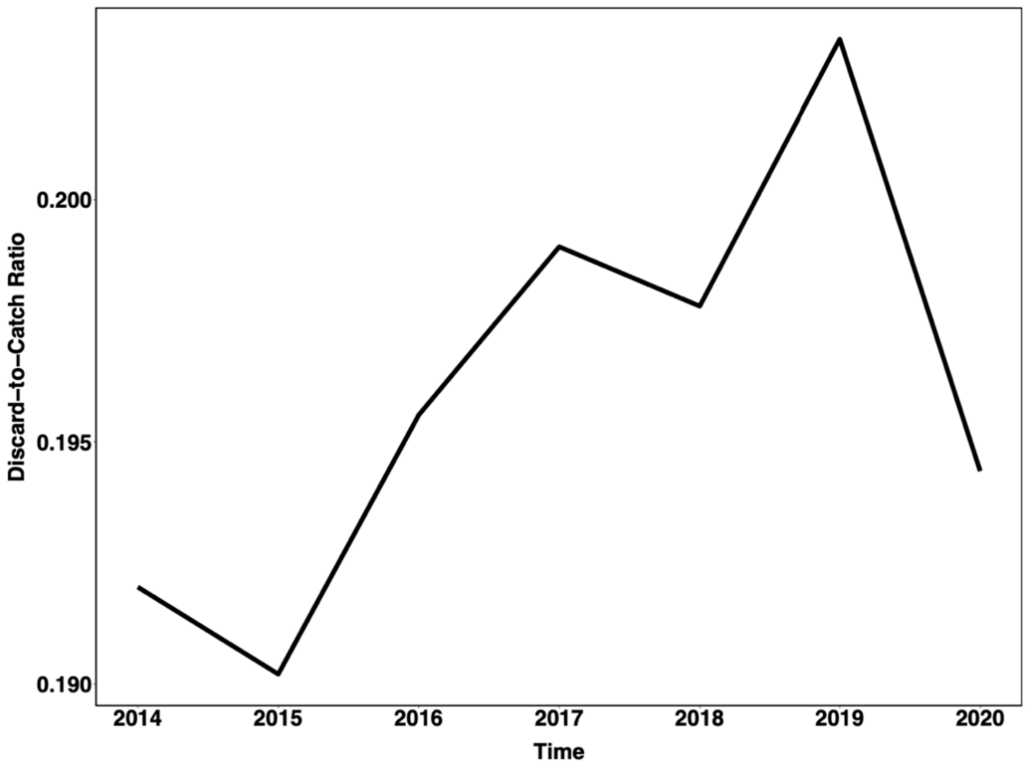


Figure 15. Total annual discards-to catch-ratio from 2014-2020 based on applying gear-specific discard rates to STECF FDI UK landings data as outlined by Gilman et al. (2020).

Using the Gilman et al. (2020) approach, there is a clear relationship between vessel length and the proportion of annual discards for the UK fleet (Figure 16). As vessel length increases, so does its contribution to total annual discards. Throughout the timeseries, most discards consistently came from vessels over 40m followed by vessels in the 24-40m length category. Smaller vessels categories (under 24 m) account for a much smaller proportion (28.54% in 2020) of annual discards suggesting that larger vessels may have a disproportionate impact on overall discard volumes. However, it is important to note that these patterns observed are a reflection of patterns in total annual landings across vessel lengths rather than vessel-length specific discard rates.

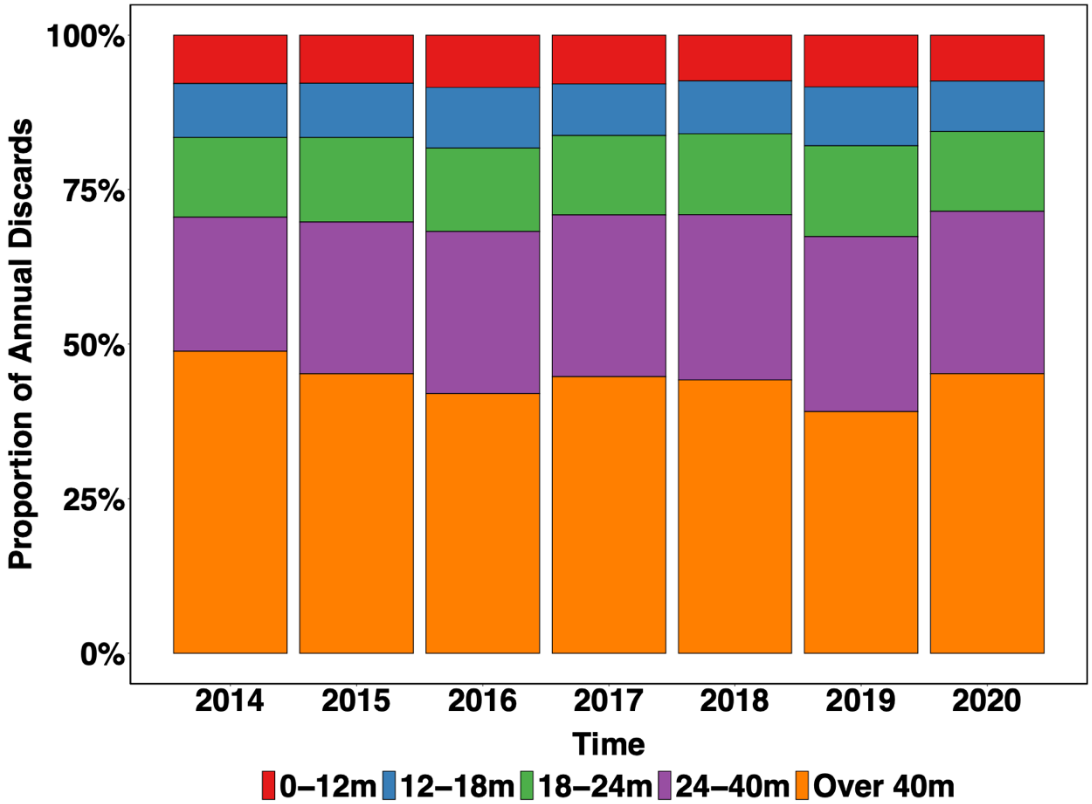


Figure 16. Proportion of total annual discards by gear type from 2014-2020 based on applying gear-specific discard rates to STECF FDI UK landings data as outlined by Gilman et al. (2020). Colours correspond to vessel size classes from smallest (top) to largest (bottom).

The majority of total annual discards estimated using the Gilman et al. (2020) approach come from five main gear types, including OTB, midwater otter trawl (OTM), PTB, TBB, and pots and traps (FPO) (Figure 17), some of which were recognised when deriving total annual discards from STECF discard estimates (bottom otter trawls, bottom pair trawls, and beam trawls). The relative proportions of discard contributions from these gear types remain consistent through time, again reflecting the general pattern in landings across gear types through time. Regardless, the consistent dominance of these gear types suggests that targeted discard mitigation measures in these fleets / vessels using these high-discard gear types, such as OTB could have a significant impact on overall discard levels across the UK fleet.

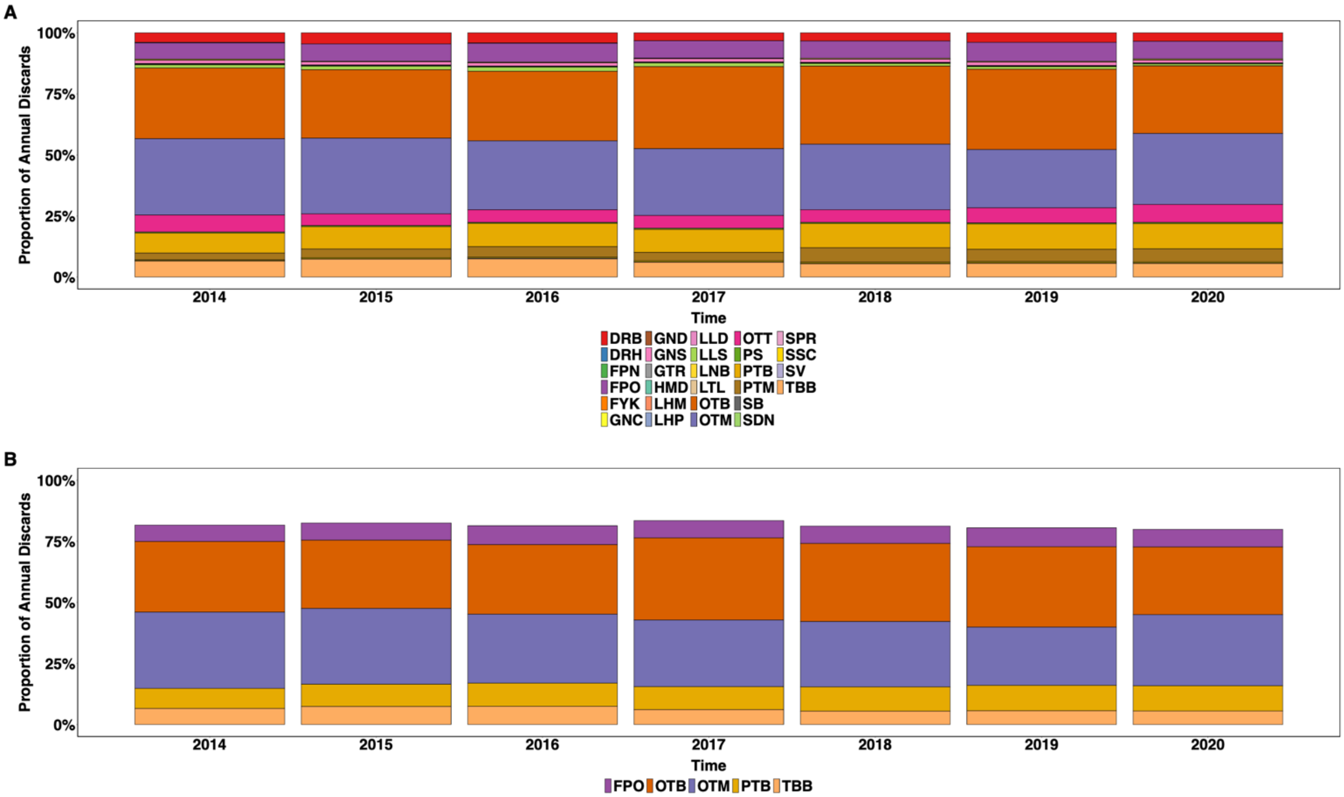


Figure 17. Proportion of total annual discards by gear type from 2014-2020 based on applying gear-specific discard rates to STECF FDI UK landings data as outlined by Gilman et al. (2020). Panel A shows proportion of total annual discards across all gear types while panel B shows proportion of total annual discards across high-discard gear types. Colours denote gear types ordered from top to bottom (DRB to TBB for Panel A) (FPO to TBB for Panel B).

Discards calculated using the Gilman et al. method from UK commercial fishing vessels are consistently highest in the OTB and OTM gear type, both of which are above 300,000 tonnes every year over the 6 year time series (Figure 18A and Figure 18B). In contrast, FPO, PTB, and TBB show much lower discard volumes, remaining relatively stable and below 14,000 tonnes across the time series. These patterns suggest that discard contributions vary significantly by gear type, with OTB (27.66% in 2020) and OTM (29.12% in 2020) accounting for most discards within this high-discard gear group. For total annual discards and landings for all gear types refer to Figure 29 (Annex). These patterns observed in discards closely mirror[*] corresponding landings, as discards are derived as a proportion of total landings irrespective of time. Consequently, visualising the discard-to-catch ratio over time offers no additional insight because it reflects the discard rates assigned to each gear type (Table 2). Instead, it is more informative to refer to Figure 1 for gear-specific discard rates applied to each gear type.

[*] Note: some gear types are assigned the mean of multiple discard rates and therefore may not exactly mirror catch records for their respective singular gear types.

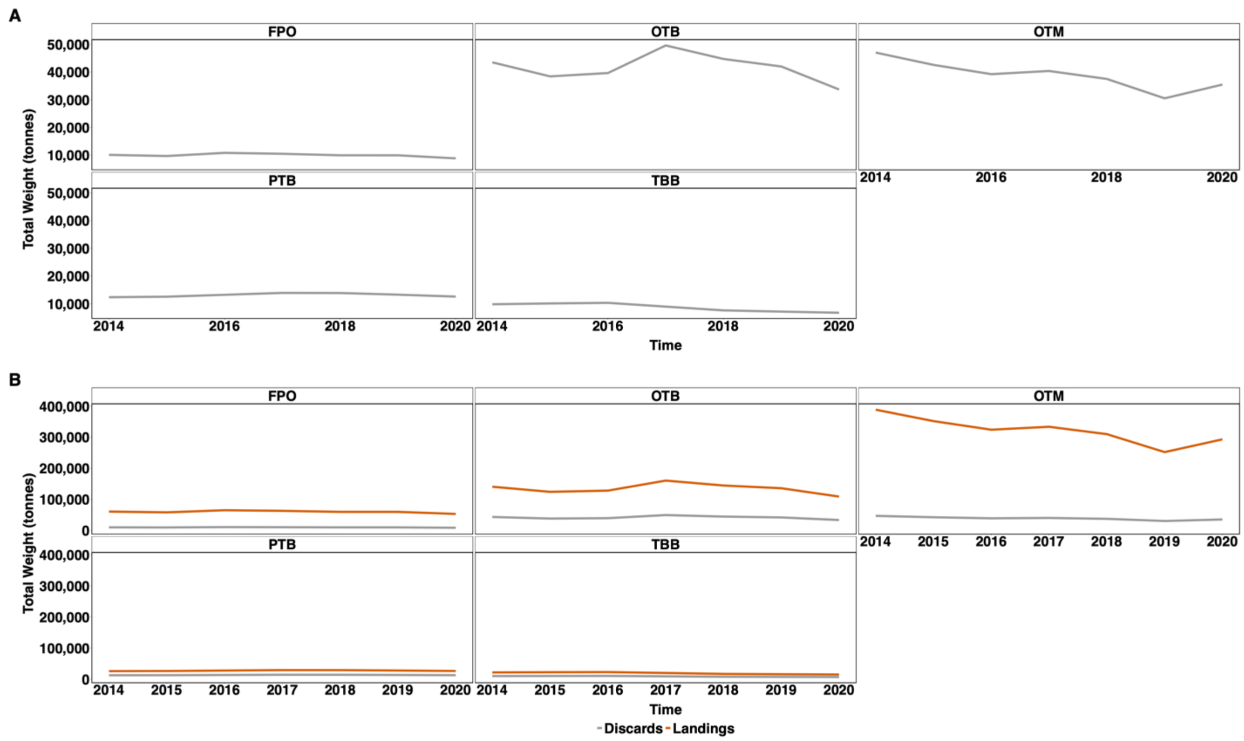


Figure 18. Total annual discards (A and B) and landings (B) based on applying gear-specific discard rates to STECF FDI UK landings data as outlined by Gilman et al. (2020). Total annual discards (in grey) and landings (in red) are distinguished by color. Gear types visualised include pots and traps (FPO), bottom otter trawl (OTB), midwater otter trawl (OTM), bottom pair trawl (PTB), and beam trawl (TBB).

Comparison of discards rates across approaches

The two approaches estimate discards using fundamentally different methods, which results in varying gear-specific discard rates and total estimate discards per gear type. When comparing the gear type specific discard-to-catch ratios averaged over time, derived from STECF FDI discard estimates to those defined by Gilman et al. (2020), STECF-based rates were higher for 13 out of the 17 gear types with available discard data (non-zero or zero values) (Table 2). This suggests that the Gilman et al. (2020) approach may result in underestimated discard levels for the UK fleet. However, given the limited and uneven coverage of the STECF discard estimates, it remains unclear whether these differences in discard rates reflect patterns across the entire fleet.

Table 2. Assignment of STECF FDI gear types to FAO gear categories used to assign discard rates in the Gilman et al. (2020) approach. The discard-to-catch ratio averaged over time derived from the STECF discard estimates is listed to compare with defined discard rates from Gilman et al. (2020). Green cells highlight which approach generated a higher discard rate for a given gear type where estimates could be derived from STECF FDI discard estimates. Gear types with no discard estimates available in the STECF FDI, or where no assignment to FAO gear codes could be made, are marked as NA.

STECF Gear Type	STECF Gear Type Code	Average discard-to-catch ratio over time derived from STECF discard estimates	Gilman et al. (2020) discard rate	FAO Gear Category Code	FAO Gear
Boat dredges	DRB	0.39	0.138	DRB	Boat dredge
Hand dredges	DRH	0.17	0.138	MIS	Miscellaneous
Drifting longlines	FPN	NA	0.138	MIS	Miscellaneous
Pots and traps	FPO	0	0.166	FPO	Pot
Fyke nets*	FYK	NA	0.261	GNB	Gillnet, bottom (demersal, set, fixed)
			0.039	FWR	Barrier, fence, trap, etc.
			0.182	GTR	Trammel net
Encircling gillnets	GEF	NA	NA	NA	NA
Combined gillnets-trammel nets	GNC	1.88	0.174	GNS	Gillnet, bottom and pelagic
Drift gillnets*	GND	3.25	0.117	GNP	Gillnet, pelagic (driftnet)
			0.174	GNS	Gillnet, bottom and pelagic
			0.261	GNB	Gillnet, bottom (demersal, set, fixed)
Anchored set gillnets	GNS	0.95	0.174	GNS	Gillnet, bottom and pelagic
Trammel nets	GTN	NA	0.182	GTR	Trammel net
Trammel nets	GTR	1.26	0.182	GTR	Trammel net
Handlines and pole lines (hand-operated)	HMD	0.36	0.138	DRB	Boat dredge
Mechanized handlines*	LHM	NA	0.095	HL_	Handline
			0.094	PL_	Pole-and-line
Handlines and pole-lines (mechanized)*	LHP	0.07	0.095	HL_	Handline
			0.094	PL_	Pole-and-line
Drift longlines*	LLD	NA	0.134	LL_	Longline, demersal and pelagic
			0.074	LLP	Longline, pelagic
Set longlines	LLS	NA	0.239	LLB	Longline, demersal

…STECF Gear Type	…STECF Gear Type Code	…Average discard-to-catch ratio over time derived from STECF discard estimates	…Gilman et al. (2020) discard rate	…FAO Gear Category Code	…FAO Gear
Boat operated lift nets	LNB	NA	0.1	LNB	Lift net, boat-operated
Trolling lines	LTL	NA	0.199	LTL	Troll
Not known	NK	NA	NA	NA	NA
Not otherwise specified	NO	NA	NA	NA	NA
Bottom otter trawls	OTB	0.53	0.309	OTB	Otter trawl, bottom
Midwater otter trawls	OTM	0.01	0.121	OTM	Otter trawl, midwater
Twin otter trawls	OTT	0.51	0.435	OTT	Trawl, otter twin
Purse seines	PS	NA	0.047	PS_	Purse seine
Bottom pair trawls	PTB	0.27	0.482	PTB	Trawl, pair, bottom
Midwater pair trawls	PTM	NA	0.192	PTM	Trawl, pair, midwater
Surrounding nets (not specified)	SB	NA	0.148	SB_	Seine, beach
Anchored seines	SDN	0.27	0.047	PS_	Purse seine
Pair seines	SPR	0.11	0.047	PS_	Purse seine
Scallop dredges	SSC	0.3	0.047	PS_	Purse seine
Seine nets (not specified)	SV	NA	0.506	SV_	Seine, boat
Beam trawls	TBB	0.87	0.457	TBB	Trawl, beam

* STECF FDI gear types that corresponded to multiple FAO gear categories were assigned the mean discard rate calculated across those relevant FAO gear types.

Despite differences in gear-specific discard rates between the two approaches, a consistent pattern emerged: three high-discard gear types were recognized across both methods: OTB, TBB, and PTB (Table 3). This overlap underscores the great contribution these gear types make to overall discard levels and reinforces their importance as priorities for targeted mitigation.

Table 3. High discard gears recognized in the STECF FDI discards and Gilman et al. (2020) approaches. Ordered top to bottom from highest discard rates to lowest (of the high-discard gears) within each approach. Orange cells highlight high-discard gear that overlap across both approaches.

STECF FDI Discard Estimates	Gilman et al. (2020)
Bottom otter trawls (OTB)	Bottom otter trawls (OTB)
Beam trawls (TBB)	Midwater otter trawls (OTM)
Bottom pair trawls (PTB)	Bottom pair trawls (PTB)
Otter twin trawls (OTT)	Beam trawls (TBB)
Scallop dredges (SSC)	Pots and Traps (FPO)

Conclusion

This analysis provides annual discard estimates for the UK fleet using two distinct approaches: STECF observer-derived discard data and gear-specific discard rates from Gilman et al. (2020). While the discard-to-catch ratio offers a useful way to standardise discards across gear types, it does not account for differences in fishing effort, which can vary significantly between gear types. Incorporating effort-based metrics would strengthen cross-fleet comparisons by providing a more complete picture of discard levels. From these two approaches five gear types were recognized to be the primary contributors to UK discards: OTB, TBB, PTB, SSC, and OTT under the STECF FDI discard estimates approach; and OTB, TBB, PTB, OTM, and FPO under the Gilman approach.

There is overlap across both approaches in three gear types, underscoring their significant contribution to discards across the UK fleet. Understanding that FPO and OTM are typically associated with low discards,[4] the high discard rates that are calculated for these gears when using the Gilman et al. approach reflects a data artefact in that the approach applies fixed discard rates to total landings, and the high landings of these gears inflated their apparent contribution to discards. Regardless, these findings highlight the importance of focusing discard mitigation on a select group of gear types that consistently contribute most to UK discards such as OTT, TBB and PTB.

Spatial-Temporal Patterns in Effort

Introduction

Understanding which fishing gears are associated with high discards is critical to be able to focus monitoring and management efforts to reduce discards and mitigate against future bycatch. It is, however, additionally important to understand where and when the fishing effort of fleets associated with high discards occur. By examining where and when fishing effort is highest among high-discard fleets, management interventions can be more effectively prioritised, focusing discard mitigation measures in the areas and seasons where they are most needed. This spatio-temporal perspective is key for shifting from broad, gear-based mitigation efforts across many fleets, areas and seasons, towards more precise efforts tailored to areas and situations that are associated with the highest discarding. This is both important in terms of financial investments of governments, management agencies and industry that may be required to use new gear technologies to reduce discarding but also to build trust between management and industry. Unsuccessful efforts are easily seen by industry as “yet another waste of resources” and “over stringent control” therefore focused approaches that can deliver real success in reducing discards are essential to promote future collaborative efforts.

Methods

To understand the spatio-temporal dynamics of the fishing gear types that contribute the most discards across the UK fishing fleet their associated fishing effort in time and space in surrounding waters of the UK was calculated. The analyses focused on the gear types known to contribute the most to total discards for UK vessels identified using both the STECF FDI discard estimates and application of discard rates to catch data (as per Gilman et al. (2020)). These high-discard gear types are TBB, PTB, and OTB, all of which are recognized using the STECF FDI data and Gilman et al. approaches to estimate discards, along with OTT and SSC that were identified in the STECF FDI discard estimate approach. While the Gilman et al. (2020) approach identified FPO and OTM as contributing elevated discard levels in the UK fleet, these gear types are not typically associated with high discards.[4] However, because the Gilman et al. method is based on applying a pre-defined discard rate to total catch, and catch from these gear types is substantial, this may have inflated the discard estimates for pot and trap (approximately 2,652 vessels estimated by Seafish[17] that on average fish a total of 133,200 fishing days a year (SD: 11,100 fishing days)) and midwater otter trawls (which on average fish a total of 1450 fishing days per year (SD: 151 fishing days) fisheries for the UK. Consequently, these gear types have been removed from the spatial-temporal analysis of fishing effort that follows.

For each high-discard gear type, the quarterly total fishing days by ICES subareas in 2020[*] were calculated, to capture seasonal patterns in fishing activity. Analyses of pre-2020 years was not undertaken because seasonal fishing activity is generally consistent through time, year-on-year (Figure 30,Figure 31,Figure 32,Figure 33,Figure 34 in Annex). The analysis did not directly examine the spatio-temporal distribution of discards by gear type, as existing discard estimates are only available for those fleets / vessels with associated observer data. Using

[*] Note: the STECF FDI data only contains data for the UK up until 2020. UK fisheries data, post-Brexit is not provided to the STECF FDI, or at least is not publicly accessible.

effort estimates to look at spatio-temporal patterns allows for an investigation across all the vessels with recorded landings data in the STECF FDI and therefore provides a more comprehensive picture of potential discarding in space and time. Further disaggregating these data spatially would reduce their reliability even further. Instead, fishing effort was used as a proxy, based on the assumption that higher fishing effort is broadly indicative of higher discard levels.

Results

Bottom otter trawls

In 2020, fishing effort for OTB was consistently high in northern UK waters, particularly in the North Sea and Northeast Atlantic (west of Scotland), with activity peaking in Quarter 3 (July-September) (Figure 19). Effort in the western English Channel remained steady throughout 2020, though at a lower intensity than in northern waters. In the Irish Sea, fishing activity increased during Quarter 2 and 3 (April-September), suggesting a seasonal difference in effort during spring and summer months. The areas described with relatively high OTB fishing effort are assumed to have elevated discard levels, given that OTB is a gear type associated with some of the highest discard rates across all fishing gear types. These spatio-temporal patterns, therefore, highlight potential priority areas to focus discard mitigation efforts for UK OTB.

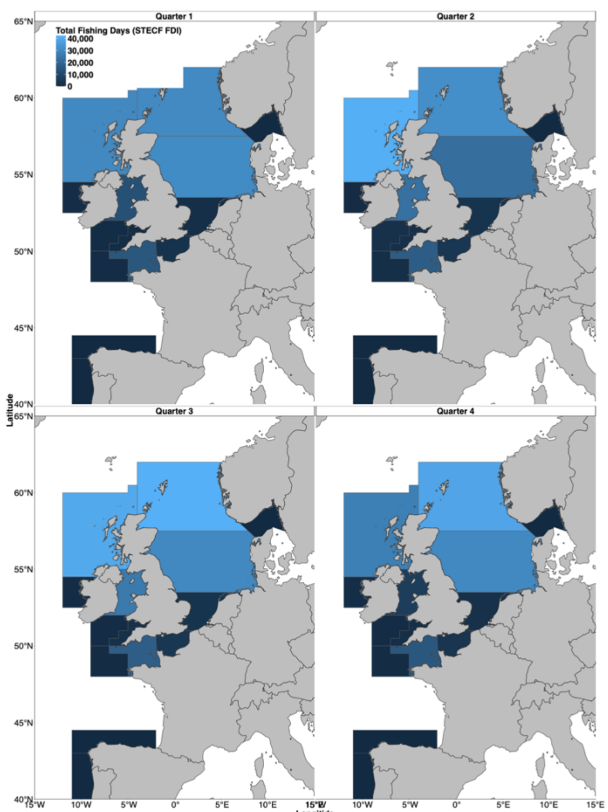


Figure 19. Total fishing effort (total number of fishing days) by quarter in 2020 for bottom otter trawls (OTB) in waters surrounding the UK. Quarter 1 = January-March, Quarter 2 = April-June, Quarter 3 = July-September, and Quarter 4 = October-December. Source: STECF FDI, 2024.

Bottom pair trawls

In 2020, fishing effort for PTB was heavily concentrated in the northern North Sea, with this pattern remaining consistent across all quarters (Figure 20). The persistence of high fishing effort in this region suggests that discard mitigation efforts towards PTB fleets operating in the North Sea could be particularly effective in reducing discards associated with UK bottom pair trawls operations.

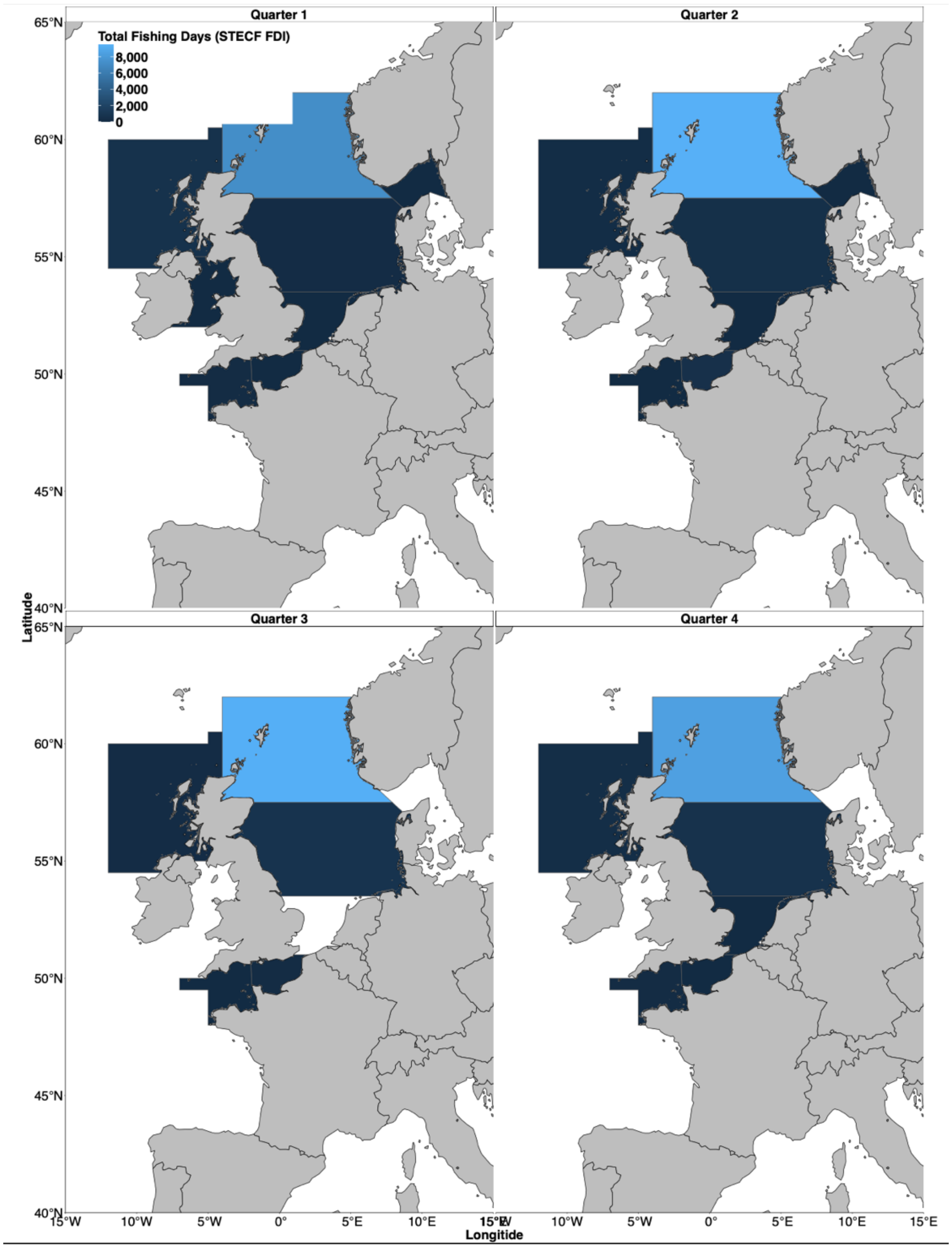


Figure 20. Total fishing effort (total number of fishing days) by quarter in 2020 for bottom pair trawls (PTB) in waters surrounding the UK. Quarter 1 = January-March, Quarter 2 = April-June, Quarter 3 = July-September, and Quarter 4 = October-December. Source: STECF FDI, 2024.

Beam trawls

The spatial footprint of beam trawl fishing effort remained relatively stable throughout 2020 (Figure 21). Fishing effort was consistently highest in the western English Channel, particularly in quarter 1 (January-March) and quarter 4 (October-December). Other regions surrounding the UK exhibited consistently lower fishing effort through time. Given the sustained and elevated fishing effort in the western English Channel, this area represents a priority region for targeted discard mitigation efforts within the beam trawl fleet.

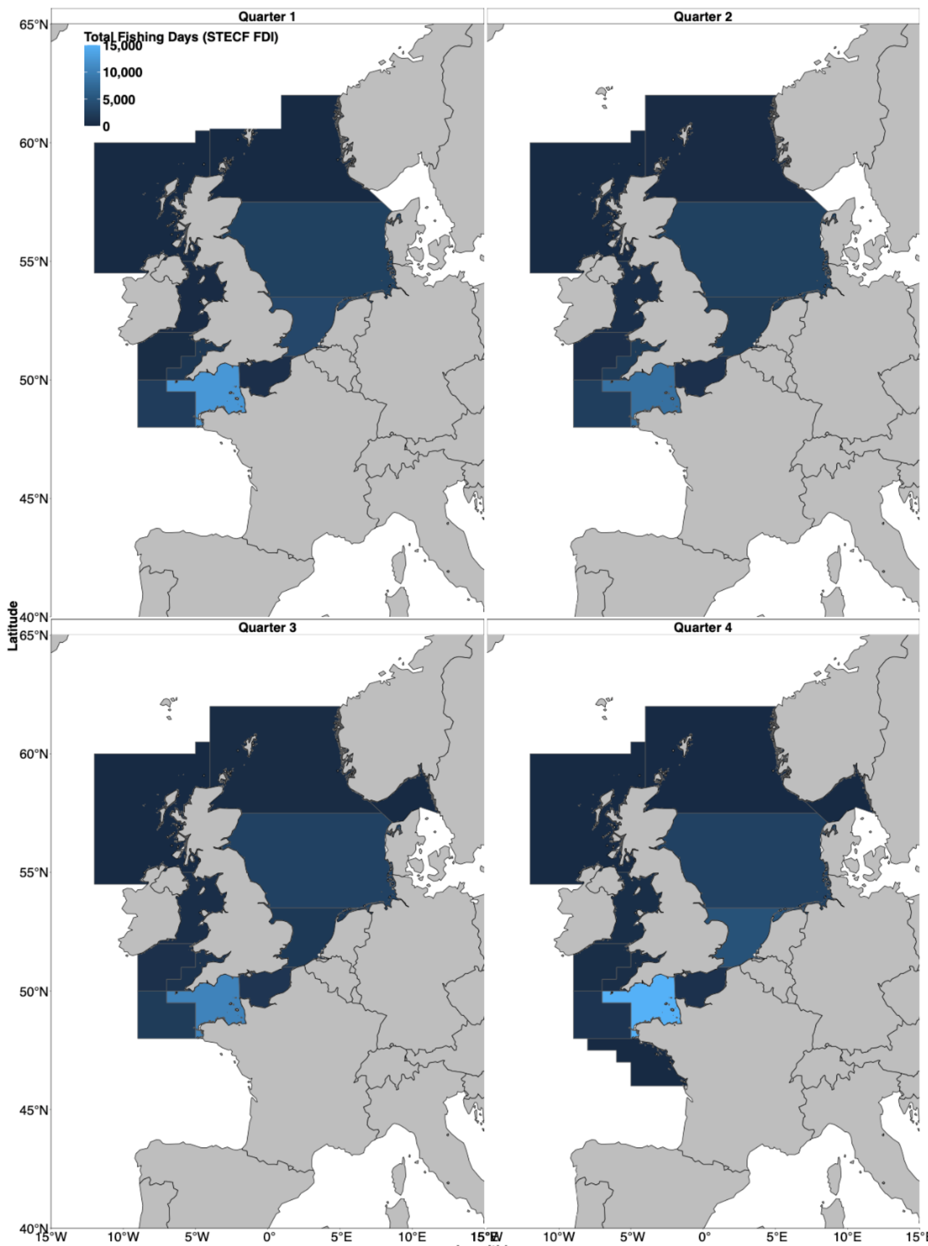


Figure 21. Total fishing effort (total number of fishing days) by quarter in 2020 for beam trawls (TBB) in waters surrounding the UK. Quarter 1 = January-March, Quarter 2 = April-June, Quarter 3 = July-September, and Quarter 4 = October-December. Source: STECF FDI, 2024.

Scallop Dredges

In 2020, fishing effort for scallop dredges was consistently highest in the northern North Sea (Figure 22). Additionally, although at a much lower intensity, an increasing fishing activity was observed in the eastern English Channel during quarter 1 (January-March) and quarter 4 (October-December).

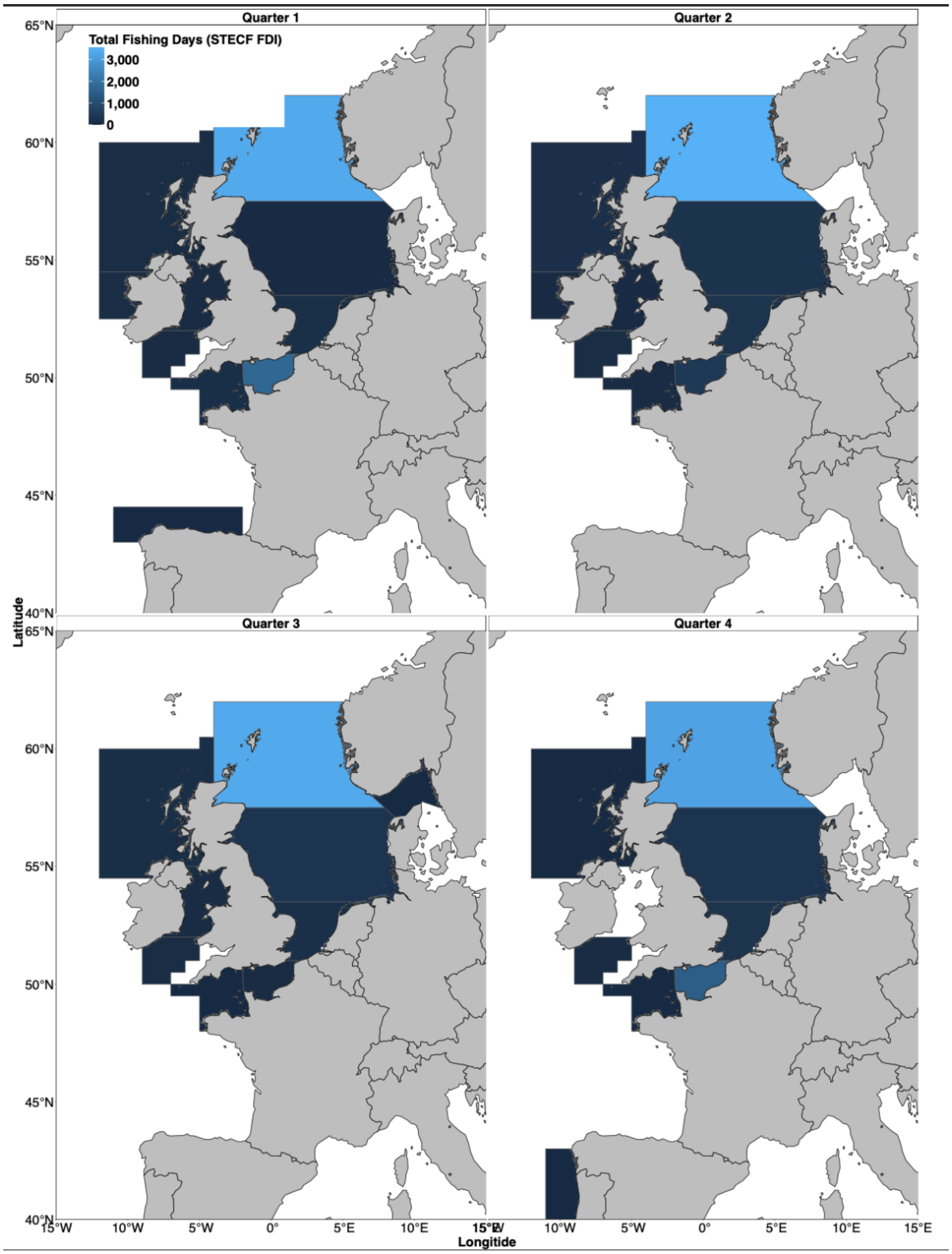


Figure 22. Total fishing effort (total number of fishing days) by quarter in 2020 for scallop dredges (SSC) in waters surrounding the UK. Quarter 1 = January-March, Quarter 2 = April-June, Quarter 3 = July-September, and Quarter 4 = October-December. Source: STECF FDI, 2024.

Twin otter trawls

In 2020, fishing effort of OTT was consistently highest in northern waters surrounding the UK, specifically in the Northeast Atlantic (west of Scotland) across all quarters, particularly (Figure 23) during quarter 2 and quarter 3 (April-September). The persistent and elevated fishing effort west of Scotland suggests this region should be a priority area for targeted discard mitigation efforts within the twin otter trawl fleet.

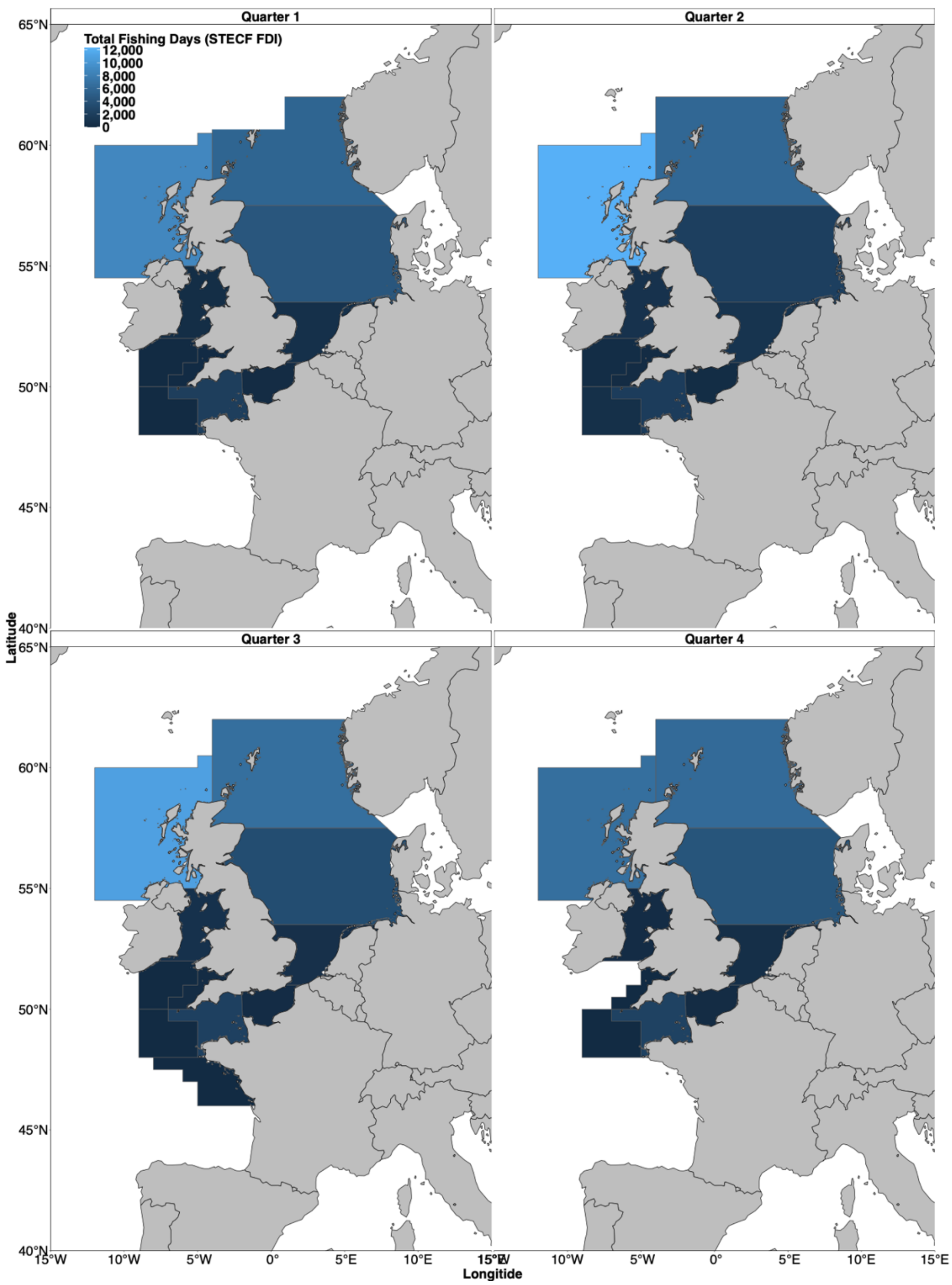


Figure 23. Total fishing effort (total number of fishing days) by quarter in 2020 for otter twin trawls (OTT) in waters surrounding the UK. Quarter 1 = January-March, Quarter 2 = April-June, Quarter 3 = July-September, and Quarter 4 = October-December. Source: STECF FDI, 2024.

Across the high discarding gear types there are a few key regions that tend to have higher concentrations of fishing effort, often sustained across multiple seasons (Table 4). These regions include northern and southern North Sea, West of Scotland, and the western and eastern English Channel. These areas represent potential priorities for targeted discard mitigation. For specifics on elevated fishing effort by region, gear type, and quarter, see Table 5, Table 6, Table 7, Table 8, and Table 9.

Table 4. Summary of spatio-temporal hotspots of fishing effort for high-discarding gear types across UK waters. For a given gear type and ICES sub region, quarters (Q1–Q4) listed indicate periods of elevated effort.

High-discard gear	Northern North Sea	Southern North Sea	West of Scotland	Western English Channel	Eastern English Channel
Bottom otter trawls	Q1,Q2,Q3,Q4	Q1,Q2,Q3,Q4	Q1,Q2,Q3,Q4		
Bottom pair trawls	Q1,Q2,Q3,Q4				
Beam trawls				Q1,Q4	
Scallop dredges	Q1,Q2,Q3,Q4				Q1,Q4
Otter twin trawls			Q2,Q3		

Table 5. Total fishing effort (in fishing days) in 2020 *for high-discarding gear types* the northern North Sea *and quarters where elevated activity was observed. Values correspond to the spatio-temporal hotspots identified in Table 4 and provide a quantitative basis for prioritising discard mitigation.*

High-discard gear	Region: Northern North Sea (27.4.a)			
	Q1	Q2	Q3	Q4
Bottom otter trawls	30842	32220	42084	38732
Bottom pair trawls	7236	9519	9471	8504
Scallop dredges	3377	3559	3360	3229

Table 6. Total fishing effort (in fishing days) in 2020 *for high-discarding gear types in* the southern North Sea *and quarters where elevated activity was observed. Values correspond to the spatio-temporal hotspots identified in Table 4 and provide a quantitative basis for prioritising discard mitigation.*

High-discard gear	Region: Southern North Sea (27.4.b)			
	Q1	Q2	Q3	Q4
Bottom otter trawls	31196	22252	30558	30568

Table 7. Total fishing effort (in fishing days) in 2020 *for high-discarding gear types in* waters west of Scotland *and quarters where elevated activity was observed. Values correspond to the spatio-temporal hotspots identified in Table 4 and provide a quantitative basis for prioritising discard mitigation.*

High-discard gear	Region: West of Scotland (27.6.a)			
	Q1	Q2	Q3	Q4
Bottom otter trawls	30325	41389	39720	27662
Otter twin trawls		12390	11079	

Table 8. Total fishing effort (in fishing days) in 2020 *for high-discarding gear types in* the western English Channel *and quarters where elevated activity was observed. Values correspond to the spatio-temporal hotspots identified in Table 4 and provide a quantitative basis for prioritising discard mitigation.*

High-discard gear	Region: Western English Channel (27.7.e)			
	Q1	Q2	Q3	Q4
Beam trawls	12366			14987

Table 9. Total fishing effort (in fishing days) in 2020 *for high-discarding gear types in* the eastern English Channel *and quarters where elevated activity was observed. Values correspond to the spatio-temporal hotspots identified in Table 4 and provide a quantitative basis for prioritising discard mitigation.*

High-discard gear	Region: Eastern English Channel (27.7.d)			
	Q1	Q2	Q3	Q4
Scallop dredges	1686			1464

Conclusion

The spatial and temporal analysis of UK fishing effort for the high-discard gear types reveals persistent hotspots of fishing activity that area considered contribute high levels of discarding. All the gears analysed bar beam trawls consistently exhibited elevated effort in northern UK waters, especially in the northern North Sea and waters surrounding the UK in the Northeast Atlantic (west of Scotland). These spatio-temporal dynamics suggest these areas should be prioritised for discard mitigation efforts, as intensified fishing activity in these regions likely correspond to higher discard levels. Additionally, to improve the accuracy of discard estimates and support more targeted interventions, the fleets operating these high-discard gear types in these high-effort regions and seasons could be the focus of increased discard recording estimates whether that be through expanded observer coverage or the use of REM. Expanding monitoring in these priority areas will not only strengthen the discard baseline but also inform more effective, regionally aligned management strategies.

Comparative Context

Introduction

A comprehensive understanding of discard levels within the UK fleet has now been established, including identification of the primary gear types contributing to discards and their associated spatial and temporal patterns of fishing activity. To build on this, it is important to contextualise the UK's performance in discards within a broader international context through comparison with other countries in Europe. Such comparative analysis enables the identification of relative strengths and weaknesses, supports the adoption of best practices, and informs the development of more effective, targeted discard mitigation strategies. It also provides a benchmark against which the UK's progress towards national and international sustainability commitments can be assessed.

Methods

Given the limitations with the Gilman et al. (2020) approach, particularly the use of pre-defined gear-specific discard rates applied to total catch, we used the STECF discard estimates derived from observer for benchmarking the UK's fleet against those of other countries. To ensure meaningful comparison, we first assessed the availability of discard records in the STECF FDI across countries and their corresponding gear types. Based on this assessment, we limited our analysis to those countries with the highest proportion of fleet landings records with associated discard records, providing a more robust and representative context for comparison.

For these countries with the highest representation of discard records in the STECF FDI, we derived the total annual discard-to-catch ratio through time, both aggregated across fleet segments and disaggregated by gear type. When comparing gear-specific discard-to-catch ratios, our analysis was limited to gear types for which at least two countries had a time series of discard-to-catch ratios spanning a minimum of two years. The discard-to-catch ratio, as a standardised rate, provides a more meaningful basis for cross-country comparison than absolute discard volumes.

Results

Data Availability

Discard estimates derived from the observer programs are quite limited and variable across EU MSs (Figure 24). Sweden (63.26%) and Portugal (0.31%) have the highest and lowest proportion of landings records that have associated discard records provided with non-zero values, respectively.

Due to the inconsistent availability of observer-derived discard estimates across EU MSs, we focus on the top five EU MSs with the highest proportions of landings records that have associated discard records provided with non-zero values. This therefore includes Sweden (63.26%), Slovenia (30.78%), United Kingdom (18.08%), Denmark (14.93%), and Belgium

(14.74%). For the proportion of fleet landing records associated with discard records by country and gear type see Figure 35 (Annex).

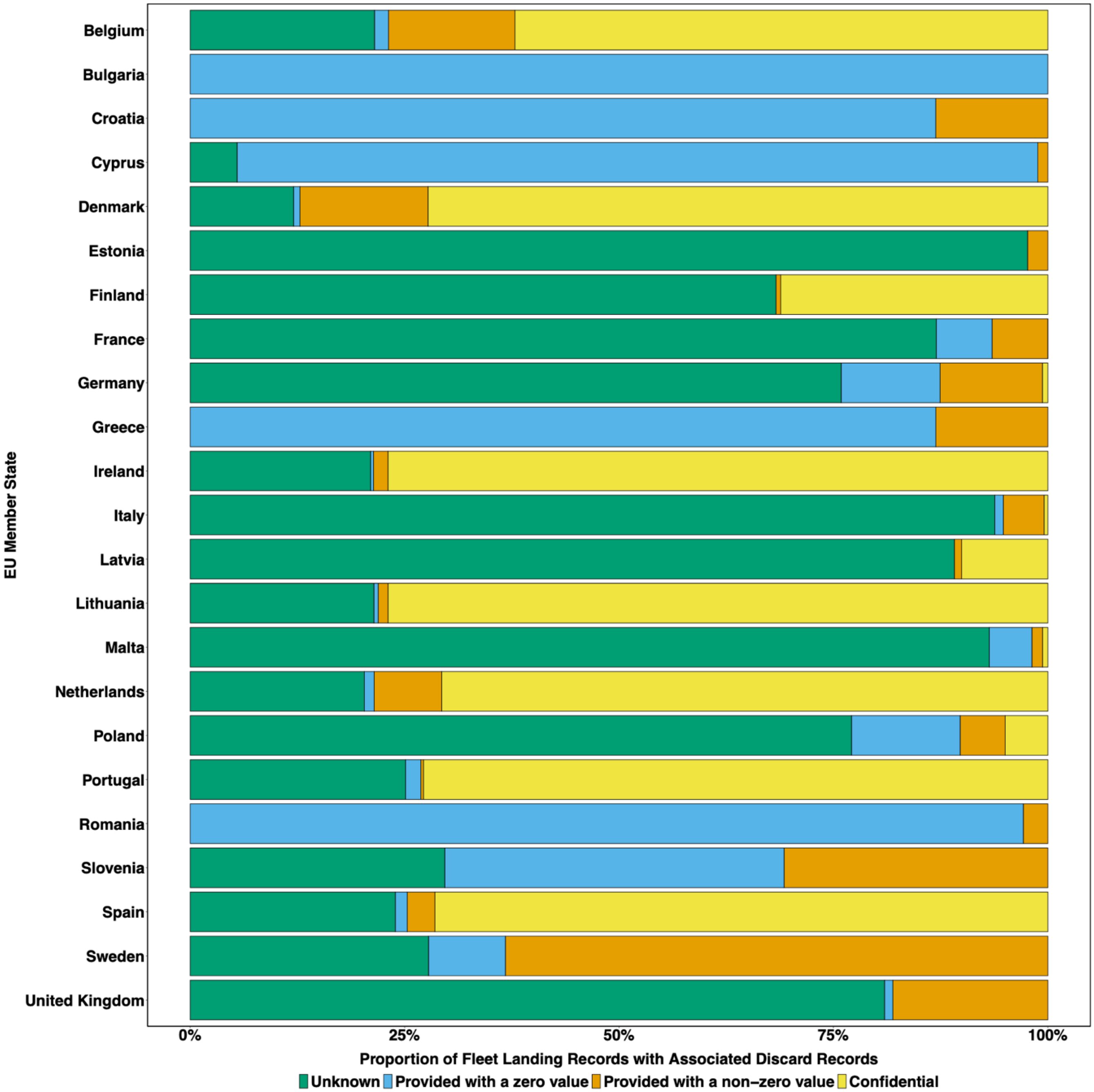


Figure 24. Proportion of fleet landing records with associated discard data by country form 2014-2020. Colors denote representation of discard data ordered from left to right: unknown (green), provided with zero values (blue), provided with non-zero values (orange), and confidential (yellow). Source: STECF FDI, 2024.

Total Annual Discard-Catch-Ratio

According to the STECF FDI, the total annual discard-to-catch ratio derived from landings data with associated non-zero discard records is variable through time across the five EU MSs with the highest proportion of available discards records (Figure 25). The UK's total annual discard-to-catch ratio remains relatively moderate amongst the other EU MSs, hovering between 0.37 and 0.58 through time, with a general decreasing trend. However, the UK timeseries is much shorter than that of the other EU MSs following Brexit and the UK's halt on reporting to STECF FDI. Belgium consistently shows the highest discard-to-catch ratios, often exceeding 0.75 throughout the timeseries, most notably in 2017-2019 and 2021-2023, which is most likely attributed to its TBB, which is its only source of discard records with non-zero values (Figure 26 and Figure 35 in Annex). The variation in discard rates across EU MSs may reflect a combination of factors including variation in gear selectivity and fleet composition, differences in implementation and enforcement of discard regulations under the EU Common Fisheries Policy (i.e. Landing Obligation), or variation in observer coverage and data recording across the different EU MSs' fleets.

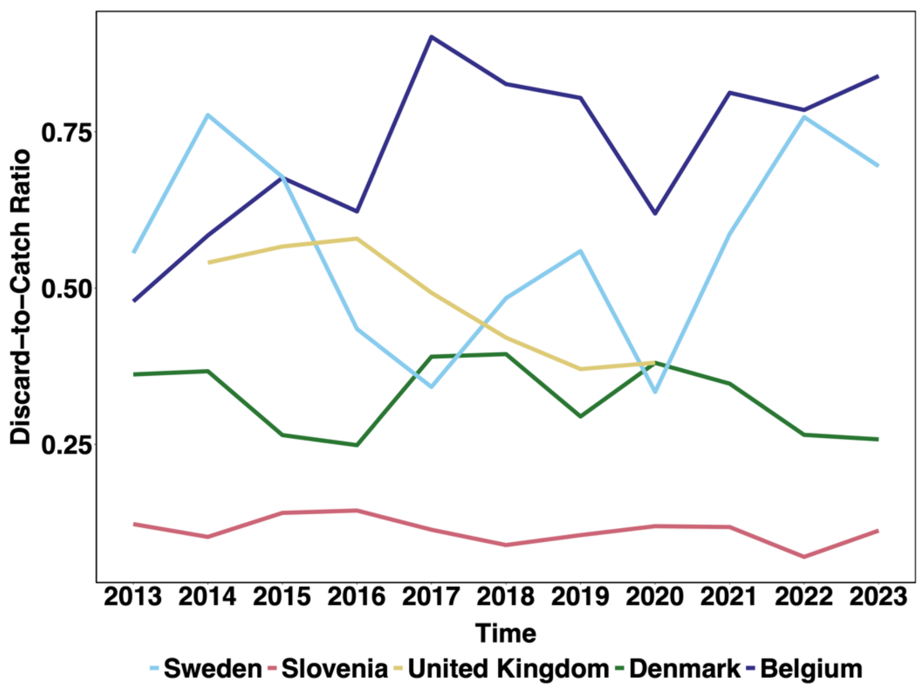


Figure 25. Total annual discards-to catch-ratio by country from 2014-2020 based on STECF FDI discard estimates and landings from fleets with associated discards records.

When total annual discard-to-catch ratios are broken down by gear type across the five EU MSs, a notable pattern emerges (Figure 26). The UK tends to exhibit higher discard-to-catch ratios over time compared to its other countries, suggesting relatively poor performance in selectivity or discard mitigation compared to other countries. This is a differing pattern than that exhibited in the aggregated discard-to-catch ratio timeseries (Figure 25), likely due to how landings are distributed across gear types. Gear types with high discard-to-catch ratios can disproportionately raise the aggregated ratio, while increased landings from gears with lower discard rates may dilute it.

The trend of consistently higher discard -to-catch ratios in the UK compared to other countries is particularly apparent in GNS, GTR, SSC, and TBB. For other gear types, such as OTB, OTT, and SDN, the UK performs in the mid-range, with discard-to-catch ratios broadly comparable to those of other EU MSs, though with some interannual variability. In the case of OTM specifically, the UK performs notably better, consistently showing lower discard-to-catch ratios than Sweden. However, Sweden's time series for this gear is relatively sparse (with data available only for three non-consecutive years), making interpretation more tentative. As mentioned above these patterns in discard-to-catch ratios across EU MSs and gear types may reflect actual differences in discard mitigation practices, gear selectivity, or fleet behavior. However, these patterns are also likely influenced by data limitations, such as inconsistencies in observer coverage across EU MSs and gear types (Figure 24).

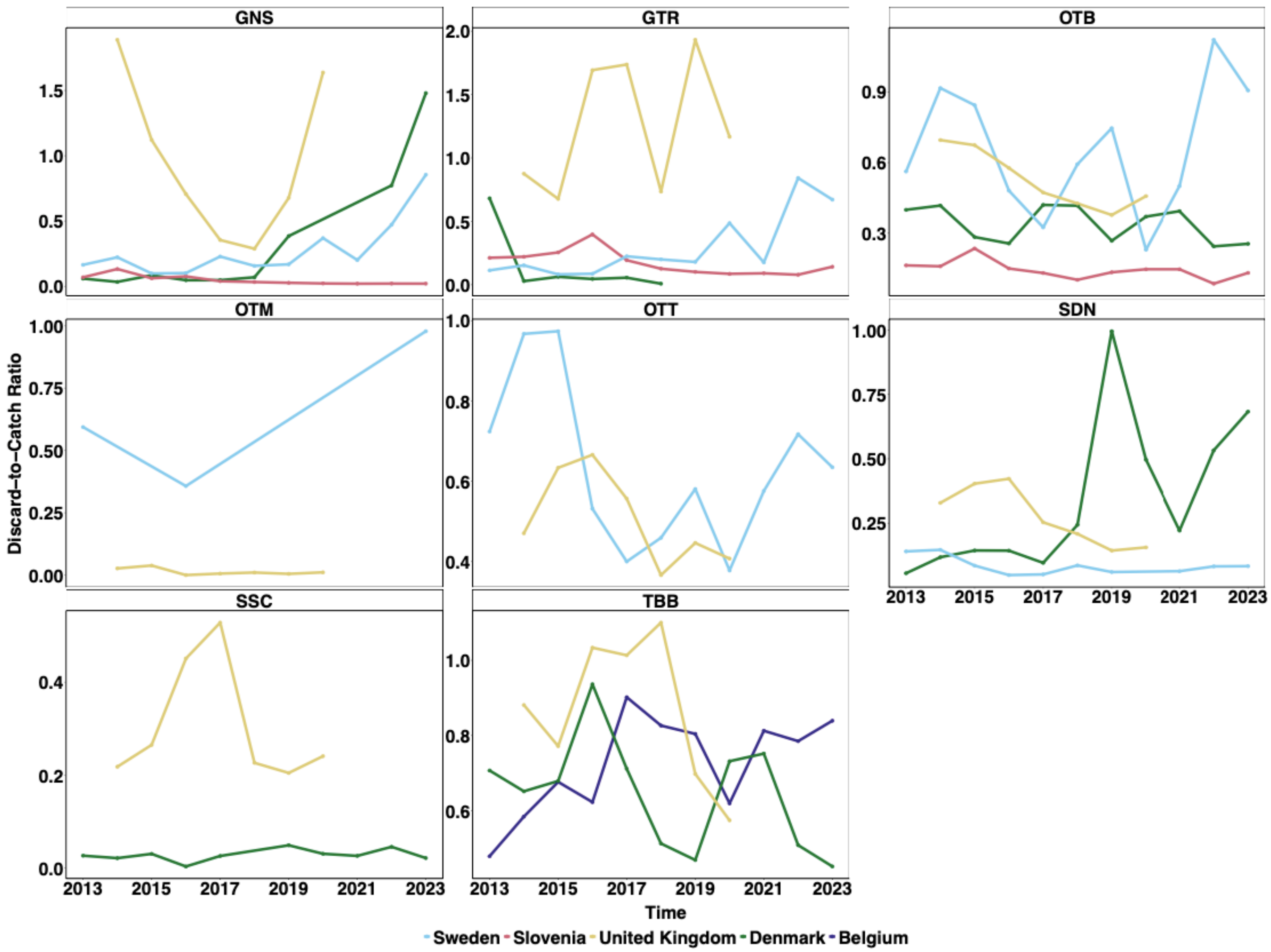


Figure 26. Total annual discards-to catch-ratio by gear type for Belgium, Denmark, Slovenia, Sweden, and United Kingdom from 2014-2020 based on STECF FDI discard estimates and landings from fleets with associated discards records Colors denote EU MSs Total annual discards-to-catch ratio is only visualized for gear types where 2 or more EU MSs have a timeseries spanning more than two years.

Conclusion

This comparative analysis highlights stark differences in both data availability and discard performance among countries. Observer-derived discard estimates across countries remains varied and limited. Additionally, the UK's discard-to-catch ratios across several gear types, particularly beam trawls, scallop dredges, trammel nets, and anchored gillnets, are consistently higher than those of comparable fleets in other countries. This suggests that the UK may benefit from targeted mitigation efforts and by learning from best practices implemented elsewhere.

To improve discard levels regionally (across countries), mitigation strategies should prioritise gear types with consistently high discard-to-catch ratios, such as many of the trawlers and anchored set gillnets. Where countries demonstrate lower discard-to-catch ratios with a corresponding gear type than other countries (e.g., Slovenia with trammel nets or Sweden with scallop dredges), knowledge-sharing and policy exchange could support mutual improvements. A gear-focused approach is critical but should be paired with cross-national cooperation to understand how regulatory, technical, or behavioral differences may influence discard performance.

These conclusions are always caveated by observer coverage. Disparities in observer coverage across countries and gear types challenge the reliability of discard estimates and complicate cross-country comparisons. To strengthen data quality, we recommend scaling up observer coverage in a representative manner, ensuring inclusion of both dominant gear types and vessel length categories within each countries' fleet. Expanded use of electronic monitoring may offer one solution. Without equitable and robust monitoring across all countries' fleets, efforts to benchmark, mitigate, or regulate discarding is undermined by data gaps rather than driven by actual performance.

While the discard-to-catch ratio provides a useful standardised metric for comparison across countries (as used in this report), it does not account for differences in fishing effort or fleet size, factors that can vary widely across countries and fleet segments. Integrating effort-based metrics in future efforts to benchmark discard performance would allow for more meaningful benchmarking of discard levels across countries.

Final Remarks

Discards remain a persistent and unresolved issue in global fisheries, with significant ecological and economic implicates. Despite regulatory frameworks aimed at reducing them, discards continue across fisheries, often unreported or poorly understood.

This report uses two complementary approaches to estimate discarding in the UK fleet: STECF FDI discard estimates and gear-specific calculations using pre-defined discard rates developed by Gilman et al. (2020) using STECF FDI catch data. Both approaches have clear limitations, which highlight the urgent need for better data collections, broader observer / monitoring coverage, and more transparent reporting to improve accuracy and usefulness of discard estimates. Despite these constraints, a consistent pattern emerged across both estimation approaches: the high discarding gears are bottom contact gears, particularly OTB, TBB**,** and PTB**.** Whiles these findings are not novel (Kelleher 2005, Uhlmann et al., 2014, WWF 2022), they underscore the need for gear-targeted discard reduction strategies, rather than UK fleet-wide based approaches alone.

Spatial-temporal analyses of these high discarding gears reveal fishing effort of these gears is concentrated in northern UK waters (e.g., North Sea and west of Scotland). The seasonal peaks in fishing effort can help guide the timing and targeting of monitoring and mitigation efforts. Comparisons with EU counterparts suggest that, while the UK is not the worst performer (Figure 25), discard-to-catch ratios for several key gear types (notably scallop dredges, beam trawls, and anchored set gillnets) are higher than in other countries, highlighting opportunities of improvement and cross-border knowledge exchange. In particular, greater collaboration between countries operating similar gear types in shared waters could support joint learning and more coordinated discard mitigation. Similarly, sharing insights from countries with lower discard rates, especially around gear selectivity improvements and operational best practices, may offer practical pathways for reducing discards in high-impact segments of the UK fleet.

Ultimately, these findings reaffirm the urgent need to close the persistent data and action gaps in discard mitigation for UK to meet its marine environmental obligations. The MSR necessary steps to be taken to maintain or achieve GES of marine waters - something that cannot be achieved without tackling the impacts of discards. While this study has limitations, it does help to clarify key data gaps and high-discard gear types and their associated hotspots in fishing activity. By highlighting these priority areas, this report offers practical evidence to help better align UK fisheries management with GES targets and to inform more focused, effective discard mitigation efforts.

Recommendations

Building on the findings highlighted by the analyses contained herein, the following recommendations outline targeted, practical steps to improve data, strengthen monitoring strategies, and support more effective discard mitigation efforts across the UK fleet:

Data Improvement and Monitoring Strategies

1. **Expand Observer Coverage**
   Increase investment in onboard observer programs to improve the vessel, gear type, and temporal representativeness of discard data across the UK fleet. Prioritising balanced coverage across vessel sizes and fisheries is essential.

2. **Implement Targeted Discard Monitoring Studies**
   Conduct regular, gear-specific discard monitoring programs at the national level. These can generate updated, catch-based discard estimates reflective of UK fleet behavior and evolving discard mitigation efforts. Conducting regular studies every few years, like the approach used by Gilman et al. (2020) to generate gear-specific discard rates, would support more adaptive management and provide a cost-effective alternative to full-scale observer programs.

3. **Integrate Remote Electronic Monitoring (REM)**
   Explore the broader application of REM systems to supplement observer data, especially for under-monitored segments of the fleet. EM can offer consistent, scalable coverage while maintaining cost efficiency over time.[14]

Discard Mitigation Strategies:

1. **Prioritise discard mitigation in high discarding gear types**
   Focus management efforts on bottom contact gear types, particularly OTB, TBB, and PTB fleets, which consistently show the highest discard levels across both estimation approaches. Targeting these gears enables the greatest ecological return on investment and ensure economic efficiency by directing mitigation resources toward fleet segments where reductions are likely to yield the greatest reductions in discards.

2. **Integrate spatial and seasonal dynamics into mitigation planning**
   Incorporate spatio-temporal analyses of fishing effort into the design of discard mitigation strategies to prioritise interventions in areas and seasons of highest risk. This approach enhances the efficiency of resource allocation by focusing management actions (monitoring and enforcement) where discard rates are likely to be highest.

3. **Foster cross-border collaboration and knowledge sharing**
   Encourage cooperation between countries operating similar gear types in shared waters to align discard mitigation strategies. Sharing insights and lessons learned, especially from fleets with lower discard rates or more selective gear, can help inform improvements in gear design, handling practices, and management approaches, supporting more effective and harmonised reductions in discards across regions.

References

1. Watson, R. A. *et al.* Global marine yield halved as fishing intensity redoubles. *Fish Fish.* **14**, 493–503 (2013).
2. *Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. https://doi.org/10.5281/zenodo.3831673 (2019).
3. Catchpole, T. L., Frid, C. L. J. & Gray, T. S. Discards in North Sea fisheries: causes, consequences and solutions. *Mar. Policy* **29**, 421–430 (2005).
4. Kelleher, K. *Discards in the World's Marine Fisheries: An Update*. https://www.fao.org/4/y5936e/y5936e00.htm#Contents (2005).
5. Petter Johnsen, J. & Eliasen, S. Solving complex fisheries management problems: What the EU can learn from the Nordic experiences of reduction of discards. *Mar. Policy* **35**, 130–139 (2011).
6. Feekings, J., O'Neill, F. G., Krag, L., Ulrich, C. & Veiga Malta, T. An evaluation of European initiatives established to encourage industry-led development of selective fishing gears. *Fish. Manag. Ecol.* **26**, 650–660 (2019).
7. European Comission. *Regulation (EU) No. 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy*. (2013).
8. Guillen, J. *et al.* A Review of the European Union Landing Obligation Focusing on Its Implications for Fisheries and the Environment. *Sustainability* **10**, 900 (2018).
9. European Commission: AZTI-Brta *et al. Synthesis of the Landing Obligation Measures and Discard Rates*. https://data.europa.eu/doi/10.2826/176808 (2021).
10. UK Governmnet. *Fisheries Act 2020*. (2020).
11. European Union. *Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 Establishing a Framework for Community Action in the Field of Marine Environmental Policy (Marine Strategy Framework Directive) (Text with EEA Relevance)*. *OJ L* vol. 164 (2008).
12. WWF. *The Untrawled Truth: Why EU Fisheries Policy Should Strengthen Discard Monitoring, Control and Reporting*. (2022).
13. MSC. *MSC Fisheries Standard Version 3.1*. https://www.msc.org/docs/default-source/default-document-library/for-business/program-documents/fisheries-program-documents/msc-fisheries-standard-v3-0.pdf (2024).
14. DEFRA. *Consultation Outcomes: Summary of Responses and Government Response*. https://www.gov.uk/government/consultations/remote-electronic-monitoring/outcome/summary-of-responses-and-government-response (2024).
15. European Commission: STECF. STECF FDI. (2024).
16. Gilman, E. *et al.* Benchmarking global fisheries discards. *Sci. Rep.* **10**, 14017 (2020).
17. Seafish. Fleet Enquiry Tool. *Tableau Public* https://public.tableau.com/app/profile/seafish/viz/FleetEnquiryTool/1Overview (2024).

Annex

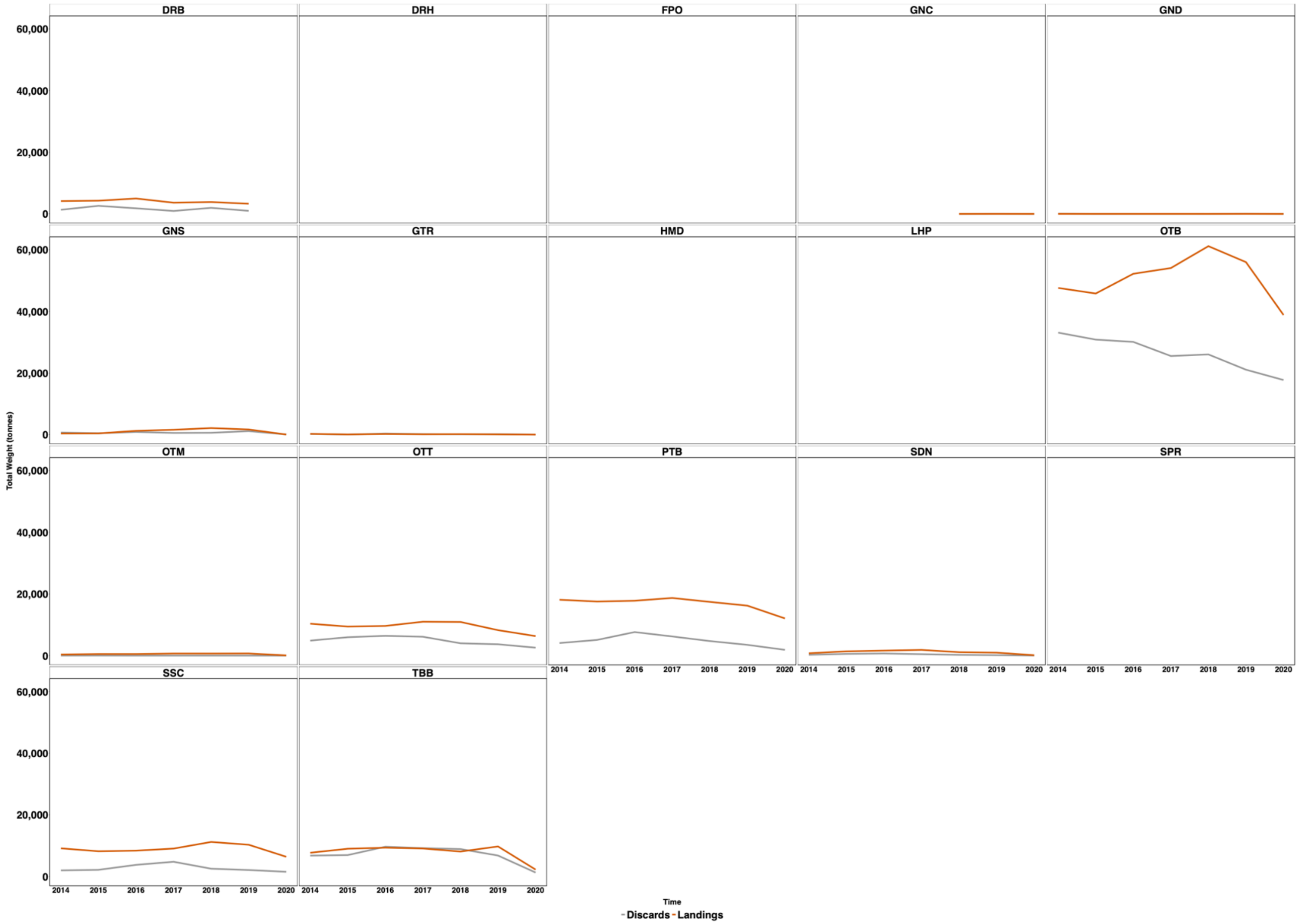


Figure 27. Total annual discards (in grey) and landings (in red) by gear type from the UK fleet from 2014-2020 based on STECF FDI discard estimates and landings data, respectively. Total annual landings shown include only those records that have corresponding discard data (provided with zero and non-zero values).

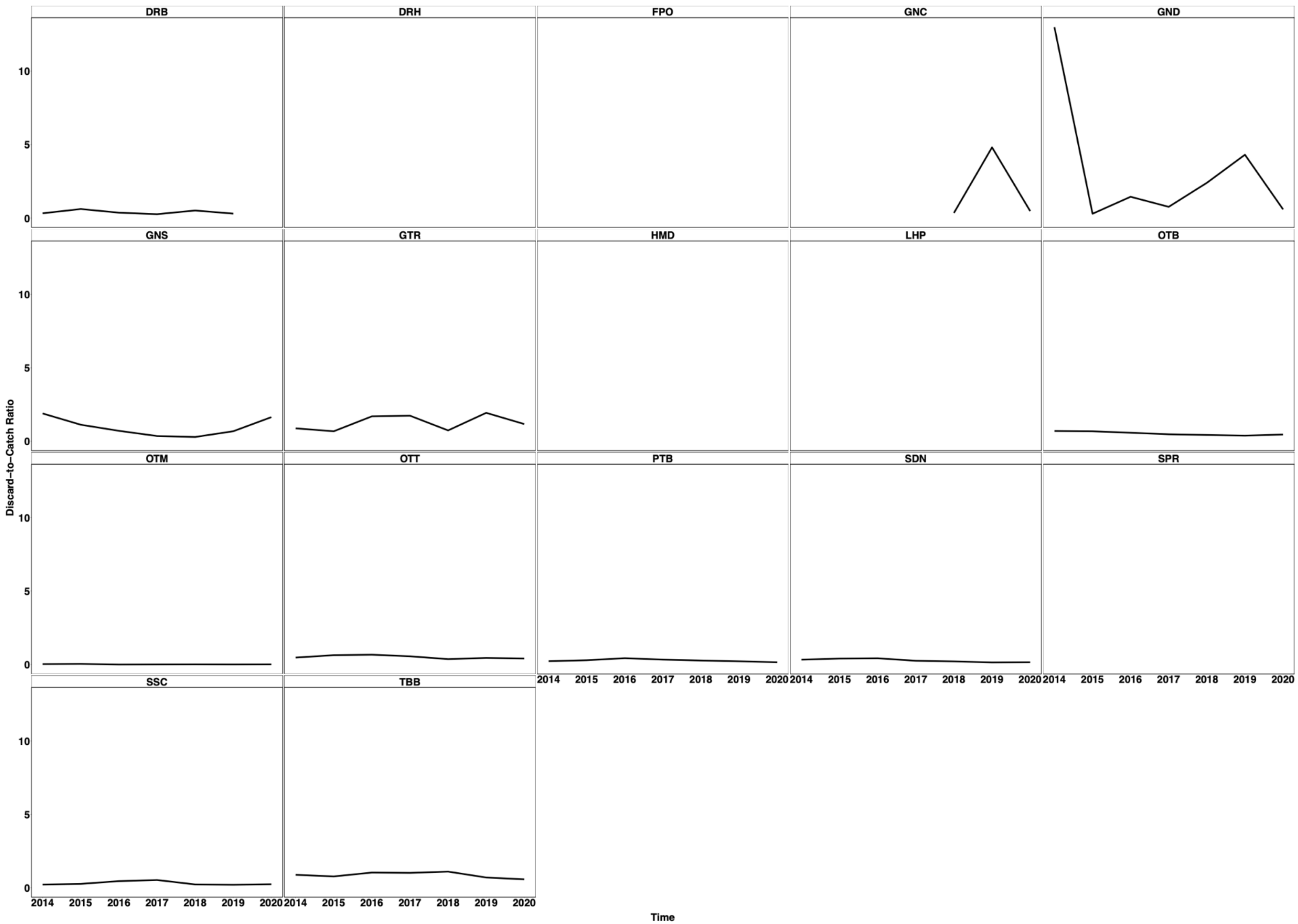


Figure 28. Total annual discards-to catch-ratio by gear type from 2014-2020 based on STECF FDI discard estimates and landings data.

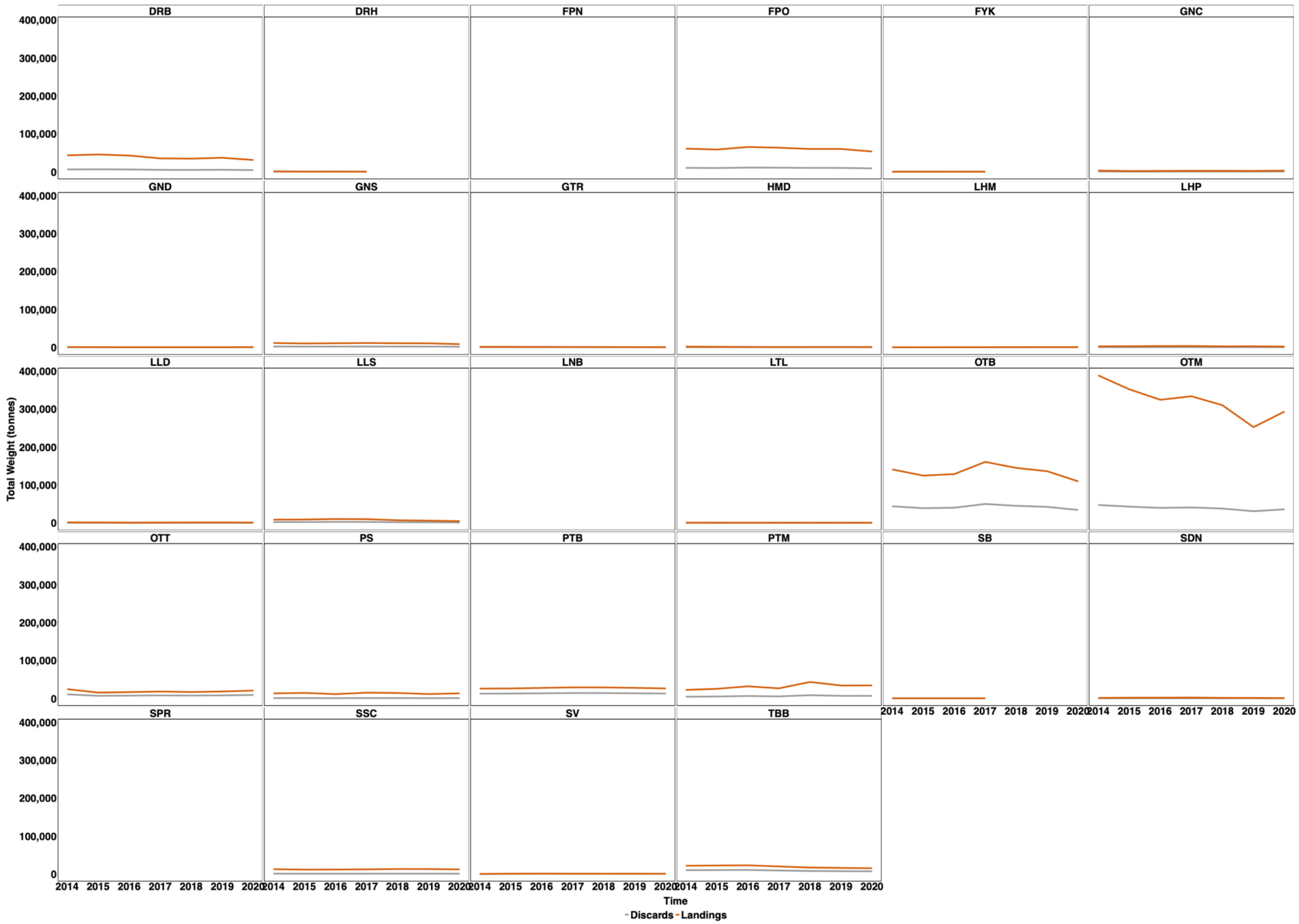


Figure 29. Total annual discards (in grey) and landings (in red) by gear type from the UK fleet from 2014-2020 based on applying gear-specific discard rates to STECF FDI UK landings data as outlined by Gilman et al. (2020)

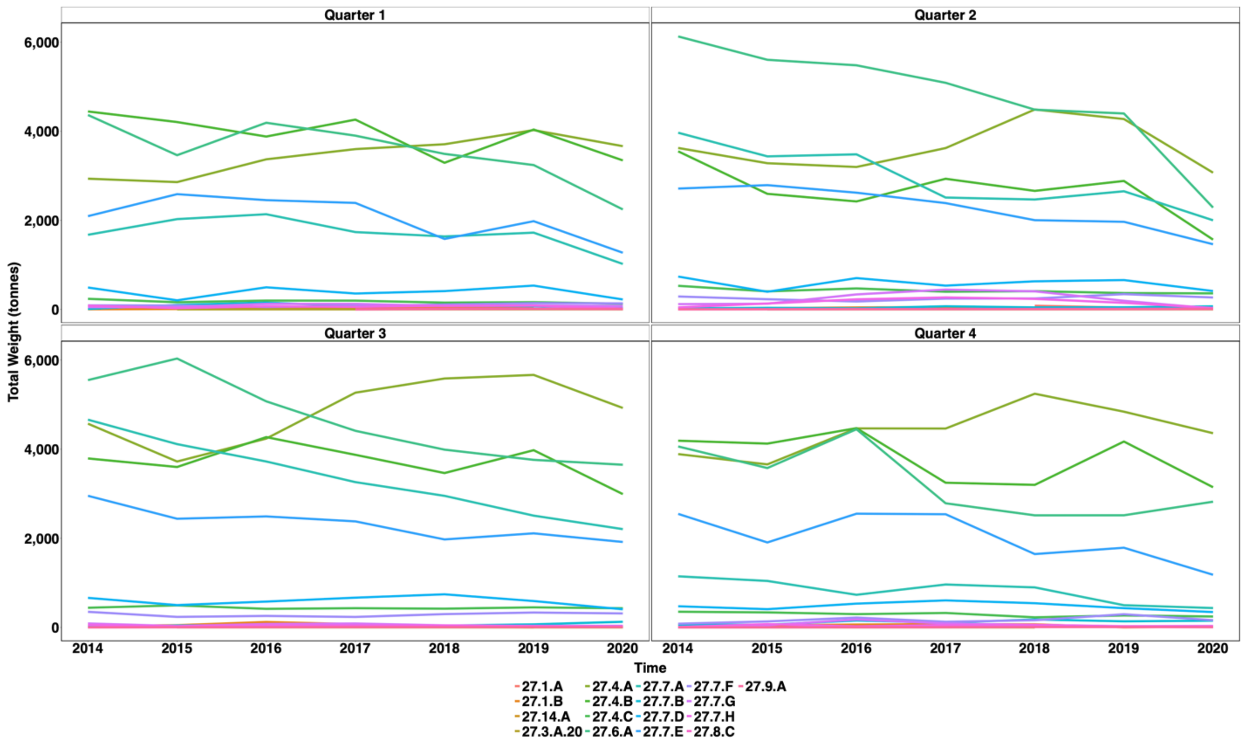


Figure 30. Total annual fishing effort (in fishing days) by quarter (panels) and ICES sub area (colors) for otter bottom trawls (OTB).

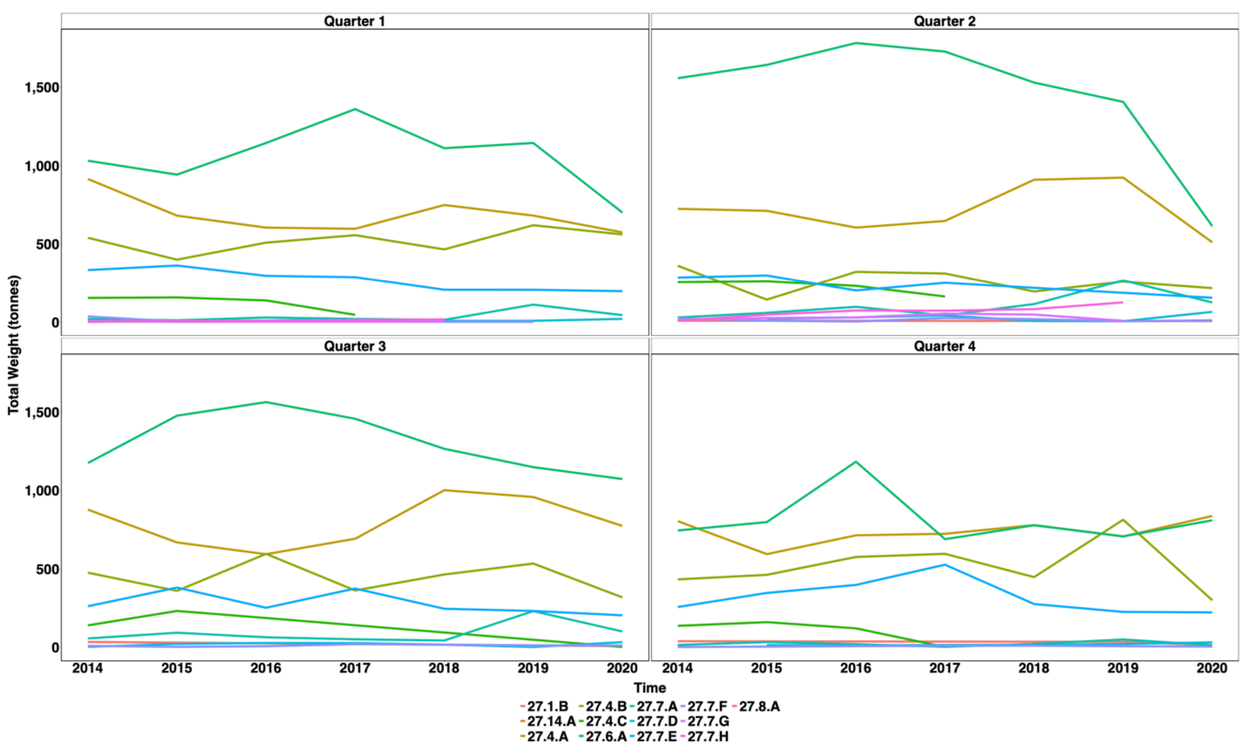


Figure 31. Total annual fishing effort (in fishing days) by quarter (panels) and ICES sub area (colors) for otter twin trawls (OTT).

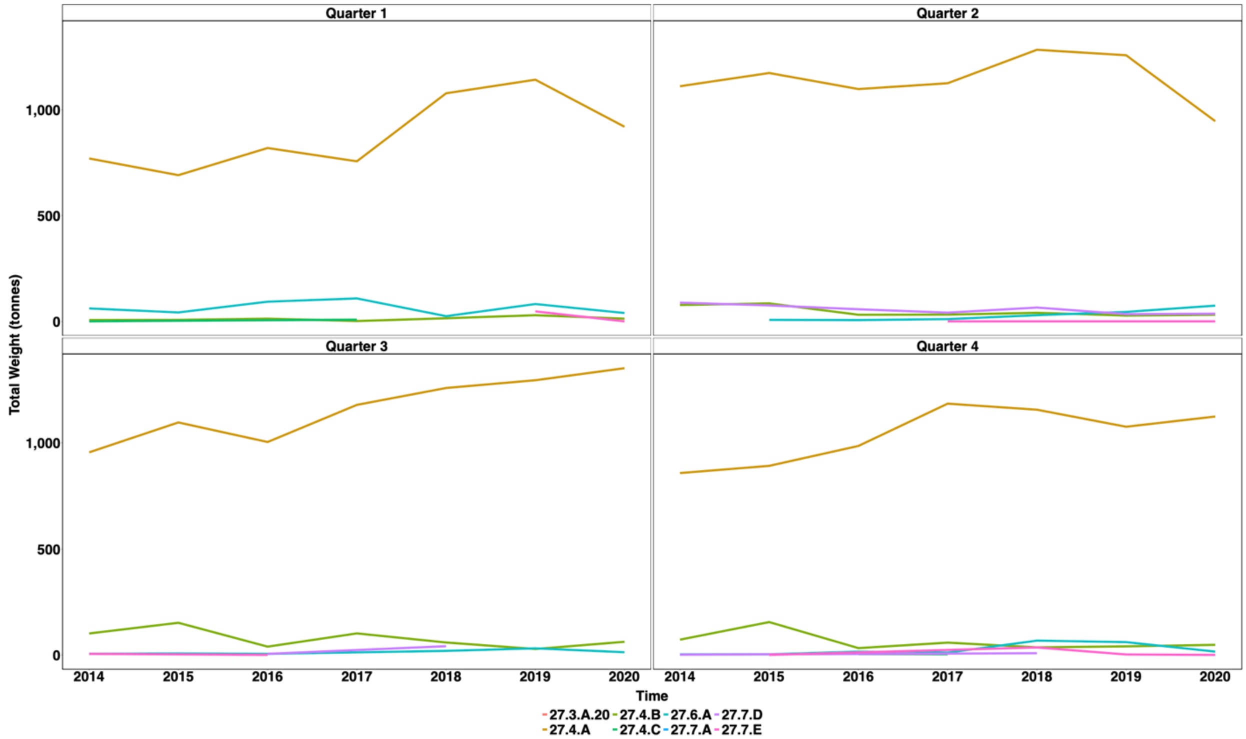


Figure 32. Total annual fishing effort (in fishing days) by quarter (panels) and ICES sub area (colors) for otter pair trawls (PTB).

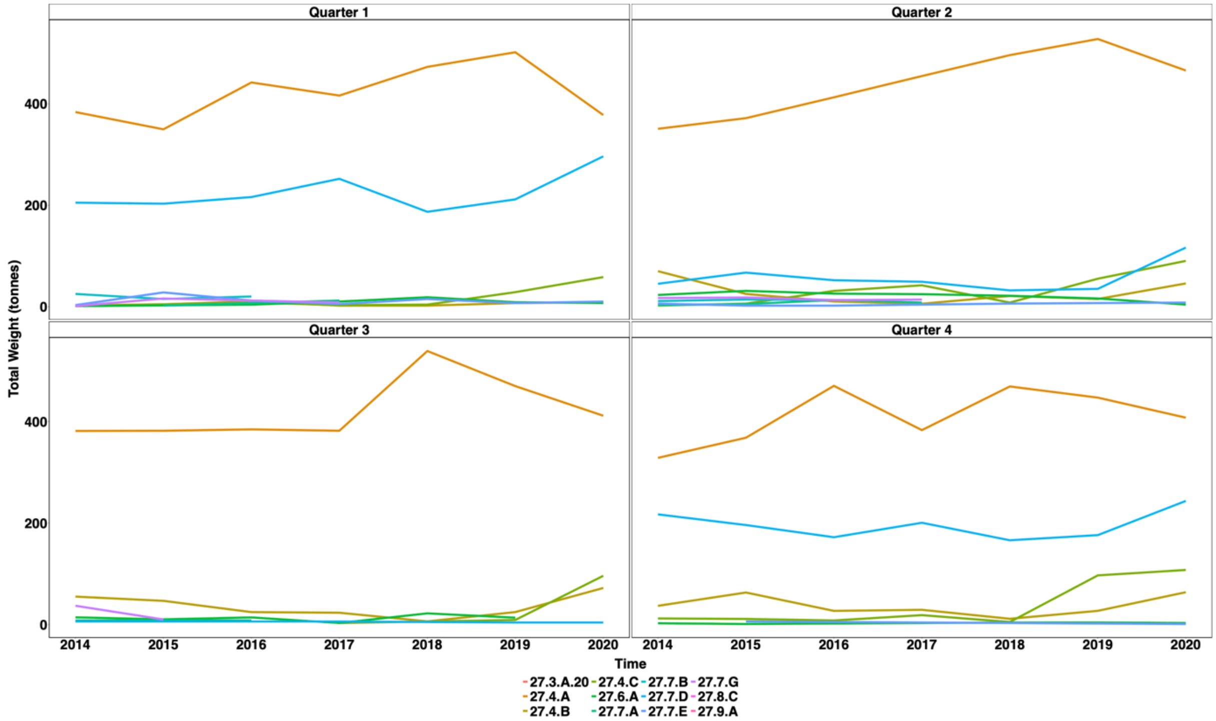


Figure 33. Total annual fishing effort (in fishing days) by quarter (panels) and ICES sub area (colors) for scallop dredges (SSC).

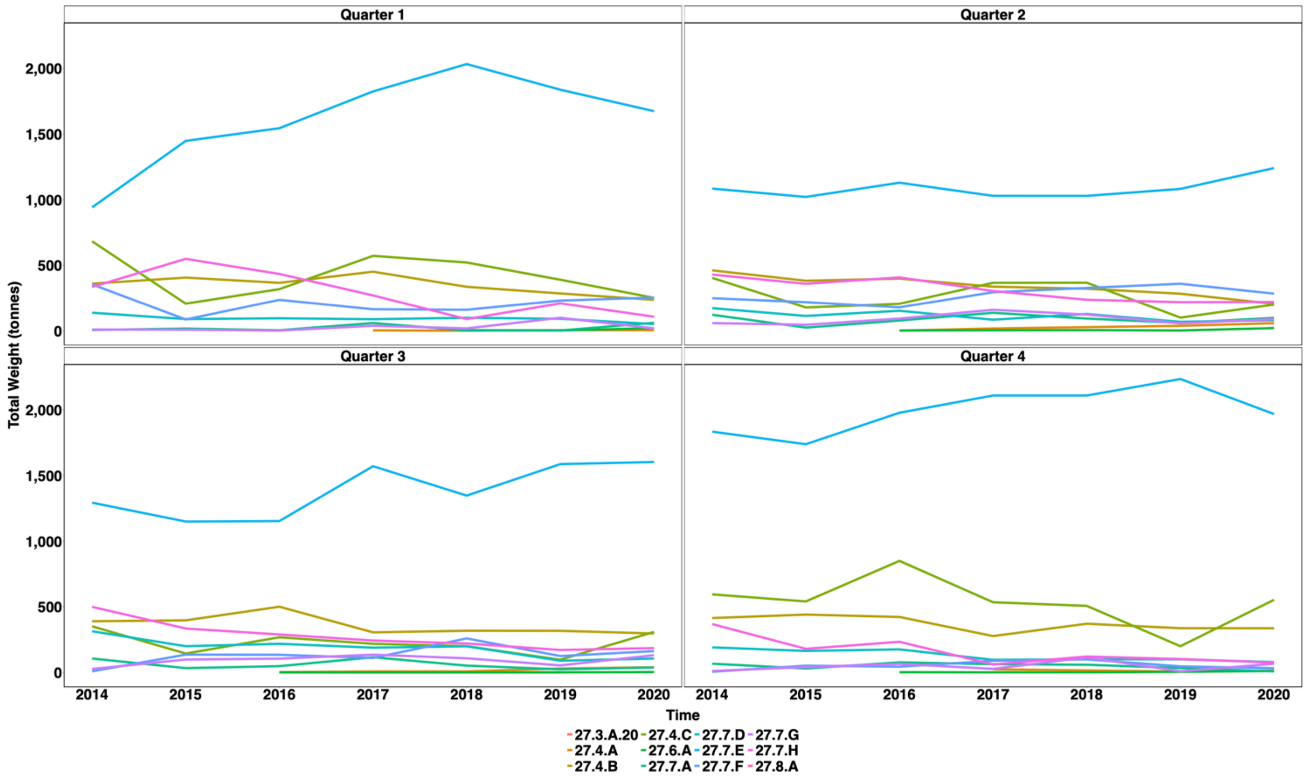


Figure 34. Total annual fishing effort (in fishing days) by quarter (panels) and ICES sub area (colors) for beam trawls (TBB).

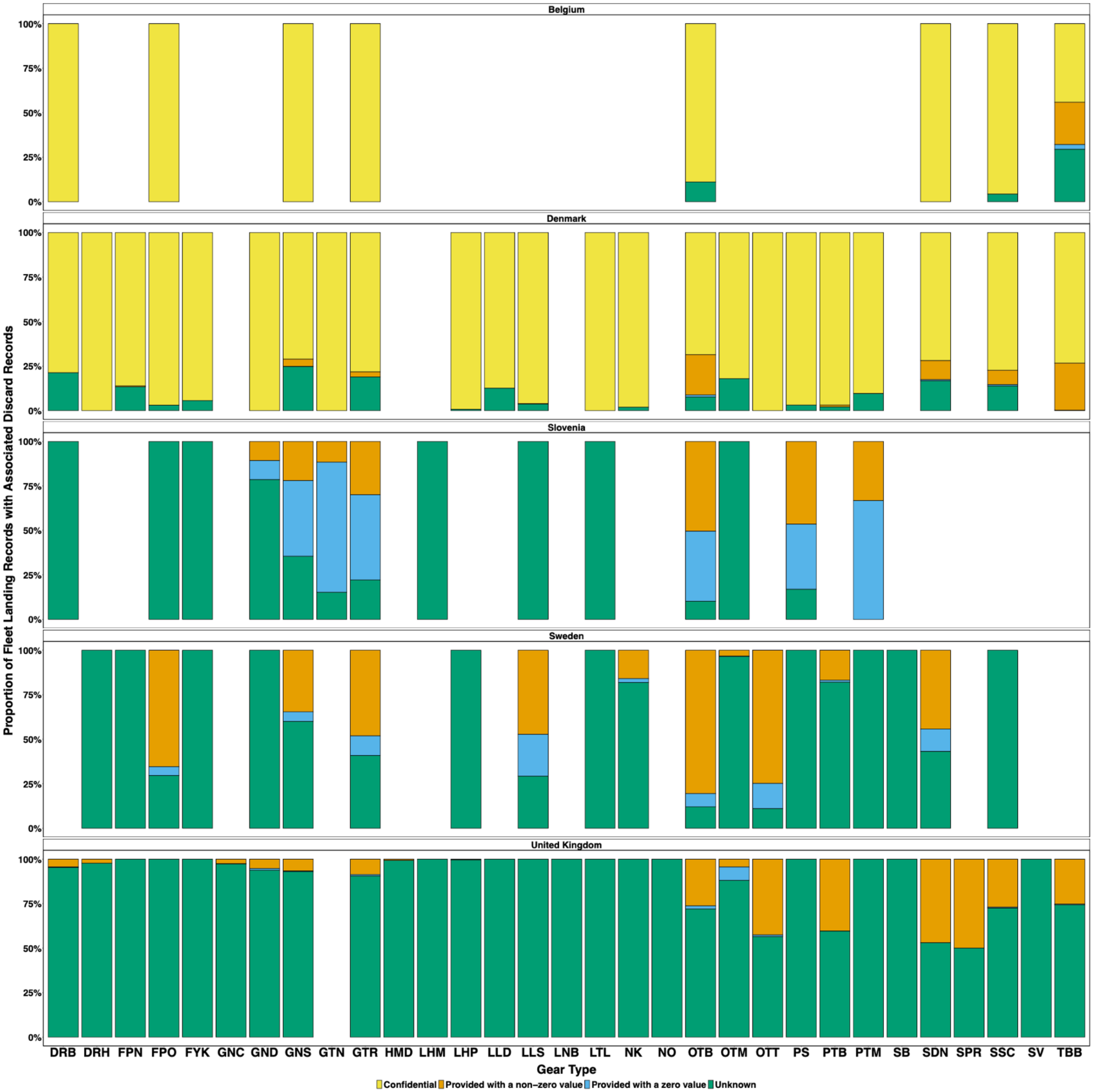


Figure 35. Proportion of fleet landing records with associated discard data by country and gear type form 2014-2020. Colors denote representation of discard data ordered from top to bottom: confidential (yellow), provided with non-zero values (orange), provided with zero values (blue), and unknown (green).