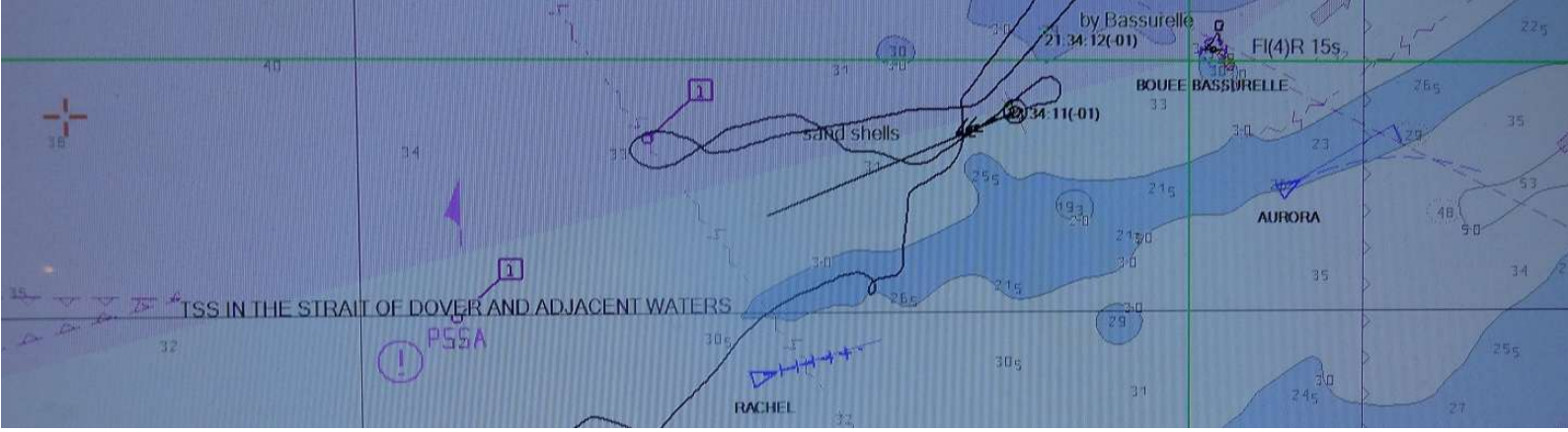


# Fishing in the English Channel and southern North Sea

## Trends in fishing effort, landings and spatial distribution of fleets in ICES divisions 27.7.d, 27.7.e and 27.4.c

Martin Pastoors

Date: 9 November 2026
Commission by: Cornelis Vrolijk BV
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## Version history

| Version | Date | Changes |
|---|---|---|
| 1.3 | 9 Nov 2026 | Restricted to ICES 27.7.d; new section on fleets, fisheries and spatial patterns (MPFF 2026-04) |
| 1.2.1 | 9 Nov 2026 | Full report on 7D, 7E and 4C again, without special focus on 7D (this report) |
| 1.2 | 26 Oct 2026 | Added UK AER data up to 2020; restricted analyses to 7D and 7E. |
| 1.1 | 5 Oct 2026 | Added UK landings data (MMO); added data explanations. |
| 1.0 | 17 July 2026 | Added one more KDE figure; small editing |
| 0.3 | 16 July 2026 | Added discussion sections after independent review; added interpretation of fishing effort |
| 0.2 | 15 July 2026 | Added Kernel spatial analysis for 7D separately, added analysis of mixed/other gear |
| 0.1 | 3 July 2026 | First complete version |

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## Executive summary

**Background and aim.** The English Channel and the southern North Sea (ICES 7D/7E/4C) are intensively exploited fishing grounds, with important fisheries for France, the United Kingdom, Belgium and the Netherlands. Over the past decade these fisheries have been shaped by two concurrent forces: changing fish stocks and post-Brexit access restructuring. Against this background, this report was commissioned by Cornelis Vrolijk to provide an objective, evidence-based characterisation of fishing effort, landings and the spatial distribution of the different fleets in the Channel and southern North Sea over the period 2008–2023 (AER), 2020–2024 (UK landings, MMO), 2013–2023 (FDI) and 2013–2025 (GFW), with particular focus on the flyshoot segment.

**Approach.** Four complementary data sources were integrated:

- STECF Annual Economic Report (AER; STECF 25-07 for the EU fleets and STECF 21-08 for the UK fleet up to 2020), providing official fishing effort and landings by fleet segment;
- UK landings data from the Marine Management Organisation (MMO), covering UK and Channel Islands vessels, which are absent from the AER after 2020;
- STECF Fisheries Dependent Information database (FDI, STECF 25-10), used to disaggregate the AER bottom trawl/seine category into conventional otter trawl (OTB) and seine (SSC/SDN) gears;
- Global Fishing Watch (GFW) AIS-derived fishing event data, used for the spatial analysis of effort distribution and concentration.

**Key findings.** Total fishing effort of the EU fleets in the study area changed from 236,395 fishing days in 2008 to 160,099 in 2023 (-32%), with the decline of the French bottom trawl/seine and gillnet effort as an important driver. France dominates the effort picture: between 2008 and 2020 France accounted for 53% of the AER fishing days, the UK for 33% and all other countries together for 14%. The French fleet mainly fishes with bottom trawl/seine, dredge, gillnet, pot/trap and Other/mixed gear, mostly with vessels of 10–24 m; the Dutch and Belgian fleets mainly fish with beam trawls, with vessels of 24 m and over. Within the bottom trawl/seine category, seine gears (SSC/SDN) account for 5–14% of the fishing days. The Dutch flyshoot fleet, while small in absolute terms, is the main seine fleet in the area, with 63% of the seine days, against 17% for France and 11% for the UK.

Landings from the study area are dominated by pelagic fish (mainly the Netherlands, Germany, the UK and France), seaweeds (France) and scallops (France and the UK); the species with the highest landings over the whole period are great atlantic scallop, atlantic herring, tangle. The three divisions differ clearly: pelagic fish were mainly taken in 7D and increasingly in 4C, seaweeds only in 7E, scallops in 7D and 7E, and flatfish and shrimps mostly in 4C. Roundfish and flatfish landings have declined sharply, while scallop landings have increased since 2016. Cuttlefish and squid landings have increased in recent years but remain small relative to other landings. Over 2020–2023, UK and Channel Islands vessels accounted for 19% of the landings from the study area.

**Spatial patterns.** The GFW data show persistent fishing hotspots in the southern part of 4C, the Pas de Calais and the Baie de Seine, reflecting the concentration of bottom trawl, dredge and beam trawl activities. French effort is spread broadly over 7D and 7E, UK effort is concentrated in the northern parts of 7D and 7E, and Dutch effort is mostly concentrated in 4C. After Brexit, French effort became more concentrated in the Baie de Seine, UK effort became slightly more diffuse and Dutch effort became more concentrated in a smaller part of 4C. The spatial concentration of fishing effort of all fleets combined increased, from a Gini coefficient of 0.59–0.63 in 2012–2015 to 0.62–0.64 in 2021–2025, and from 45–48% to 48–50% of the total effort in the top-10% of grid cells, with a very slight peak around 2020 (post-Brexit access uncertainty and COVID-19).

**Conclusions.** The fisheries in the study area show a long-term decline in fishing effort, mainly through the decline of the French bottom trawl/seine and gillnet effort; France remains the country with the highest effort in the area. The national fleets are specialised by gear and vessel size, and the three divisions differ in their landings. The composition of the landings is changing: scallops and cephalopods are increasing, flatfish and roundfish are declining, and pelagic fish remain relatively stable and high, with an increasing share from 4C. The Dutch flyshoot fleet occupies a small but stable position within this system as the main seine fleet. After Brexit, the distribution of the national fleets has changed, and fishing effort has become somewhat more concentrated. The combination of AER, MMO, FDI and GFW

data provides a multi-source baseline to compare the different fleets in the Channel and southern North Sea and to monitor future changes in fleet composition and spatial distribution. Quantifying the area swept per vessel-day using gear-specific swept-area coefficients is recommended as a priority next step for translating the effort trends into ecologically meaningful impact metrics.

## Nederlandse samenvatting

**Achtergrond en doel.** Het Engelse Kanaal en de zuidelijke Noordzee (ICES 7D/7E/4C) zijn intensief beviste gebieden, met belangrijke visserijen voor Frankrijk, het Verenigd Koninkrijk, België en Nederland. In het afgelopen decennium zijn deze visserijen beïnvloed door twee gelijktijdige ontwikkelingen: veranderende visbestanden en herstructurering van de toegang na Brexit. In dit kader is dit rapport in opdracht van Cornelis Vrolijk opgesteld. Het doel is een objectieve, op feiten gebaseerde beschrijving van de visserij-inspanning, aanvoer en ruimtelijke verdeling van de verschillende vloten in het Kanaal en de zuidelijke Noordzee over de periode 2008–2023 (AER), 2020–2024 (Britse aanvoer, MMO), 2013–2023 (FDI) en 2013–2025 (GFW), met bijzondere aandacht voor het flyshoot-segment.

**Aanpak.** Vier complementaire databronnen zijn gecombineerd:

- STECF Annual Economic Report (AER; STECF 25-07 voor de EU-vloten en STECF 21-08 voor de Britse vloot tot en met 2020), met officiële gegevens over visserij-inspanning en aanvoer per vlootsegment;
- aanvoergegevens van de Britse Marine Management Organisation (MMO) voor Britse vaartuigen en vaartuigen van de Kanaaleilanden, die na 2020 niet meer in de AER zijn opgenomen;
- STECF Fisheries Dependent Information-database (FDI, STECF 25-10), gebruikt om de AER-categorie bodemtrawl/zegen te splitsen in conventionele bordenvisserij (OTB) en zegenvisserij (SSC/SDN);
- AIS-gegevens van Global Fishing Watch (GFW) over visserij-activiteiten, gebruikt voor de ruimtelijke analyse van de verdeling en concentratie van de inspanning.

**Belangrijkste bevindingen.** De totale visserij-inspanning van de EU-vloten in het studiegebied veranderde van 236,395 visdagen in 2008 naar 160,099 in 2023 (-32%), met de afname van de Franse inspanning met bodemtrawl/zegen en staand want als belangrijke oorzaak. Frankrijk domineert het inspanningsbeeld: in 2008–2020 was Frankrijk goed voor 53% van de AER-visdagen, het VK voor 33% en de overige landen samen voor 14%. De Franse vloot vist vooral met bodemtrawl/zegen, dreg, staand want, potten/fuiken en overig/gemengd tuig, grotendeels met schepen van 10–24 m; de Nederlandse en Belgische vloten vissen vooral met de boomkor, met schepen van 24 m en groter. Binnen de categorie bodemtrawl/zegen is 5–14% van de visdagen zegenvisserij (SSC/SDN). De Nederlandse flyshootvloot is in absolute termen klein, maar is de belangrijkste zegenvloot in het gebied, met 63% van de zegendagen; Frankrijk heeft 17% en het VK 11%.

De aanvoer uit het studiegebied wordt gedomineerd door pelagische vis (vooral Nederland, Duitsland, het VK en Frankrijk), zeewier (Frankrijk) en sint-jakobsschelpen (Frankrijk en het VK). De drie divisies verschillen duidelijk: pelagische vis werd vooral in 7D gevangen en in toenemende mate in 4C, zeewier alleen in 7E, sint-jakobsschelpen in 7D en 7E, en platvis en garnalen vooral in 4C. De aanvoer van rondvis en platvis is sterk gedaald, terwijl de aanvoer van sint-jakobsschelpen sinds 2016 is toegenomen. De aanvoer van zeekat en pijlinktvis is de laatste jaren toegenomen, maar blijft klein vergeleken met de overige aanvoer. In 2020–2023 waren Britse vaartuigen en vaartuigen van de Kanaaleilanden goed voor 19% van de aanvoer uit het studiegebied.

**Ruimtelijke patronen.** De GFW-gegevens laten persistente visserijhotspots zien in het zuidelijk deel van 4C, het Nauw van Calais en de Baie de Seine, waar de bodemtrawl-, dreg- en boomkorvisserij geconcentreerd is. De Franse inspanning is breed verspreid over 7D en 7E, de Britse inspanning is geconcentreerd in de noordelijke delen van 7D en 7E en de Nederlandse inspanning vooral in 4C. Na Brexit is de Franse inspanning sterker geconcentreerd in de Baie de Seine, is de Britse inspanning iets meer verspreid geraakt en is de Nederlandse inspanning meer geconcentreerd in een kleiner deel van 4C. De ruimtelijke concentratie van de visserij-inspanning van alle vloten samen nam toe, van een Gini-coëfficiënt van 0,59–0,63 in 2012–2015 naar 0,62–0,64 in 2021–2025, en van 45–48% naar 48–50% van de totale inspanning in de 10% meest beviste rastercellen, met een zeer lichte piek rond 2020 (onzekerheid over de toegang na Brexit en COVID-19).

**Conclusies.** De visserij in het studiegebied laat een langdurige afname van de visserij-inspanning zien, vooral door de afname van de Franse inspanning met bodemtrawl/zegen en staand want; Frankrijk blijft het land met de hoogste inspanning in het gebied. De nationale vloten zijn gespecialiseerd naar vistuig en scheepsgrootte, en de drie divisies verschillen in hun aanvoer. De samenstelling van de aanvoer verandert: sint-jakobsschelpen en inktvissen nemen toe, platvis en rondvis nemen af, en pelagische vis blijft relatief stabiel en hoog, met een toenemend aandeel uit 4C.

De Nederlandse flyshootvloot neemt binnen dit systeem een kleine maar stabiele positie in als belangrijkste zegenvloot. Na Brexit is de verspreiding van de nationale vloten veranderd en is de visserij-inspanning iets meer geconcentreerd geraakt. De combinatie van AER-, MMO-, FDI- en GFW-gegevens biedt een basis uit meerdere bronnen om de verschillende vloten in het Kanaal en de zuidelijke Noordzee te vergelijken en om toekomstige veranderingen in vlootsamenstelling en ruimtelijke verdeling te volgen. Het kwantificeren van de bestreken oppervlakte per visdag via vistuig-specifieke *swept area*-coëfficiënten wordt aanbevolen als prioritaire volgende stap.

# 1 Introduction

## 1.1 Background

This study looks into the international fisheries developments in the English Channel and the southern North Sea in the past 15 years. Over this period there has been an increase in the fisheries for squid and cuttlefish in the Channel (and more recently also in the southern North Sea). This change in fishing patterns has come under increasing public and media scrutiny, including critical coverage in the Netherlands (e.g. Follow the Money). This study attempts to provide a thorough knowledge base on the fisheries in the Channel and southern North Sea using data from different sources: 1) STECF Annual Economic Report (AER; STECF 21-08 and 25-07; STECF, 2021, 2025a), 2) UK landings data 2020–2024 (MMO, 2025), 3) STECF Fisheries Dependent Information (FDI; STECF, 2025b) and 4) Global Fishing Watch data (https://globalfishingwatch.org). The aim is to provide an objective, evidence-based assessment of the fisheries development in terms of effort and catches of the fleets operating in the Channel and southern North Sea, their spatial distribution, and the available scientific literature on those fisheries.

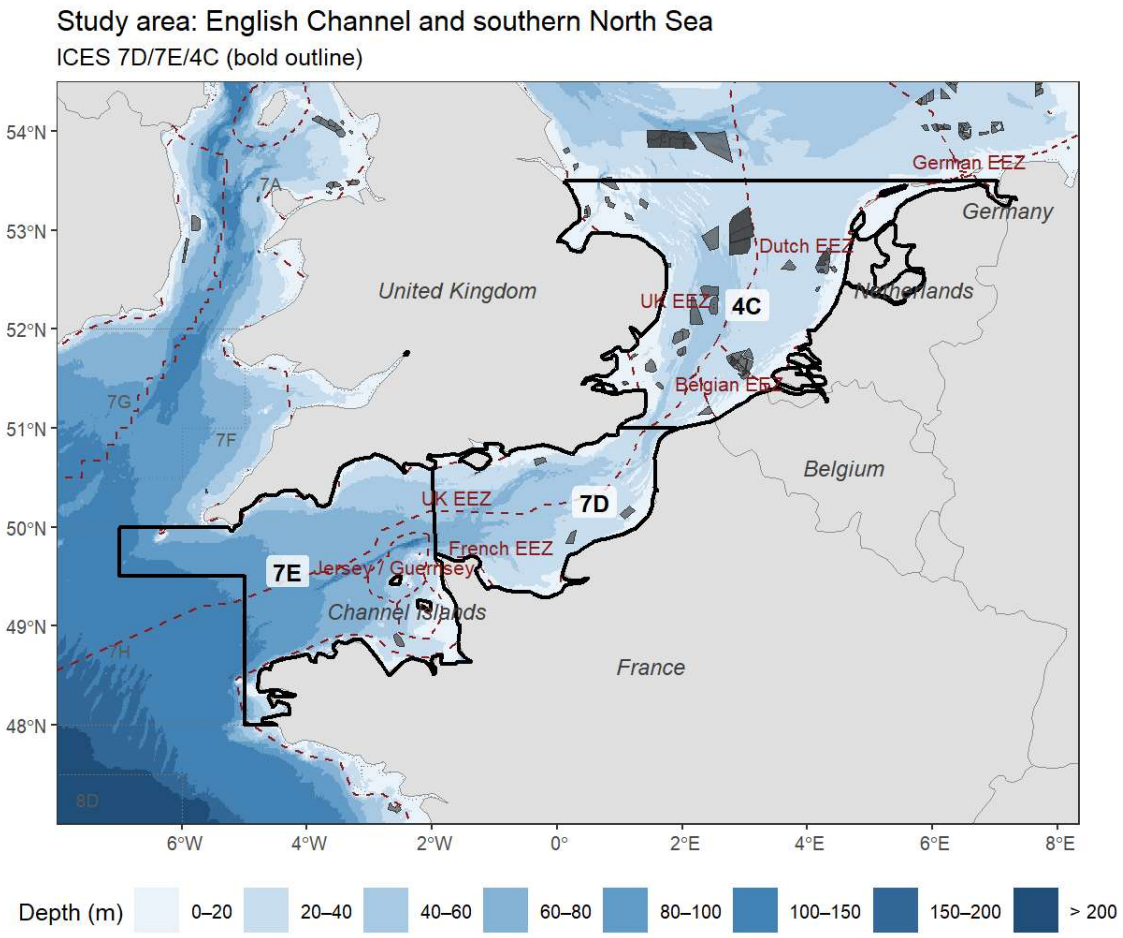
The report was commissioned by the Cornelis Vrolijk company (https://www.cornelisvrolijk.eu) and executed by Martin Pastoors Fish & Fisheries.

## 1.2 Objectives

- To quantify trends in fishing effort and landings in the Channel and southern North Sea (2008/2013–present) using official STECF (AER) and MMO statistics.
- To characterise the spatial distribution and concentration of fishing effort in the Channel and southern North Sea, and the changes after Brexit, using GFW AIS data.
- To compile a scientifically grounded overview of the fisheries in the Channel and southern North Sea, with particular focus on sustainability, ecosystem effects and the positioning of the flyshoot fishery.

## 1.3 Study area and scope

The study covers ICES divisions 27.7.d (7D, eastern English Channel), 27.7.e (7E, western English Channel) and 27.4.c (4C, southern North Sea), which together will be called the “study area” in this report (Figure 1). In the remainder of the report the divisions are referred to as 7D, 7E and 4C. The three divisions are analysed as one area; the eastern Channel (7D) on its own is described in a separate report (Pastoors, 2026).




er ICES divisions. Dashed red lines: EEZ boundaries (Marine Regions, World EEZ v12). Dark grey: offshore wind farms (operational or approved).

**Figure 1: Study area: ICES 7D/7E/4C (bold outline), other ICES divisions (dotted), EEZ boundaries (dashed red; Marine Regions World EEZ v12), bordering countries and water depth (NOAA ETOPO 2022, 1 arc-minute). Dark grey areas: offshore wind farms (operational or approved).**

The period of analysis is 2008–2023 for effort and landings trends (AER; data for 2024 were not available for France and 2024 has therefore been left out; the UK fleet is included up to 2020), 2020–2024 for UK landings (MMO), and 2013–2025 for the spatial analysis (GFW).

# 2 Material & Methods

This report combines four data sources, each covering a different period and providing different information. Figure 2 gives an overview: the AER provides the long-term series of effort and landings, the MMO data add the landings of the UK and Channel Islands fleets after 2020, the FDI data are used only to split the AER bottom trawl/seine category into otter trawl and seine, and the GFW data are used only for the spatial analysis. The sources are described in detail in Sections 2.1 to 2.4.

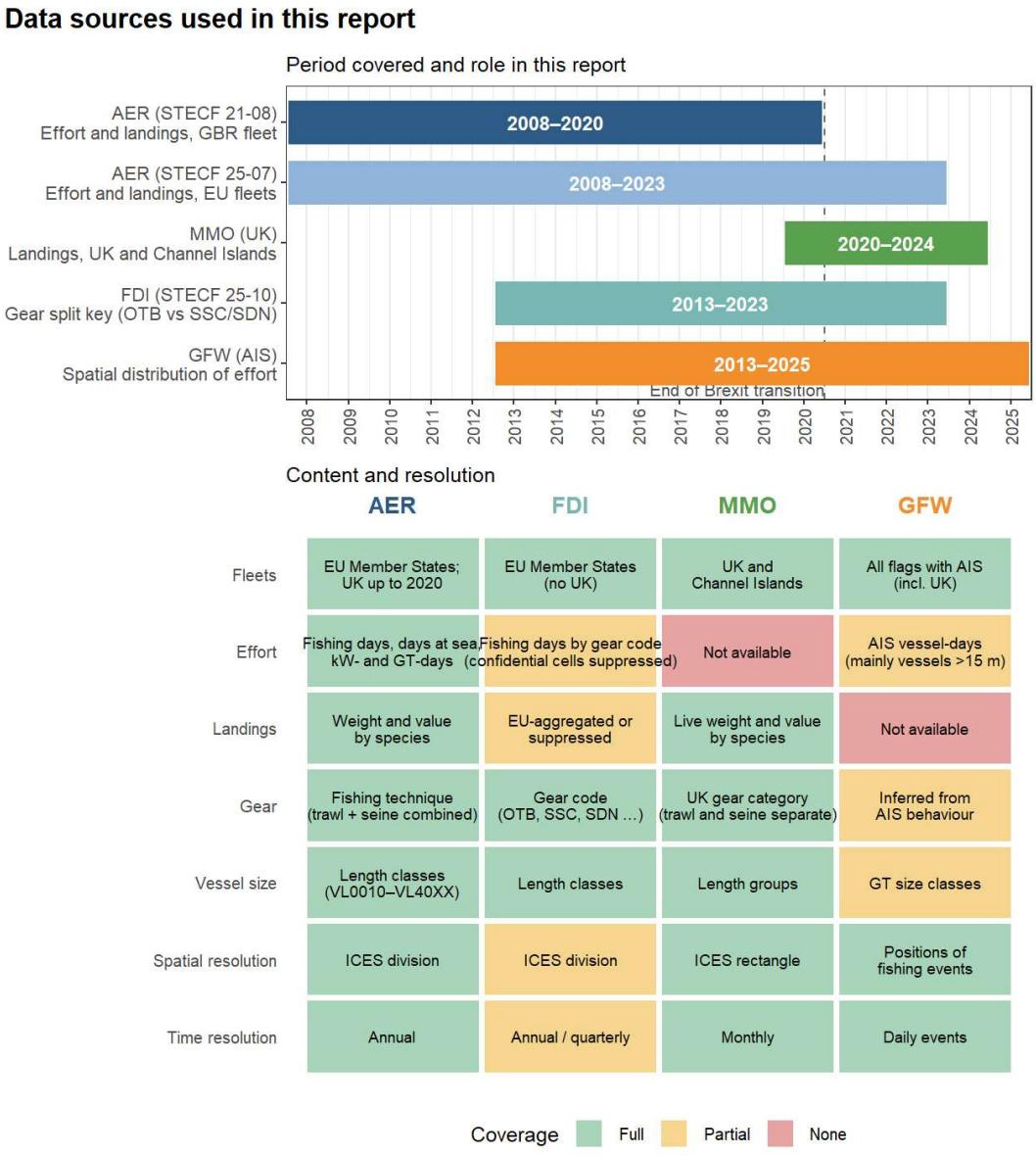



**Figure 2: Overview of the data sources used in this report. Top: period covered by each source and its role in the analysis; the dashed line marks the end of the Brexit transition period, after which UK landings come from MMO instead of the AER. Bottom: content and resolution of each source (green = full, yellow = partial, red = not available).**

## 2.1 STECF AER data (effort and landings trends)

The Annual Economic Report (AER) data were obtained from two STECF data releases (*EU Fleet Economic and Transversal data, fleet segment level*): STECF 25-07 (STECF, 2025a), covering the EU Member States for 2008–2023, and STECF 21-08 (STECF, 2021), the last release that includes the United Kingdom, covering 2008–2020. The 25-07 release is used for every country × year combination it contains; the 21-08 release only adds the UK fleet. The AER provides fishing effort (fishing days, sea days, kW-days, GT-days) and landed weight and value by fleet segment (country × fishing technique × vessel length class), disaggregated by FAO division.

The AER analyses in this report cover the period 2008–2023. The end year of 2023 reflects the absence of French effort and landings data for 2024 in the current STECF 25-07 release. The AER does not distinguish between bottom trawl and seine fisheries; they are reported as a combined category.

After 2020 the AER no longer contains data for the United Kingdom. UK landings for the later years were therefore obtained separately from the UK Marine Management Organisation (Section 2.2). No UK effort data were available for the years after 2020, so from 2021 onwards the effort figures cover EU fleets only; years without UK effort are marked with an asterisk in the effort figures.

### 2.1.1 Vessel length classes

The AER reports effort and landings by vessel length class (VLC), defined by overall length (LOA) in metres. Six standard classes are used throughout this report, as defined in the STECF fleet data collection framework (Table 1).

**Table 1: Vessel length classes (VLC) used in STECF AER data and throughout this report.**

| Code | Length range (m) | Typical vessel type |
|---|---|---|
| **VL0010** | < 10 | Small inshore vessels (outboard/inboard motor) |
| **VL1012** | 10–12 | Small coastal vessels |
| **VL1218** | 12–18 | Medium coastal/demersal vessels |
| **VL1824** | 18–24 | Medium offshore vessels, beam trawlers, flyshoot |
| **VL2440** | 24–40 | Large demersal and pelagic trawlers |
| **VL40XX** | > 40 | Freezer trawlers |

### 2.1.2 Species groups

Landings in the AER are reported at the individual species level using FAO 3-alpha species codes. For summary figures and tables, individual species are aggregated into ecologically and commercially meaningful species groups. The grouping was applied using FAO 3-alpha codes as the primary key (reliable and consistent across Member States) with species name pattern matching as a fallback. Table 2 lists the species groups used and the main constituent species.

**Table 2: Species groups used in landings analyses throughout this report, with principal constituent species.**

| Species group | Main species |
|---|---|
| **Pelagic fish** | Atlantic herring (HER) |
| | Atlantic mackerel (MAC) |
| | Horse mackerel (HOM/JAX) |
| | European sardine/pilchard (PIL) |
| | European sprat (SPR) |
| **Seaweeds** | Tangle/kelp/seaweeds nei (LQD, LAH, SWX and others) |
| **Cuttlefish** | Common cuttlefish (CTC) and other Sepia spp. |
| **Squid** | European squid/Loligo (LOL/LOG) |
| | Other squids nei (SQZ, SQR, SQC and others) |
| **Mullets** | Grey/golden/red mullet (MUL, MUG, TFM) |
| **Gurnards** | Red/tub/grey gurnard (GUR, GUU, TUB) |

| Species group | Main species |
|---|---|
| **Roundfish** | Whiting (WHG) |
| | Pouting/bib (BIB) |
| | Pollack (POL) |
| | Atlantic cod (COD), haddock (HAD), saithe (POK), hake (HKE), ling (LIN) |
| **Seabass & seabreams** | European seabass (BSS) |
| | Black seabream (BRB) and other seabreams (SBX, SBR, SBG) |
| **Elasmobranchs** | Small-spotted catshark (SYC), smooth-hounds (SDV, SMD), tope (GAG) |
| | Thornback ray (RJC), blonde ray (RJH), spotted ray (RJM), undulate ray (RJU) |
| | Other skates and rays nei (RAJ, SKA and others) |
| **Flatfishes** | Common sole (SOL) |
| | European plaice (PLE) |
| | Turbot/brill (TUR/BLL) |
| | Megrim (MEG/LDB) |
| | Dab/flounder/other flatfishes (DAB, FLE, LEM, WIT and others) |
| **Scallops** | Great Atlantic scallop (SCE) |
| | Queen scallop (QSC) |
| **Shellfish & crustaceans** | Whelk (WHE) |
| | Edible/spider crab (CRE/SCR) |
| | Other shellfish nei |
| | Common European bittersweet (GKL) |
| **Other demersal fish** | European conger (COE), monkfish (MON), John dory (JOD) |
| | Marine fishes nei (MZZ) and other demersal fish |

## 2.2 UK landings data (MMO)

UK landings were obtained from the dataset underlying the UK Sea Fisheries Statistics 2024 (MMO, 2025), covering landings by UK vessels into all ports and landings by non-UK vessels into UK ports for 2020–2024. The dataset reports monthly landings by vessel nationality, ICES division and statistical rectangle, port of landing, vessel length group, gear category and species, as live weight, landed weight and first-sale value (GBP).

**Selection.** Only vessels of UK nationality (England, Scotland, Wales and Northern Ireland) were retained, together with vessels from Jersey and Guernsey, which are reported separately as Channel Islands (CHI). Landings by non-UK vessels into UK ports were excluded, because these are already included in the AER data of the respective flag states. The data were restricted to ICES 7D/7E/4C.

**Harmonisation with the AER.** UK vessel length groups were mapped onto the AER vessel length classes (Table 1) using the lower bound of each length group. UK gear categories were mapped onto the AER gear categories as shown in Table 3. The original UK gear categories were retained in addition; unlike the AER, they distinguish demersal trawls from demersal seines. Species are coded with FAO 3-alpha codes in both sources, but some species are reported under different codes. Horse mackerel (HOM/JAX), cuttlefish (CTC/CTL), monkfish (ANF/MON/MNZ), squids (SQC/SQR/SQZ) and skates and rays (RJX/SKA) were therefore harmonised to a common code before species grouping (Section 2.1.2). Live weight was used throughout, consistent with the AER. Values were converted from GBP to EUR using annual average ECB exchange rates.

**Use and limitations.** The MMO data cover landings only. They are added only for the country × year combinations that are not in the AER, i.e. from 2021 onwards; for 2020 and earlier the UK landings come from the AER (STECF 21-08), so nothing is counted twice. UK landings before and after 2021 therefore come from different sources, which may differ somewhat in coverage. UK effort is only available from the AER, up to 2020. Spatial attribution may differ slightly between sources: UK landings are attributed to the reported rectangle and division, while AER landings by sub-region are compiled by Member States from logbook and sales-note data.

**Table 3: Mapping of UK (MMO) gear categories to the AER gear categories used in this report.**

| UK gear category (MMO) | AER gear category |
|---|---|
| **Demersal trawls** | Bottom trawl/seine |
| **Demersal seine** | Bottom trawl/seine |
| **Beam trawl** | Beam trawl |
| **Dredge** | Dredge |
| **Drift and fixed nets** | Gillnet |
| **Handlines, Longlines** | Handline/rod |
| **Pots and traps** | Pot/trap |
| **Pelagic seine** | Purse seine |
| **Pelagic trawls, Other mobile/passive gears, Unknown** | Other/mixed |

## 2.3 STECF FDI data: limitations and use as gear-splitting key

The STECF Fisheries Dependent Information (FDI) dataset was obtained for the study area and period. Unfortunately, the FDI Landings table is EU-aggregated (no country breakdown), and the Effort and Catches tables suffer from substantial confidentiality suppression in many strata. In addition, the spatial FDI tables were not available on the STECF website at the time of analysis. Therefore, the FDI data have not been used as the main source of data for the report.

Despite these limitations, the FDI Effort table retains one piece of information not available in the AER data: **gear code at the FAO level** (e.g. OTB, OTT, SSC, SDN, PTB). The AER combines all of these into a single Bottom trawl/seine category, which conflates conventional otter trawl (OTB) with Danish/Scottish seine (SSC/SDN), two gears with very different fishing patterns and fleet compositions. The FDI gear-code information is therefore used to disaggregate the AER Bottom trawl/seine category, as described below.

**Splitting approach.** For each stratum (year, country, vessel length class, division), the share of each gear code within the Bottom trawl/seine total was computed from the FDI Effort table. This proportional split key was then applied to the corresponding AER fishing days, so that the total days in each stratum are conserved exactly. Shares in the FDI strata are rescaled to sum to 1 within each stratum, which handles any within-stratum confidentiality suppression transparently, although it does not account for seasonal dynamics.

**Coverage and fallback rules.** FDI data are used for 2013–2023 only. Strata with no FDI coverage (primarily IRL, DNK, and some BEL and DEU strata where FDI reported zero or suppressed days) are assigned a pooled fallback split key derived from the FDI data aggregated across all available years and countries, stratified by vessel length class.

**Limitations.** Countries for which FDI coverage is sparse (IRL, DNK, DEU) receive a pooled fleet-average split that may not reflect their actual gear mix. Results for these countries should be interpreted with caution and are excluded from the figures showing the French, Dutch and UK trends.

## 2.4 GFW data (spatial effort distribution and concentration)

Fishing activity data were retrieved via the Global Fishing Watch (GFW) API (gfwr v3.0) using the Events endpoint. Vessel metadata (flag state, gear type, gross tonnage) were obtained from the GFW vessel registry (https://global-fishingwatch.org; Kroodsma et al., 2018).

Recent publications have shown that the haul-based effort from GFW may not be a reliable indicator of fishing effort for trawl-based gears (Hintzen et al., 2025). Therefore, we define GFW days at sea in this report as vessel-days: for each day, each vessel is assigned to the ICES division in which it spent most of its time, based on the spatial distribution of AIS positions recorded during that day. This definition is therefore a simple presence-day metric. The effort trends derived from GFW data were found to be very different from effort trends in AER (and FDI) data. An important limitation of the GFW data is that vessels below the AIS carriage requirement threshold (typically 15 m LOA, though requirements vary by flag state and fishing area) are systematically under-represented or absent. This means that gears dominated by small inshore vessels (gillnets, pots and traps, handlines) are structurally under-counted relative to larger trawl and seine vessels, which carry AIS as a mandatory requirement. Therefore, the GFW data are used exclusively for the spatial analysis using effort density maps, spatial hotspots, and effort concentration metrics. The

GFW spatial analysis covers the full period 2013–2025; the first year is left out of the maps because of incomplete AIS coverage.

### 2.4.1 Kernel density estimation of spatial effort distribution

The spatial distribution of fishing effort was characterised using kernel density estimation (KDE), a standard non-parametric method for converting a set of discrete point locations into a smooth continuous surface representing effort intensity (Silverman, 1986). Fishing event coordinates were projected into a metric coordinate system (UTM Zone 30N) and a Gaussian kernel with bandwidth σ = 10 km was applied within the study area. The bandwidth is fixed across years and fleets so that changes in the density surface reflect genuine shifts in fishing distribution rather than smoothing artefacts. Land is excluded from the estimation window. For the annual maps, the resulting surface is normalised to a 0–1 scale within each year, making spatial patterns directly comparable across years regardless of differences in total effort; for absolute effort levels, the AER-based effort figures in Section 3.2 should be consulted alongside the KDE maps. For the comparison before and after Brexit, the density is expressed as the share of each period's events per unit area, so that the maps do not depend on the number of years in a period or on the growth in AIS-recorded events over time. KDE is widely used in fisheries spatial analysis to identify persistent hotspots, characterise seasonal grounds and detect shifts in fleet distribution over time (Gerritsen & Lordan, 2011; Kroodsma et al., 2018).

### 2.4.2 Fleets in the spatial analysis

The spatial distribution of fishing effort is shown for all fleets combined and, for the comparison before and after Brexit, for the main national fleets in the study area (FRA, GBR, NLD, BEL). The flag state of each vessel comes from the GFW vessel registry. The comparison uses the periods 2014–2020 (before Brexit) and 2021–2025 (after the start of the EU–UK Trade and Cooperation Agreement on 1 January 2021). Because the two periods differ in length and the number of AIS-recorded events increased over time, the density in each period is expressed as the share of that period's events per unit area, normalised within each country.

### 2.4.3 Spatial concentration metrics: Gini coefficient and top-10% cell share

Two complementary metrics were computed annually for all fleets combined on a regular 5 km × 5 km grid to quantify how concentrated fishing effort is in space, rather than simply where it occurs. The Gini coefficient is a well-established inequality measure, originally from economics and widely applied in fisheries spatial analysis (Greenstreet et al., 2009; Eigaard et al., 2017), that summarises the full distribution of effort across all grid cells on a scale from 0 (effort perfectly uniform across all cells) to 1 (all effort in a single cell). Values above approximately 0.7 indicate strong spatial concentration; a rising Gini over time signals progressive compression of effort into fewer areas, which may reflect displacement from previously accessible grounds, regulatory closures or increasing targeting efficiency. The top-10% cell share is a more intuitive companion metric: it expresses what percentage of total annual fishing events falls within the 10% of grid cells that were most intensively fished that year. If effort were uniform this would equal 10%; values of 40–70% are typical in concentrated demersal fisheries. Together the two metrics capture different aspects of concentration: the Gini reflects the shape of the full distribution while the top-10% share highlights the intensity of the most-fished areas. Tracking both annually allows changes in spatial footprint to be detected even when total effort remains stable.

## 2.5 Literature review approach

The literature review underpinning Section 4 is based on:

**Scientific literature** identified through targeted searches of Web of Science, Scopus and Google Scholar using the terms: *English Channel fisheries*, *Channel demersal fisheries*, *flyshoot*, *Danish seine Channel*, *beam trawl North Sea Channel*, *scallop Pecten maximus Channel*, *seabed disturbance trawl*, *AIS fishing effort*, and combinations thereof. Priority was given to peer-reviewed articles published since 2010, supplemented by earlier foundational studies where relevant (e.g. Eigaard et al., 2016a,b; Depestele et al., 2016).

**ICES working group reports** sourced from the ICES library (https://www.ices.dk), primarily:

- *Working Group on Celtic Seas Ecoregion* (WGCSE, ICES 2025a): principal source for demersal stocks in the Channel (sole, plaice, whiting, sea bass, monkfish, megrim, mullet) and for the broader ecosystem and fisheries context of 7D and 7E.
- *Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak* (WGNSSK, ICES 2025c): principal source for the demersal stocks in the southern North Sea (4C), e.g. North Sea sole and plaice, and for stocks with distributions spanning the Channel (e.g. plaice, dab).
- *Working Group on Widely Distributed Stocks* (WGWIDE, ICES 2025e): responsible for the assessment of mackerel (*Scomber scombrus*) and horse mackerel (*Trachurus trachurus* western stock), both of which can be important bycatch species in the study area.
- *Working Group on Cephalopod Fisheries and Life History* (WGCEPH, ICES 2025d): consulted for cuttlefish (*Sepia officinalis*) and squid (*Loligo* spp., *Illex* spp.) in the Channel. WGCEPH does not produce formal TAC advice but provides the best available science on stock status and drivers of variability.

ICES advice sheets for the relevant stocks were also consulted directly.

**Official statistics and national sources** include the STECF AER (primary quantitative source for this report), Ifremer fleet and stock assessment reports, the UK Marine Management Organisation (MMO) annual sea fisheries statistics, and the Belgian ILVO annual fleet reports (ILVO, 2022). Where possible, the most recent published edition was used.

**Policy and grey literature** includes EU regulation texts, the UK–EU Trade and Cooperation Agreement fisheries annex and parliamentary reports on post-Brexit fisheries.

All quantitative claims made in the literature sections are cross-referenced with the AER and GFW results presented in Section 3, and discrepancies or gaps are noted where they arise.

# 3 Trends in landings and effort in the Channel and southern North Sea

This section describes the overall trends in landings and fishing effort in ICES 7D/7E/4C, based on the AER and MMO data (landings and effort), and the spatial patterns in fishing effort based on the GFW data.

## 3.1 Landings trends

### 3.1.1 Landings by species during 2008–2023

The overall landings by species in the study area during all of the years available in the AER and MMO data are shown in Figure 3. The species with the highest landings are great atlantic scallop, atlantic herring, tangle. The main countries fishing for scallops are France and UK, for pelagic species (herring, horse mackerel) are the Netherlands, Germany and the UK, while tangle (LQD, a seaweed) is only fished by France.

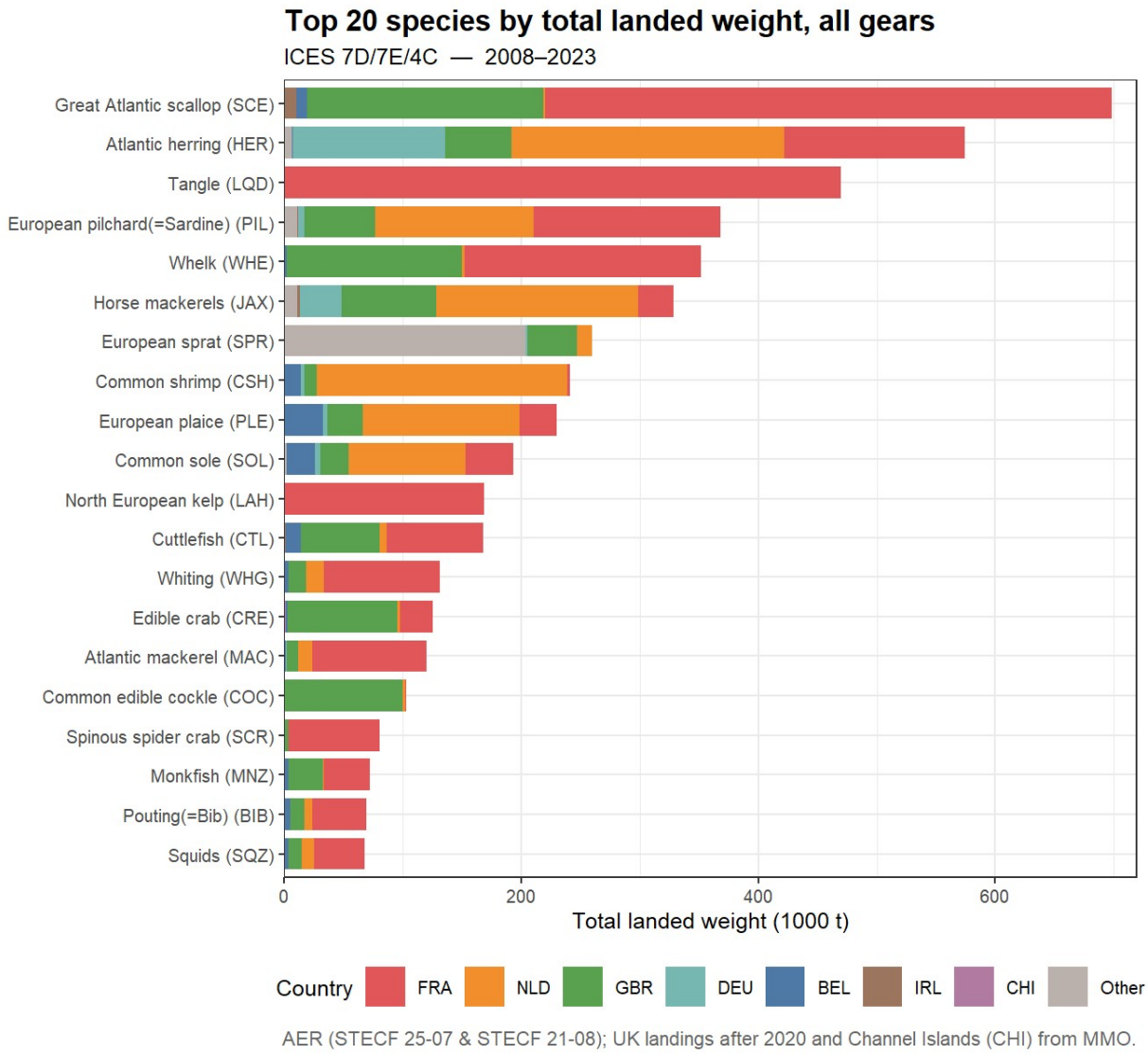



**Figure 3: Top 20 species by total landed weight in ICES 7D/7E/4C (2008–2023), all gears combined, by country. Source: STECF 25-07 & STECF 21-08; UK after 2020 and Channel Islands from MMO.**

Tangle (LQD) is a seaweed species harvested from the sea (*Laminaria digitata*). Common European bittersweet (GKL) is a shellfish species (*Glycymeris glycymeris*).

### 3.1.2 Total landed weight by year, country and gear

Total landings by gear and country are shown in Figure 4. The highest landings were in the category Other/mixed (including pelagic trawl for e.g. herring) and bottom trawl/seine (France), beam trawl (Netherlands, UK, Belgium) and dredge (France, UK).

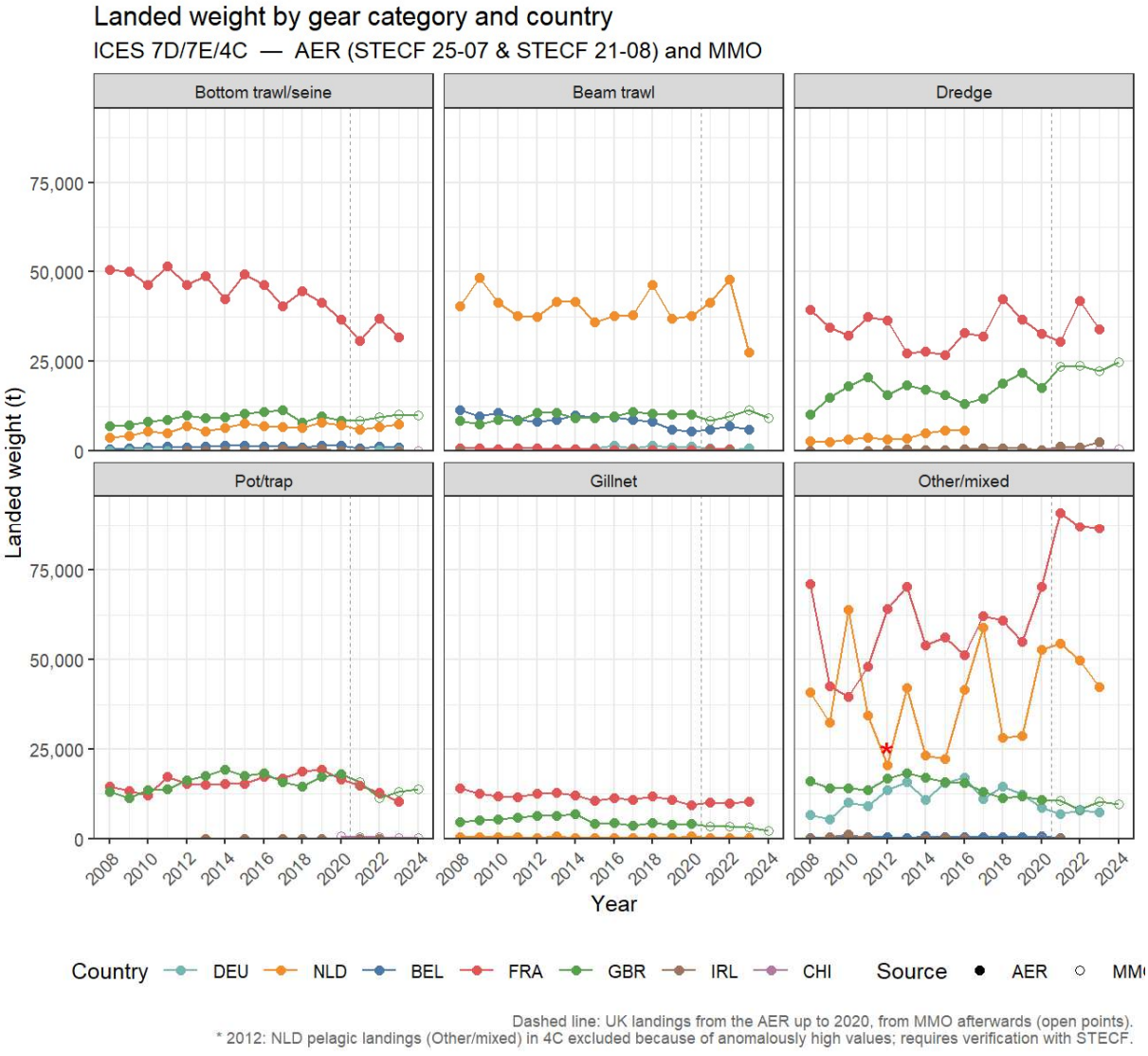



**Figure 4: Landed weight (t) in ICES 7D/7E/4C per year by country and gear category. Source: STECF 25-07 & STECF 21-08; UK after 2020 and Channel Islands from MMO (open points).**

### 3.1.3 Total landed weight for Other/mixed gear

The Other/mixed gear category covers a highly diverse range of fishing techniques and target species that do not fit neatly into the main AER gear categories, and its composition differs markedly by country (Figure 5). The French Other/mixed landings were dominated by seaweed, scallops and pelagic fish. Dutch, German and UK Other/mixed landings were mostly pelagic fish.




**Figure 5: Landed weight (1000 t) by species group and country for the Other/mixed gear category, ICES 7D/7E/4C. The 10 species groups with the highest landings are shown separately; all other groups are combined as Other. Source: STECF 25-07 & STECF 21-08; UK after 2020 and Channel Islands from MMO.**

### 3.1.4 Key species groups: landings by country

Figure 6 shows the landings of the key species groups by country. Landings were dominated by pelagic fish (the Netherlands, Germany, the UK and France), seaweeds (France) and scallops (France and the UK). Roundfish and flat-fish landings declined markedly. Cuttlefish and squid landings have increased in recent years but remain small relative to other landings.

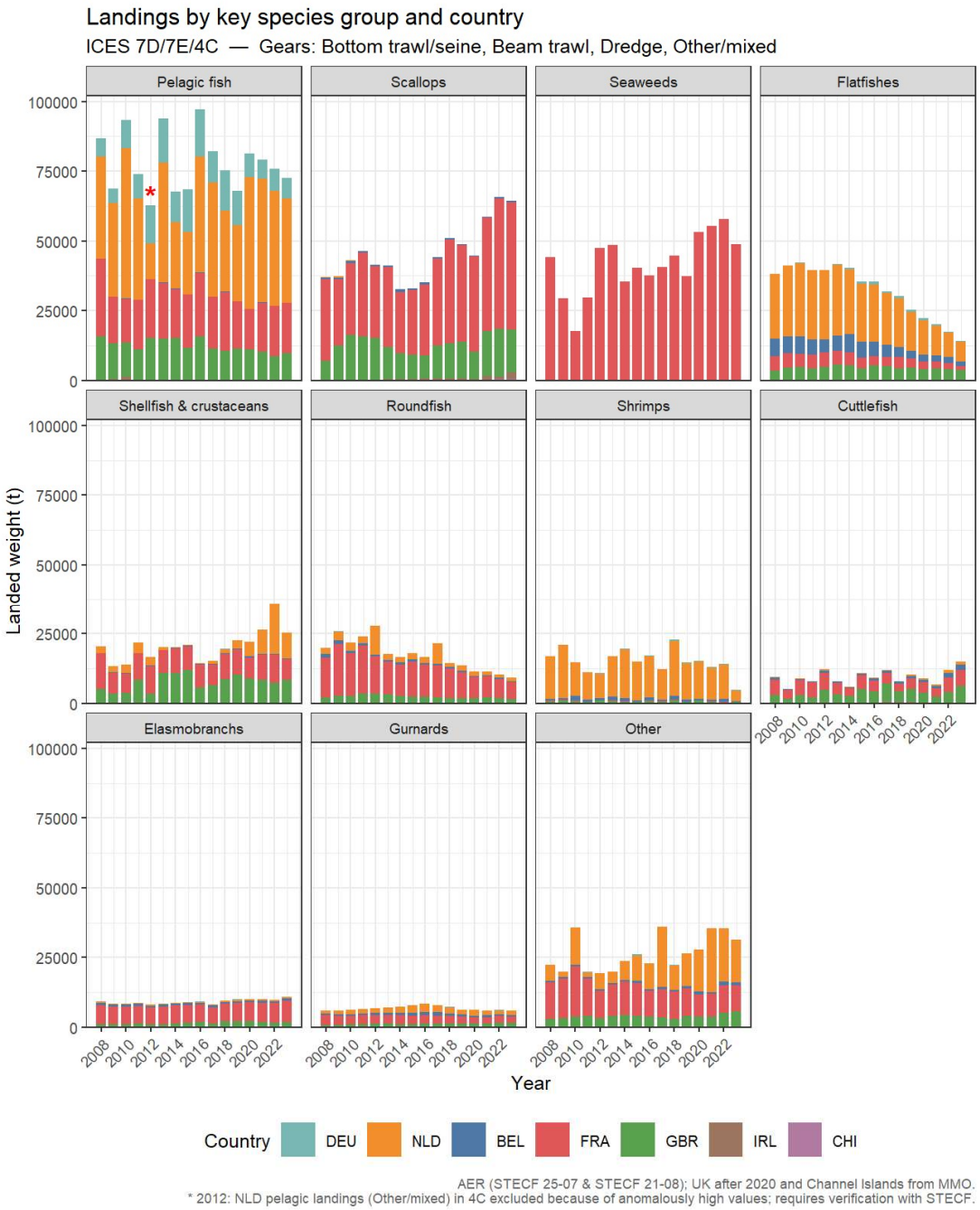



**Figure 6: Landings by key species group and country for selected gears (Bottom trawl/seine, Beam trawl, Dredge, Other/mixed) in ICES 7D/7E/4C (AER + MMO, 2008–2023). The 10 species groups with the highest landings are shown separately; all other groups are combined as Other.**

### 3.1.5 Key species groups: landings by gear category

Figure 7 shows the same landings by gear category. Pelagic landings were mostly taken by Other/mixed gear. Scallops and seaweeds were taken mostly by dredge and Other/mixed gear. Cuttlefish (and squid), gurnards and roundfish were predominantly taken by bottom trawl/seine.

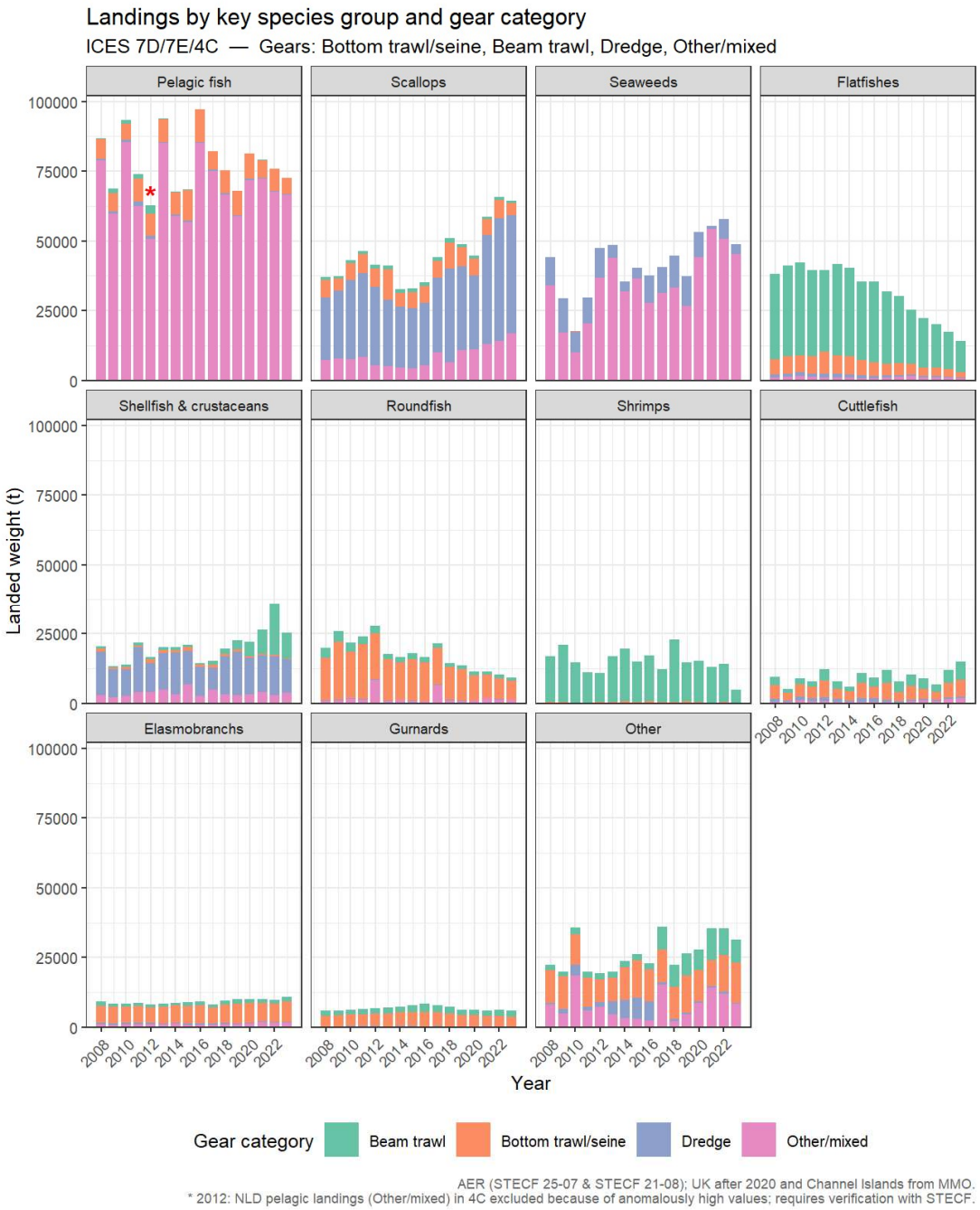



**Figure 7: Landings by key species group and gear category for selected gears in ICES 7D/7E/4C (AER + MMO, 2008–2023). The 10 species groups with the highest landings are shown separately; all other groups are combined as Other.**

### 3.1.6 Key species groups: landings by ICES division

Figure 8 shows the same landings by ICES division. Pelagic fish were predominantly taken in 7D and increasingly in 4C, seaweeds only in 7E and scallops in 7D and 7E. Flatfish and shrimps were taken mostly in the southern North Sea (4C).

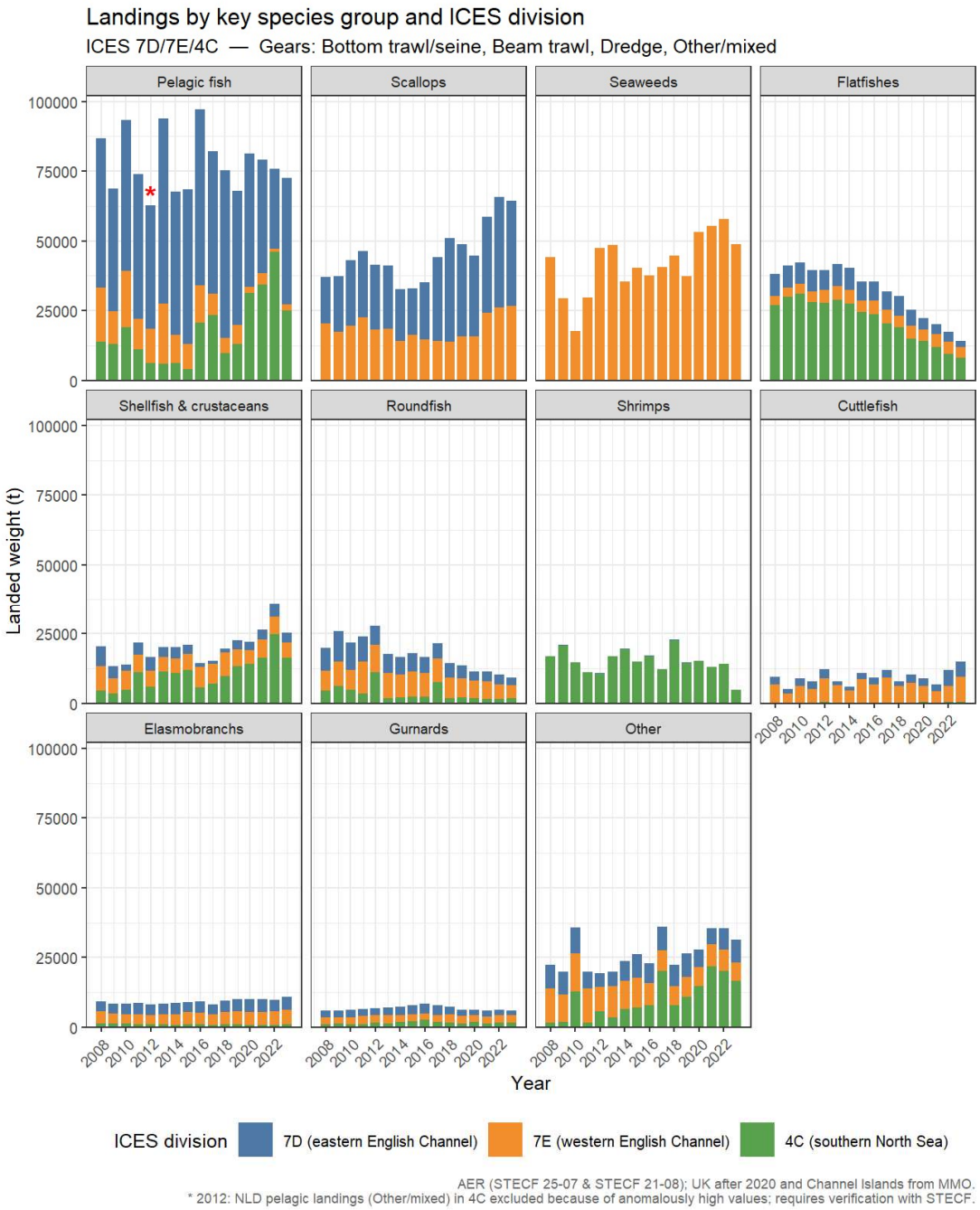



**Figure 8: Landings by key species group and ICES division for selected gears (Bottom trawl/seine, Beam trawl, Dredge, Other/mixed) in ICES 7D/7E/4C (AER + MMO, 2008–2023). The 10 species groups with the highest landings are shown separately; all other groups are combined as Other.**

## 3.2 Effort trends

### 3.2.1 Total fishing days by year and country (AER, all gears)

Total fishing effort of the EU fleets in the study area changed from 236,395 days in 2008 to 160,099 days in 2023, a change of -32% over the period (Figure 9). Over the years in which UK effort data are available, the fishing effort of

all fleets changed from 348,710 fishing days in 2008 to 249,981 in 2020 (-28%; 2020 was also affected by the COVID-19 pandemic). Between 2008 and 2020, France contributed 53% of the AER fishing days, the UK 33% and all other countries together 14%. No UK effort data are available for the years after Brexit.

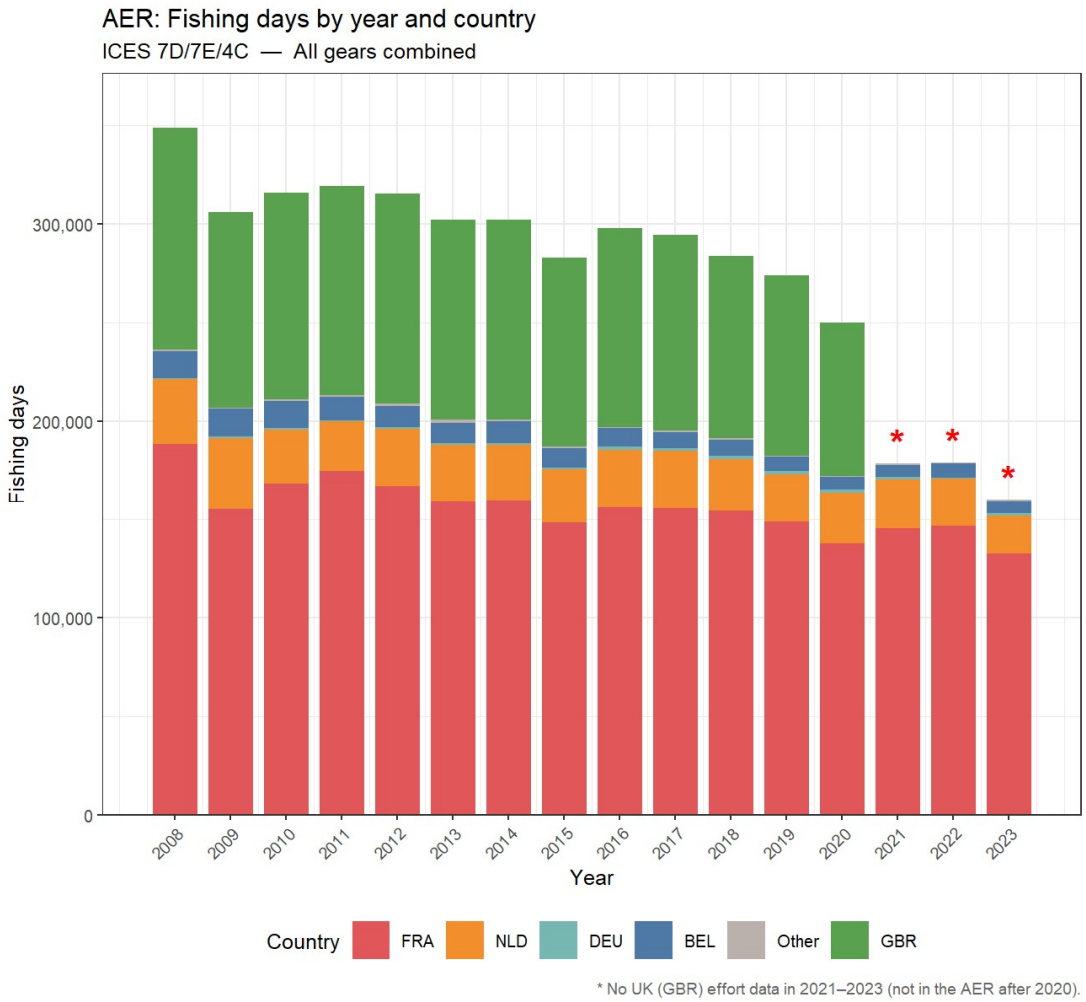



**Figure 9: Total fishing days per year by country in ICES 7D/7E/4C, all gears combined (AER, 2008–2023). Source: STECF 25-07 & STECF 21-08.**

### 3.2.2 Total fishing days by year, country and gear category (AER)

The breakdown of effort by gear category (Figure 10) shows which gears dominate the study area. All gears have maximum fishing days per country at a similar level. For France, the main fishing gears were bottom trawl/seine, dredge, gillnet, pot/trap and Other/mixed. French bottom trawl/seine and gillnet effort has strongly declined over time. French dredge effort also appears to decline, but this is partly offset by an increase in Other/mixed gear. The Dutch and Belgian fleets are mostly visible in beam trawl and the Dutch fleet also in bottom trawl/seine and Other/mixed gear.

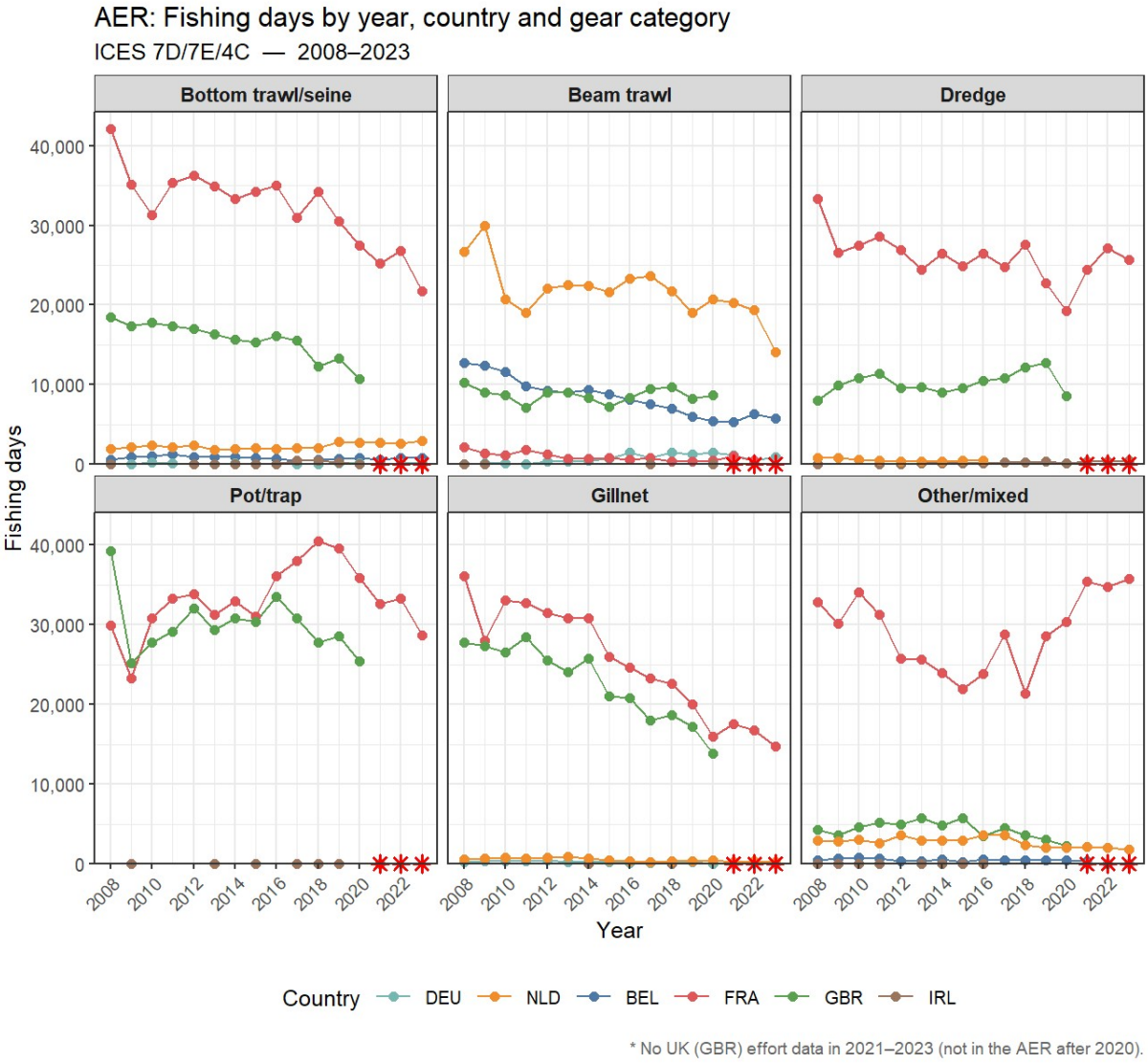



**Figure 10: Total fishing days per year by country and gear category in ICES 7D/7E/4C (AER, 2008–2023). Asterisks: years without UK (GBR) effort data.**

### 3.2.3 Total fishing days by year, country and vessel length class (AER)

Fishing effort by vessel length class (Figure 11) reveals distinct fleet structures by country. The French fleet dominated the 10–12 m and 12–18 m length classes. The UK and France both had a substantial share of the under-10 m effort. French effort declined gradually in the 18–24 m length class. The Dutch fleet was concentrated in the length classes of 18 m and up and showed declining trends for 18–40 m vessels. The 18–24 m and 24–40 m length classes showed the most multi-country competition (UK, French, Dutch and Belgian vessels).

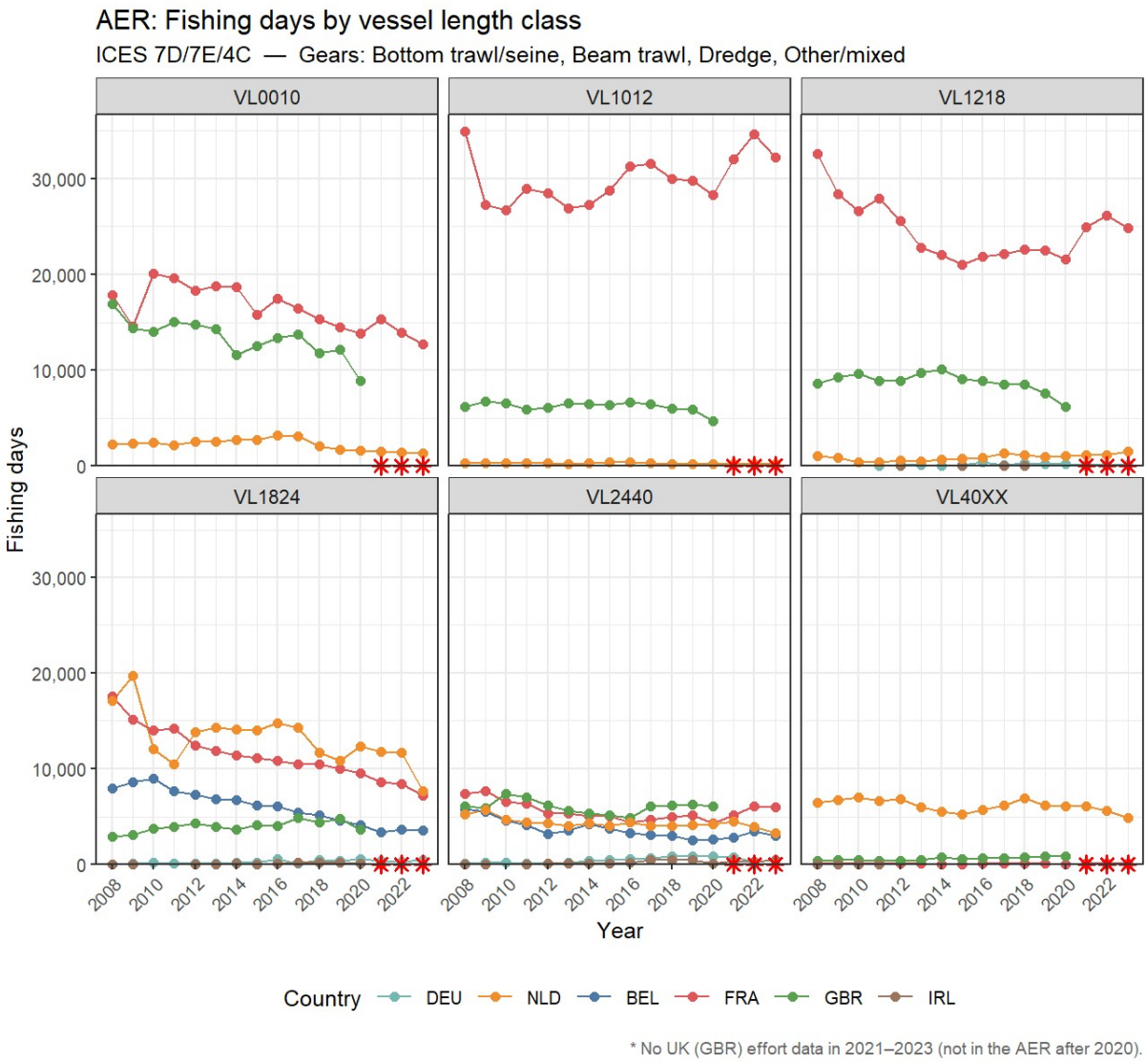



**Figure 11: Total fishing days in ICES 7D/7E/4C per year by country and vessel length class for selected gears (Bottom trawl/seine, Beam trawl, Dredge, Other/mixed) (AER, 2008–2023).**

### 3.2.4 Fishing days by year, country, gear and vessel size (AER)

Figure 12 shows the effort by gear and vessel size together, which reveals the specialisation of the fleets. French vessels dominated the bottom trawl/seine effort from 10 to 24 m, with a strong reduction for French 18–24 m vessels. UK vessels dominated the bottom trawl/seine effort of the under-10 m vessels. French dredge effort came mostly from vessels between 10 and 18 m. Dutch effort was concentrated in beam trawl (24 m and over).

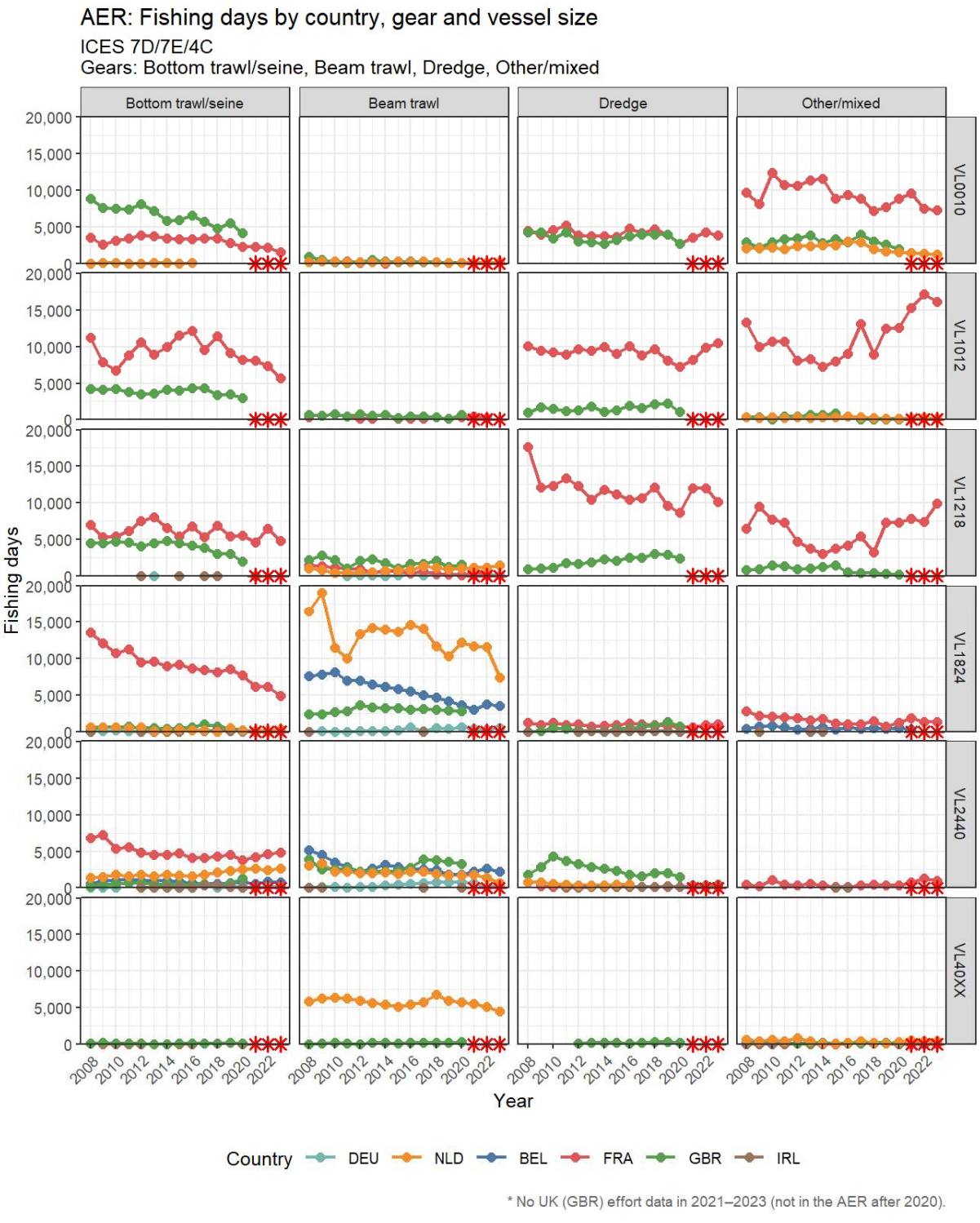



**Figure 12: Fishing days by country, gear category and vessel length class for selected gears (AER, 2008–2023). Asterisks: years without UK (GBR) effort data.**

### 3.2.5 Disaggregation of bottom trawl/seine (FDI-derived)

As described in Section 2.3, the AER Bottom trawl/seine category was disaggregated into conventional otter trawl (OTB/OTT/PTB) and seine (SSC/SDN) gears using proportional split keys derived from the STECF FDI Effort data. The left panel of Figure 13 shows the absolute fishing days by gear type over 2013–2023. The right panel shows the gear-type share based on direct FDI splits only: conventional otter trawl accounts for 86–95% of the days, and seine (SSC/SDN) for 5–14%. The picture varies strongly by country (Figure 14): France and the UK fish mostly with otter trawls, while the Netherlands fishes predominantly with seines, reflecting the Dutch flyshoot fleet. Of all seine days in the study area, 63% are Dutch, 17% French and 11% British. Note that BEL and DEU received pooled fallback splits due to sparse FDI coverage and are therefore excluded from the percentage panel.

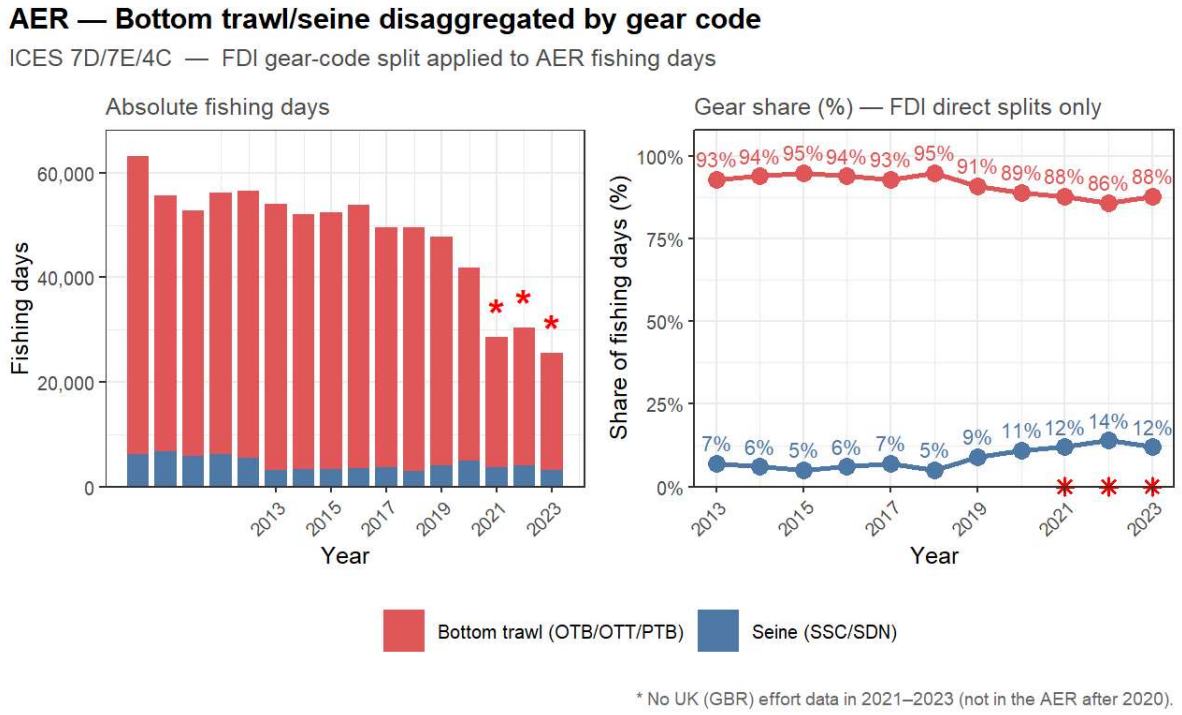



**Figure 13: Bottom trawl/seine fishing days disaggregated into conventional otter trawl (OTB/OTT/PTB) and seine (SSC/SDN) using FDI gear-code proportions (AER + FDI, 2013–2023).**

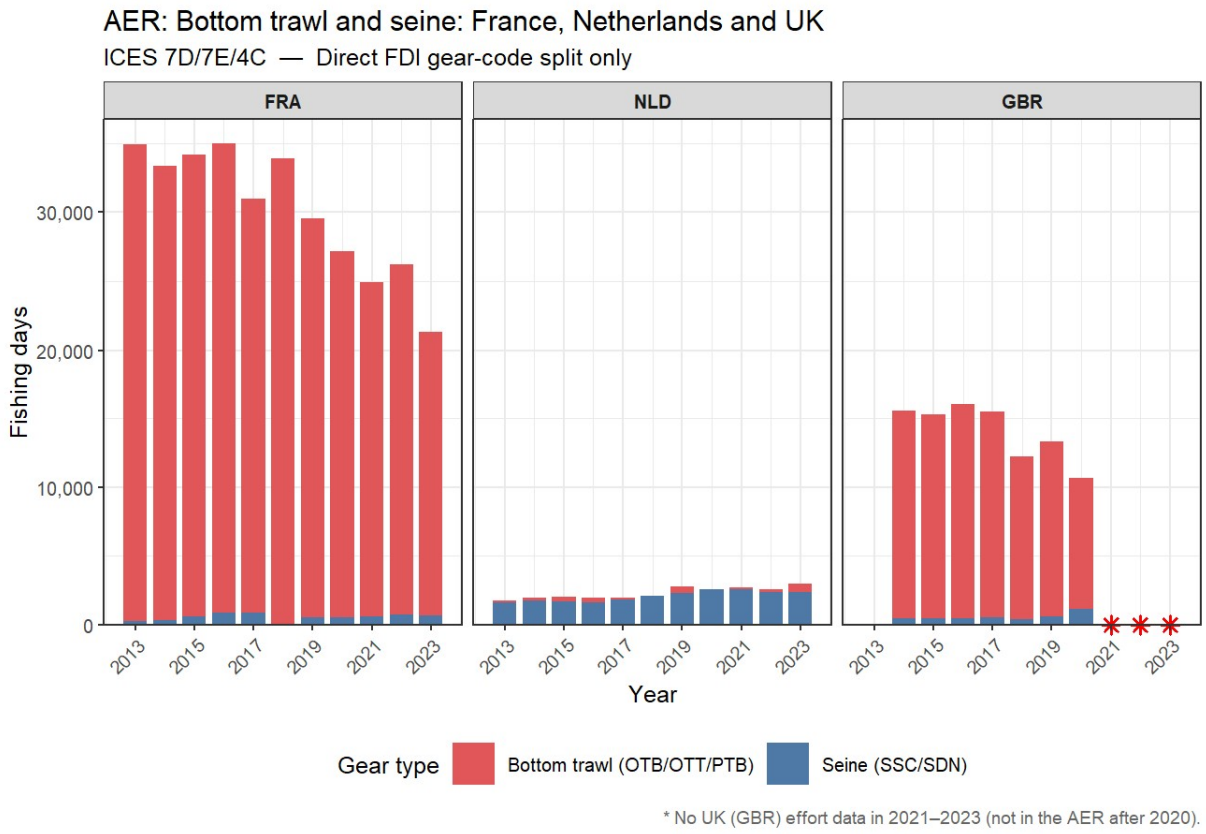



**Figure 14: Bottom trawl/seine fishing days disaggregated by gear code for France, the Netherlands and the UK (AER + FDI, 2013–2023). Direct FDI gear-code splits only. Asterisks: years without UK (GBR) effort data.**

### 3.2.6 Total GFW fishing days by year and flag state

GFW-derived fishing effort in the study area (Figure 15) shows a different trend from the AER data. The GFW effort showed a clear increasing trend, dominated by small vessels (S1 <100 GT), whose growing contribution drove much of the increase. This may partly reflect improving AIS coverage over time rather than a genuine increase in fishing activity.

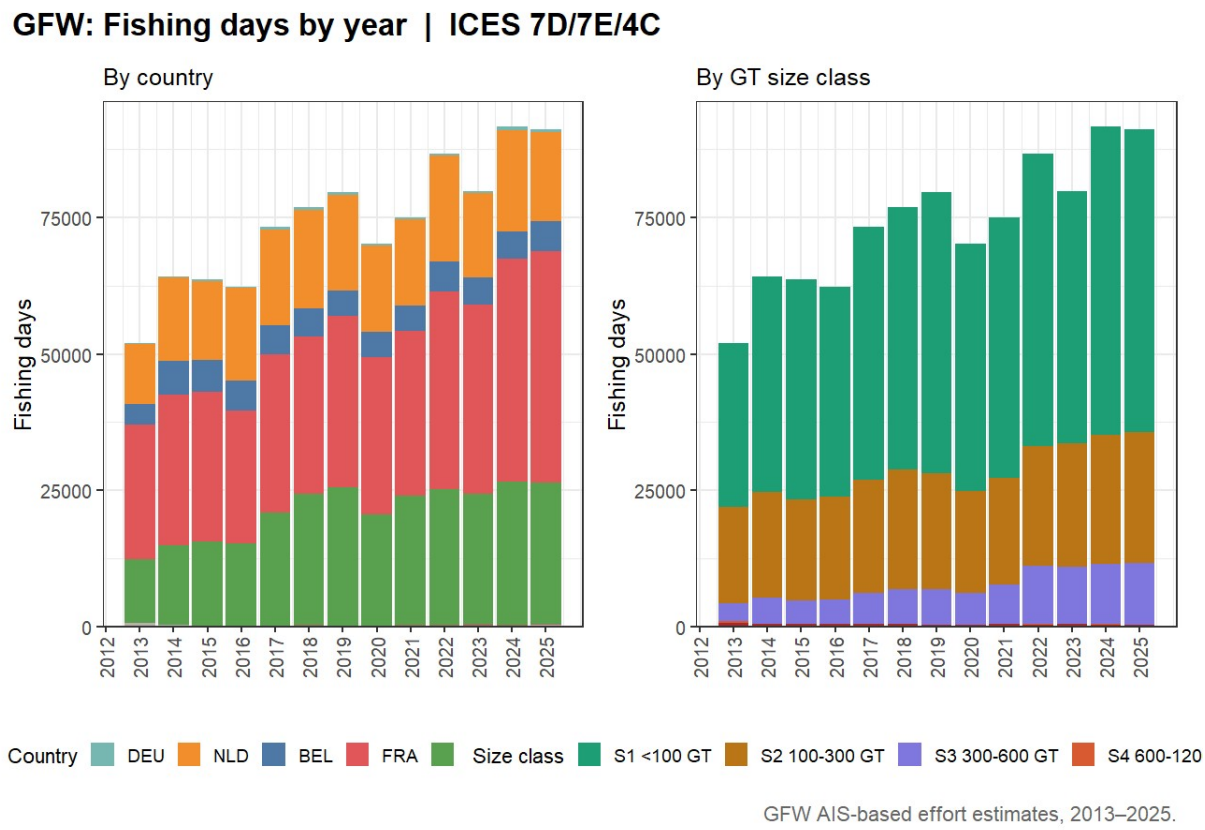



**Figure 15: Total GFW fishing days per year by country and vessel size class (ICES 7D/7E/4C, 2013–2025).**

The two data sources measure effort differently: AER reports administrative fishing days declared by Member States; GFW estimates fishing days from AIS vessel-tracking. Several factors can explain systematic differences between the two series:

- **Method for counting fishing days**: AER records one fishing day as any day on which a vessel is registered as fishing by its flag state; GFW counts a vessel-day as active when AIS-derived speed and movement patterns are classified as fishing behaviour. The two methods can disagree for the same vessel on the same day.
- **AIS coverage and adoption**: AIS was gradually mandated across the EU fleet between 2008 and 2014. Early years of the GFW series therefore under-represent vessels that did not yet carry AIS transponders, leading to lower GFW effort estimates before ~2014.
- **Small coastal vessels**: Vessels below ~15 m LOA are not required to carry AIS in many jurisdictions. This segment is captured in the AER (via logbook reporting) but largely absent from GFW, causing a structural undercount in GFW relative to AER for gears dominated by small vessels (e.g. pot/trap, gillnet).
- **Gear type assignment**: GFW classifies gear from registry information and AIS movement patterns; misclassification can shift effort between gear categories when comparing with AER gear-specific totals.
- **Spatial attribution**: AER effort is attributed to the ICES division declared in the logbook; GFW effort is attributed to the GPS position of the fishing event. In boundary areas the two can differ.

## 3.3 Spatial patterns in fishing effort (GFW)

This section describes where fishing takes place in the study area, how the distribution of the main national fleets changed after Brexit, and how concentrated the fishing effort is. It is based on the GFW data, which mainly represent the larger vessels that carry AIS (Section 2.4).

### 3.3.1 Spatial distribution of fishing events

Although the GFW data cannot be used as an indicator of total fishing effort, the spatial distributions can still be used to assess the spatial patterns in the fishing operations. Figure 16 shows a sample of all fishing events, coloured by country, and Figure 17 the same per year. The French effort was spread broadly in 7D and 7E, with strongest concentrations in the Baie de Seine and Pas de Calais. UK effort was concentrated in the northern parts of 7D and 7E, while Dutch effort was mostly concentrated in the southern North Sea (4C).

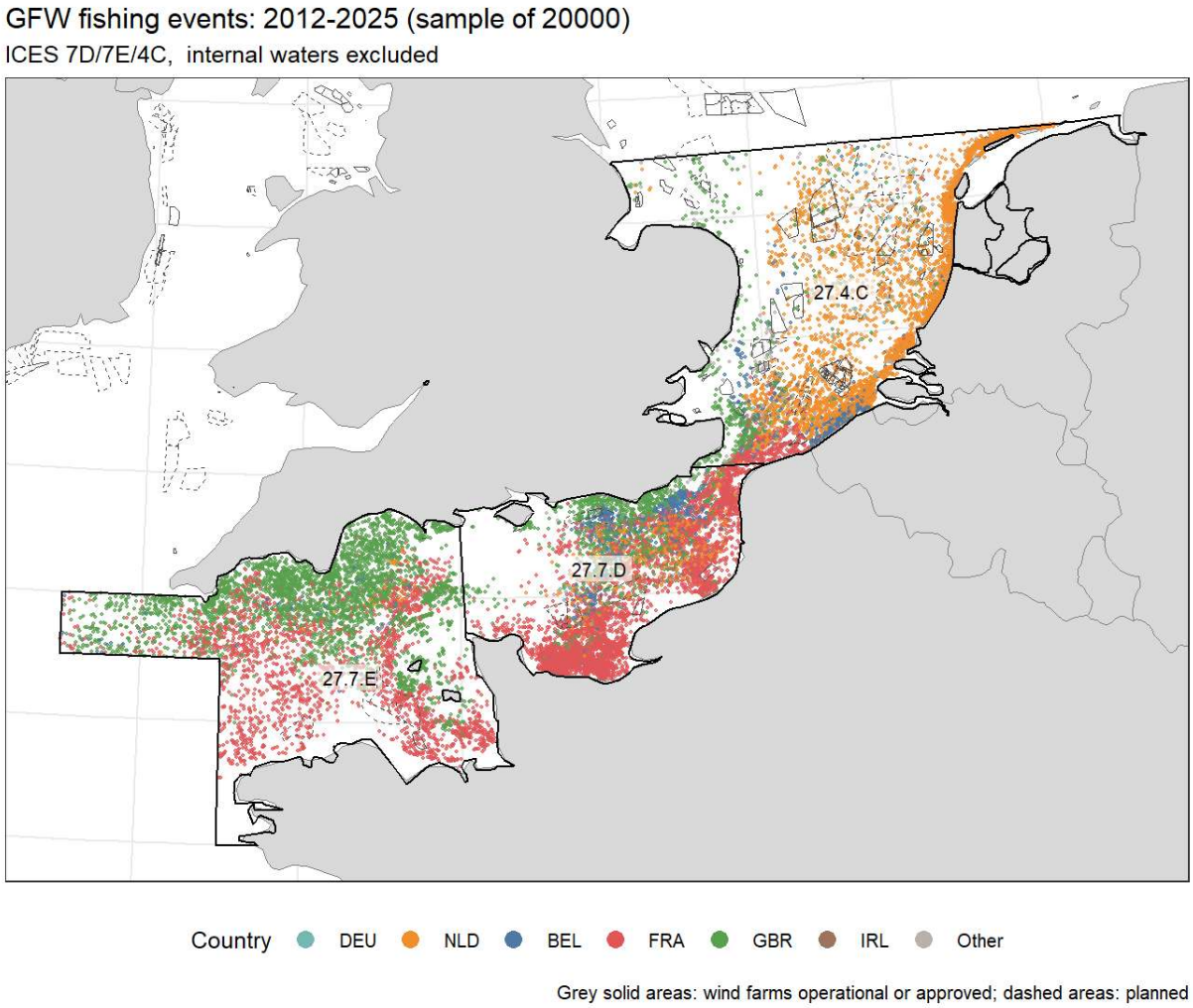



**Figure 16: Spatial distribution of GFW fishing events (random sample of 20,000), all years combined, coloured by country. ICES 7D/7E/4C.**

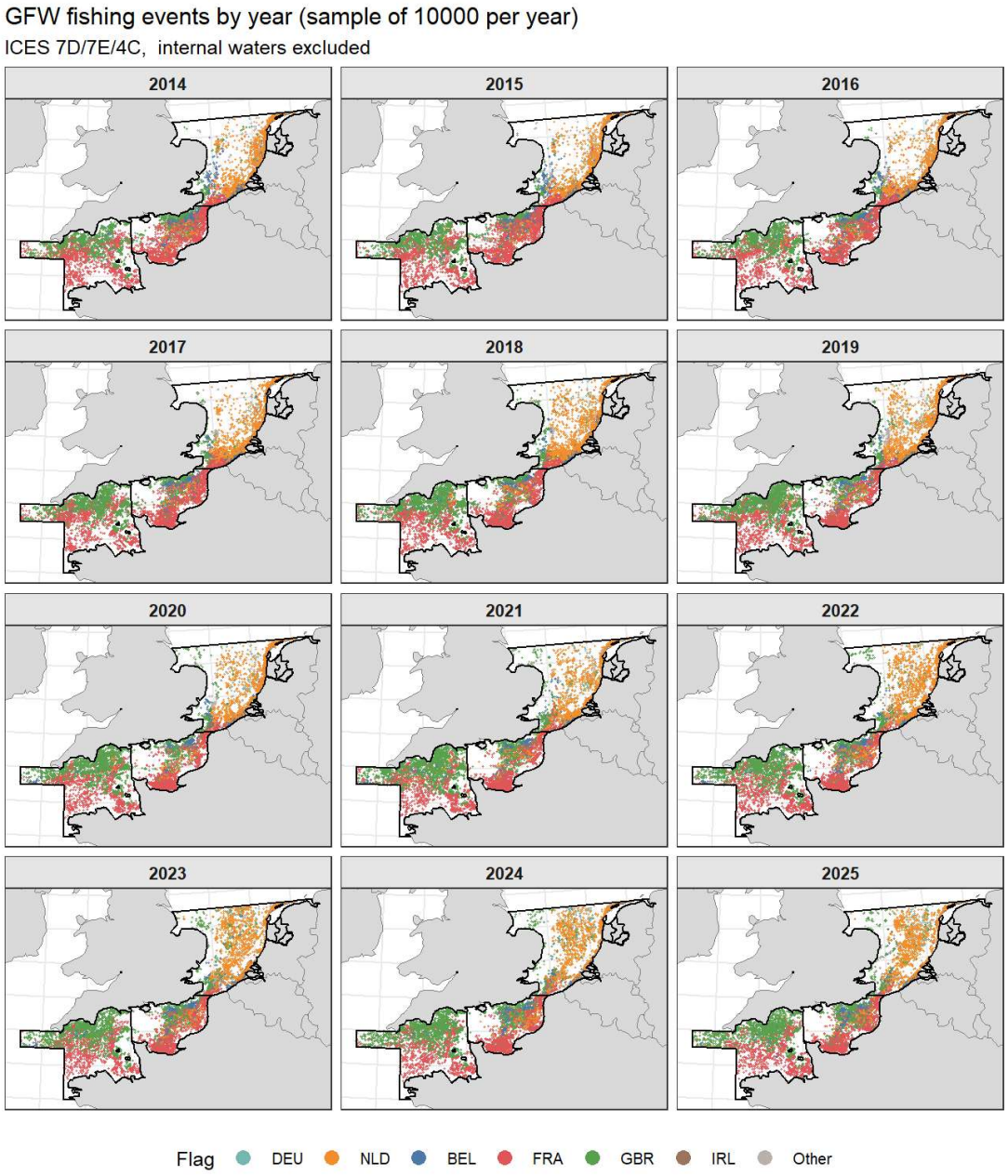



**Figure 17: Spatial distribution of GFW fishing events by year (random sample of 10,000 per year), coloured by country. ICES 7D/7E/4C.**

The kernel density maps (Figure 18) convert the fishing event locations into a continuous surface of effort intensity, normalised within each year (Section 2.4). This makes the annual maps comparable in terms of spatial pattern, but means that absolute effort levels cannot be compared between years: a year with low total effort and a year with high total effort will both have cells reaching 1.0. The southern part of 4C, the Pas de Calais and Baie de Seine showed the highest effort densities, reflecting the concentration of bottom trawl, dredge and beam trawl activities.

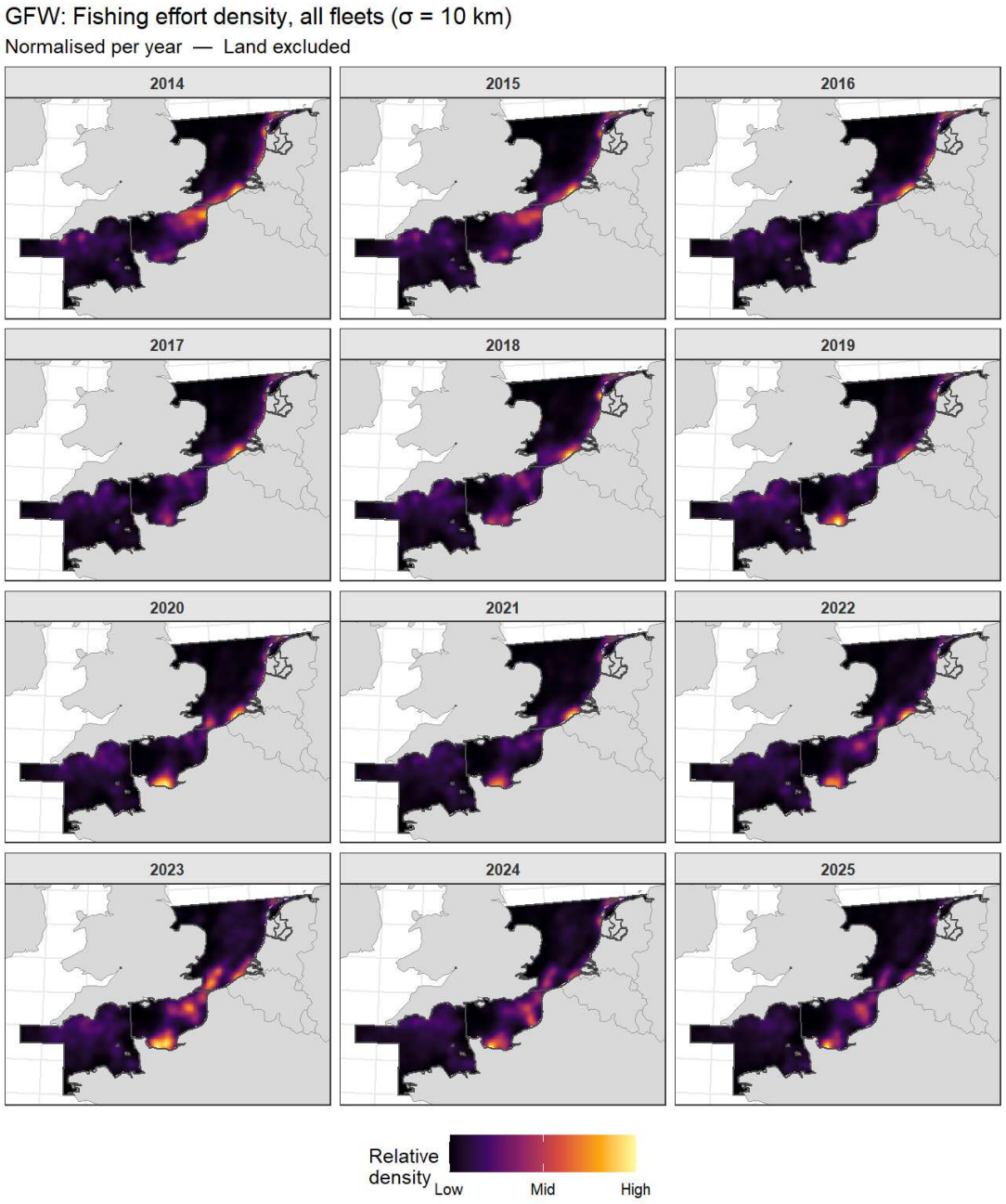



**Figure 18: Kernel density of GFW fishing effort for all fleets combined, faceted by year. Bandwidth σ = 10 km. Density normalised within each year (0 = low, 1 = high).**

### 3.3.2 Spatial distribution before and after Brexit

Figure 19 compares the spatial distribution of the main national fleets (FRA, GBR, NLD, BEL) before Brexit (2014–2020) and after the start of the EU–UK Trade and Cooperation Agreement (2021–2025). The density is expressed as the share of each period's events, so the comparison is not affected by the number of years in each period or by the growth in AIS-recorded events over time. The French effort became more concentrated in the Baie de Seine after

Brexit. The UK effort became slightly more diffuse and the Dutch effort became more concentrated in a smaller part of 4C.

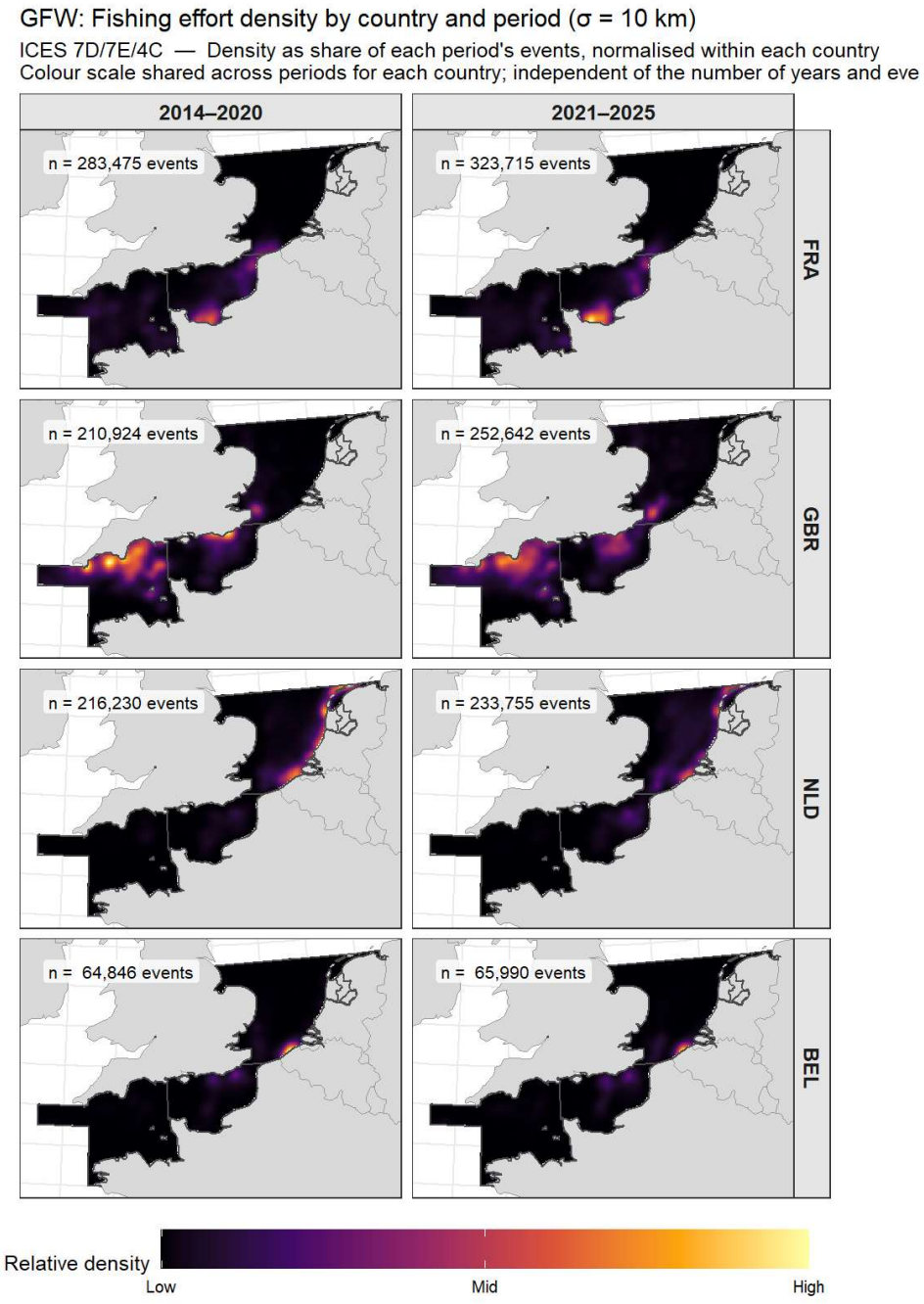



**Figure 19: Kernel density of GFW fishing effort by country (rows) before and after Brexit (columns). Bandwidth σ = 10 km. Density as share of each period's events, normalised within each country, so that the panels are independent of the number of years and events per period (0 = low, 1 = high).**

### 3.3.3 Spatial concentration of fishing effort

Two complementary metrics are used to quantify the spatial concentration of fishing effort across the 5 km × 5 km grid cells covering the study area.

The **Gini coefficient** is a standard inequality measure borrowed from economics, adapted here to quantify the unevenness of effort across grid cells. It ranges from 0 to 1: a value of 0 means fishing effort is spread perfectly uniformly across all cells; a value of 1 means all effort is concentrated in a single cell. In practice, fishing effort is always somewhat concentrated. Values above 0.7 indicate strong spatial concentration in a small number of areas, while values below 0.5 suggest a relatively dispersed fleet. A rising Gini over time indicates that the fleet is progressively concentrating in fewer locations.

The **top-10% cell share** is a more intuitive companion metric: it asks what percentage of the total annual fishing events falls within the 10% of grid cells that were most intensively fished that year. If effort were uniform, this would be exactly 10%. In practice values of 40–70% are common in concentrated fisheries, meaning that a small fraction of the available sea area absorbs the majority of fishing pressure. Together, the two metrics capture different aspects of spatial concentration: the Gini summarises the full distribution of effort, while the top-10% share focuses specifically on the most intensively exploited areas.

For all fleets combined (Figure 20), the Gini coefficient for ICES 7D/7E/4C ranged from 0.59–0.63 in 2012–2015 to 0.62–0.64 in 2021–2025. The proportion of total effort in the most-fished 10% of cells was 45–48% in 2012–2015 and 48–50% in 2021–2025, with a peak of 52% in 2020. The fishing effort became more concentrated, with a very slight peak around 2020 (post-Brexit access uncertainty and COVID-19) and values remaining somewhat above the pre-2015 levels.

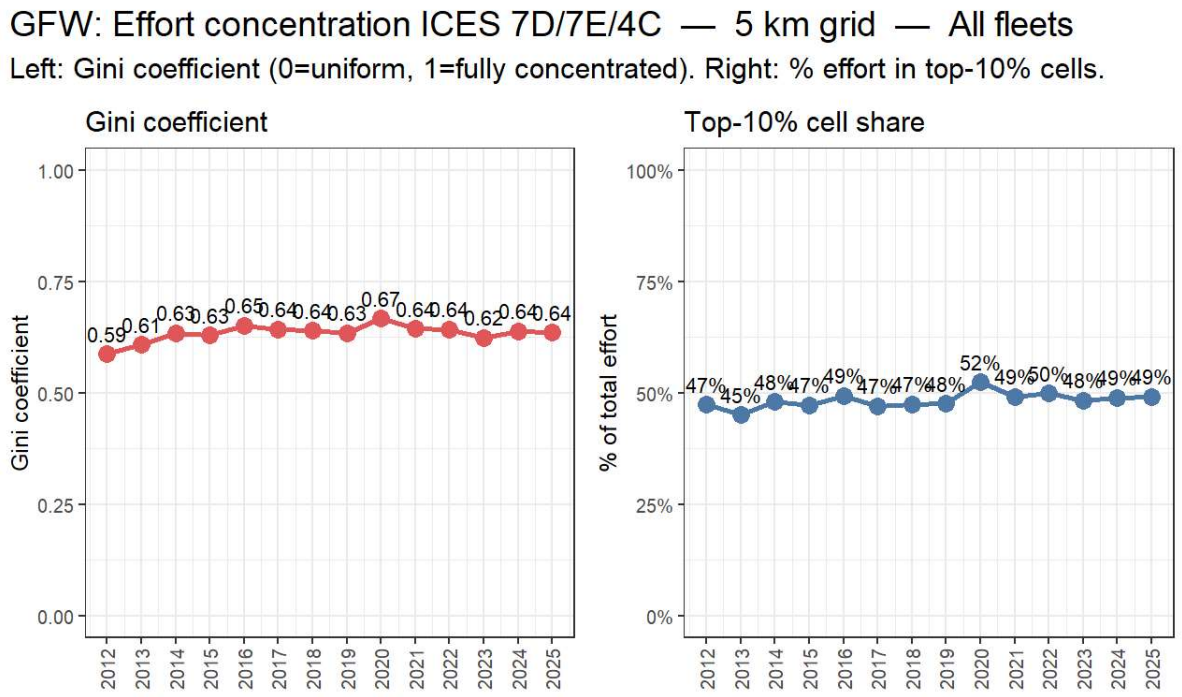



**Figure 20: Spatial concentration of GFW fishing effort in ICES 7D/7E/4C, all fleets: Gini coefficient (left) and percentage of total effort in the top-10% most-fished 5 km grid cells (right), 2013–2025.**

### 3.3.4 Limitations of effort-based concentration metrics

The spatial concentration metrics presented above are based on GFW fishing event counts, which approximate the number of vessel-days in each grid cell. This is a measure of effort intensity in time. It does not account for the area of seabed swept per fishing event. That area varies considerably between gear types and is an important dimension of fishing impact that vessel-day counts alone cannot reveal. In addition, the increase in AIS coverage over time may affect the spatial concentration metrics.

These limitations are particularly relevant for the study area, where beam trawl, otter trawl and flyshoot fleets operate side by side. The FDI gear split in Section 3.2.5 shows the contribution of flyshoot (SSC/SDN) relative to conventional otter trawl (OTB) over the 2013–2023 period. These two gear types have very different relationships between fishing time and seabed area contacted.

Eigaard et al. (2017) estimated trawling intensity at both surface and subsurface levels from VMS and logbook data across European waters. They found that subsurface trawling intensities are generally much lower than surface intensities. The exception is beam trawl and dredge fisheries, where surface and subsurface contact areas are approximately equal because the heavy gear penetrates the sediment consistently across the full gear width. The Channel and southern North Sea show relatively high subsurface footprints largely for this reason.

For flyshoot, the relationship between surface and subsurface disturbance is different. The surface footprint is large while the subsurface disturbance is relatively low. Long ropes are deployed and retrieved across a wide area of seabed during the encircling phase of each set. The net footrope itself contacts a considerably smaller area with limited sediment penetration. A simple comparison of vessel-days between flyshoot and otter trawl therefore understates the surface seabed area contacted per vessel-day by flyshoot, while overstating its subsurface impact relative to beam trawl.

# 4 Channel fisheries context: literature review

This section places the quantitative results from Section 3 in the broader context of the Channel fisheries literature. It draws on ICES WGCSE, STECF, Ifremer, MMO and peer-reviewed sources (see Section 2.5 for the literature selection approach).

## 4.1 Fleet composition and dominant gear types

The Channel (7D and 7E) and the southern North Sea (4C) are among the most diverse and intensively fished areas in Europe. The French fleet dominates total effort in the study area, contributing over 53% of total AER fishing days in most years (ICES, 2025a; Ifremer, 2025), consistent with the AER results in Figure 9, which show France as the largest contributor. Bottom trawl/seine gears account for the largest share of demersal fishing effort, targeting mixed assemblages of flatfish, cephalopods and small pelagics. The Dutch flyshoot fleet expanded slightly through the 2010s (Quirijns et al., 2020), a trend also visible in the AER series (Figure 14). Dutch and Belgian beam trawl effort has declined substantially since the mid-2000s under pressure from fuel costs and quota restrictions (ILVO, 2022), consistent with the low and declining Dutch and Belgian effort in the beam trawl panels throughout the AER figures.

The scallop dredge fishery is concentrated in the Baie de Seine (7D) and the western Channel (7E), dominated by the French and UK fleets. Scallop landings from the Baie de Seine reached a record ~48,000 t in 2024–2025 (Varenne & Foucher, 2025). MSC certification has been granted for the Baie de Saint-Brieuc fishery (2022) and the Baie de Seine fishery (2024), covering the majority of French Channel scallop production (MSC, 2024). The landings data (Figures 3, 6, 7 and 8) confirm scallops as one of the highest-tonnage species groups, dominated by the French dredge fleet.

Pot and trap fisheries targeting whelk (*Buccinum undatum*), crab and lobster are important to UK coastal communities, though the AER series shows limited representation of this segment at the fleet level. The whelk fishery in the Channel has grown markedly since the mid-2010s, driven by Asian export demand (MMO, 2023).

## 4.2 Historical effort trends and structural change

Total fishing effort in the study area has declined substantially since the early 2000s, consistent with EU fleet capacity reduction programmes and quota restrictions under successive CFP reforms. The AER series (2008–2023) shows a general downward trend in fishing days for bottom trawl/seine and beam trawl across the major countries (Figure 10), with the Dutch demersal trawl/seine fleet being an exception showing some growth through the 2010s before stabilising after 2020. This is consistent with Quirijns et al. (2020) and STECF (2025a).

Post-Brexit disruption from 2021 onwards has reshaped fleet access in the Channel and southern North Sea. UK licensing restrictions have reduced French, Belgian and Dutch access to UK waters in 7D and 7E, driving spatial redistribution towards French EEZ waters (Phillipson & Symes, 2018; House of Lords, 2022). This structural shift may contribute to the changes in spatial effort patterns visible in the GFW maps (Figures 18 and 19), with French effort concentrating in the Baie de Seine, in the southern (French EEZ) part of 7D. Post-Brexit bilateral agreements and access negotiations between the EU Member States and the UK may continue to shape fleet access patterns in the Channel.

## 4.3 Stock status of key target species

Table 4 summarises the assessment and advice status for the principal commercial stocks in the Channel. Stocks are grouped by the ICES working group responsible for their assessment. Note that several species caught in the Channel, particularly cephalopods, do not have formal ICES assessments or TAC-based management; these are indicated accordingly.

**Table 4: Principal commercial stocks in the Channel and southern North Sea: responsible ICES working group, assessment type, F/SSB status relative to reference points, TAC status and key notes. FMSY = fishing mortality at maximum sustainable yield; Bpa = precautionary biomass reference point; WG = working group. Status characterisations based on most recent available ICES advice (2025 cycle).**

| Species | Common name | Stock/area | ICES WG | Assessment type | F vs FMSY | SSB vs Bpa | TAC | Notes |
|---|---|---|---|---|---|---|---|---|
| ***Solea solea*** | Common sole | 27.7.e | WGCSE | Analytical | F < FMSY | SSB > Bpa | Yes | Stock well above MSY Btrigger (ICES, 2025a) |
| | | 27.7.d | WGCSE | Analytical | F > FMSY | SSB < Bpa | Yes | Declining; below safe limits (ICES, 2025a) |
| | | 27.4.c | WGNSSK | Analytical | F > FMSY | SSB < Bpa | Yes | Part of NS sole stock (ICES, 2025c) |
| ***Pleuronectes platessa*** | European plaice | 27.7.e | WGCSE | Biomass index only | | | Yes | Harvest rate declining (ICES, 2025a) |
| | | 27.7.d | WGCSE | Analytical | F > FMSY | SSB < Bpa | Yes | Stock below Blim (ICES, 2025a) |
| | | 27.4.c | WGNSSK | Analytical | F < FMSY | SSB > Bpa | Yes | Part of NS plaice stock that is well above Bpa (ICES, 2025c) |
| ***Lepidorhombus spp.*** | Megrim | 27.7.d/e | WGCSE | Analytical | F < FMSY | SSB > Bpa | Yes | Part of larger Bay of Biscay and Celtic Sea stock (ICES, 2025a) |
| ***Merlangius merlangus*** | Whiting | 27.7.e | WGCSE | Analytical | F > FMSY | SSB << Blim | Yes | Zero catch advice (ICES, 2025a) |
| | | 27.7.d/27.4.c | WGNSSK | Analytical | F << FMSY | SSB >> Bpa | Yes | Part of North Sea stock (ICES, 2025a) |
| ***Lophius spp.*** | Monkfish | 27.7.d/e | WGCSE | Analytical | F < FMSY | SSB > Bpa | Yes | Part of larger stock area. Stock increasing (ICES, 2025a) |
| ***Dicentrarchus labrax*** | Sea bass | 27.4.c, 27.7.d/e | WGCSE | Analytical | F < Fmsy | SSB > Bpa | Yes | Part of larger stock. Stock is increasing (ICES, 2025a) |
| ***Trachurus trachurus*** | Horse mackerel | 27.4.c, 27.7.d | WGWIDE | Analytical | - | SSB << Blim | Yes | Part of larger North Sea stock. Zero catch advice (ICES, 2025e) |
| | | 27.7.e | WGWIDE | Analytical | F < Fmsy | SSB ~ Bpa | Yes | Part of larger Western stock (ICES, 2025e) |
| ***Scomber scombrus*** | Atlantic mackerel | NE Atlantic | WGWIDE | Analytical | F > FMSY | SSB ~ Blim | Yes | Disputed; quota conflict EU/UK/NO/IS (ICES, 2025e) |
| ***Pecten maximus*** | King scallop | 27.7.d Baie de Seine | Ifremer | Biomass survey | - | Recovering | No | Record 2025-25 season; MSC certified Nov 2025 |
| | | 27.7.e western | MMO/Cefas | Biomass survey | - | Declining | No | UK MMO concern; closures possible 2026-27 |
| ***Sepia officinalis*** | Common cuttlefish | 27.7.d/e, 27.4.c | WGCEPH | Biomass survey | - | Increasing | No | High interannual variability (ICES, 2025d) |
| ***Loligo vulgaris*** | European squid | 27.7.d/e | WGCEPH | Biomass survey | - | Increasing | No | No formal assessment (ICES, 2025d) |
| ***Chelidonichthys spp.*** | Gurnards | Channel/NS | None | Not assessed | - | - | No | Bycatch species; no TAC |
| ***Buccinum undatum*** | Common whelk | 27.7.d/e | None | Not assessed | - | - | No | UK export fishery; no ICES assessment |
| ***Mullus surmuletus*** | Striped red mullet | 27.4.c, 27.7.d/e | WGNSSK | Biomass index | - | Increasing | No | Limited assessment capacity (ICES, 2025a) |

## 4.4 Fisheries for squid

Squid has emerged as an increasingly important non-quota target species in the Channel and southern North Sea, particularly for the Dutch flyshoot fleet. The Dutch fleet, initially the flyshooters and more recently otter trawlers and beam trawlers, has increasingly targeted squid during winter, driven by high profitability, the need for fleet diversification, and the absence of quota restrictions. While the common squid (*Loligo vulgaris*) was once restricted to the English Channel, it is now turning up in large numbers in the southern North Sea, with Dutch fishermen fishing intensively for this species over the past five years. Brunel et al. (2025) provide a comprehensive characterisation of the Dutch squid fishery, documenting the fleet composition, seasonal and spatial dynamics of effort and landings, bycatch species composition, and stock assessment approaches for both *Loligo vulgaris* and *L. forbesii* in the Channel and southern North Sea. The English Channel has the highest long-finned squid landings in the Northeast Atlantic, making squid one of the most valuable resources exploited by demersal fisheries in this area.

Cephalopods in the Channel and southern North Sea, principally *Loligo vulgaris*, *L. forbesii*, common cuttlefish (*Sepia officinalis*) and horned octopus (*Eledone cirrhosa*), differ fundamentally from conventional fish stocks in their population dynamics (Van de Pol et al., 2025). They are semelparous, have life cycles of approximately one year, grow extremely fast and show high natural mortality, meaning annual stock size is almost entirely determined by recruitment success rather than spawning stock size. Abundance can therefore fluctuate dramatically between years in ways that make conventional MSY-based management approaches largely unsuitable. Both *Loligo* species have expanded their distribution northward into the southern North Sea in recent decades as water temperatures have risen, and survey data confirm a clear increase in their abundance since the mid-2010s. Despite their growing commercial importance, with cuttlefish and squid together representing a substantial share of the landings in the eastern Channel and southern North Sea, no formal stock assessments or TACs exist for any of these species. Van de Pol et al. (2025) conclude that cephalopods currently operate without the biological safeguards applied to quota species and recommend development of assessment methods for *L. vulgaris* and *S. officinalis*.

## 4.5 Ecosystem effects and sustainability

The seabed disturbance footprint of the Channel and southern North Sea fisheries has been studied in the context of broader European assessments. Eigaard et al. (2017) estimated trawling intensity at surface and subsurface levels from VMS and logbook data across European shelf waters. They found that the relatively high subsurface footprint in the southern North Sea, Irish Sea, Celtic Sea and the Channel is largely due to the trawling activities of beam trawl and dredge fisheries, which have similar surface and subsurface contact areas. For most other bottom trawl types, subsurface intensities are much lower than surface intensities because gear components penetrate the sediment only shallowly. This distinction between surface and subsurface disturbance is important for evaluating the relative ecological impact of different gear types operating in the Channel. Comparisons between gear types show that Danish seine (flyshoot) has a large surface footprint due to the ropes deployed during the encircling phase, but a considerably smaller subsurface footprint (Eigaard et al., 2016a,b), while beam trawl has similar surface and subsurface contact areas due to the deep penetration of tickler chains and beam shoes (Depestele et al., 2016).

Bycatch and discards in the study area's mixed fisheries remain a management concern under the EU landing obligation (in force since 2019), though exemptions for high-survival species and *de minimis* provisions have reduced the practical scope of the obligation for many fleets (ICES, 2025a). The flyshoot fishery is generally considered to have moderate bycatch rates compared to other demersal gears, though species composition of the bycatch varies considerably with area and season (Quirijns et al., 2020).

# 5 Discussion & Synthesis

## 5.1 Effort trends

Total fishing effort of the EU fleets in the study area changed by -32% between 2008 and 2023. An important driver is the decline of the French bottom trawl/seine and gillnet effort. France dominates the effort picture, with 53% of the AER fishing days in 2008–2020, against 33% for the UK and 14% for all other countries combined. Within the bottom trawl/seine category, conventional otter trawl (OTB/OTT/PTB) accounts for 86–95% of the fishing days and seine/flyshoot (SSC/SDN) for 5–14%. Within this category, France and the UK fish almost entirely with otter trawls, while the Dutch fleet fishes predominantly with flyshoot gear. Outside it, the Dutch and Belgian fleets fish mainly with beam trawls, with vessels of 24 m and over. Although small in absolute terms, the Dutch fleet accounts for 63% of the seine days in the area, with France at 17% and the UK at 11%.

The effort in these analyses has been measured in fishing days, because other metrics were not consistently available. That may affect the interpretation of the effort trends shown. For example, a flyshoot haul encloses a larger area of seabed than an otter trawl, but with lighter bottom contact. Fishing days therefore do not capture differences in seabed footprint between gears. Area swept per fishing day, based on gear-specific coefficients (Eigaard et al., 2017), would be a more meaningful measure of spatial impact.

## 5.2 Landings trends

Landings from the area (in volume) are dominated by great atlantic scallop, atlantic herring, tangle. The landings differ clearly between the divisions: pelagic fish were mainly taken in 7D and increasingly in 4C, seaweeds only in 7E, scallops in 7D and 7E, and flatfish and shrimps mostly in 4C. Roundfish and flatfish landings have declined sharply. Scallop landings increased since 2016, supported by record biomass in the Baie de Seine (Varenne & Foucher, 2025). Cuttlefish and squid landings have increased in recent years, but remain small relative to other landings.

## 5.3 Contribution of the UK fleet

UK effort is available from the AER up to 2020, but not for the years after, so the post-Brexit fishing pressure of UK vessels cannot be expressed in fishing days. Over 2020–2023, UK and Channel Islands vessels accounted for 19% of the landings from the study area.

## 5.4 Fleets and spatial patterns

There are indications that the main fishing grounds of the national fleets in the study area have changed after Brexit. The GFW data show persistent fishing hotspots in the southern part of 4C, the Pas de Calais and the Baie de Seine. French effort is spread broadly over 7D and 7E, UK effort is concentrated in the northern parts of 7D and 7E, and Dutch effort is mostly concentrated in 4C. After Brexit, French effort became more concentrated in the Baie de Seine and Dutch effort in a smaller part of 4C, while UK effort became slightly more diffuse. Spatial concentration for all fleets combined changed slightly from a Gini coefficient of 0.59–0.63 in 2012–2015 to 0.62–0.64 in 2021–2025, and the share of effort in the top-10% of grid cells from 45–48% to 48–50%. Changes in spatial distribution around the time of Brexit are consistent with the altered access conditions under the Trade and Cooperation Agreement (European Commission, 2021). However, the data cannot show whether such changes result from formal licensing, informal avoidance of previously used grounds, or other factors such as changes in target species or AIS coverage.

## 5.5 Use and limitations of the data sources

The AER and GFW series measure effort in fundamentally different ways (logbook declarations versus AIS-derived vessel-days) and are not comparable in absolute terms. Differences in trend between the two series are explained by improving AIS coverage over the early years of the GFW series and by the under-representation in GFW of small inshore vessels below the AIS carriage threshold. The AER therefore provides the authoritative time series of effort and landings by fleet segment, and GFW provides the spatial resolution of within-division distributions, national fishing grounds and shifts in spatial patterns. The FDI data were used only to split the AER bottom trawl/seine category by gear code. Confidentiality suppression and EU-aggregated landings precluded their use as a primary source (STECF, 2025b).

The lack of UK effort data after Brexit creates a gap in the effort analyses, as the recent trends cannot be fully compared with historical data.

All data used here are aggregated at fleet-segment and annual level, or (GFW) at the level of fishing events. They are suited to detecting structural trends, but not to assessing compliance with management measures or bilateral agreements, which would require vessel-level logbook or VMS data. The gear split does provide a quantitative baseline against which future changes in gear composition, for example in response to gear specifications in bilateral agreements, can be assessed.

# 6 Conclusions & Recommendations

## 6.1 Conclusions

1. Fishing effort of the EU fleets in the study area changed by -32% between 2008 and 2023, mainly through the decline of the French bottom trawl/seine and gillnet effort. Over the years in which UK effort data were available (2008-2020), the fishing effort of all fleets declined by 28%. During that period, France has the highest effort (53%), followed by UK (33%).
2. The national fleets are specialised by gear and vessel size: the French fleet mainly fishes with bottom trawl/seine, dredge, gillnet, pot/trap and Other/mixed gear with vessels of 10–24 m, the UK fleet has a large share of under-10 m vessels, and the Dutch and Belgian fleets mainly fish with beam trawls with vessels of 24 m and over.
3. The flyshoot fishery is a small but stable component of the fisheries in the study area. The Dutch fleet is the main seine fleet.
4. The composition of the landings is changing: scallops and cephalopods are increasing and flatfish and roundfish are declining. Pelagic fish remain relatively stable and high, with an increasing share from 4C. The divisions differ clearly in their landings: seaweeds come only from 7E, scallops from 7D and 7E, and flatfish and shrimps mostly from 4C.
5. Post-Brexit spatial restructuring is visible from 2021, with changes in the distribution of the national fleets (French effort more concentrated in the Baie de Seine, Dutch effort in a smaller part of 4C) and a modest increase in spatial concentration.
6. The combination of AER, MMO, FDI and GFW data provides a multi-source baseline to compare the different fleets in the Channel and southern North Sea and to monitor future changes in fleet composition and spatial distribution.

## 6.2 Recommendations

1. **Obtain post-Brexit UK effort data.** UK effort data for 2021–2025 (fishing days, days at sea and kW-days by year, division, gear and vessel length) should be requested from the MMO, so that the UK fleet can be included in the effort trends after Brexit.
2. **Improve the gear split between otter trawl and seine.** Unsuppressed FDI data, or national logbook data by gear code, should be requested from the relevant Member States (in particular France and the Netherlands) to make the split of the AER bottom trawl/seine category more robust.
3. **Express effort as seabed footprint.** Area swept per fishing day should be quantified with gear-specific coefficients, using the ICES VMS data product, to compare the spatial impact of otter trawl and flyshoot.
4. **Update the series when new data become available.** The AER series should be extended to 2024 once the French data are published, and the UK series once the MMO publishes the 2025 data.

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# 8 Annexes

## 8.1 Annex A Data sources

| Dataset | Source | Period | Role in this report |
|---|---|---|---|
| STECF AER | STECF 25-07 | 2008–2023 | Effort and landings trends, EU fleets |
| STECF AER | STECF 21-08 | 2008–2020 | UK fleet effort and landings up to 2020 |
| UK landings | MMO | 2020–2024 | UK and Channel Islands landings after 2020 |
| STECF FDI | STECF 25-10 | 2013–2023 | Gear-code split of AER bottom trawl/seine |
| GFW vessel registry | GFW | 2013–2025 | Flag, gear type, GT |
| GFW Events API | GFW API v3 (gfwr 3.0) | 2013–2025 | Spatial analysis only |
| ICES/FAO shapefiles | ICES/FAO | – | ICES division polygons |

## 8.2 Annex B Supplementary tables

The tables below summarise the key data for the study area (ICES 7D/7E/4C), covering the period 2008–2023. The landings tables (B1–B3) combine the AER (STECF 25-07 & STECF 21-08) and the MMO data: UK landings up to 2020 come from the AER, from 2021 onwards and for the Channel Islands (CHI) from MMO. The effort tables (B4–B7) are based on the AER (and FDI for the gear split) only; no UK effort data are available after 2020, so GBR effort is shown as 0 from 2021 onwards and the totals for those years cover EU fleets only. Values are rounded for presentation; totals may not sum exactly due to rounding. The 2012 pelagic landings of the Netherlands in 4C (84,362 t) are excluded because of anomalously high values (Section 3.1). All weights in tonnes (live weight); effort in fishing days.

**Table B 1: Total landed weight (t) by year and country, all gears, ICES 7D/7E/4C (AER + MMO, 2008–2023).**

| Year | DEU | NLD | BEL | FRA | GBR | IRL | CHI | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| **2008** | 6,721 | 88,306 | 12,210 | 200,446 | 59,757 | 16 | 0 | 11,417 | 378,873 |
| **2009** | 5,850 | 88,242 | 11,108 | 165,163 | 60,741 | 346 | 0 | 10,705 | 342,155 |
| **2010** | 10,847 | 114,344 | 12,291 | 152,322 | 69,014 | 1,254 | 0 | 52,259 | 412,331 |
| **2011** | 9,317 | 81,173 | 10,213 | 175,964 | 71,865 | 127 | 0 | 26,241 | 374,900 |
| **2012** | 14,057 | 68,586 | 9,525 | 184,174 | 76,740 | 314 | 0 | 6,487 | 359,883 |
| **2013** | 16,456 | 93,429 | 10,086 | 185,100 | 81,105 | 503 | 0 | 26,052 | 412,731 |
| **2014** | 11,684 | 76,723 | 12,163 | 159,889 | 79,341 | 383 | 0 | 5,281 | 345,464 |
| **2015** | 16,466 | 71,923 | 11,207 | 164,368 | 74,916 | 681 | 0 | 49,225 | 388,786 |
| **2016** | 18,632 | 92,337 | 11,230 | 170,936 | 75,442 | 654 | 0 | 32,067 | 401,298 |
| **2017** | 12,213 | 103,892 | 10,205 | 171,468 | 73,792 | 1,171 | 0 | 7,995 | 380,736 |
| **2018** | 16,119 | 81,280 | 9,609 | 188,030 | 72,259 | 1,385 | 0 | 7,540 | 376,222 |
| **2019** | 13,512 | 73,921 | 7,983 | 173,135 | 78,729 | 1,295 | 0 | 12,395 | 360,970 |
| **2020** | 10,020 | 98,226 | 7,681 | 180,994 | 74,136 | 362 | 944 | 4,462 | 376,825 |
| **2021** | 7,830 | 102,112 | 6,883 | 191,330 | 73,271 | 1,298 | 773 | 4,705 | 388,202 |
| **2022** | 8,493 | 104,379 | 8,326 | 201,035 | 69,972 | 941 | 863 | 2,882 | 396,891 |
| **2023** | 8,245 | 77,565 | 7,086 | 181,641 | 73,424 | 2,641 | 623 | 3,858 | 355,083 |
| **Total** | **186,462** | **1,416,438** | **157,806** | **2,845,995** | **1,164,504** | **13,371** | **3,203** | **263,571** | **6,051,350** |

Selected gears: Bottom trawl/seine, Beam trawl, Dredge, Other/mixed.

**Table B 2: Total landed weight (t) by year and country, selected gears (Bottom trawl/seine, Beam trawl, Dredge, Other/mixed), ICES 7D/7E/4C (AER + MMO, 2008–2023).**

| Year | DEU | NLD | BEL | FRA | GBR | IRL | CHI | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| **2008** | 6,609 | 87,881 | 12,210 | 162,266 | 41,705 | 16 | 0 | 11,346 | 322,033 |
| **2009** | 5,658 | 87,702 | 11,108 | 128,091 | 43,540 | 346 | 0 | 10,700 | 287,145 |
| **2010** | 10,641 | 113,854 | 12,291 | 118,771 | 49,254 | 1,254 | 0 | 52,251 | 358,316 |
| **2011** | 9,146 | 80,822 | 10,213 | 137,903 | 51,480 | 127 | 0 | 26,239 | 315,930 |
| **2012** | 13,840 | 68,312 | 9,525 | 147,623 | 53,155 | 314 | 0 | 6,252 | 299,021 |
| **2013** | 16,316 | 92,769 | 10,086 | 146,857 | 56,547 | 503 | 0 | 26,042 | 349,120 |
| **2014** | 11,560 | 76,450 | 12,163 | 124,855 | 52,824 | 383 | 0 | 5,277 | 283,512 |
| **2015** | 16,384 | 71,753 | 11,207 | 133,205 | 51,149 | 679 | 0 | 49,219 | 333,596 |
| **2016** | 18,582 | 92,176 | 11,230 | 131,012 | 49,351 | 654 | 0 | 32,061 | 335,066 |
| **2017** | 12,161 | 103,664 | 10,205 | 135,048 | 50,103 | 1,169 | 0 | 7,994 | 320,344 |
| **2018** | 16,064 | 81,034 | 9,609 | 148,324 | 48,629 | 1,384 | 0 | 7,426 | 312,470 |
| **2019** | 13,452 | 73,675 | 7,983 | 133,378 | 53,549 | 1,292 | 0 | 12,395 | 295,724 |
| **2020** | 10,010 | 97,658 | 7,681 | 140,221 | 47,253 | 362 | 333 | 4,462 | 307,980 |
| **2021** | 7,826 | 101,972 | 6,883 | 152,972 | 51,141 | 1,298 | 334 | 4,705 | 327,131 |
| **2022** | 8,493 | 104,240 | 8,326 | 166,735 | 51,305 | 940 | 467 | 2,877 | 343,383 |
| **2023** | 8,243 | 77,463 | 7,086 | 152,509 | 54,210 | 2,641 | 305 | 3,856 | 306,313 |
| **Total** | **184,985** | **1,411,425** | **157,806** | **2,259,770** | **805,195** | **13,362** | **1,439** | **263,102** | **5,097,084** |

Selected gears: Bottom trawl/seine, Beam trawl, Dredge, Other/mixed. Species groups as defined in Section 2.1.2.

**Table B 3: Total landed weight (t) by year for the 10 species groups with the highest landings (other groups combined as Other), all countries, selected gears (Bottom trawl/seine, Beam trawl, Dredge, Other/mixed), ICES 7D/7E/4C (AER + MMO, 2008–2023).**

| Year | Pelagic fish | Scallops | Sea-weeds | Flat-fishes | Shellfish & crus-taceans | Round-fish | Shrimps | Cuttle-fish | Elasmo-branchs | Gur-nards | Other | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2008** | 96,352 | 37,160 | 44,200 | 38,375 | 20,414 | 20,013 | 16,973 | 9,440 | 9,168 | 6,157 | 23,781 | 322,033 |
| **2009** | 78,694 | 37,456 | 29,379 | 41,449 | 13,202 | 25,799 | 21,015 | 5,116 | 8,505 | 5,894 | 20,637 | 287,146 |
| **2010** | 144,463 | 43,069 | 17,522 | 42,983 | 13,857 | 21,952 | 14,743 | 8,979 | 8,514 | 6,142 | 36,092 | 358,316 |
| **2011** | 94,501 | 46,435 | 29,736 | 39,750 | 21,889 | 24,072 | 11,215 | 7,917 | 8,618 | 6,589 | 25,208 | 315,930 |
| **2012** | 68,633 | 41,312 | 47,345 | 40,001 | 16,612 | 27,664 | 10,843 | 12,142 | 8,175 | 6,920 | 19,373 | 299,020 |
| **2013** | 112,979 | 41,113 | 48,425 | 42,271 | 20,167 | 17,661 | 16,986 | 7,907 | 8,432 | 7,150 | 26,029 | 349,120 |
| **2014** | 72,464 | 32,625 | 35,520 | 40,656 | 20,209 | 16,702 | 19,535 | 5,904 | 8,780 | 7,445 | 23,670 | 283,510 |
| **2015** | 112,016 | 33,085 | 40,210 | 35,568 | 20,922 | 17,911 | 14,895 | 10,819 | 8,948 | 7,830 | 31,390 | 333,594 |
| **2016** | 128,332 | 35,017 | 37,516 | 35,780 | 14,432 | 16,988 | 17,140 | 9,153 | 9,104 | 8,661 | 22,944 | 335,067 |
| **2017** | 88,542 | 44,270 | 40,711 | 32,028 | 15,114 | 21,601 | 12,282 | 11,938 | 8,251 | 7,984 | 37,624 | 320,345 |
| **2018** | 82,519 | 50,988 | 44,623 | 30,329 | 19,466 | 14,527 | 22,798 | 7,955 | 9,611 | 7,231 | 22,425 | 312,472 |
| **2019** | 78,322 | 48,883 | 37,398 | 25,299 | 22,699 | 13,680 | 14,567 | 10,272 | 9,933 | 6,273 | 28,399 | 295,725 |
| **2020** | 85,542 | 44,706 | 53,126 | 22,415 | 22,123 | 11,281 | 15,301 | 9,044 | 10,136 | 6,163 | 28,142 | 307,979 |
| **2021** | 83,724 | 58,737 | 55,399 | 20,111 | 26,475 | 11,502 | 13,038 | 6,731 | 9,968 | 5,876 | 35,571 | 327,132 |
| **2022** | 78,030 | 65,679 | 57,865 | 17,329 | 35,949 | 10,265 | 14,160 | 11,876 | 9,868 | 6,106 | 36,256 | 343,383 |
| **2023** | 75,199 | 64,273 | 48,751 | 14,130 | 25,289 | 9,464 | 4,911 | 14,862 | 10,893 | 5,962 | 32,576 | 306,310 |
| **Total** | **1,480,312** | **724,808** | **667,726** | **518,474** | **328,819** | **281,082** | **240,402** | **150,055** | **146,904** | **108,383** | **450,117** | **5,097,082** |

Selected gears: Bottom trawl/seine, Beam trawl, Dredge, Other/mixed.

**Table B 4: Total fishing days by year and country, selected gears (Bottom trawl/seine, Beam trawl, Dredge, Other/mixed), ICES 7D/7E/4C (AER, 2008–2023). No UK (GBR) effort data after 2020.**

| Year | DEU | NLD | BEL | FRA | GBR | IRL | Other | Total |
|---|---|---|---|---|---|---|---|---|
| **2008** | 102 | 32,353 | 13,738 | 110,502 | 41,034 | 8 | 661 | 198,398 |
| **2009** | 237 | 35,678 | 14,022 | 93,254 | 39,888 | 18 | 566 | 183,663 |
| **2010** | 416 | 26,840 | 13,459 | 94,006 | 41,764 | 7 | 1,117 | 177,609 |
| **2011** | 184 | 24,272 | 11,782 | 97,032 | 41,122 | 9 | 959 | 175,360 |
| **2012** | 379 | 28,455 | 10,521 | 90,189 | 40,572 | 102 | 1,005 | 171,223 |
| **2013** | 450 | 27,670 | 10,381 | 85,657 | 40,681 | 194 | 1,262 | 166,295 |
| **2014** | 568 | 27,605 | 10,886 | 84,410 | 37,900 | 181 | 725 | 162,275 |
| **2015** | 730 | 27,056 | 9,877 | 81,877 | 37,831 | 144 | 631 | 158,146 |
| **2016** | 1,468 | 29,308 | 9,330 | 85,909 | 38,532 | 217 | 431 | 165,195 |
| **2017** | 865 | 29,328 | 8,479 | 85,407 | 40,345 | 662 | 117 | 165,203 |
| **2018** | 1,539 | 26,166 | 8,140 | 83,486 | 37,649 | 743 | 119 | 157,842 |
| **2019** | 1,431 | 23,872 | 7,135 | 82,077 | 37,414 | 622 | 178 | 152,729 |
| **2020** | 1,644 | 25,455 | 6,728 | 77,658 | 30,275 | 177 | 41 | 141,978 |
| **2021** | 1,314 | 25,131 | 6,144 | 86,146 | 0 | 402 | 80 | 119,217 |
| **2022** | 648 | 23,972 | 7,189 | 89,227 | 0 | 315 | 49 | 121,400 |
| **2023** | 1,127 | 18,850 | 6,591 | 83,020 | 0 | 490 | 127 | 110,205 |
| **Total** | **13,102** | **432,011** | **154,402** | **1,409,857** | **505,007** | **4,291** | **8,068** | **2,526,738** |

Selected gears: Bottom trawl/seine, Beam trawl, Dredge, Other/mixed. VL0010 and VL40XX included for completeness.

**Table B 5: Total fishing days by year and vessel length class, selected gears (Bottom trawl/seine, Beam trawl, Dredge, Other/mixed), ICES 7D/7E/4C (AER, 2008–2023). UK (GBR) fleet included up to 2020 only.**

| Year | VL0010 | VL1012 | VL1218 | VL1824 | VL2440 | VL40XX | Total |
|---|---|---|---|---|---|---|---|
| **2008** | 36,970 | 41,509 | 42,496 | 45,839 | 24,560 | 7,023 | 198,397 |
| **2009** | 31,340 | 34,350 | 38,708 | 46,748 | 25,052 | 7,464 | 183,662 |
| **2010** | 36,590 | 33,514 | 37,019 | 39,307 | 23,366 | 7,813 | 177,609 |
| **2011** | 36,813 | 35,134 | 37,609 | 36,580 | 21,947 | 7,278 | 175,361 |
| **2012** | 35,730 | 34,884 | 35,698 | 38,388 | 19,114 | 7,408 | 171,222 |
| **2013** | 35,678 | 33,668 | 33,712 | 37,539 | 18,859 | 6,838 | 166,294 |
| **2014** | 32,994 | 34,025 | 33,152 | 36,426 | 19,237 | 6,440 | 162,274 |
| **2015** | 31,132 | 35,486 | 31,119 | 35,744 | 18,557 | 6,109 | 158,147 |
| **2016** | 34,097 | 38,327 | 32,093 | 36,445 | 17,623 | 6,610 | 165,195 |
| **2017** | 33,344 | 38,328 | 32,103 | 35,419 | 19,010 | 6,999 | 165,203 |
| **2018** | 29,193 | 36,222 | 32,593 | 32,484 | 19,505 | 7,844 | 157,841 |
| **2019** | 28,366 | 35,919 | 31,228 | 30,811 | 19,235 | 7,171 | 152,730 |
| **2020** | 24,385 | 33,196 | 28,968 | 30,383 | 18,115 | 6,930 | 141,977 |
| **2021** | 16,923 | 32,192 | 26,188 | 24,189 | 13,511 | 6,214 | 119,217 |
| **2022** | 15,378 | 34,864 | 27,364 | 24,029 | 14,057 | 5,709 | 121,401 |
| **2023** | 14,004 | 32,446 | 26,498 | 18,888 | 13,353 | 5,016 | 110,205 |
| **Total** | **472,937** | **564,064** | **526,548** | **549,219** | **305,101** | **108,866** | **2,526,735** |

Based on aer_split, the FDI-derived disaggregation of the AER Bottom trawl/seine category, all countries combined. Only direct FDI splits are shown (pooled fallback rows excluded). See Section 2.3 for the methodology.

**Table B 6: FDI gear-code split: fishing days by year and gear type for bottom trawl/seine, all countries (AER + FDI direct splits only, 2013–2023).**

| Year | Bottom trawl (OTB/OTT/PTB) | Seine (SSC/SDN) | Total |
|---|---|---|---|
| **2013** | 34,756 | 2,817 | 37,573 |
| **2014** | 48,382 | 3,019 | 51,401 |
| **2015** | 48,762 | 2,811 | 51,573 |
| **2016** | 50,100 | 2,985 | 53,085 |
| **2017** | 45,751 | 3,301 | 49,052 |
| **2018** | 46,307 | 2,479 | 48,786 |
| **2019** | 42,717 | 3,980 | 46,697 |
| **2020** | 36,654 | 4,740 | 41,394 |
| **2021** | 24,426 | 3,278 | 27,704 |
| **2022** | 25,744 | 4,031 | 29,775 |
| **2023** | 22,128 | 3,138 | 25,266 |
| **Total** | **425,727** | **36,579** | **462,306** |

Bottom trawl/seine disaggregated into bottom trawl (OTB/OTT/PTB) and seine (SSC/SDN) using the FDI split key. Other gears shown as reported in the AER.

**Table B 7: Total fishing days by year and gear, with bottom trawl/seine disaggregated using the FDI gear-code split from 2013 onwards. '--' indicates gear not separately reported for that year. ICES 7D/7E/4C (AER + FDI, 2008–2023).**

| Year | Bottom trawl/seine (unsplit) | Bottom trawl (OTB/OTT/PTB) | Seine (SSC/SDN) | Beam trawl | Dredge | Other/mixed | Total |
|---|---|---|---|---|---|---|---|
| **2008** | 63,321 | -- | -- | 51,783 | 42,220 | 41,073 | 198,397 |
| **2009** | 55,788 | -- | -- | 52,871 | 37,285 | 37,718 | 183,662 |
| **2010** | 53,147 | -- | -- | 42,356 | 38,839 | 43,266 | 177,608 |
| **2011** | 56,438 | -- | -- | 37,887 | 40,504 | 40,531 | 175,360 |
| **2012** | 56,798 | -- | -- | 41,951 | 37,084 | 35,390 | 171,223 |
| **2013** | -- | 50,802 | 3,198 | 41,730 | 34,593 | 35,634 | 165,957 |
| **2014** | -- | 48,703 | 3,363 | 41,215 | 35,990 | 32,757 | 162,028 |
| **2015** | -- | 49,084 | 3,341 | 39,117 | 35,013 | 31,444 | 157,999 |
| **2016** | -- | 50,371 | 3,432 | 41,718 | 37,698 | 31,895 | 165,114 |
| **2017** | -- | 45,986 | 3,631 | 42,239 | 35,767 | 37,533 | 165,156 |
| **2018** | -- | 46,699 | 2,969 | 40,280 | 39,939 | 27,909 | 157,796 |
| **2019** | -- | 43,593 | 4,132 | 34,974 | 35,824 | 34,135 | 152,658 |
| **2020** | -- | 37,057 | 4,879 | 36,853 | 27,988 | 35,182 | 141,959 |
| **2021** | -- | 24,857 | 3,671 | 27,856 | 24,867 | 37,950 | 119,201 |
| **2022** | -- | 26,344 | 4,052 | 26,693 | 27,467 | 36,810 | 121,366 |
| **2023** | -- | 22,465 | 3,166 | 20,821 | 26,089 | 37,575 | 110,116 |
| **Total** | **285,492** | **445,961** | **39,834** | **620,344** | **557,167** | **576,802** | **2,525,600** |

## Session information

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## Running under: Windows 11 x64 (build 26200)
##
## Matrix products: default
##   LAPACK version 3.12.1
##
## locale:
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## [4] LC_NUMERIC=C                         LC_TIME=English_Netherlands.utf8
##
## time zone: Europe/Amsterdam
## tzcode source: internal
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
##  [1] officer_0.7.5           officedown_0.4.1        ineq_0.2-13             rnaturalearthdata_1.0.0 rnaturalearth_1.
2.0
##  [6] spatstat_3.6-0          spatstat.linnet_3.5-1   spatstat.model_3.7-1    rpart_4.1.27            spatstat.explore
_3.8-1
## [11] nlme_3.1-169            spatstat.random_3.5-0   spatstat.geom_3.8-1     spatstat.univar_3.2-0   spatstat.data_3.
1-9
## [16] sf 1.1-1                flextable 0.9.11        captioner 2.2.3         patchwork 1.3.2         janitor 2.2.1
## [21] readxl 1.5.0            lubridate 1.9.5         forcats 1.0.1           stringr 1.6.0           dplyr 1.2.1
## [26] purrr_1.2.2             readr_2.2.0             tidyr_1.3.2             tibble_3.3.1            ggplot2_4.0.3
## [31] tidyverse_2.0.0
##
## loaded via a namespace (and not attached):
##  [1] DBI_1.3.0               deldir_2.0-4            marmap_1.0.12           rlang_1.3.0             magrittr_2.0.5
##  [6] snakecase_0.11.1        otel_0.2.0              e1071_1.7-17            compiler_4.5.2          RSQLite_3.53.1
## [11] mgcv_1.9-4              systemfonts_1.3.2       vctrs_0.7.3             reshape2_1.4.5          pkgconfig_2.0.3
## [16] shape 1.4.6.1           fastmap 1.2.0           labeling 0.4.3          rmarkdown 2.31          tzdb 0.5.0
## [21] ragg_1.5.2              bit_4.6.0               xfun_0.57               cachem_1.1.0            goftest_1.2-3
## [26] blob 1.3.0              uuid 1.2-2              spatstat.utils 3.2-3    terra 1.9-27            R6 2.6.1
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.1.0
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```