ANALYSES OF FISHING ACTIVITIES IN THE BELGIAN PART OF THE NORTH SEA, FLEMISH BANKS AND PROPOSED MANAGEMENT AREAS FOR SEAFLOOR INTEGRITY

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federal public service
**HEALTH, FOOD CHAIN SAFETY
AND ENVIRONMENT**

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Acknowledgements

List of abbreviations

Term	Description
BPNS	Belgian Part of the North Sea
CBS	Centraal Bureau voor de Statistiek (Netherlands)
CFP	Common Fisheries Policy
CPI	Consumer Price Index
CPUE	Catch per Unit of Effort
DCF	Data Collection Framework
EEZ	Exclusive Economic Zone
GT	Gross Tonnage
HICP	Harmonised Index of Consumer Prices
ICES	International Council for the Exploration of the Sea
Insee	Institut national de la statistique et des études économiques' (France)
KW	Kilowatt
MPA	Marine Protected Area
MSFD	Marine Strategy Framework Directive
MSP	Marine Spatial Plan
NM	Nautical Mile
SAR	Swept Area Ratio
SAC	Special Area of Conservation
StatBel	the Belgian statistical office
STECF	Scientific, Technical and Economic Committee for Fisheries
TAC	Total Allowable Catch
VMS	Vessel Monitoring by Satellite

List of gear types

Gear Code	Description
DRB	Boat dredge
FPO	Pots and traps
GN	Gillnets (not specified)
GTN	Combined gillnets- trammel nets
GNS	Set gillnets
GTR	Trammel nets
HMD	Mechanized dredges
LHM	Mechanized hand-lines and pole-lines
LHP	Hand-operated hand-lines and pole-lines
MIS	Miscellaneous gear
NK	Gear not known
OTB	Bottom otter trawls
OTB_CRU	Bottom otter trawls targeting crustaceans
OTB_DEF	Bottom otter trawls targeting demersal fish
OTB_MCD	Bottom otter trawls targeting mixed crustaceans and demersal fish
OTM	Midwater otter trawls
OTT	Otter twin trawls
PS	Purse seines
PTB	Bottom pair trawl
PTM	Midwater pair trawls
PUL	Pulse trawl targeting demersal fish
SDN	Danish seines / Anchored seine
SSC	Scottish seines / Fly shooting seine
SUM	Sumwing, a type of beam trawler with a wing profile
TBB	Beam trawls targeting demersal fish
TBS	Beam trawls targeting shrimp

Executive summary

In the framework of the Belgian measures program of the Marine Strategy Framework Directive, the Belgian Government is submitting a proposal with 3 new management areas where bottom disturbing fishery will be forbidden to protect special benthic habitats: submerged sandbanks, gravel beds and biogenic reefs. For the EU negotiation procedure, a background document investigating the economic activities in the newly defined management areas was needed. Therefore, this report describes the fishing activities in the BPNS, in the Natura2000 area 'Flemish Banks' and in the 3 management areas.

Vessel Monitoring by Satellite (VMS) and catch data from logbooks were used to analyse fishing activities in the BPNS and in the proposed management areas. A data call was sent out in April 2023 to the countries with fishing activities in the BPNS. All countries replied within 4 months. VMS data were made available for Belgium, France, the Netherlands and Denmark for the period 2007-2022 and for Germany and the United Kingdom for 2009-2022. As France uses a different data format system, not all requested information was provided, and French data could not be integrated in all representations. To safeguard confidentiality, data concerning less than 5 vessels were not represented. For this reason, data from Denmark, Germany and the UK were frequently combined. The analysis includes estimates of effort in fishing hours, landed weight and value of landings. The value of landings was corrected for inflation.

The BPNS is an area with intense fishing activity. The main player in the BPNS was the Netherlands with on average 66% of the effort and ≈80% of landings in weight and value. Belgium came in second with 31% of the fishing hours and ≈17% of the landings. France was the 3rd most important player, although its share in the total effort and landings was only ≈1%. The combined contribution of Denmark, Germany and the UK represented only ≈2% of the effort and landings The main gears in the BPNS were pulse trawls, beam trawls, shrimp trawls, seine gear, otter trawls and passive gear.

New/other maritime players (such as windfarms) have received designated areas to conduct their activities in the BPNS and have become competitors for space. Overall declining trends in the landings in the BPNS were observed and are highly linked to the Dutch trends, reflecting several changes that occurred and are occurring in the Dutch fleet, including a ban on pulse trawling and a large decommissioning scheme. The years 2021 and 2022 were exceptional years for shrimp in the BPNS, especially for smaller Belgian vessels, influencing the total trends.

The proposed management areas combined represent roughly 10% of the area of the BPNS. On average, 8% of the total effort and 13% of the total value of landings in the BPNS were attributed to the management areas.

A large transition from beam trawling to pulse trawling is observed from 2011 onwards. After 2016-2018, beam trawl activity increased again as pulse trawl activity decreased following the European ban on pulse trawling. Moreover, competition with pulse trawlers kept coastal beam trawling vessels (< 70 GT) contained within the 3 NM zone. After the disappearance of pulse trawling, their activity dispersed beyond this limit. Pulse trawling was mainly conducted by the Dutch while both Dutch and Belgian vessels had beam trawl activities. Larger and more efficient vessels were active in Area 1 and Area 2 which are located further offshore. Smaller beam trawl vessels were active in Area 3. On average 15% of the value of landings generated by beam trawlers in the BPNS originated from the 3 management areas combined.

The shrimp fishery in the BPNS only concerns the Netherlands and Belgium and showed an increasing trend in absolute as well as in relative terms for both countries. Shrimp are caught in coastal areas and are important for smaller vessels that are allowed in the 3NM zone. The shrimp fishery is very important for the Belgian fleet as a whole. In 2022, the shrimp fishery accounted for 85% of the landed value and 84% of the landed weight by the Belgian fleet in the BPNS. Only Area 3 was of importance for shrimp trawling. For the Belgian shrimp fishery, 8.5% of the value of landings in the BPNS from 2018 to 2022 and even 13% in 2022 originated from Area 3.

Most otter trawl activity in the BPNS can be attributed to France, especially in the surroundings of Area 1 and Area 2. On average 5% of the landed value by otter trawls in the BPNS originated from Area 1 and 16% from Area 2.

Seine fishing is a practice that has seen an increase in activity since its introduction in the BPNS from 2008 onwards, with an increase in activity of Dutch and UK vessels. The activity seems to take place in a number of hotspots in the BPNS, including Area 1 and spots in Area 2. An all-time high share relative to the BPNS was observed in 2022 with more than 21% for all variables in Area 1 and about 18% in terms of landings and 14.5% in effort in Area 2. On average, 9% of the value of landings from the BPNS originated from Area 1 and 8% from Area 2.

The activities of passive gears have declined in the BPNS. Especially Area 2 was of relative importance for vessels using passive gears between 2007 and 2022. The average share in the BPNS of Area 2 was around 17% of the landed weight and value. Passive gear were mainly operated by France and Belgium. Despite several attempts of introducing passive gear in the Belgian fleet between 2015 and 2021, the activity in 2022 was extremely low.

The 3 management areas accounted for 13-14% of the Dutch landings from the BPNS in weight and value representing on average 566 tonnes and 2.3 million euro yearly between 2007 and 2022. For Belgium the 3 areas represented 5% of the landings from the BPNS in weight and value. Especially Area 3 has been of importance for the Belgian shrimp fishery in recent years. For France, the average value of landings between 2007 and 2022 from the management areas was 52% of the French value of landings in the BPNS. The fact that most of their activities, consisting mainly of otter trawls and passive gear, are in these areas is a logical consequence of the direct border between France and the Flemish Banks. For the other countries, the management areas accounted for 17% of their landings from the BPNS. A marked increase in fishing activity in Area 1 since 2020 was observed and can mainly be attributed to an increase in seine fishing by the UK.

Fishing in the proposed management areas is not negligible and occurs equally frequent as in other areas of the BPNS. There does not seem to be a claim on the proposed management areas and changes or shifts over time can be linked to interactions with many other events and players.

1   Introduction

The need to protect or restore marine biodiversity, habitats and fish stocks has led to increasing calls for the establishment of marine protected areas (MPAs). The Biodiversity Strategy for 2030 of the European Union (EU) promotes a larger and well-connected European-wide network of MPAs with effective fishery management measures to contribute to the sustainable use of seas and oceans (EC, 2020). Key commitments by 2030 include the legal protection and effective management of at least 30% of the area of the marine waters of the EU. At least one third of that area (10% of EU's marine waters) should be under strict protection. The EU Habitats Directive [92/43/EEC] and Birds Directive [2009/147/EC] form the legal cornerstones for the conservation of the most vulnerable species and habitat types. In this framework, Belgium has designated two areas under the Habitats Directive and three areas under the Birds Directive. Together, they form the Belgium marine part of the European Natura 2000 ecological network of protected areas.

The largest of these areas is the "Flemish Banks", which was designated as a Special Area of Conservation (SAC) under the Habitats Directive (RD of 16 October 2012) for a better protection of the fauna of shallow submerged sandbanks (H1110) and biogenic reefs (H1170). Submerged sandbanks represent the main habitat in the Belgian Part of the North Sea (BPNS) covering its entire surface with a geologically unique sandbank system. This habitat consists of different macrobenthic communities: the coarse sand *Hesionura elongata* community, the medium sand *Nephtys cirrosa* community, the muddy fine sand *Abra alba* and *Ensis leei - Magelona* community and the muddy *Macoma balthica* community (Breine *et al.*, 2018). Benthic habitats are very important, as they constitute the largest single ecosystem on earth in spatial coverage and support the provision of important and valuable ecosystem services. For example, highly diversified macrobenthic communities (organisms > 1 mm) have important roles in biogeochemical cycles, in providing nutrients for higher trophic levels and in creating habitat and substrates through ecosystem engineering (Degraer *et al.*, 2008; Birchenough *et al.*, 2011; Breine *et al.*, 2018; de la Torriente *et al.*, 2020).

In the BPNS, special attention is given to two important habitat features under habitat type "Reefs" (H1170): gravel beds and biogenic reefs formed by the sand mason *Lanice conchilega*. Gravel beds act as oases in coarse sand environments, promoting high biomass and species richness with diverse functional traits, but are fragile to anthropogenic disturbance, particularly bottom-disturbing fishing (Papenmeier *et al.*, 2020; Montereale Gavazzi *et al.*, 2023). When present in high abundance, *L. conchilega* aggregations form oases in muddy fine sands, characterized by high biodiversity, that provide a sheltered area for many juvenile flatfish (Van Hoey et al., 2008; Desmet, 2014). These aggregations and especially the associated benthic species are also sensitive to bottom-disturbing fishing (Rabaut *et al.*, 2009; Tiano *et al.*, 2021).

The impacts of bottom trawling on the seafloor's physical and ecological integrity have been extensively studied and its severity is widely acknowledged (Pitcher *et al.*, 2022; Bruns *et al.*, 2023). In relation to seafloor disturbance, bottom disturbing fisheries are one of the activities that are known to negatively affect the seafloor, especially when the frequency of the disturbance does not allow for benthic recovery (Mazor *et al.*, 2020; Rijnsdorp *et al.*, 2020; McConnaughey *et al.*, 2019; Amoroso *et al.*, 2018; Hiddink *et al.*, 2017). On the other hand, removing physical disturbance can lead to recovery and increased survival of long living, more vulnerable species. The creation of MPAs where human activities are restricted have been chosen around the world as one of the management measures for restoring ecosystems (McConnaughey *et al.*, 2019; Ban *et al.*, 2019; Sala and Giakoumi,

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2018; Pecceu *et al.*, 2014; Rabaut *et al.*, 2009). Research has shown that MPAs can provide direct benefits not only to ecosystems, but also to many stakeholders, including fishers. Protected areas result in the increase of biological indicators of fish and invertebrates like density, biomass, body-size and species richness, compared to areas without protection (Lester *et al.*, 2009). In addition, if MPAs are well-designed and managed, density-dependent processes can then allow organisms to migrate to areas adjacent to the protected area through spillover (Di Lorenzo et al., 2020). In the long term, this could provide higher yields for fisheries in the form of increased size, biomass or abundance.

Despite the designation of a large total MPA area in Belgian waters (37% of BPNS), no effective management measures have been taken thus far to protect the benthic habitats. In a busy marine environment like the BPNS where numerous human activities are undertaken in a relatively small area, seafloor integrity needs special attention (MSP 2020-2026; Vanden Eede *et al.*, 2014; Belgian State, 2018). To restore the previously mentioned ecosystems, the Belgian Government started a process for implementing fishery restrictions within the Belgian MPAs about ten years ago. According to the Common Fisheries Policy (CFP), a EU negotiation procedure must be followed in order to take fisheries measures. This process eventually leads to a joint recommendation. Based, on the first Belgian Marine Spatial Plan (MSP) (2014-2020), four areas inside the Flemish Banks where fishery measures would be implemented were formally proposed in 2014. Consequently, a negotiation procedure was executed that led to a joint recommendation. However, the measures for commercial fisheries inside these four areas were not converted into an EU Delegated Act and were revoked by the European Parliament in 2018.

In the next Belgian MSP of 2020-2026, a new process was started. In this MSP, three new areas, termed 'search zones', were outlined in order to define an adequate portion within these areas in which management measures could be implemented. The aim was to take into account different trade-offs and ultimately to define the optimal management areas for excluding mobile bottom fishing and meeting the conservation objectives. This analysis was conducted in 2020 and results of this study can be found in detail in Pecceu & Paoletti *et al*. (2021). Following this study, the Federal Government has proposed three subareas termed 'management areas' where seafloor disturbing activities will be forbidden. Two of them are located within the SAC 'Flemish Banks'. The third is located further offshore (Figure 1).

This will be the new proposal from Belgium that goes to the EU negotiation procedure, as defined in the CFP. For this procedure, a background document needs to be compiled. Most information has already been compiled in Pecceu & Paoletti *et al*. (2021). However, the analyses on fishing activity focused on the 'search zones'. In the following study, the fishing activity is described at the level of the newly defined management areas. Moreover, additional information is collected in this study over a long time period (2007-2022). Therefore, in this report fishing activities within the BPNS, the Natura2000 area 'Flemish Banks' and within the three management areas were investigated and described in detail. The analysis includes estimates of effort in fishing hours, landings in value and in weight from 2007 to 2022 for all current and former EU member states active in the BPNS.

2 Material and Methods

This section gives detailed information on the data call for obtaining fishery activity data and how this data is processed. Unique within this report is the insights given in the procedure to determine for various metiers when they are fishing and how the value of the landings is obtained when taking into account inflation.

2.1 Data collection (data call)

2.1.1 Data source

Vessel Monitoring by Satellite (VMS) and catch data from logbooks were used to analyse fishing activities. Within the European Framework, logbooks are compulsory for most commercial fishing vessels. These contain information on the daily catch composition, the type of fishing gear used as well as the departure and arrival times in harbours. For all vessels > 12 m, each fishing trip is logged. The location of the catch must be recorded at the level of an ICES statistical rectangle.

In the EU, VMS provides data at regular intervals on the location (latitude and longitude), time, compass heading and speed of identified fishing vessels. Time intervals are usually 2-hourly in the EU. Data are under the responsibility of the fisheries authorities. VMS was implemented in several phases. It first became mandatory for vessels > 24 m (2000-2004), then for vessels > 15 m (2005-2011) and finally for vessels > 12 m (from 2012 onwards). (European Commission 2003, European Commission 2009, Lee *et al.*, 2010, European Commission 2011) .

2.1.2 Data call

A data call was sent out in April 2023 to Belgium, the Netherlands, France, Germany, Denmark and the United Kingdom, i.e. the countries with fishing activity in the BPNS. Data from 2007, or as far backwards as possible, up to 2022 were asked. Legally, fisheries institutions of these countries may only exchange VMS and logbook data in aggregated forms. For this reason, prior to sending out the data call, permission was first asked to the different authorities explaining the different aims for using the data and clarifying the level of aggregation in the final outputs.

A set of model R-scripts written and developed by ILVO using VMStools version 0.76 were included in the data call along with a predefined 1.6 × 1.6 km grid (UTM 31). VMStools is a software that was developed in R to process and analyse VMS and logbook data (Hintzen *et al.*, 2012). It allows for a standardization of analyses and to improve pan-European overviews. Where relevant, the scripts were adjusted by the country expert to best represent the behaviour of the fleet or vessels.

Aside from requesting data by grid, fishing activity was requested specific for five areas: Vlaamse Banken, management areas 1, 2 and 3 and the entire BPNS (Figure 1) A special request was made to include beam trawling for shrimp and pulse trawling for flatfish as separate gears. Otherwise, gear was grouped at metier level 4 as described in the European Data Collection Framework Appendix IV (DCF, Reg. (EC) No 949/2008, Commission Decision 2010/93/EU).
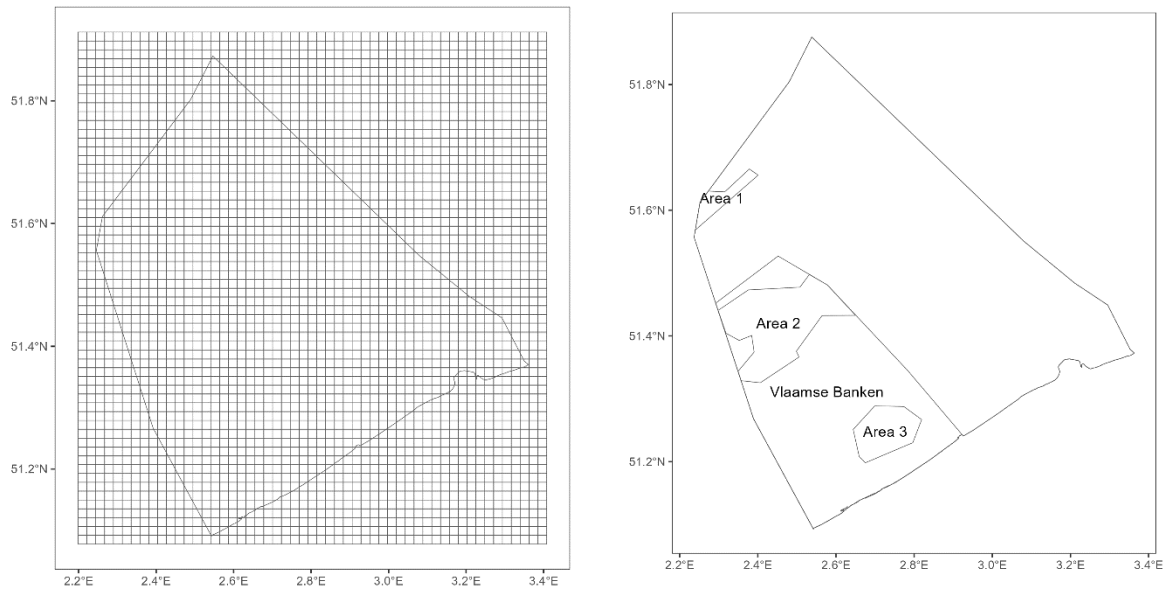
Figure 1   Left: The above grid (1.6 × 1.6 km) was used as a framework to request spatial data on fishery activity;
Right: The BPNS including the SAC Vlaamse Banken and the areas for management measures (Areas 1, 2 and 3)

2.1.3   Data call Response

VMS data were available for Belgium, France, the Netherlands and Denmark for the period 2007-2022 and for Germany and the United Kingdom for 2009-2022.

As France uses a different data format system, it did not use the model R-scripts. However, consequently, the French data was not provided in the format requested and not all requested information was submitted. Moreover, gridded aggregation data were provided using a different grid than the one requested, in terms of size, coverage and projection (Figure 2). Therefore, France could not be integrated in all representations. In an attempt to include France as much as possible, separate maps were produced and fishing hours were preferred over hours at sea, as for France only fishing hours were available. French ministerial representatives who provided the data were made aware of this issue. France did not provide information by quarter, on the SAR, on vessel characteristics (gross tonnage and engine power), on speed thresholds nor on statistics regarding VMS and logbook matching.

For the other countries most information was provided, except for a few aspects. The Netherlands did not consistently provide information on vessel gross tonnage (GT). The UK did not provide information by quarter nor on speed thresholds. Furthermore, the information was provided in pounds sterling, although euro was requested.
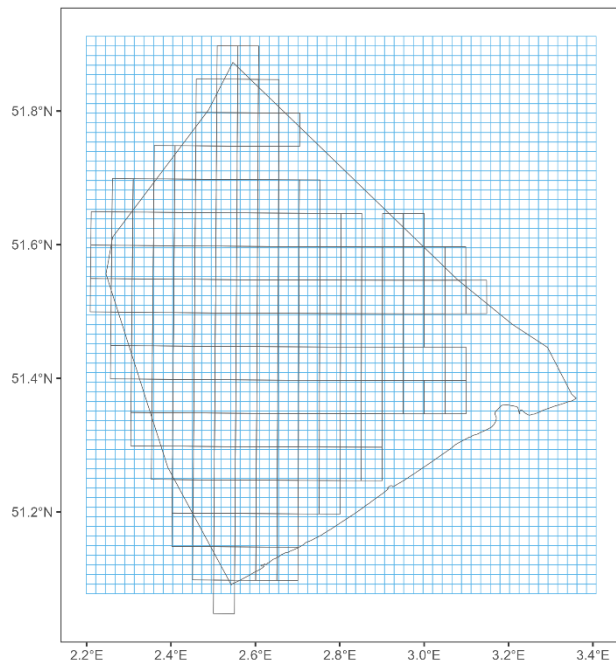
Figure 2   The French grid (3° × 3°) in black, superimposed on the requested grid (1.6 × 1.6 km) in light blue. The projection of these grids is different which is why the French grid is distorted in this figure.

2.2   Data procedure

2.2.1   Determining fishing activity

For each VMS ping, the activity of the vessel was defined based on its speed and the gear type used during the trip. In general, depending on the gear, fishing will occur within a certain speed interval. Below this, the vessel is considered as floating or in the harbour, above this, it is considered steaming. We requested that points close to a harbour were excluded before defining activities as these may be mistaken for fishing points when a vessel slows down to enter the harbour.

Speed thresholds can be determined in different ways. Each country was requested to use their speed thresholds and methodology, rather than using the ones provided in the example template. Indeed, the fleets differ in composition, types and sizes of vessels, resulting in possible different speed thresholds for fishing activity of the same gear group. A description of the used methodology was requested.

A possible way to determine thresholds, is by fitting normal distributions through the speed profiles. The analysis assumes that the speed profile close to zero can be mirrored to create a good normal distribution. Figure 3 represents an example of the frequency distribution of a single vessel in a single year (Poos *et al*., 2013). The estimated density functions are also drawn and we can distinguish the three activity modes (floating, fishing, steaming).

An overview of the speed thresholds (knots) to define fishing activity for gears used per country was given in Table 8 (in Annex).
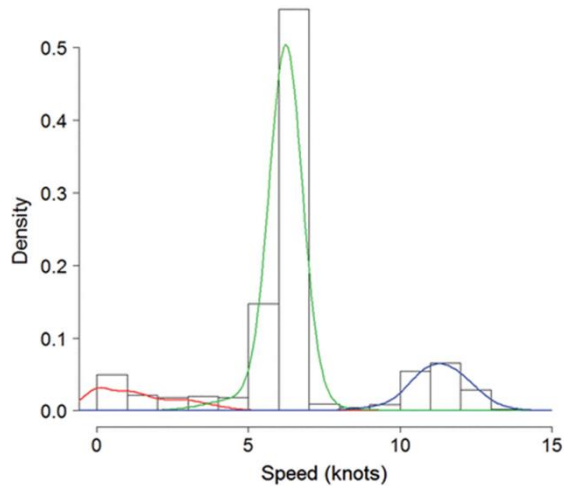
Figure 3   Speed frequency distribution of a single vessel in a single year and estimated density functions representing different activities: floating (red), fishing (green) and steaming (blue). VMS records of a given speed can be assigned to an activity based on these normal distributions (Poos *et al*., 2013)

- Belgium

Yearly ranges by fitting normal distributions were determined for the following metiers: beam trawls for demersal fish (TBB), beam trawls for shrimp (TBS), otter trawls targeting crustaceans and demersal fish (OTB_MCD), otter trawls targeting demersal fish (OTB_DEF), dredges (DRB) and fly shooting seines (SSC). For example, Figure 4 gives the yearly speed distribution for TBB according to the estimated activity. VMS points close to a harbour were removed so "h" stands for floating. As can be seen, the fishing range for TBB was usually between 2.4 and 6.7 knots. On average, it was between 2 and 4.8 knots for TBS.

For otter trawls targeting crustaceans (OTB_CRU) and for pots and traps (FPO), not all years had sufficient data and therefore years were pooled to fit a normal distribution, leading to the determination of a fixed speed threshold for the time series. Previously used fixed speeds were used as speed thresholds for the remaining gears (LHP, SDN, GNS, PTM, GTR).
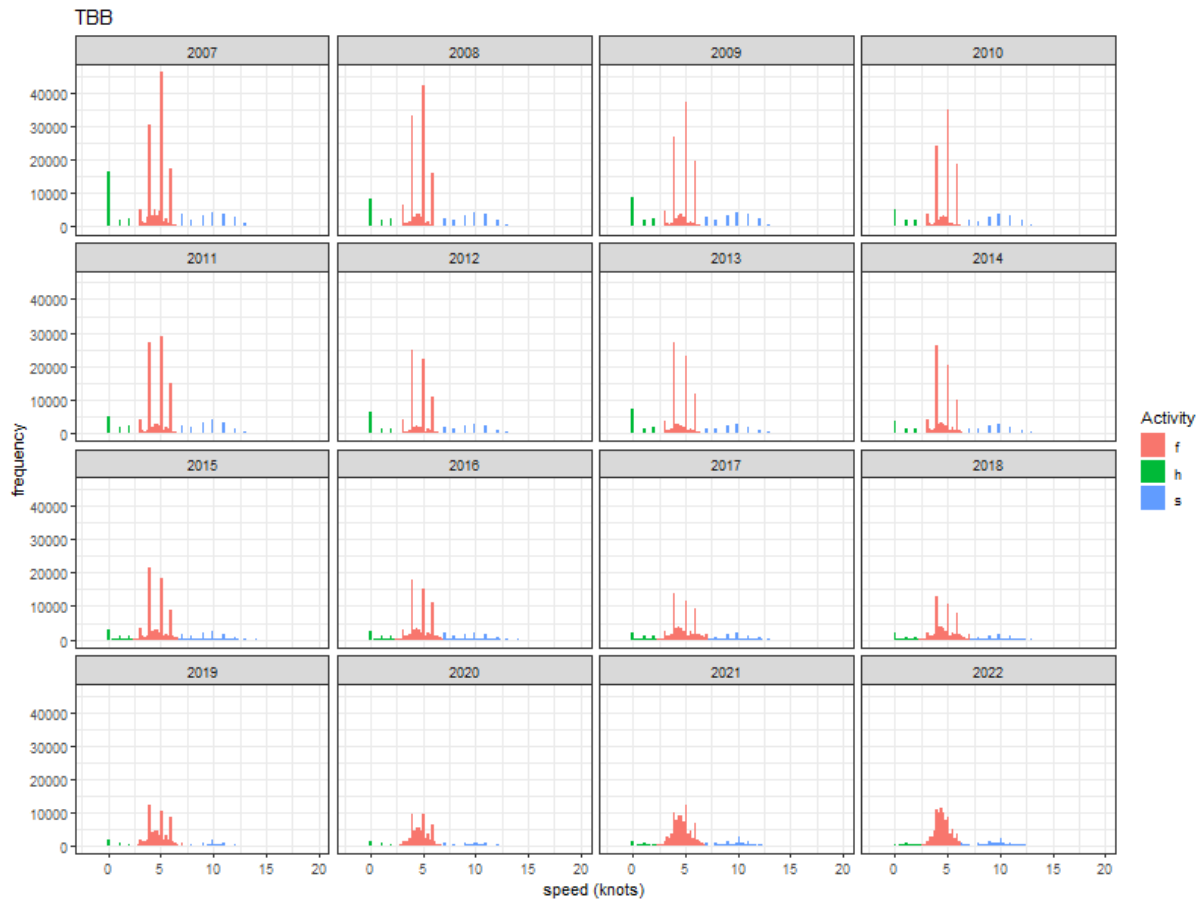
Figure 4 Frequency distribution of observed vessel speeds for Belgian beam trawlers targeting flatfish (2007-2022). The colours represent the different assigned activities based on the estimated normal distribution: floating (h), fishing (f) and steaming (s).

- The Netherlands

Yearly ranges by fitting normal distributions were determined taking into account vessel engine power for certain gears (TBS, TBB, OTB, OTT, SSC, DRB, PUL). Furthermore, yearly ranges by fitting normal distributions were determined for PTB, HMD, OTM and PTM. Fixed speeds were used for the remaining gears.

- Denmark & Germany

Fixed speeds were used as thresholds to determine activity.

- France & UK

Methodology unknown.

2.2.2 Linking VMS and logbook data

Once activity is defined for a VMS point, the landings in terms of weight and value can be distributed among fishing pings. There are different ways of doing this and the choice was left to the member state. The `splitAmongPings()` function of VMStools offers different levels and hierarchies to allocate the catches to pings. In this study it was recommended to use the highest level, i.e. to allocate the catch among pings matching vessel, trip ID, day and ICES rectangle. However, if there is a mismatch between the logbook and VMS data for a record on a specific day or in a specific rectangle it can still be distributed either to the day or to the rectangle.

For Belgium, the day was preferred as the ICES rectangle information in the logbook may be less reliable than the day of the catch. It is not always possible to match all logbook information to VMS information. For example, a trip on which the VMS transmitter did not work will have no pings, but still have logbook data on ICES rectangle level. Given that the BPNS is a relatively small area and covers only part of four ICES rectangles (Figure 5), catch information without VMS data might well have come from outside of the BPNS. It was therefore decided in the template not to distribute these catches to other VMS fishing pings in the same rectangle. On average 11% of the Belgian landed weight from ICES rectangles 31F2, 31F3, 32F2 and 32F3 could not be coupled to VMS pings, while this was 7% on average for the Dutch landed weight. The amount of mismatch is not reported by the other countries.

A misidentified fishing trip will have no logbook record as VMS fishing points are based on speeds. We hypothesized that this can occur when a vessel makes a trip without actually fishing, for e.g. when moving from one location to another at relatively low speed. In this case there will be no corresponding logbook record. VMS points on land and near the harbour were theoretically removed by each country before defining activities. Other possibly misidentified fishing points with no catch were later removed.
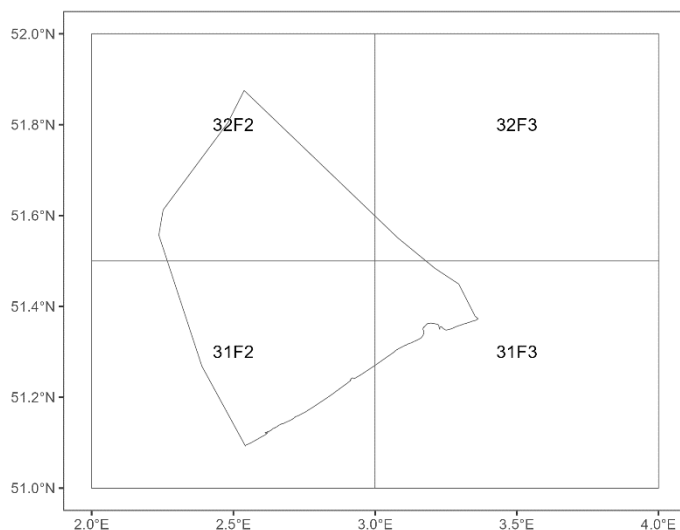
Figure 5   Map representing the Belgian part of the North Sea and ICES rectangles concerned.

2.2.2.1 Estimating fishing hours

In the VMStools package, the interval time between VMS pings was determined on a trip level (time between ping x and ping x-1). The first ping received an interval time of 120 min. Intervals of more than 230 min where set to twice the common interval to be defined by each country. In the case of Belgium this was 240 min (2 × 120 min). In such a case, it was assumed that some consecutive VMS points were lost in the data transfer.

The fishing hours are approximated by the interval time allocated to fishing points, where a link with the logbook could be established. This means that interval times allocated to fishing points without landings were not included, they represented about 2% of the allocated interval times.

2.2.2.2 Estimating the Swept Area Ratio

The swept area ratio (SAR) is the surface area of a fishing activity relative to the bottom surface, here of a grid cell. The following gear codes were assumed to have an impact on the bottom: TBB, TBS, OTT, OTB, SSC, SDN, PTB, DRB, PUL. The SAR was not determined for passive gear metiers.

The surface area of a fishing activity was calculated by using information on gear width, speed and fishing time. If gear width was available in the logbooks, these were used. If not, gear width was estimated using a model described in Eigaard *et al.*, 2016, based on gear and average vessel characteristics (i.e. average overall vessel length or average KW engine power). For VMS records without any vessel characteristics, a fill-in value provided by ICES (2015) based on a table by the JNCC or on the BENTHIS survey (Eigaard *et al.* 2016) was used. The sfdSAR-package in R includes functions to link and execute these steps. https://github.com/ices-tools-dev/sfdSAR. It was not catalogued in the output which approach was used by the different countries, but will probably in most cases be the logbook or model as described in Eigaard *et al.* (2016).

For Belgium, gear width was not available via the logbooks and was therefore estimated using the model described in Eigaard *et al.*, 2016. Based on prior interviews with the industry, it is known that the outcomes from the model overestimate the length of the seining rope (two times more) for seiners. Therefore, the length of the rope was adjusted by halving the estimated rope length by the model for Belgian seiners. The other countries were also informed and may have made similar adjustments.

Fishing sequences were interpolated for each gear and vessel via a cubic Hermite spline interpolation (Hintzen *et al.*, 2010). An interpolation adds fishing points between measured pings based on vessel speed and direction (for example. 10 extra points between the two measured pings with 2 hours between). This cubic Hermite spline interpolation ensures that it is not a straight line interpolation. The interpolation in general ensures that the SAR (and the interpolated fishing hours) are more (and hopefully better) spread out. Seining gear were not interpolated as their fishing speeds are usually low. For each estimated fishing sequence, the swept area was determined by using the following formulas :

- o   Trawls : fishing hours × gear width × fishing speed (knots) × 1.82
- o   Danish seiners: fishing hours/2.591234 × (rope length)²/ (4π). As described in the sfdSAR-package.
- o   Scottish seiners: fishing hours/1.9125 × (rope length /4)² × 1.5. (Based on the formula of the sfdSAR-package, but adjusted to cover the area of a square)

2.2.2.3 Limitations of the data

The VMS methodology described above may not be very accurate for defining fishing activity of passive gears. France reported an important share of the overall passive gear activity, while it was unclear how fishing activity was defined for French data overall (France did not provide this information). Furthermore French 0-12 m vessels mainly using passive gears appeared from 2015 onwards. Possibly, these vessels were not using VMS systems prior to 2015.

- Methodological approach: Post data harvest

As a rule of thumb, the presented information on metier/quarter/year/member states was aggregated if < 5 vessels were represented, especially when regarding sensitive information, to safeguard confidentiality. Data from Denmark, Germany and Great Britain were combined in most representations. Depending on the area considered, other countries were further added to the combined countries. Gear groups were considered according to Table 1.

Table 1 Relation between gear groups and gear codes in this analysis.

Passive	FPO, GN, GNS, GTR, LHM, LHP
Beam trawl	TBB, SUM
Shrimp trawl	TBS
Pulse trawl (flatfish)	PUL
Otter trawl	OTB, OTM, OTT, PTB
Seiners	SDN, SSC, PS
Other gears	DRB, HMD, MIS, PTM

- Taking inflation into account by converting to real value

The value in euro over the considered time period was corrected for inflation. A Consumer Price Index (CPI) tries to capture the changes in average prices over time and can therefore be useful for determining the value of a monetary unit in one year compared to another.

Within the European Union, the harmonised index of consumer prices (HICP) is compiled by Eurostat and national statistical institutes following a similar methodology. The HICP allows for a comparison in the inflation rates across member states. The HICP can differ from a national CPI in the way goods and services are assembled and weighted, however using the HICP seems reasonable enough for the purposes of this study.

Eurostat was the main source. There were some adjustments to cover the entire timeline. Eurostat only displayed the time period 2013-2022 online (September 2023). Therefore, the missing years were supplemented with indices published in the STECF-Annual Economic Report on the EU fishing fleet, which goes back until 2008 (STECF 2019). The source used in this report is also Eurostat, however the link provided inside the report is no longer valid. Overlapping years were cross-checked.

Data for 2007 was only available (or relevant) for Belgium, France and the Netherlands. For Belgium HICP-Index was found on the website of StatBel. For the Netherlands it was found through 'Centraal Bureau voor de Statistiek' (CBS, StatLine) and for France through the 'Institut national de la statistique et des études économiques' (Insee). The overlapping years were cross-checked with values found via Eurostat.

As a consequence of Brexit, data for the UK after 2019 were no longer available through Eurostat. Therefore, a CPI for 2020-2022 was found online on the website of the Office for National Statistics (UK Government). Overlapping years on this website only slightly differ from HICP-Indices provided by Eurostat. The pound to euro ratio was also close to one.

Table 2   Overview of the HICP. Eurostat is the source unless otherwise specified.

Year	BEL	DK	DEU	FRA	NLD	UK
2007	86.13*	NA	NA	89.51**	88,36***	83.3[++]
2008	90	91.2	91.9	92.34	90.32	84.7
2009	89.99	92.1	92.1	92.44	91.2	86.6
2010	92.09	94.1	93.2	94.04	92.05	89.4
2011	95.18	96.6	95.5	96.2	94.32	93.4
2012	97.68	98.9	97.5	98.33	96.99	96.1
2013	98.9	99.4	98.6	99.31	99.47	98.5
2014	99.38	99.8	99.3	99.91	99.79	100
2015	100	100	100	100	100	100
2016	101.77	100	100.4	100.31	100.11	100.7
2017	104.03	101.1	102.1	101.47	101.4	103.4
2018	106.44	101.8	104	103.6	103.02	105.9
2019	107.77	102.5	105.5	104.95	105.78	107.8
2020	108.23	102.9	105.8	105.5	106.96	108.9[++]
2021	111.71	104.9	109.2	107.68	109.98	111.6[++]
2022	123.26	113.8	118.7	114.04	122.78	120.5[++]

*Statbel; **Insee; ***CBS; [++] Office for National Statistics

As can be seen in the Table 2, these indices use 2015 as a base year, i.e. the reference year that was chosen by these European and national institutions. The following formula was used to convert the value reported in the data call (nominal value) to the real value with 2015 as a base year (STECF 2019).

Real value i = Nominal value i / ($HICP_i$ / $HICP$2015)

With $HICP$2015 = 100

This means that the amounts in euro for each year are converted to the value of the euro in 2015. As such the converted amounts represent the equivalent of what these amounts would have been worth in 2015. This standardization allows for comparison over time and between countries, especially with high and variable inflation. Table 3 shows the differences in percent after conversion compared to the submitted value of landings.

Table 3 Difference in submitted Value and Real value (%) per year and per country

Year	BEL	FRA	NLD	DEU	UK	DK
2007	13.87	10.49	11.64	NA	NA	0
2008	10	7.66	9.68	NA	NA	0
2009	10.01	7.56	8.8	7.9	13.4	0
2010	7.91	5.96	7.95	6.8	0	5.9
2011	4.82	3.8	5.68	4.5	6.6	3.4
2012	2.32	1.67	3.01	2.5	3.9	1.1
2013	1.1	0.69	0.53	1.4	1.5	0.6
2014	0.62	0.09	0.21	0.7	0	0.2
2015	0	0	0	0	0	0
2016	-1.77	-0.31	-0.11	-0.4	-0.7	0
2017	-4.03	-1.47	-1.4	-2.1	-3.4	0
2018	-6.44	-3.6	-3.02	-4	-5.9	0
2019	-7.77	-4.95	-5.78	-5.5	-7.8	0
2020	-8.23	-5.5	-6.96	-5.8	-8.9	0
2021	-11.71	-7.68	-9.98	-9.2	-11.6	0
2022	-23.26	-14.04	-22.78	0	-20.5	-13.8

3 Fishing Activity in the Belgian part of the North Sea

3.1 Overview in the BPNS

3.1.1 Overall trends and trends per country

3.1.1.1 Pattern in fishing hours and landings

There were 6 countries active in the BPNS between 2009 and 2022. The Netherlands held the first position with 66% of the fishing hours and ≈80% of landings in weight and value. Belgium came in second with 31% of fishing hours and 17-18% of landings. France was the 3rd most important player, although its share in the total effort and landings in weight and value was only 1-2%. The combined contribution of Denmark, Germany and the UK represented 2% of the effort in fishing hours as well as 2% of the landings both in weight and in value. The total number of fishing hours in the BPNS shows no convincing trend, while for the landings (weight and value) there seems to be a declining trend (Figure 6). These overall trends largely follow the trends of the Dutch fleet, most active in the BPNS waters. However, in 2021 and 2022, total landings (weight and value) increased again slightly, but not for the Dutch fleet. A dip can be seen in all trend lines in 2020. However, for Belgium, effort and landings increased again after 2020 and influenced the total landings in 2021 and 2022. Considering the entire period (2007-2022), no significant increase or decrease was observed for effort and landings for the Belgian fleet.
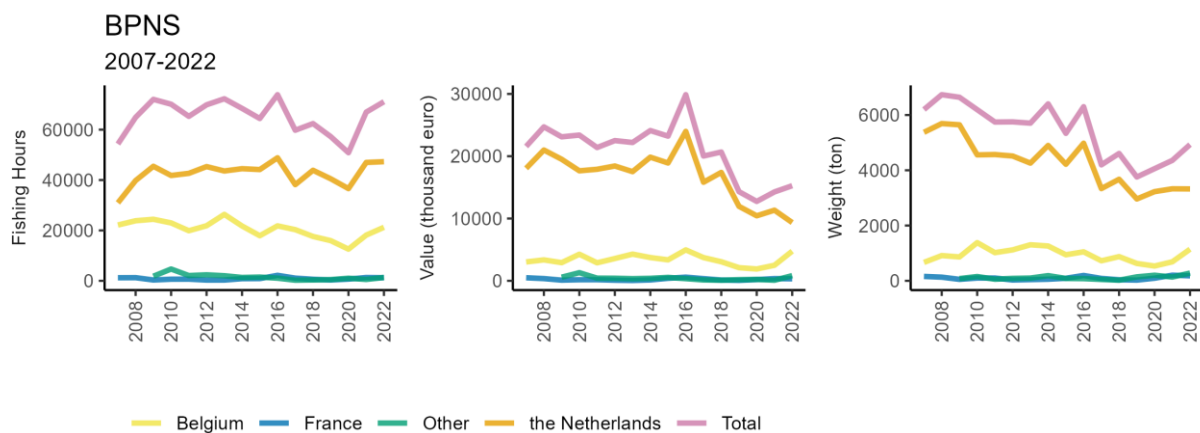
Figure 6 Total fishing effort in fishing hours, landed value (thousand euro) and landed weight (ton) in the Belgian part of the North Sea between 2007 and 2022 (all gears combined). 'Other' includes activities of the Danish, German and British fleet (2009-2022).

A seasonal pattern was observed for Belgium, with the highest average effort and landings in the third quarter (summer) and lowest in the first quarter (winter) (Figure 7). This was also observed for Germany and Denmark combined. The mean Belgian vessel gross tonnage (GT) and engine power were lowest in the third quarter, indicating that on average smaller vessels were active in this quarter (Table 11 in annex). A seasonal pattern was visible for the Dutch effort with highest activity in the second quarter (spring) and lowest in the fourth (autumn). However, no such pattern was apparent for the Dutch landings, with very similar amounts over the seasons.
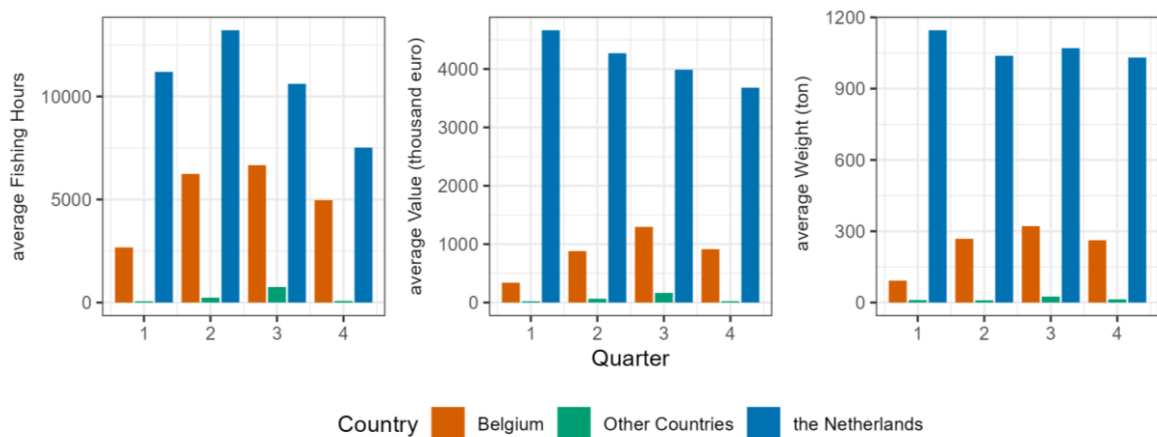
Figure 7   Average fishing effort in fishing hours, landed value (thousand euro) and landed weight (ton) per country in the Belgian part of the North Sea between 2007 and 2022 (all gears combined), per quarter. 'Other' includes activities of the Danish and German fleet (2009-2022). France and the UK could not be included.

3.1.1.2   Vessel characteristics

Close to 200 vessels were active in the BPNS and this number did not seem to decline between 2007 and 2022, although there is some variation between the years. The overall number of Belgian vessels in the BPNS decreased between 2007 (73) and 2018 (31), to increase slightly again in 2020 (39), 2021 (50) and 2022 (42) (Figure 8 & Figure 9). Such a decreasing trend was not apparent for Dutch vessels, with numbers between 66 and 99. France with an average of 33 vessels, had a relatively high number of vessels in the BPNS compared to their effort and landings. Though few in absolute terms, the number of UK vessels shows an increasing trend in the last years of the timeline, with an average of 13 vessels in 2020 to 2022, compared to 2.6 vessels on average for the previous years (2009-2019). This represents an increase of 400%. Most of these vessels belonging to the UK were > 24 m (Figure 8). Denmark and Germany only had a few vessels active in the BPNS.

Table 4 describes the distribution of the average vessel length per country. Average numbers, engine power and GT are found in Table 12 in annex. About 8% of the Belgian vessels in the BPNS had a length between 12 and 18 m, with an average of 25 GT, while 53% of the Belgian vessels (28 vessels) had a length between 18 and 24 m with an average of 82 GT. The average GT for Denmark, Germany and the UK for this same length category was > 100 GT. Only 1% of the Belgian vessels were under 12 m and the remaining 39% of the Belgian vessels were > 24 m.

The Netherlands had larger vessels, with 48% > 24 m, 41% between 18 and 24 m and 7% an unknown length between 2007 and 2022. On average there were annually 38 Dutch vessels > 24 m and 33 Dutch vessels between 18 and 24 m in the BPNS. For the Netherlands there is an increase of vessels of 18 to 24 m in 2022. The average engine power of Dutch vessels > 24 m was 1219 kW compared to 986 kW for Belgian vessels > 24 m, while the engine power of the 18 to 24 m vessels was comparable for both countries. France had smaller vessels in the BPNS: those of 0 to 12 m represented 11% and those of 12 to 18 m 10% in the entire period. The French vessels of 0 to 12 m appear in the timeline from 2015 onwards (Figure 8).

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Table 4   Average number of vessels (%) by length category and by country active in the course of one year in the Belgian part of the North Sea. The data includes Belgian, Danish, French and Dutch vessels (2007-2022) as well as the German and British vessels (2009-2022).

Length category	Belgium	Denmark	France	Germany	Netherlands	United Kingdom
0-12	0.4 (1%)	0	3.8 (11%)	0	1.8 (2%)	0
12-18	4.0 (8%)	1.1 (43%)	3.3 (10%)	1.1 (30%)	0.9 (1%)	0.1 (3%)
18-24	27.6 (53%)	1.1 (43%)	14.4 (43%)	1.0 (26%)	32.6 (41%)	0.3 (6%)
> 24	20.5 (39%)	0.3 (13%)	11.8 (35%)	1.6 (43%)	38.1 (48%)	4.3 (88%)
Unknown	0	0	0	0	5.9 (7%)	0.1 (3%)
Total	52.4 (100%)	2.5 (100%)	33.2 (100%)	3.8 (100%)	79.3 (100%)	4.9 (100%)
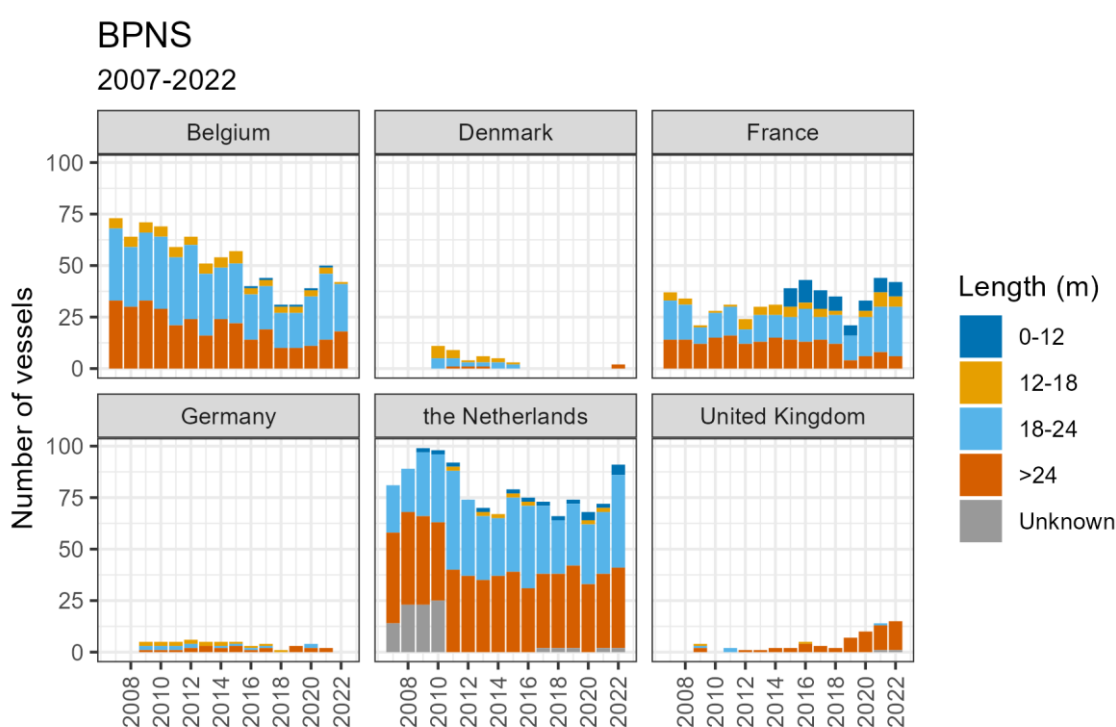
Figure 8 Evolution of the number of vessels active in the BPNS per length category and per country between 2007-2022. Data for the UK and Germany were available between 2009-2022.

3.1.2 Temporal fishing patterns per gear and country

The fishing activities per gear are shown in Figure 9 (number of vessels) and Figure 10 (fishing hours and landings in weight and value). The miscellaneous category 'other gear' is not shown in the figures as its contribution was marginal.

The total number of beam trawlers showed a declining trend until 2020; in 2021-2022 it increased again (Figure 9). The same pattern was also visible in the effort and landings, although slightly dephased (Figure 10). Simultaneously, the number, effort and landings of pulse trawls increased, followed by a decline in recent years. As in a mirror, we see in the trends that pulse and beam trawlers seem to be compensating for each other. This mirroring pattern is even more pronounced when observing the number of vessels for the Dutch beam and pulse trawls (Figure 9). From 2011 onwards, an increase of the relative importance of Dutch fishing activity with pulse trawls in the BPNS was

observed together with a decrease in the relative importance of beam trawls (Figure 11). Dutch pulse trawl activity started decreasing again after 2016-2018 and beam trawl activity increased again. The number of Belgian beam trawls declined, as did the share of the beam trawls in the Belgian effort and landings in the BPNS (Figure 9 & Figure 11).

Overall, the number, effort and landings of shrimp trawls suggest an increasing trend (Figure 9 & Figure 10). The number of Belgian shrimp trawls did not increase, while the number of Dutch shrimp trawls did. In relative terms, the share of both Belgian and Dutch shrimp trawls for effort and landings indicates an increasing trend (Figure 11, Table 16 and Table 17 in Annex).

The number and fishing activities of otter trawls decreased until 2018 and increased again between 2019 and 2022 (Figure 9 & Figure 10). Otter trawls were relatively important for France representing more than 50% of the effort and landings in most years of the time series, the exceptions being 2015 to 2017 (Figure 11).

The number and fishing activities of seining gears show an increasing trend overall (Figure 9 & Figure 10). Important contributions came from the Dutch fleet, where the relative share increased (Figure 11). However, the relative share of seining gears for other countries also increased in the last years of the time series.

Passive gears contributed only little to the fishing activities in the BPNS with an overall declining trend. The share of passive gear for 'other countries' was once important (at its maximum in 2010 and 2011), but activities have ceased in the last years of the time series. For Belgium the relative contribution of passive gears to fishing activities in the BPNS was never high, although it increased between 2015 and 2020. It was lower again in 2021 and 2022. The relative share of passive gears is still important for France (Figure 11).
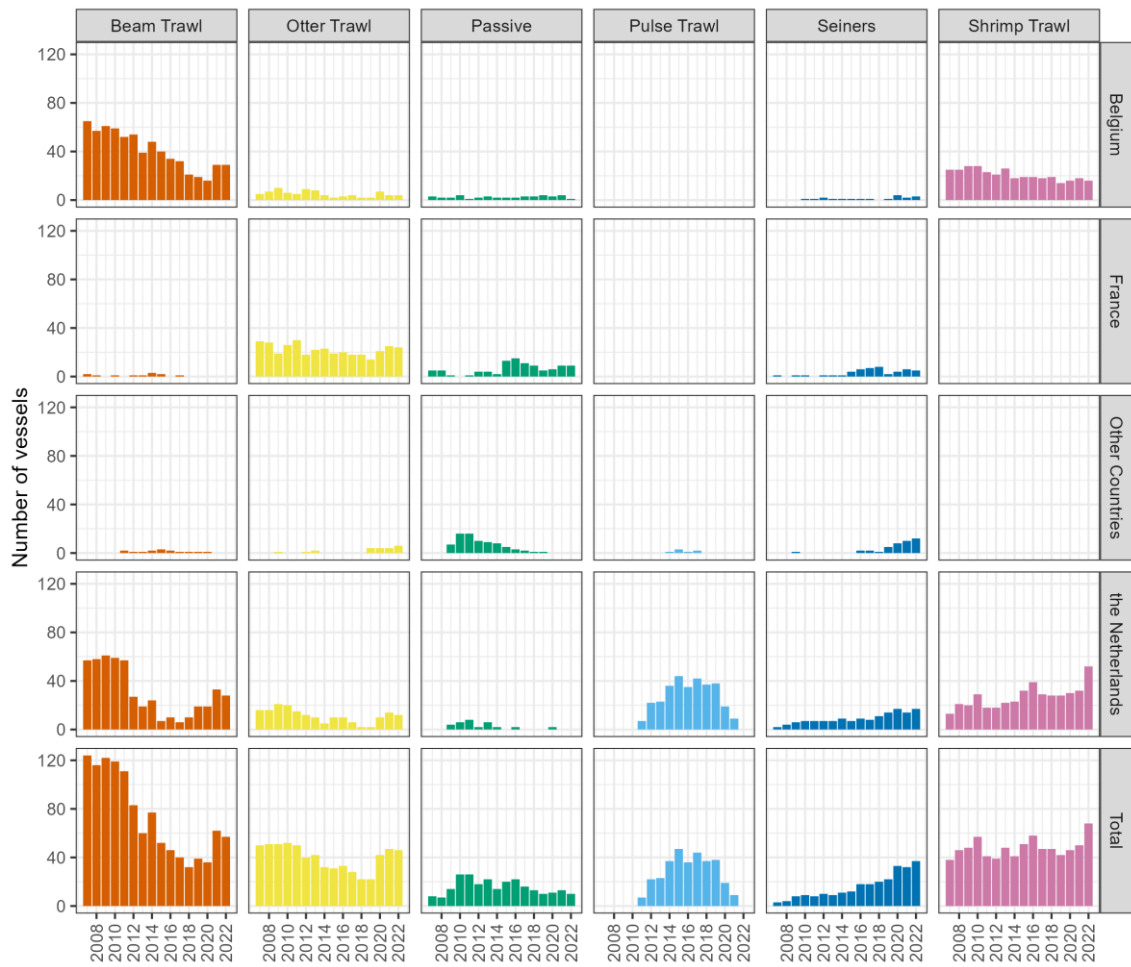
Figure 9 Number of vessels per gear group and year for each country active in the BPNS (2007-2022). Other includes the German, Danish and British fleet. Data for Germany and the United Kingdom were only available between 2009 and 2022.
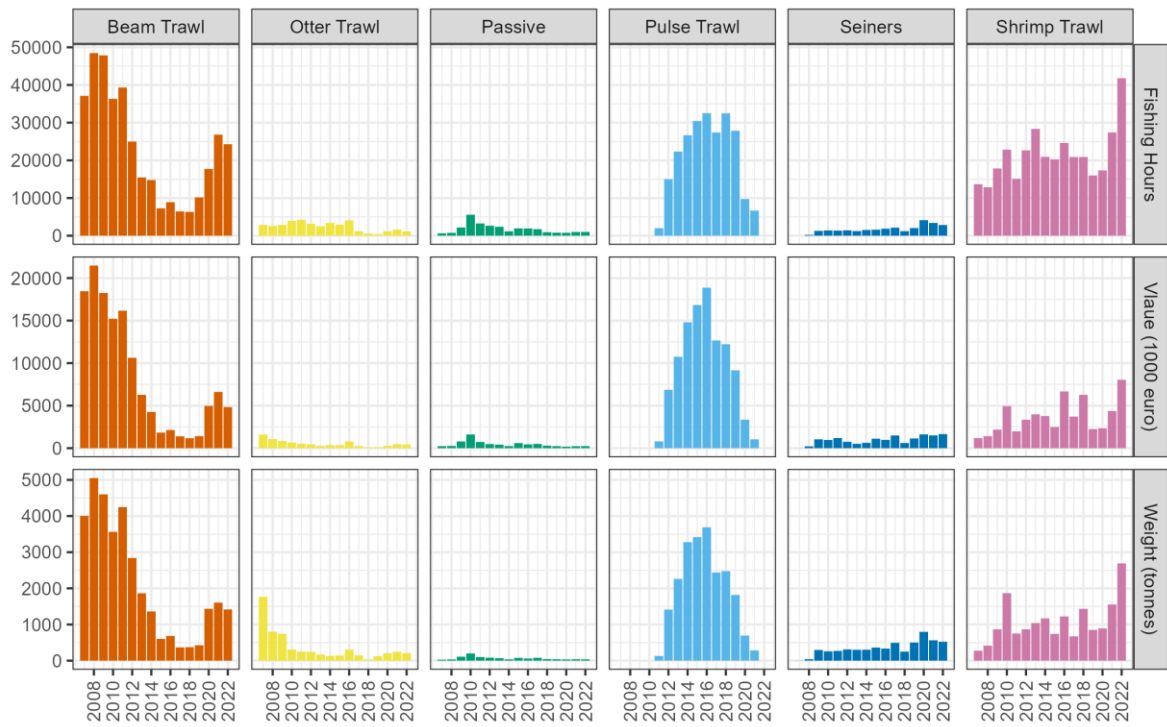
Figure 10 Total fishing effort in fishing hours, landings in value and in weight for the different fishing gears in the Belgian part of the North Sea (2007-2022). The miscellaneous category 'other gear' is not shown. Data includes activities of the Belgian, Danish, French and Dutch fleet (2007-2022) as well as the German and British fleet (2009-2022).
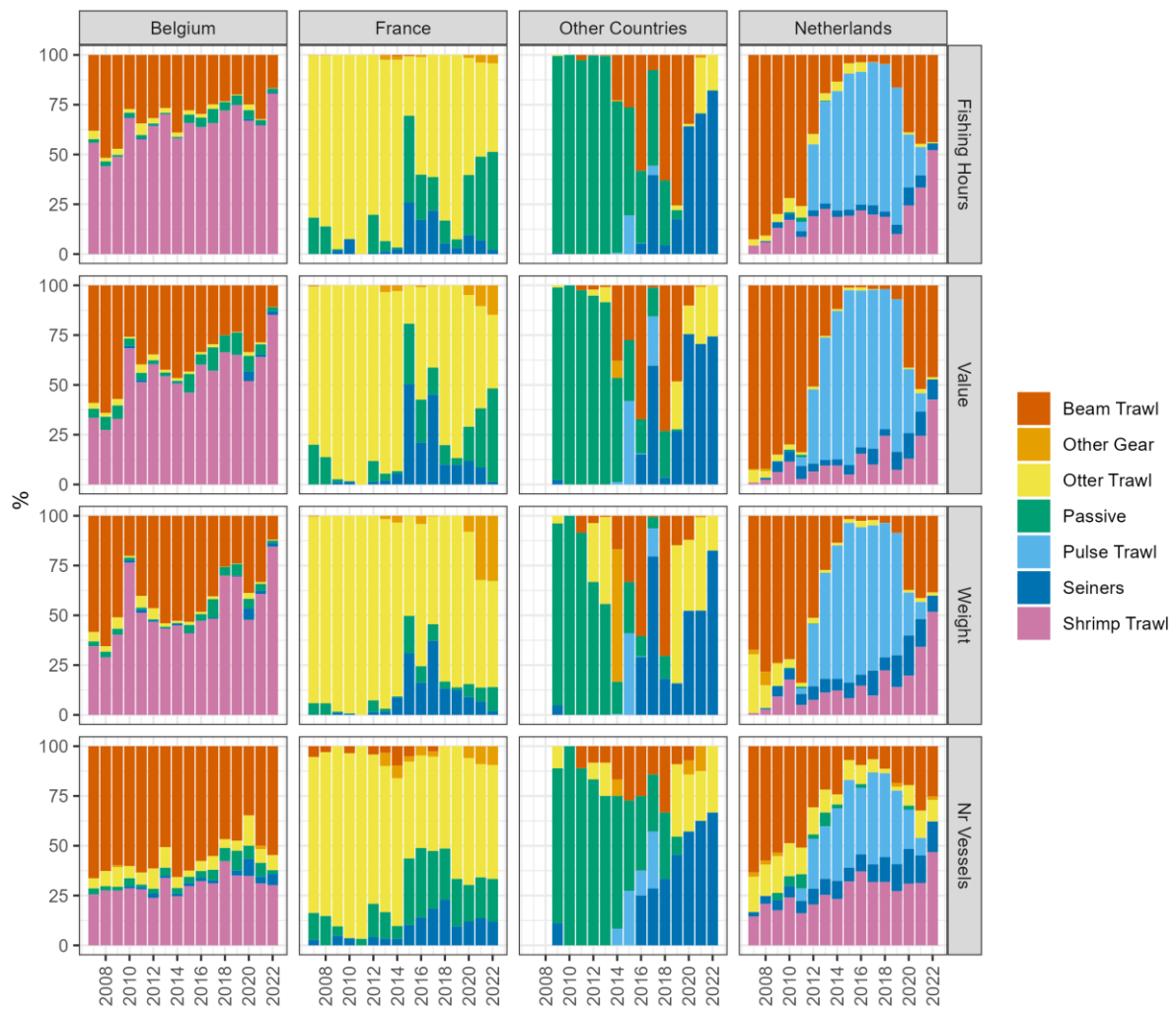
Figure 11 Relative fishing effort (fishing hours), landings in value, landings in weight and number of vessels per country and per gear in the Belgian part of the North Sea (2007-2022). 'Other countries' includes the German, Danish and British fleet. Data for Germany and the United Kingdom were only available between 2009 and 2022.

3.1.3   Spatial patterns in fishing activity

3.1.3.1   Overall Fishing activity: fishing hours and swept area ratio

Fishing hours

Figure 12 depicts the overall spatial trend in fishing activity in the Belgian part of the North sea for all countries, except France, shown separately in Figure 13 on a different spatial scale. A shift towards more coastal fishing effort can be observed over the years (Figure 12). On the North-East side of the BPNS, an area with no fishing appears over time (grey area). This coincides with the gradual developments of wind farms. The first pylons were built in 2009-2010 and as construction continued, a gradual disappearance of fishing activities can be observed. The wind farm area was fully operational from 2020-2021 onwards.

Total
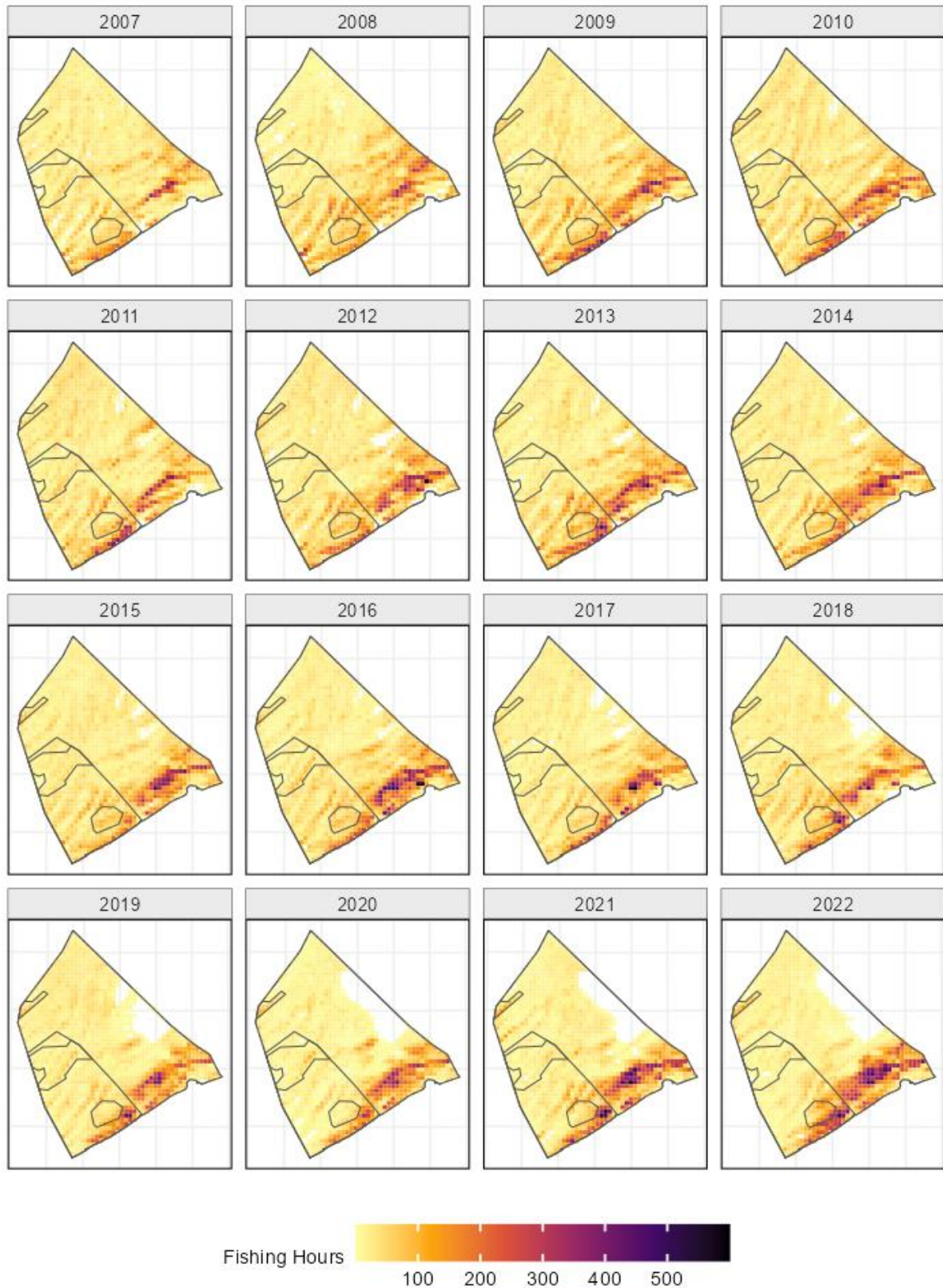
Figure 12 Total fishing effort in fishing hours in the Belgian part of the North Sea between 2007 and 2022 (all gears combined). Data includes activities of the Belgian, Danish and Dutch fleet (2007-2022) as well as the German and British fleet (2009-2022). France is missing. The information is presented on a 1.6 × 1.6 km grid. The Flemish Banks is represented along with the areas where fishing measures are proposed.

France

Figure 13 Total fishing effort for France in fishing hours in the Belgian part of the North Sea between 2007 and 2022 (all gears combined). The information is presented on a 3° × 3° grid. The Flemish Banks is represented along with the areas where fishing measures are proposed.

Swept area ratio

The average swept area ratio (SAR) (without France) between 2009 and 2022 in the BPNS is depicted in Figure 14 (left panel). The SAR is especially high in Area 1 and at the Gootebank area in the middle of the BPNS (≈51.5°N, ≈2.9°E). Furthermore several 'tiger scratch'-like lines are visible, two of which located in the Flemish Banks (Figure 14 left). This is related to a difference in intensity of the fishing activities between gullies, flanks and tops of the sandbanks system. When comparing to the fishing hours (Figure 14 right), the pattern is different: less pronounced in Area 1, the Gootebank area and other lines that were highlighted on the image of the SAR. On the other hand different locations seek our attention, mainly a large area close to the coast and we see a relatively high fishing activity in Area 3.

When removing seining gear, the SAR image (Figure 15 left) changes and reflects more the spread of the average fishing hours (Figure 15 right). The image of the fishing hours does not change significantly compared to Figure 14 right, although Area 1 and the middle location fade away, indicating that the high SAR (and fishing hours) in these locations can be attributed to seiner activity. Seining gear has large swept areas and therefore a high SAR. Therefore, in order to visualize differences, the scale of Figure 14 left (including seiner activity) needed to be 3 times larger than the scale in Figure 15 left. As a consequence, Figure 15 left gives more detail and the large area close to the coast appears now more subjected to fishing pressure than in Figure 14 left. Nevertheless, the entire BPNS is an area with intensive fishing activity, leading to many areas under high fishing pressures (SAR > 5).

The fishing hours in Figure 14 and Figure 15 are based on interpolated fishing pings that were used to estimate the SAR at a finer resolution (see material and methods). The overall image is similar to the image when considering fishing hours of none interpolated pings (Figure 12).
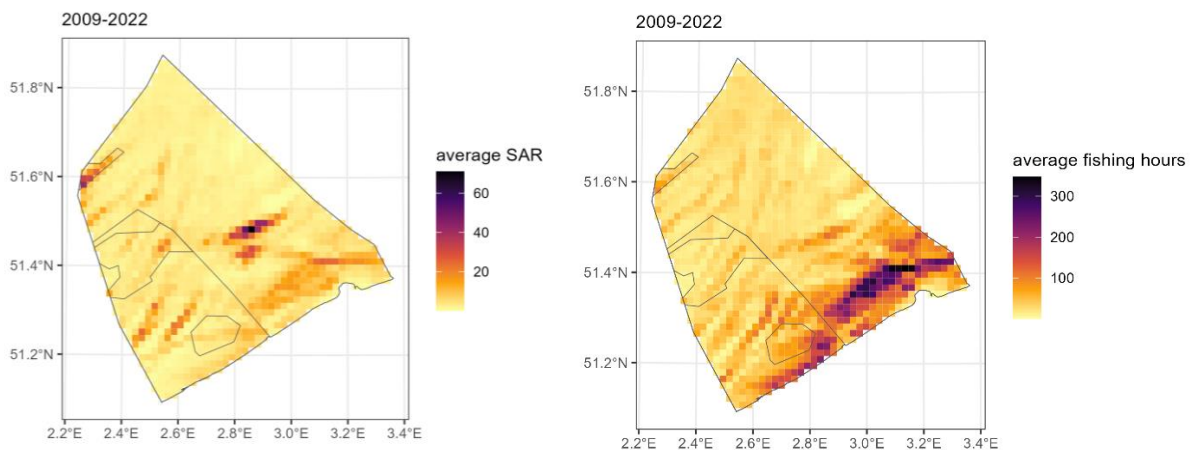
Figure 14. Average SAR and average fishing hours in the Belgian part of the North Sea between 2009 and 2022 (all trawling gears combined). The data were interpolated and include activities of the Belgian, Dutch, German, Danish and British fleet (2009-2022). French data could not be included. The information is presented on a 1.6 × 1.6 km grid. The Flemish Banks is represented along with the areas where fishing measures are proposed.
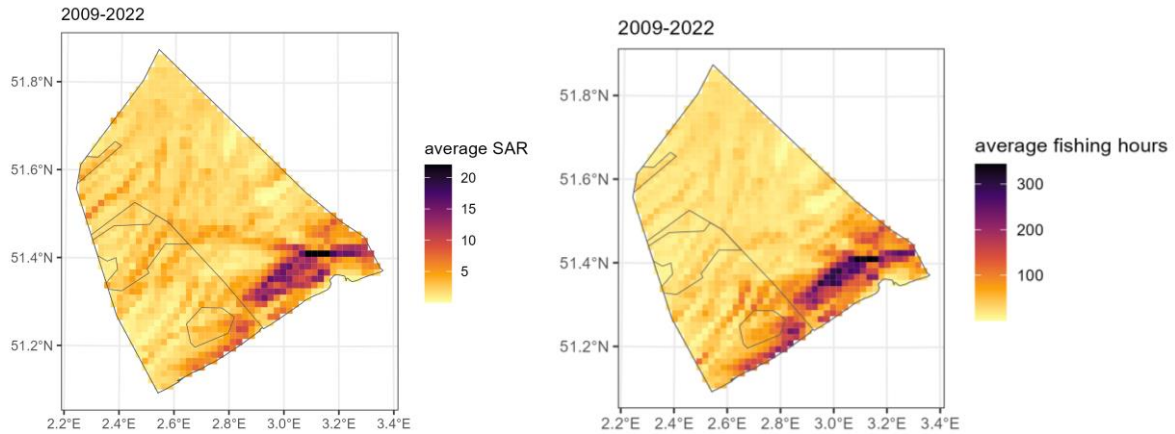
Figure 15. Average SAR and average fishing hours in the Belgian part of the North Sea between 2009 and 2022, combining all trawling gears except for seining gears. The data were interpolated and include activities of the Belgian, Dutch, German, Danish and British fleet (2009-2022). French data could not be included. The information is presented on a 1.6 × 1.6 km grid. The Flemish Banks is represented along with the areas where fishing measures are proposed.

3.1.3.2 Spatial overview of fishing activities (fishing hours) per gear

Shrimp trawl

In the BPNS, trawling for brown shrimp (*Crangon crangon*) is an important activity for Belgian vessels and to a lesser extent for the Dutch, although the relative share compared to other gears in the BPNS is increasing (see Figure 11). Shrimp fishing takes place along the coastline, including in the Flemish Banks (Figure 16). Within the category of trawling vessels, shrimp trawls represent relatively small vessels when comparing to those active further offshore. Belgian shrimp trawlers generally consist of vessels < 70 GT and ≤ 221 kW and so are allowed to operate within the 3 NM zone. There are also shrimp trawlers > 70 GT but ≤ 221 kW and usually ≤ 24 m. Locally they are called the "Eurokotters" and are not allowed to operate within the 3 NM zone. The majority of Dutch shrimp trawlers had an engine power ≤ 221 kW. No complete information was available on GT.

Beam trawl and pulse trawl

Beam trawling for flatfish is an important activity for Belgian and Dutch vessels. Smaller vessels are active closer to the coast and may alternate beam trawling and shrimp trawling depending on the season. Further offshore larger vessels predominate. An important target species is sole (*Solea solea*) which could also successfully be caught with a pulse trawl. In the time series the shift from beam trawling to pulse trawling made by many Dutch vessels is visible (Figure 17, Figure 18, Figure 9, Figure 10, Figure 11). This was not the case for the smaller coastal vessels that operate in the 3 NM zone (Figure 17). There was no pulse trawling for flatfish close to the coast (2011-2021) and pulse trawling stopped in 2021.

Otter Trawl

Otter trawling decreased considerably in the BPNS for all countries except France (Figure 19). For France the image is different with no clear decrease in fishing effort over time (Figure 20). Area 1 and Area 2 as well as their surroundings seem important for the French otter trawls. This was also visible in the total fishing hours for France (Figure 13).

Seine fishing

Predominantly Scottish seiners were introduced in the BPNS over time. The relative spread of effort within the BPNS (France not included) seems relatively stable over time and a number of fishing ground hotspots can be observed. Area 1 seems to be one of these. Another one is in the center of the BPNS (Goote bank area), while in the Flemish Banks also several hotspots appear (Figure 21). For privacy reasons, no figure is included for France, as the amount of vessels was too low (< 5 vessels). The image for France was similar to the overall image in Figure 13 and roughly depicts the same fishing grounds, including the hotspots described above.

Passive gears

Fishing activities with passive gears varied largely over the years, due to a diminished activity from the other countries and more recently from Belgium, and an increased activity of France. Area 2 seems especially important for French passive gears. For confidentiality reasons, the entire time line could not be visualized and therefore only 2009-2020 is considered overall and 2015-2022 for French passive gears.

Between 2009-2015 the overall activity of all countries except for France was mainly offshore. After 2015 coastal activity appears as well, while offshore activity gradually disappears. For France such a shift is not visible and offshore activity continued between 2015-2022.

Shrimp Trawl
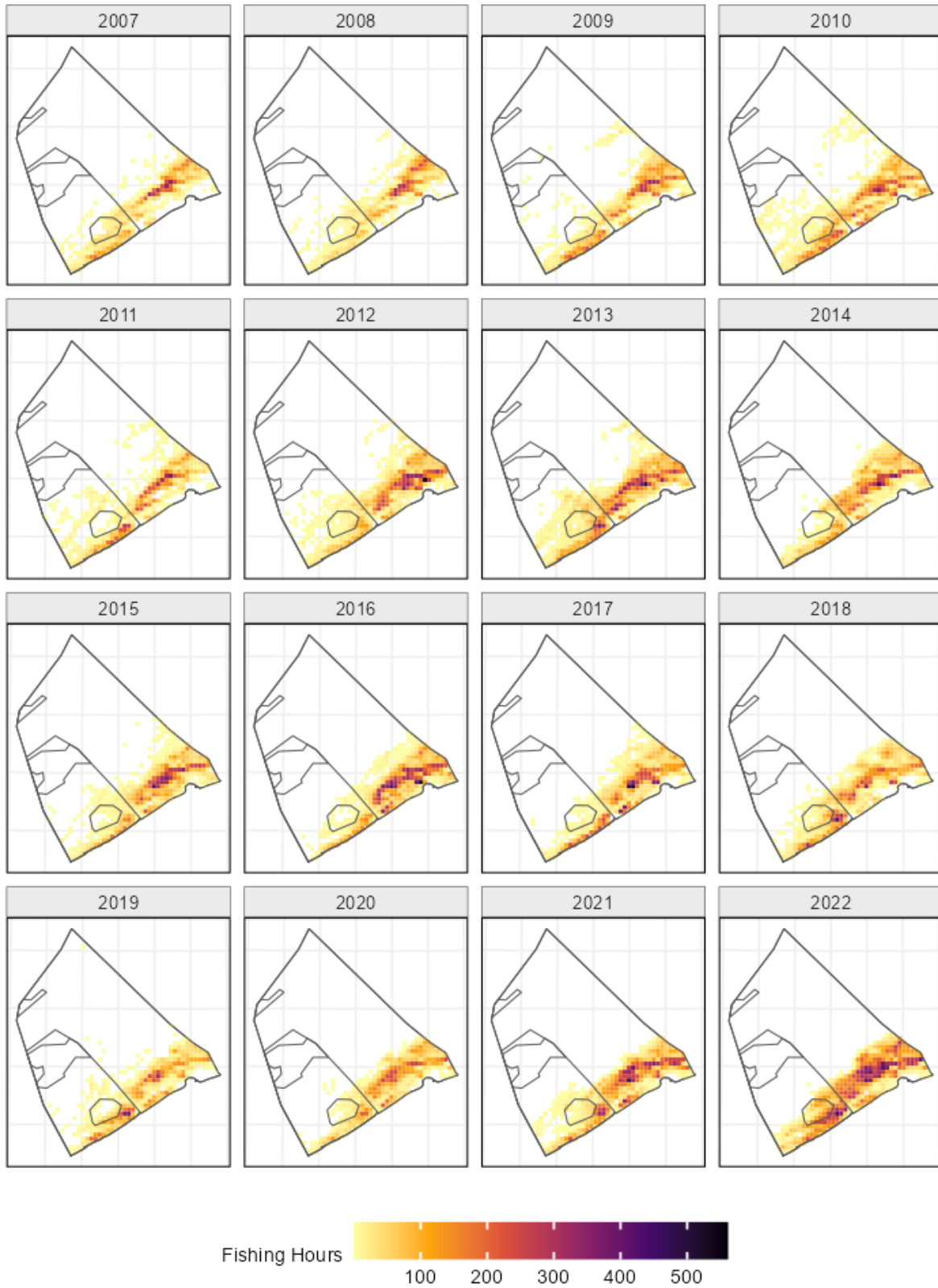
Figure 16 Fishing effort in fishing hours for shrimp trawlers in the Belgian part of the North Sea between 2007 and 2022. Data includes activities of the Belgian, Danish and Dutch fleet (2007-2022) as well as the German and British fleet (2009-2022). France is missing. The information is presented on a 1.6 × 1.6 km grid. The Flemish Banks is represented along with the areas where fishing measures are proposed.

Beam Trawl
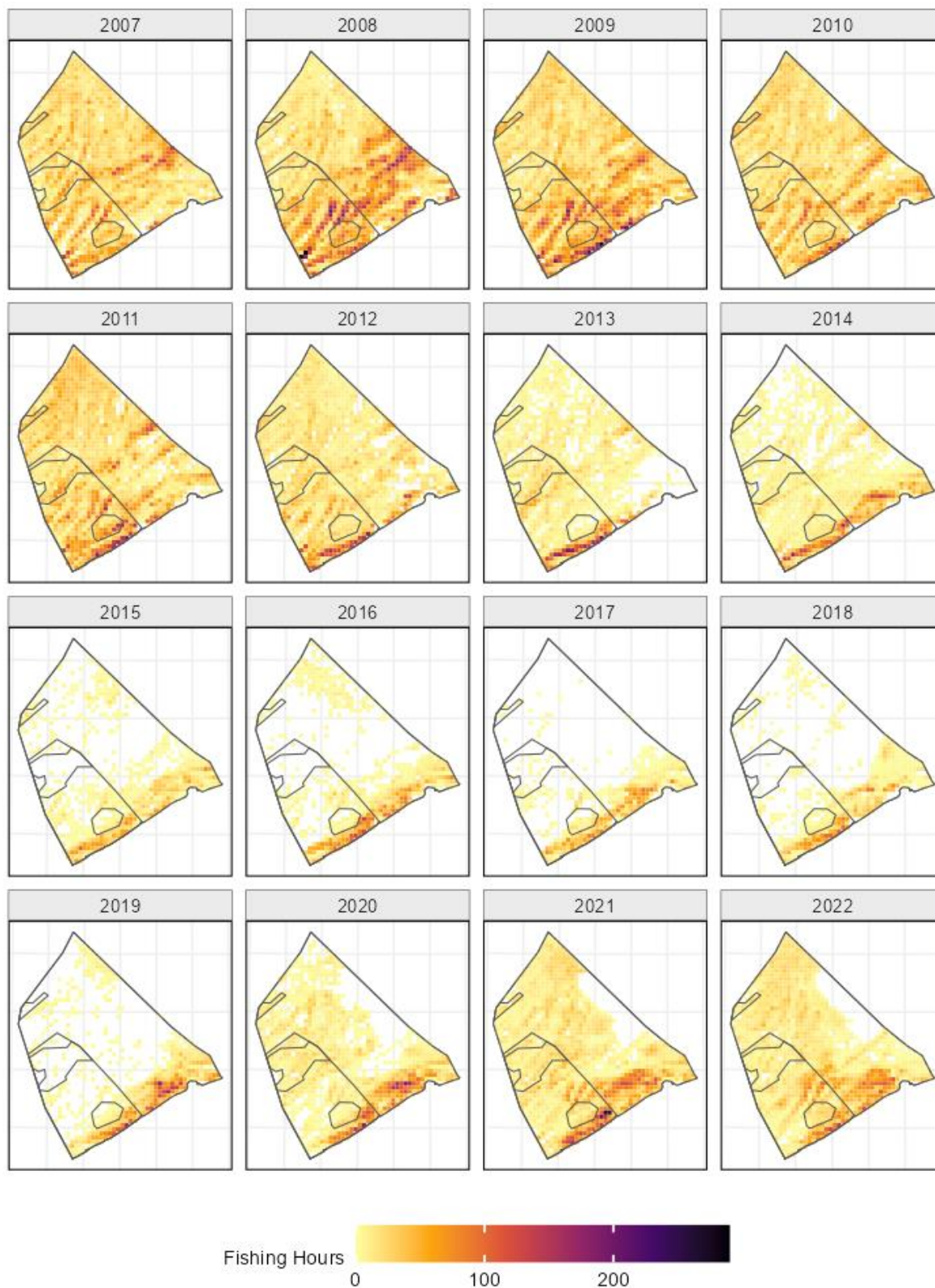
Figure 17 Fishing effort in fishing hours for beam trawlers in the Belgian part of the North Sea between 2007 and 2022. Data includes activities of the Belgian, Danish and Dutch fleet (2007-2022) as well as the German and British fleet (2009-2022). France is missing. The information is presented on a 1.6 × 1.6 km grid. The Flemish Banks is represented along with the areas where fishing measures are proposed.

Pulse Trawl
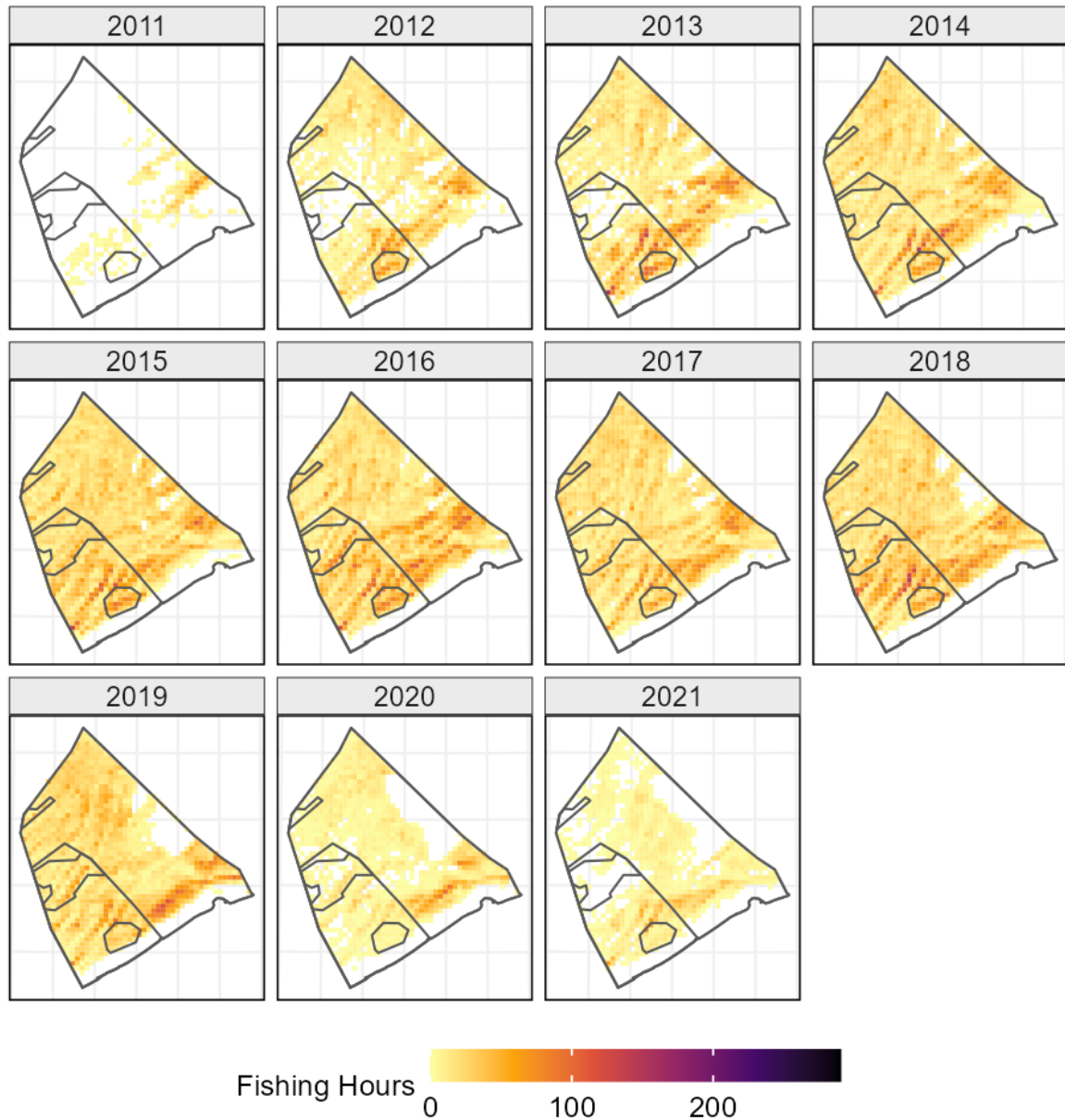
Figure 18 Fishing effort in fishing hours for pulse trawlers in the Belgian part of the North Sea between 2007 and 2022. Data includes activities of the Belgian, Danish and Dutch fleet (2007-2022) as well as the German and British fleet (2009-2022). France is missing. The information is presented on a 1.6 × 1.6 km grid. The Flemish Banks is represented along with the areas where fishing measures are proposed.

Otter Trawl

Figure 19 Fishing effort in fishing hours for otter trawlers in the Belgian part of the North Sea between 2007 and 2022. Data includes activities of the Belgian, Danish and Dutch fleet (2007-2022) as well as the German and British fleet (2009-2022). France is missing. The information is presented on a 1.6 × 1.6 km grid. The Flemish Banks is represented along with the areas where fishing measures are proposed.

Otter Trawl - France

Figure 20. Fishing effort in fishing hours for French otter trawlers in the Belgian part of the North Sea between 2007 and 2022. The information is presented on a 3° × 3° grid. The Flemish Banks is represented along with the areas where fishing measures are proposed.

Seiners

Figure 21. Fishing effort in fishing hours for seine gear in the Belgian part of the North Sea between 2007 and 2022. Data includes activities of the Belgian, Danish and Dutch fleet (2007-2022) as well as the German and British fleet (2009-2022). France is missing. The information is presented on a 1.6 × 1.6 km grid. The Flemish Banks is represented along with the areas where fishing measures are proposed.
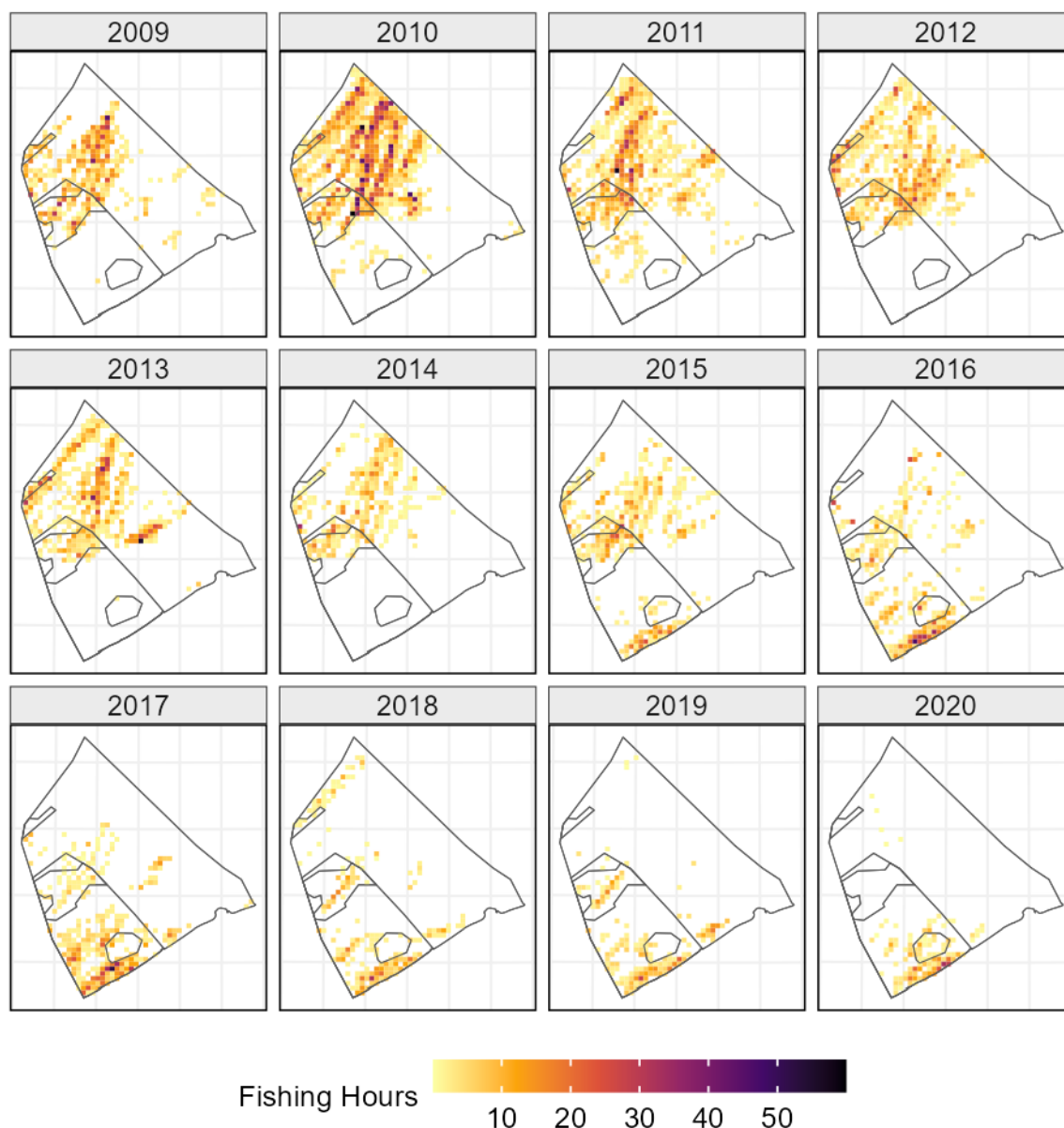
Passive gears

Figure 22 Fishing effort in fishing hours for passive gears in the Belgian part of the North Sea between 2009 and 2020. Data includes activities of the Belgian, Danish and Dutch fleet as well as the German and British fleet. France is missing. The information is presented on a 1.6 × 1.6 km grid. The Flemish Banks is represented along with the areas where fishing measures are proposed.

Passive gears - France
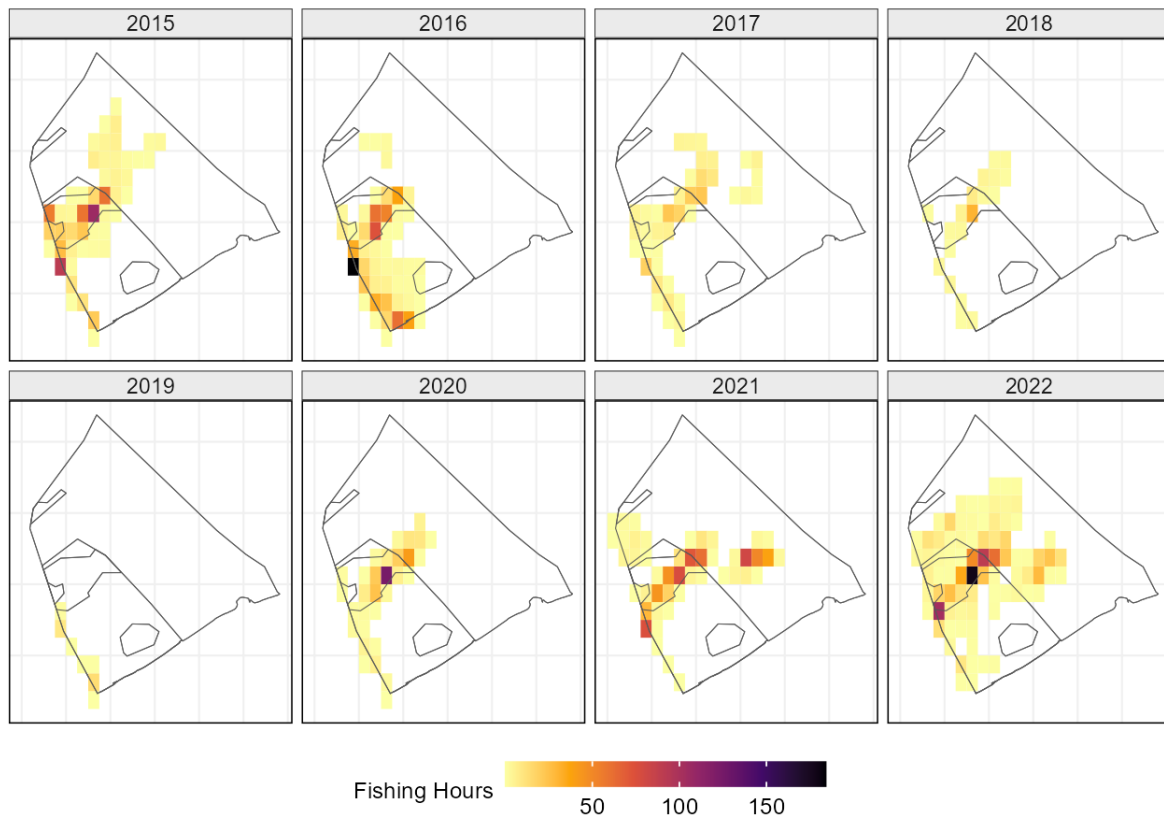
Figure 23 Fishing effort in fishing hours for French passive gears in the Belgian part of the North Sea between 2015 and 2022. The information is presented on a 3° × 3° grid. The Flemish Banks is represented along with the areas where fishing measures are proposed.

3.2 Fishing activities in the Flemish Banks

3.2.1 Overall trends

About 33% of the effort in the BPNS occurred in the Flemish Banks and roughly the same share of the landings both in weight and value originated from the area. When considering total trends, there seems to be an overall decline in the Flemish Banks, similarly to the trends in the BPNS, at least for the period 2012 – 2020 (Figure 24). The trend is more apparent for the landed weight than for the fishing effort and seems steeper for the BPNS than for the Flemish Banks. Since 2017, the landed weight is clearly lower for rather the same effort. A simple linear regression model was fitted for the entire period, showing no significant negative relationship between years and fishing effort in the Flemish Banks (p > 0.1). On the other hand, there appears to be a significant decline of 70 tonnes per year (p-value < 0.001) in the Flemish Banks. A decline for the value of landings was also significant (p-value < 0.01).
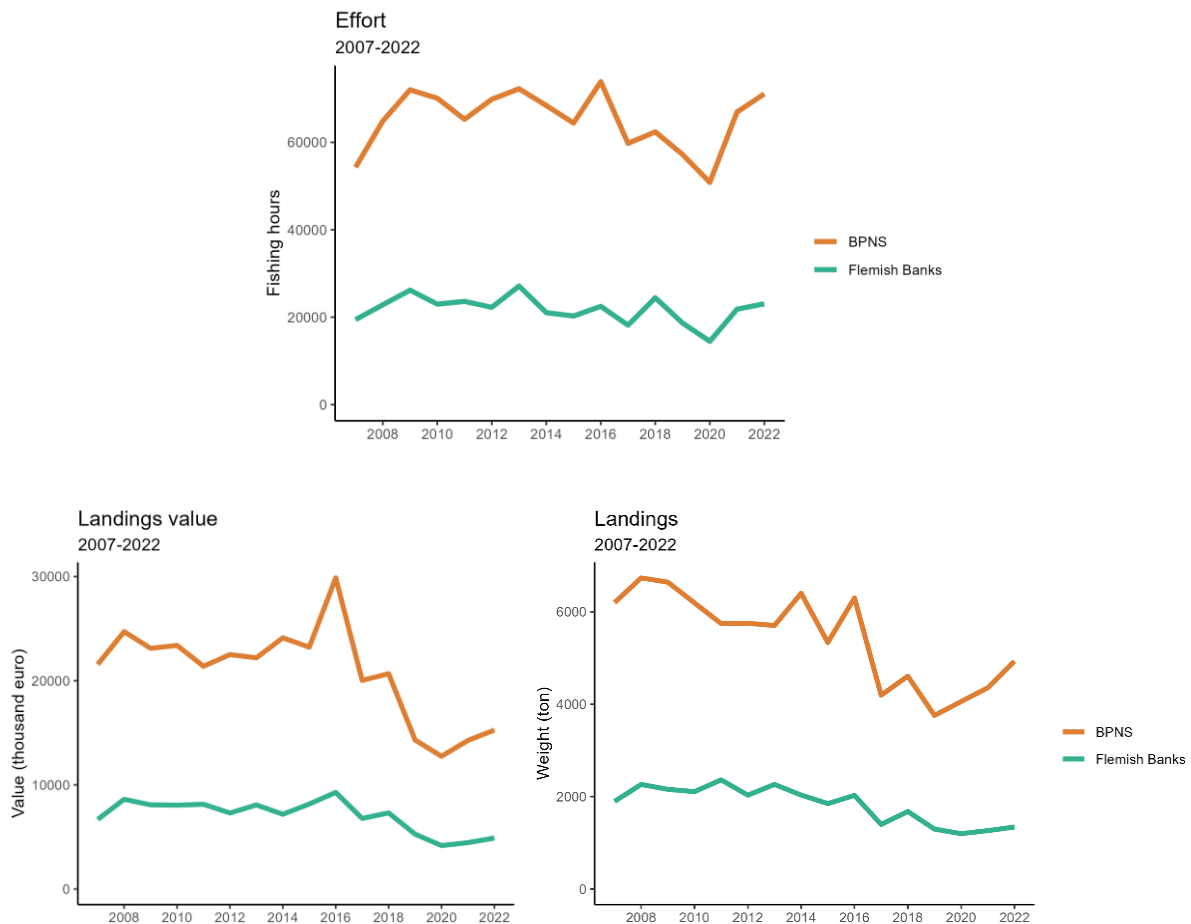
Figure 24 Effort, value of landings and landed weight in the Flemish Banks and the Belgian part of the North Sea (all gears combined). The data includes Belgian, French and Dutch vessels (2007-2022) as well as the German, Danish and British vessels (2009-2022).

The fishing effort in the Flemish Banks represents on average 33% of the fishing effort in the BPNS. The relative share of the Flemish Banks to the BPNS did not decrease significantly between 2007-2022 (Figure 25). A simple linear regression model was fitted through these percentages for the entire period, showing no significant negative relationship between years and relative fishing effort in the Flemish Banks (p-value > 0.1). Similarly, there was no significant decline in relative weight (p-value > 0.1) and relative value of landings (p-value > 0.5) in the Flemish Banks.

The spatial distribution of the fishing activity in the Flemish Banks is visualized in Figure 12. There is variation over the years, but generally activity is most pronounced close to the coast.

40
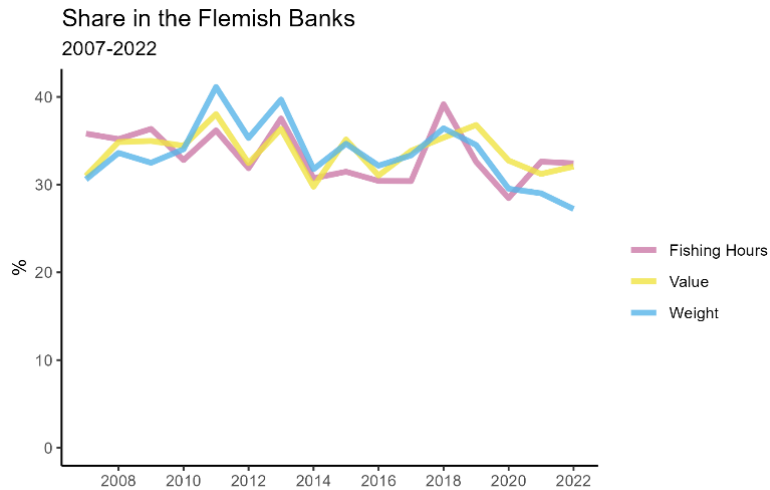
Figure 25 Percent of effort, weight and value of landings in the Flemish Banks relative to the Belgian part of the North Sea (all gears combined). The data includes Belgian, French and Dutch vessels (2007-2022) as well as the German, Danish and British vessels (2009-2022).

3.2.2   Trends per country

The Netherlands are an important player in the Flemish Banks, as their landings are high. There is a clear declining trend for the total landed weight and value, while no trend is apparent for the fishing hours. For Belgium no clear trend can be observed. The total number of Belgian fishing hours ran in the same order of magnitude as the total Dutch fishing hours. There are large differences for the total landings, with the Netherlands landing about 3-fold more weight and value than Belgium. However, in 2022 the total landings for Belgium and the Netherlands were comparable for the first time in the analyzed period (Figure 26). For Belgium roughly 50% of the effort and landings in the BPNS came from the Flemish Banks, while for the Netherlands this was around 30%. The contribution of the Netherlands and Belgium to the landed weight from the Flemish Banks was about 68% and 29% (2009-2022). The contribution to the value of landings from the Flemish Banks was close to 73% for the Netherlands and about 25% for Belgium.

The contribution of France and the other countries to the landed weight from the Flemish Banks was limited to 2.4% and 0.8%, while the value of landings was 1.6% and 0.9% respectively. For France the effort and landings (value and weight) within the Flemish Banks relative to effort and landings in the BPNS was 52% and 48% respectively. For other countries this represented 17% of their effort, 15% of their value of landings and 13% of their landed weight in the BPNS.

When considering vessels ≤ 24 m and > 24 m, the image is slightly different (Figure 26). There is little difference between the Belgian fleet and Dutch fleet for vessels ≤ 24 m regarding the amount of effort and landings. However, overall the Dutch effort is lower than the Belgian effort for the same amount of landings for vessels ≤ 24 m. Also no trend is visible in the amount of effort for both countries, whereas there is a declining trend in weight and value of landings for the Netherlands since roughly 2013. For Belgium, in 2022 we see high amounts of effort and landed weight and an exceptionally high value of landings for vessels ≤ 24 m.

For vessels > 24 m, there is very limited contribution from Belgium in the Flemish Banks. The main contribution comes from the Netherlands, accounting for 94% of the weight and 96% of the value of

landings from vessels > 24 m in the Flemish Banks. For effort they accounted for 95%. There is a decline in all variables, but it is steeper for the weight and value of landings than for the effort. This decline for vessels > 24 m determines the overall total trend in the Flemish Banks except for 2022.
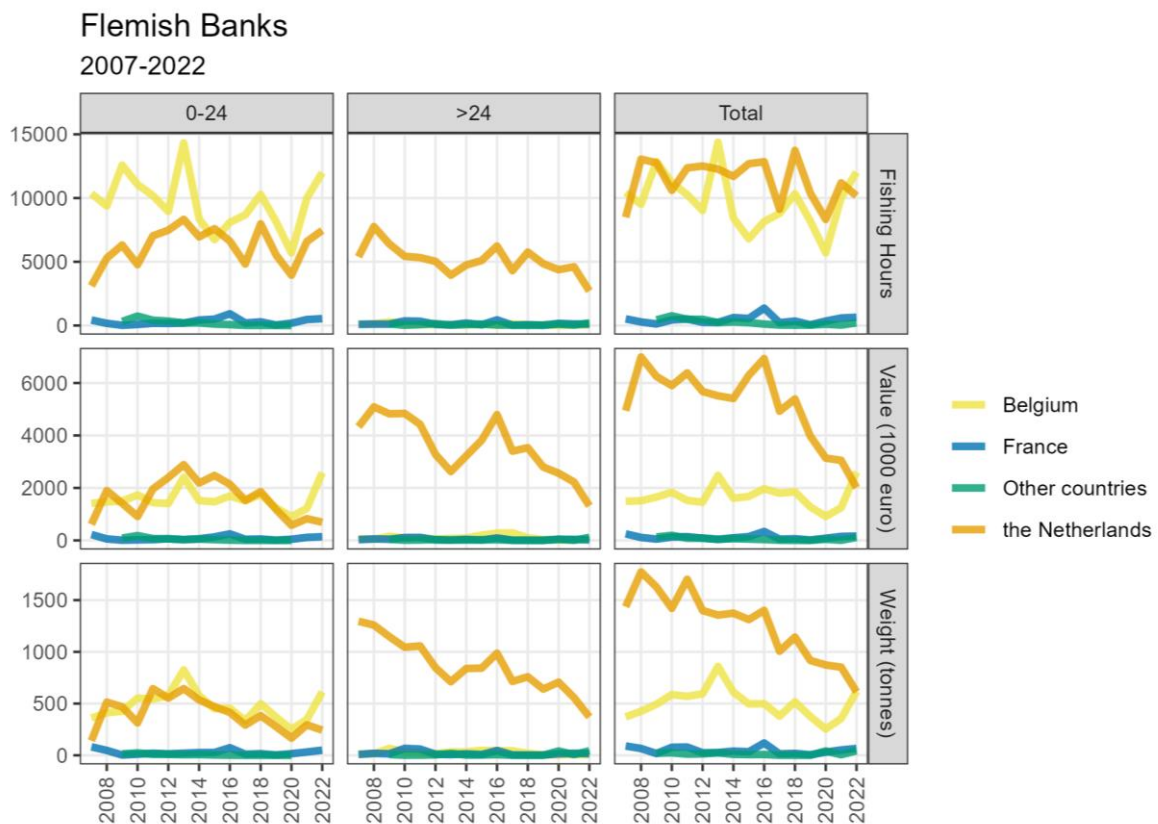
Figure 26 Effort, weight and value of landings in the Flemish Banks per country for vessels ≤ 24m and > 24m (all gears combined). Vessels with an unknown length category were left out in the division ≤ 24m and > 24m, but included in the totals. The data includes Belgian, French and Dutch vessels (2007-2022) as well as the German, Danish and British vessels denoted as 'Other countries' (2009-2022).

3.2.3 Trends per gear

Figure 27 gives an overview of the total fishing effort per gear group in the Flemish Banks and the BPNS. Shrimp trawl, beam trawl and pulse trawl were the most important gears and follow the same trend in the Flemish banks as in the BPNS. The beam trawl and pulse trawl - targeting mainly the same species - replace each other, with the pulse trawl making its introduction in 2011 and completely disappearing in 2022. The spatial distribution of effort of the different gears in the Flemish Banks is visualized above (Figure 16-Figure 23). The fishing activities inside the Flemish Banks relative to the BPNS between 2007-2022 are shown in Figure 28.
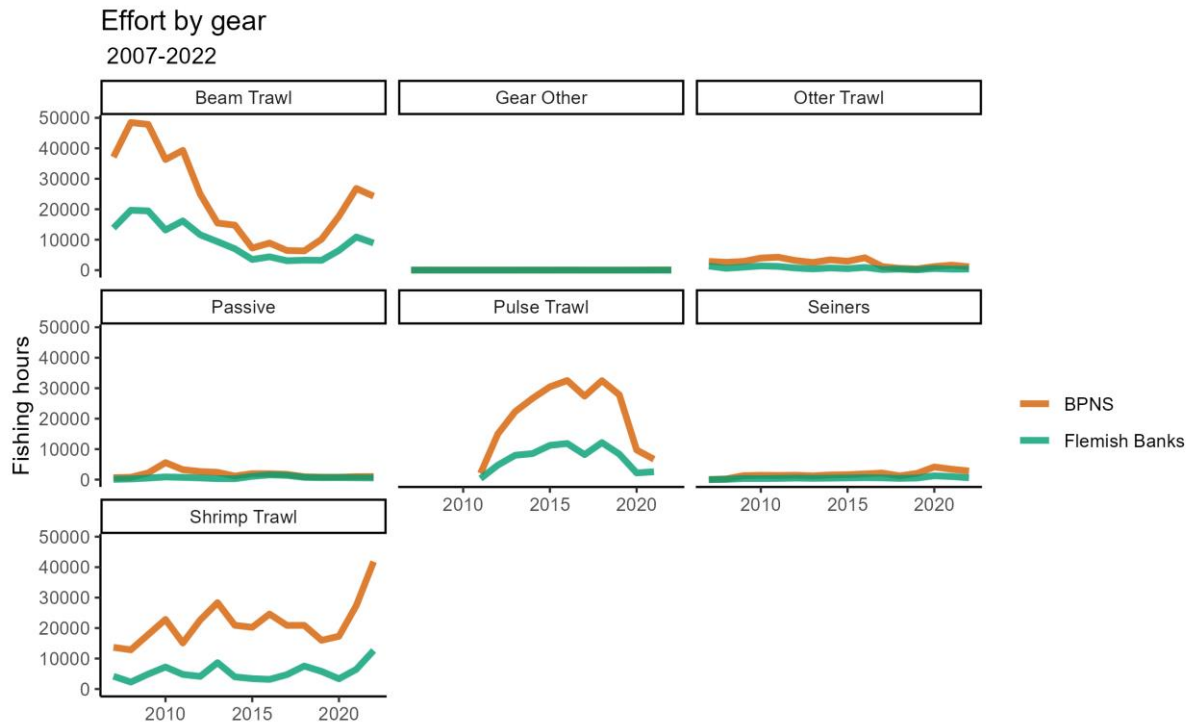
Figure 27 Total fishing effort in fishing hours per gear group, both in the Belgian part of the North Sea and the Flemish Banks. The data includes Belgian, French and Dutch vessels (2007-2022) as well as the German, Danish and British vessels (2009-2022).
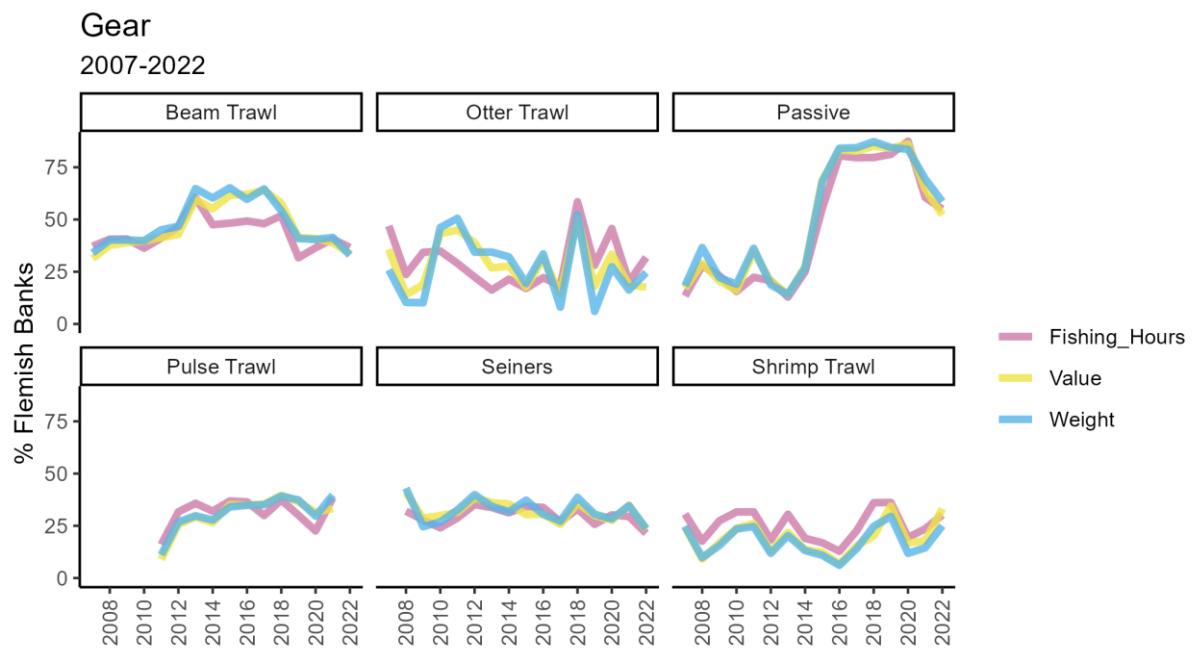
Figure 28 Percent of effort, weight and value of landings in the Flemish Banks relative to the BPNS per gear between 2007 and 2022 (all countries combined). "Other gears" were not included .

Shrimp fishing takes place along the coastline, including in the Flemish Banks (Figure 16). There is variation from year to year, however there appears to be more activity in the Flemish Banks in 2021 and 2022 (Figure 27 & Figure 16). The same pattern was present in the BPNS, so no increase for shrimp trawl was observed inside the Flemish Banks relative to the BPNS (Figure 28).

An overall effort displacement for the **beam trawl** is visible: there was an increase of the relative share of effort, but even more of weight and value inside the Flemish Banks from 2013 to 2018 (Figure 28). The relative share of effort and landings for **pulse trawling** remained stable in the same period. Between 2007-2011 **beam trawling** was intensive and spread over the entire Flemish Banks. Since 2012, the intensity diminished until reaching a minimum in 2015 until 2019 (

Figure 27 & Figure 18). Form 2020 onwards it increased again, but not reaching the intensity of before 2012. Additionally the concentration close to the coast becomes more visible from 2012 onwards and remains until 2021 (Figure 18). Pulse trawling on the contrary does not happen close to the coast, it is spread over the entire BPNS including the Flemish Banks and is limited by a straight line parallel to the coast (Figure 18). This most likely coincides with the permitted boundary.

Otter trawling for all countries, except for France, considerably decreased in the Flemish Banks (Figure 19 & Figure 20). No trend for otter trawl inside the Flemish Banks relative to the BPNS was observed between 2007-2022 (Figure 28).

Seiners were introduced in the Flemish Banks over time and gain importance. The spread of effort within the Flemish Banks relative to the BPNS seems stable over time and a few fishing ground hotspots can be observed (Figure 28 & Figure 21).

Passive gears seem to have increased their share inside the Flemish Banks since 2013 (Figure 28). They are mainly active in Area 2, but have extended their effort closer to the coast since 2015 (Figure 22 & Figure 23). French passive gears appear to be active mainly in Area 2 from 2015 onwards (Figure 23).

3.3 Fishing activity in the proposed management areas

3.3.1 Overall trends

Figure 29 shows the estimated effort, landed weight and value of landings from the three proposed management areas. The spatial distribution can be seen in Figure 12.
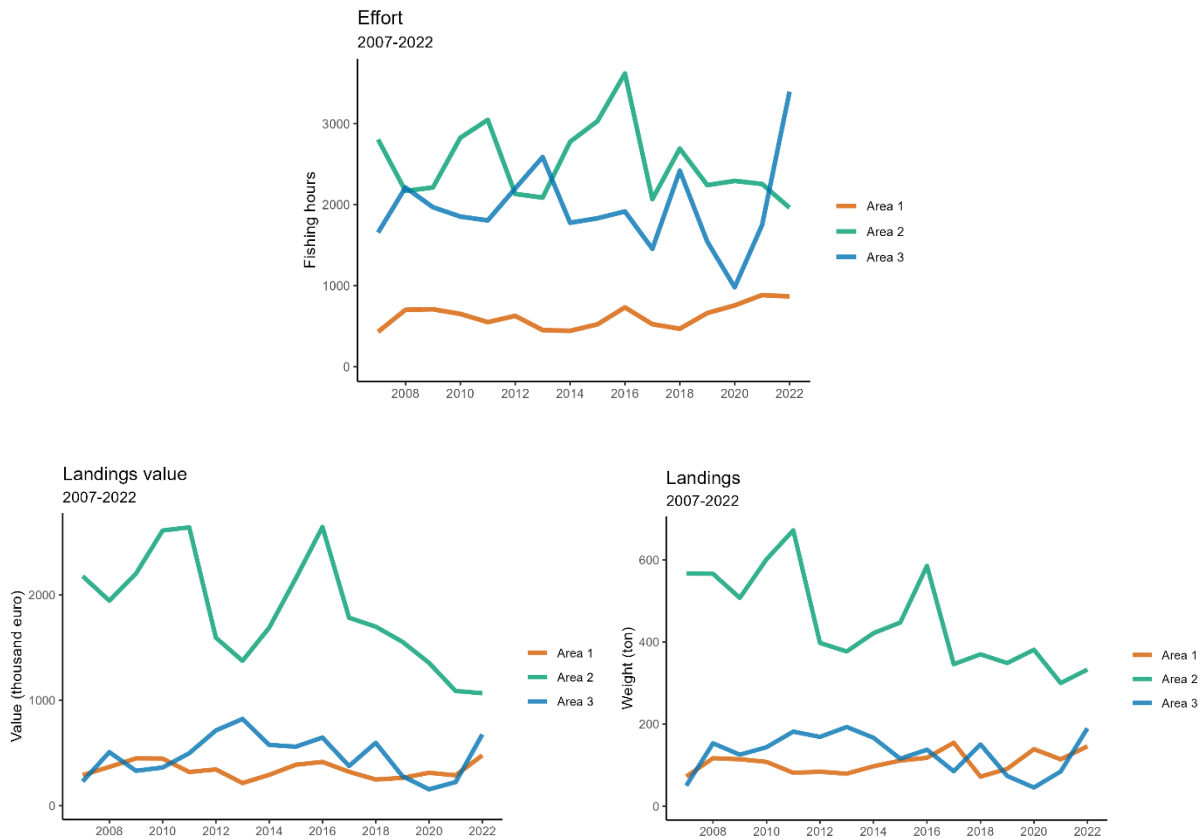
Figure 29. Effort, value of landings and landed weight in the three proposed management areas per area (all gears combined). The data includes Belgian, Danish, French and Dutch vessels (2007-2022) as well as German and British vessels (2009-2022).

There seems to be a slightly increasing trend in **Area 1** since 2018 for fishing hours, somewhat less pronounced for the landings (Figure 29). Relative to the BPNS, an increasing trend is also apparent (Figure 30), with the increase in the share more pronounced for weight and value of landings than for effort.

For **Area 2**, there is a clear declining trend for the landed weight and value, while no trend is apparent for the effort (Figure 29). Relative to the BPNS, however, there is no declining trend, indicating that the decline in Area 2 follows the general declining trend in the BPNS (Figure 30). The share of fishing hours relative to the BPNS is much lower than that of the landings (weight and value), suggesting more activity of larger or more efficient vessels in this area. Efficiency here alludes to a higher catch per unit of effort (CPUE), a measure that is often used in fishery research.

For **Area 3** there is no clear trend in absolute terms, nor in relative terms (relative to BPNS), although there seems to be an increase since 2020 (Figure 29, Figure 30). Landings both in weight and value for 2007 seem peculiar.
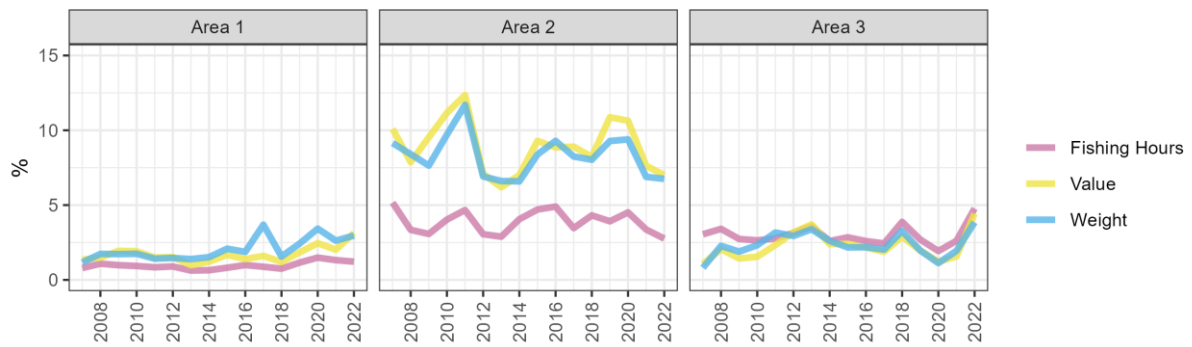
Figure 30 Percent of effort, landed weight and value of landings per proposed management zone relative to totals of the BPNS between 2007 and 2022.

3.3.2   Relative shares per management area and country

An overview of the number of active vessels in the different management areas is shown in Figure 31. The average share per country relative to their activities in the BPNS from 2007 to 2022 is given in Table 5, while the average yearly effort and landings per country is presented in Table 6.
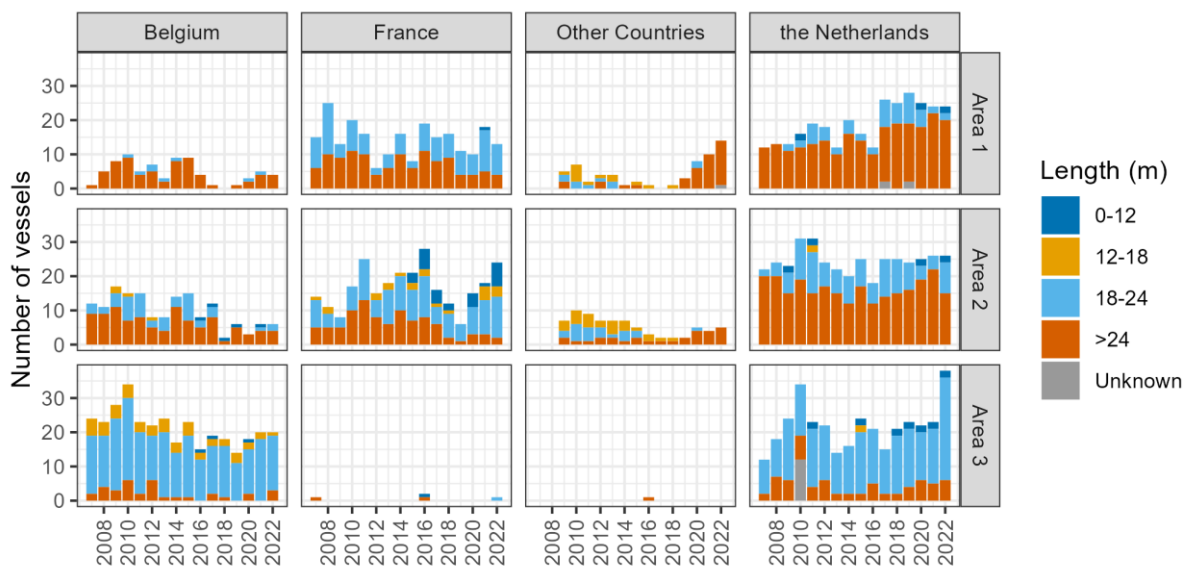
Figure 31 Evolution of the number of vessels active in the management areas per length category and per country between 2007-2022. Data for the UK and Germany were available between 2009-2022.

Table 5 Average percent per country of fishing effort, value of landings and landed weight in the proposed management areas relative to the BPNS (2007–2022).

		Area 1	Area 2	Area 3	Area 1+2+3
Belgium	Fishing Hours	0.1	0.5	3.3	3.9
	Value	0.3	1.7	3.4	5.4
	Weight	0.4	1.2	3.6	5.2
France	Fishing Hours	10.6	43.3	0	54
	Value	10.2	41.6	0	51.9
	Weight	11	43.9	0	54.9
Netherlands	Fishing Hours	1	4.4	3	8.5
	Value	1.7	9.8	2.1	13.6
	Weight	2	9.1	2.2	13.2
Other countries	Fishing Hours	5.5	12.1	0	17.6
	Value	5.8	10.6	0.2	16.6
	Weight	8	8.1	0.3	16.4

Table 6 Average fishing hours, value of landings (1000 euro) and landed weight (ton) in the proposed management areas and in the BPNS for Belgium, France and the Netherlands (2007–2022) as well as for Other countries (2009-2022).

		Area 1	Area 2	Area 3	Area 1+2+3	BPNS
Belgium	Fishing Hours	28	102	671	801	20548
	Value (1000 euro)	11	58	115	184	3402
	Weight (ton)	3	11	34	49	944
France	Fishing Hours	91	372	*	464	859
	Value (1000 euro)	25	103	*	129	248
	Weight (ton)	11	43	*	54	99
Netherlands	Fishing Hours	434	1883	1288	3605	42534
	Value (1000 euro)	282	1649	357	2289	16820
	Weight (ton)	84	388	95	567	4285
Other countries	Fishing Hours	82	179	~	261	1481
	Value (1000 euro)	24	45	~	70	422
	Weight (ton)	10	10	~	19	119

*< 5 vessels; ~ a single occurrence.

3.3.2.1 Area 1

Area 1 is mainly important for the Netherlands and France, representing on average respectively 80% and 10% of the landed weight from the Area 1 (Figure 32). Relative to the fishing activity of the Netherlands in the BPNS, the share from Area 1 only represents 2% of the landings and 1% of the effort (Figure 33 and Table 5). For the French fleet the share of fishing activities in Area 1 fluctuates around 11% of its fishing activities in the BPNS. An increase could be observed for other countries in the last years of the time series which can be attributed to an increased fishing activity from the UK (Figure 32). In absolute numbers, the landings from the Netherlands did not show an increasing trend while the effort did seem to increase. The trend for France seems to follow the same pattern as its relative share of Area 1. For the other countries an increase in effort and landings from 2019 onwards is visible in absolute terms as well as in relative terms.
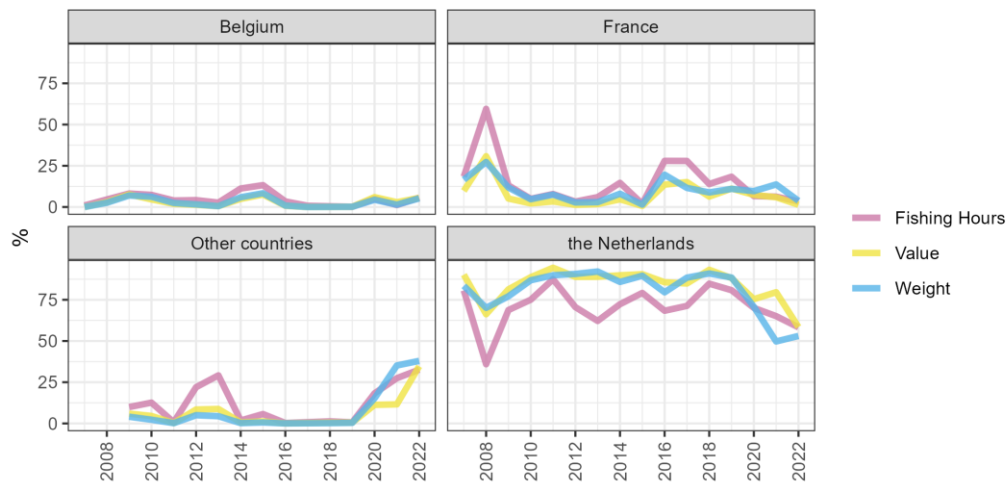
Figure 32 Percent of effort, weight and value of landings in Area 1 per country relative to totals of Area 1 (all countries combined) between 2007 and 2022. Other countries includes Denmark, Germany and the UK.
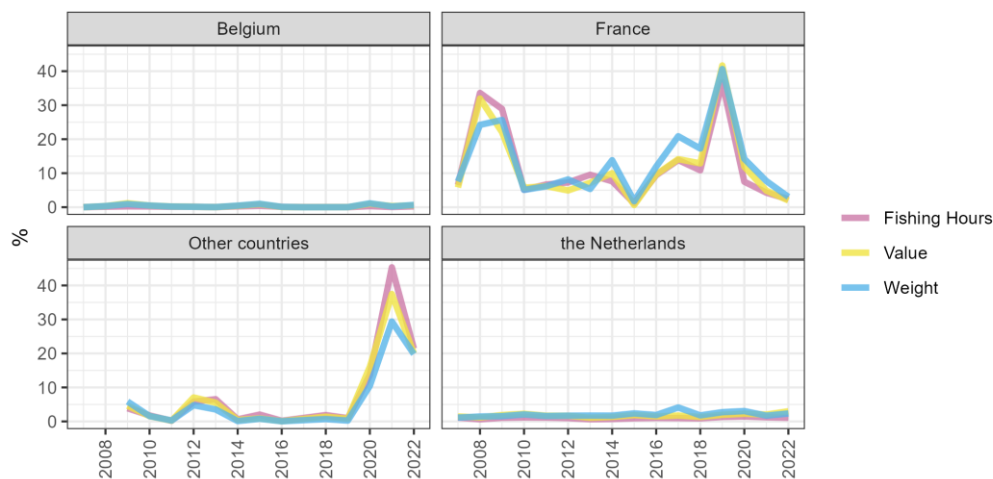
Figure 33 Percent of effort, weight and value of landings in Area 1 per country relative to totals per country in the BPNS between 2007 and 2022. Other countries includes Denmark, Germany and the UK.

3.3.2.2   Area 2

Area 2 is mainly important for the Netherlands and France, representing on average 86% and 9% of the landed weight from Area 2 (Figure 34). The Belgian fleet landed around 2.5% of the weight originating from Area 2. Relative to the fishing activity of the Netherlands in the BPNS, the share from Area 2 represented 9%-10% of the landings and 4% of the fishing hours (Figure 35 and Table 5). For France the share from Area 2 represented more than 40% of the fishing activities in the BPNS, although highly variable from year to year (Figure 35 and Table 5). In absolute numbers, the effort and landings from the Netherlands shows a decreasing trend. There is no clear trend for France. For the other countries an overall decreasing trend in effort and landings from 2010 onwards is visible.
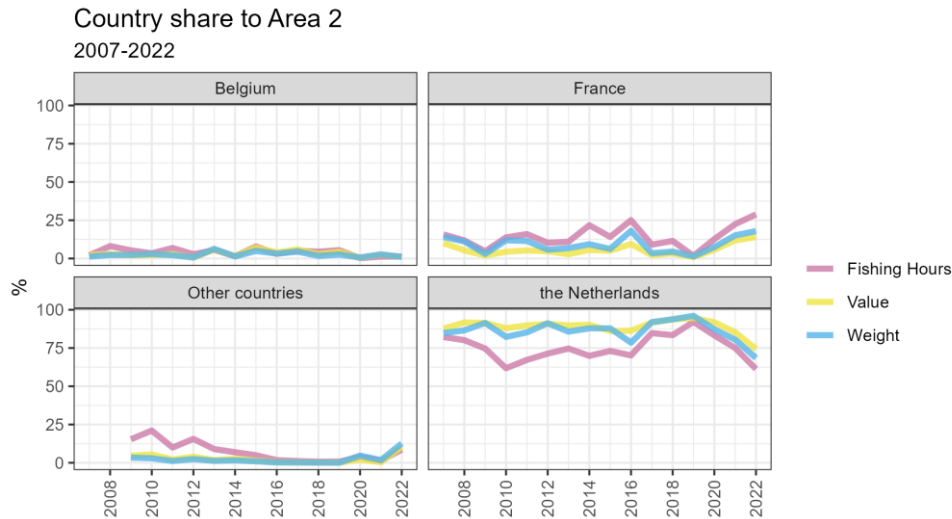
Figure 34 Percent of effort, weight and value of landings in Area 2 per country relative to totals of Area 2 (all countries combined) between 2007 and 2022. Other countries includes Denmark, Germany and the UK.
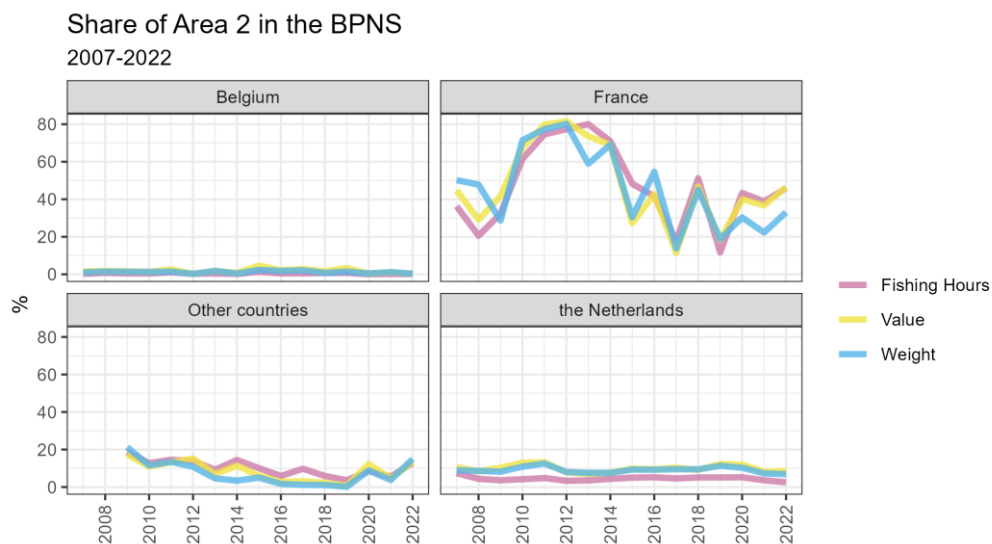
Figure 35 Percent of effort, weight and value of landings in Area 2 per country relative to totals per country in the BPNS between 2007 and 2022. Other countries includes Denmark, Germany and the UK.

3.3.2.3   Area 3

Area 3 is mainly important for the Netherlands and Belgium, representing on average 73% and 27% of the landed weight from Area 3 (Figure 36). However, in 2022 the Belgian share was larger than the Dutch share.

Relative to the fishing activity of the Netherlands in the BPNS, the share from Area 3 represented on average 2%-3% of the effort and landings when considering the entire time series (Figure 37 and Table 5). For Belgium this figure was around 3.5% of the fishing activities in the BPNS between 2007 and 2022. However, when considering 2018 to 2022 this share was 5% for effort and 6.6% for the Belgian landings, with an all-time high in 2022 (≈12% of the landings and 10% of the effort, Table 29 and Table 26). For the Netherlands the share remained around 2% of the landings and 3% of the effort from 2018

to 2022 (Table 26). In absolute numbers, the landings from the Netherlands seem to be decreasing since 2012, while this was less clear for the effort. There was no clear trend for Belgium, however 2022 presents an all-time high compared to other years, also in absolute terms.
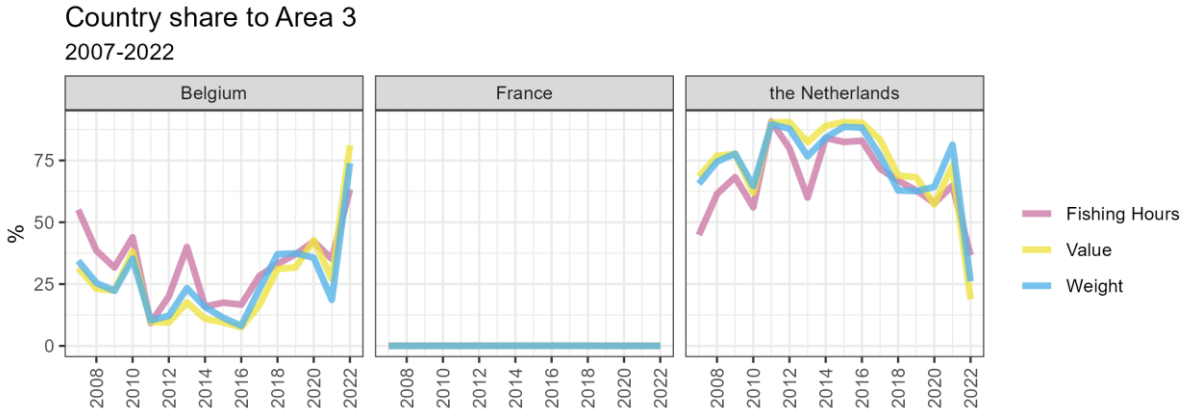
Figure 36. Percent of effort, weight and value of landings in Area 3 per country relative to totals of Area 3 between 2007 and 2022.
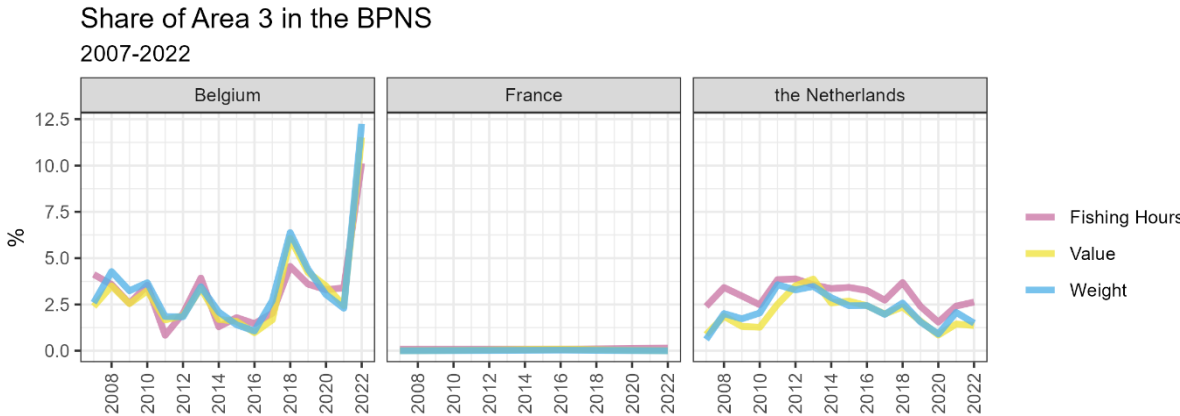
Figure 37. Percent of effort, weight and value of landings in Area 3 per country relative to totals per country in the BPNS between 2007 and 2022.

3.3.2.4 All Areas combined

Figure 38 combines the relative shares from the BPNS of the three proposed management areas. The share for the Netherlands was on average 13-14% for the landings (weight and value) and 8.5% for the effort, with no clear trend over time (Figure 38 and Table 5). For Belgium this was around 5% for the landings and 4% for the effort, with an important increase in 2022. For France the share was high, with an average of more than 50% for all variables (Table 5). There seems to be a decreasing trend since 2012. Especially Area 1 and Area 2 seem important for France over time (see Figure 13). For other countries, the average was 16% for the landed weight, 17% for the landed value and 18% for the effort, with a decreasing trend between 2009 and 2019 and an increasing trend between 2019 and 2022.

Share of the 3 Areas combined in the BPNS
2007-2022
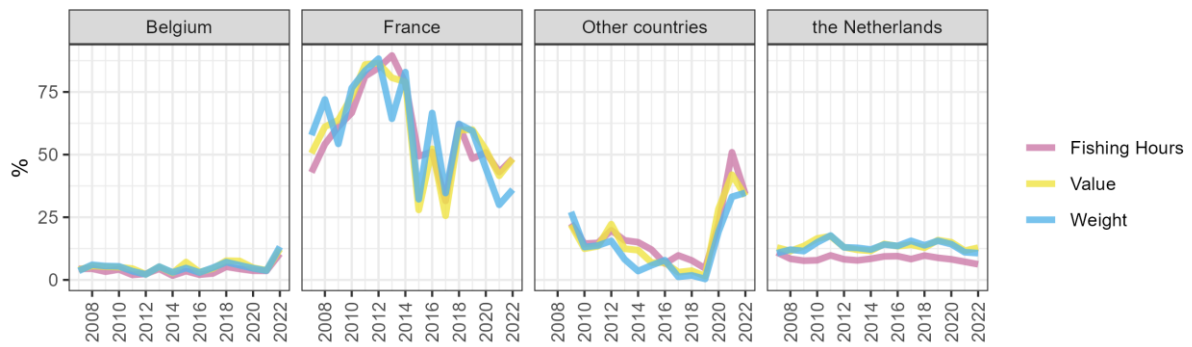
Figure 38 Percent of effort, weight and value of landings in the three management areas per country relative to totals per country in the BPNS between 2007 and 2022. Other countries includes Denmark, Germany and the UK.

3.3.3 Per gear

The different proposed management areas were of different relevance for different gears (Figure 39 and Table 7).

By Gear
Effort 2007-2022
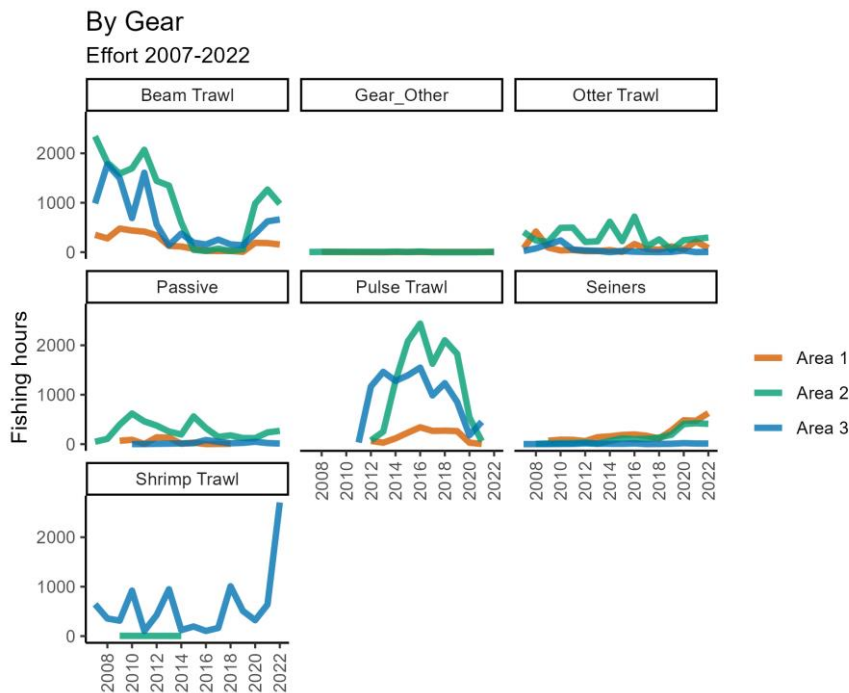
Figure 39 Total fishing effort in fishing hours per gear group in the different proposed management areas. The data includes Belgian, French and Dutch vessels (2007-2022) as well as the German, Danish and British vessels (2009-2022).

Table 7   Average percent per gear group of fishing effort, value of landings and landed weight in the proposed
management areas relative to the BPNS (2007 – 2022).

		Area 1	Area 2	Area 3	Area 1+2+3
Beam Trawl	Fishing Hours	0.9	4.4	2.7	8
	Value	1.7	11.5	1.7	14.9
	Weight	1.6	11	2.1	14.8
Otter Trawl	Fishing Hours	3.9	13.1	1.8	18.8
	Value	4.9	16	0.9	21.7
	Weight	4	11.4	0.6	16.1
Passive	Fishing Hours	1.7	15.4	1	18.1
	Value	1.3	16.9	0.8	19.1
	Weight	1.4	16.5	0.9	18.8
Seiners	Fishing Hours	11.3	7.4	0.4	19.2
	Value	9	7.8	0.4	17.1
	Weight	10.7	8.7	0.4	19.8
Shrimp Trawl	Fishing Hours	0	0	2.8	2.8
	Value	0	0	2.6	2.7
	Weight	0	0	2.6	2.6
Pulse Trawl	Fishing Hours	0.7	5.3	4.5	10.5
	Value	1.1	9.4	3.3	13.8
	Weight	1.2	9.1	3.7	14

Shrimp trawl

Only Area 3 was important for shrimp trawls. The relative share to the BPNS fluctuates from year to year (Figure 40). The share was on average 2.6% of landings and 2.8% of the effort, with a highest value of 6% of landed weight, 7.6% of landed value and 6.5% of the effort in 2022. An increase in fishing effort in Area 3 in 2022 was also observed in the spatial image (Figure 16). For Belgian shrimp trawls, 8.5% of the value of landings in the BPNS from 2018 to 2022 and even 13% in 2022 originated from Area 3. When considering 2007 to 2022, 4% of the value of landings in the BPNS for Belgian shrimp trawls originated from Area 3.
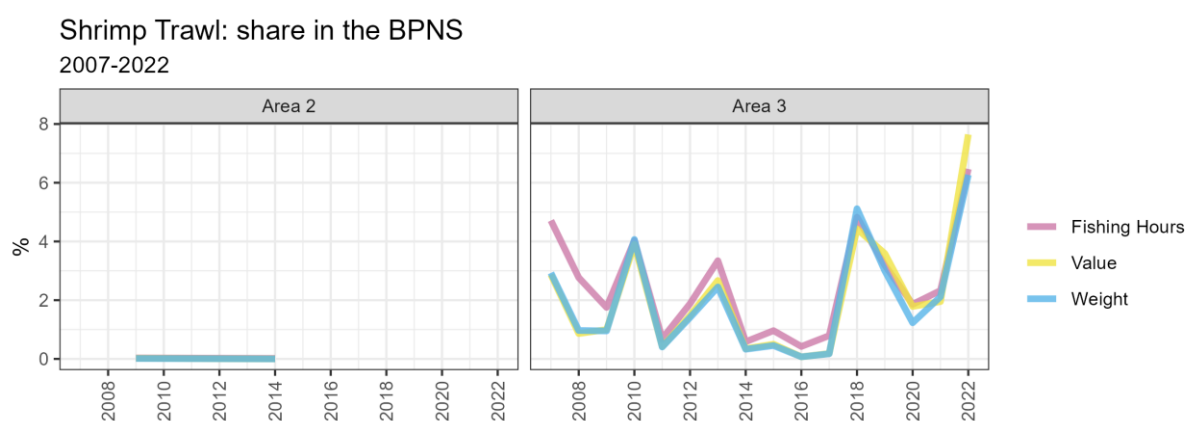
Figure 40 Percent of effort, weight and value of landings in Area 3 relative to the BPNS for shrimp trawls between 2007 and 2022 (all countries combined).

Beam trawl / pulse trawl

All three areas were of some importance to beam trawls and pulse trawls (Figure 39). Pulse trawl activity was stopped in 2021. Especially for Area 2 and Area 3, we see the previously described replacement of beam trawl by pulse trawl, followed by the reintroduction of more beam trawl activity after the decline of pulse trawling. Both the beam trawl and the pulse trawl were active in all 3 management areas, albeit slightly more concentrated in Area 3 (Figure 17 & Figure 18).

When distinguishing vessels ≤ 24 m and vessels > 24 m for beam trawls, Area 1 and Area 2 were more important for the larger > 24 m beam trawl vessels (Figure 41). Area 2 accounted for about 10% of the effort of the larger (> 24 m) beam trawls and for 17% and 16% of their landed weight and value relative to the BPNS (Table 39). Area 3 was more important for beam trawl vessels ≤ 24 m (Figure 41 & Figure 42). A steep decline in Area 2 is visible for vessels > 24 m from 2012 to 2015 followed by an increase again in 2020 (Figure 41). A similar decline in effort is also visible in Area 3 for vessels ≤ 24 m from 2011 onwards, followed by an increase from 2020 onwards. This coincides with an effort displacement towards the 3 NM zone between 2012 and 2020 which can be observed in Figure 17 & Figure 18. Area 3 accounted for about 4% of the ≤ 24 m beam trawl effort, and 5% of the weight and value relative to the BPNS (Table 39).

Area 2 was important for the pulse trawl (Figure 43). We see that the relative effort in Area 2 was much lower than the relative landings (Figure 44). This was also apparent in Figure 30, when considering the total relative effort and landings in Area 2, relative to the BPNS. The share of pulse trawl in Area 3 to the BPNS increased as the share in Area 2 and Area 1 decreased in the last years of its activity (Figure 44).
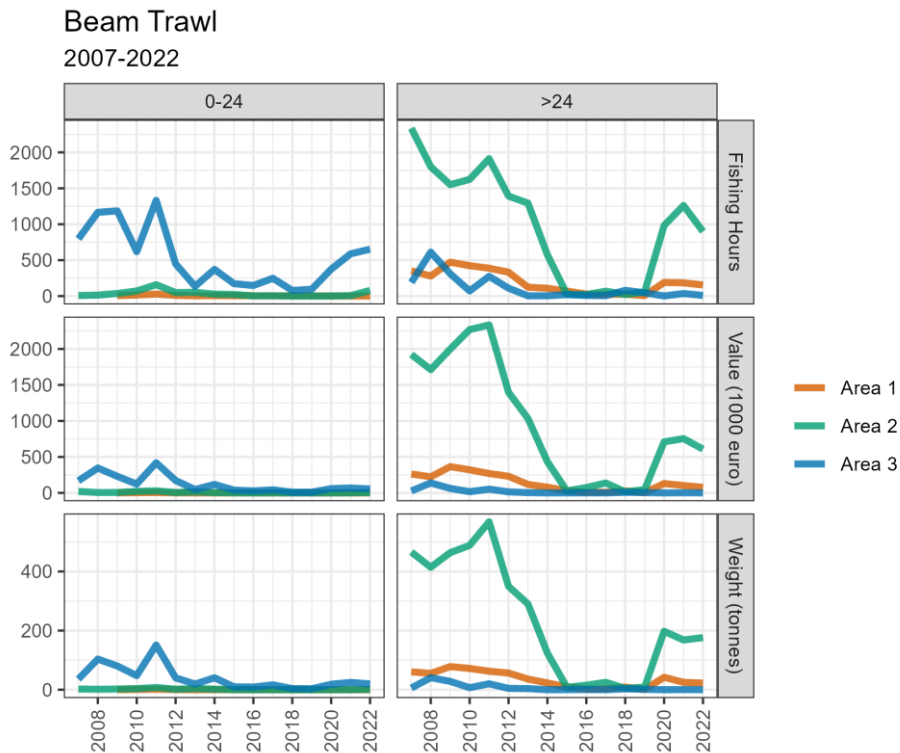
Figure 41 Effort, landed weight and value of landings for beam trawls in the proposed management areas for beam trawl vessels ≤ 24 m and > 24 m. The data includes Belgian, French and Dutch vessels (2007-2022) as well as the German, Danish and British vessels (2009-2022).
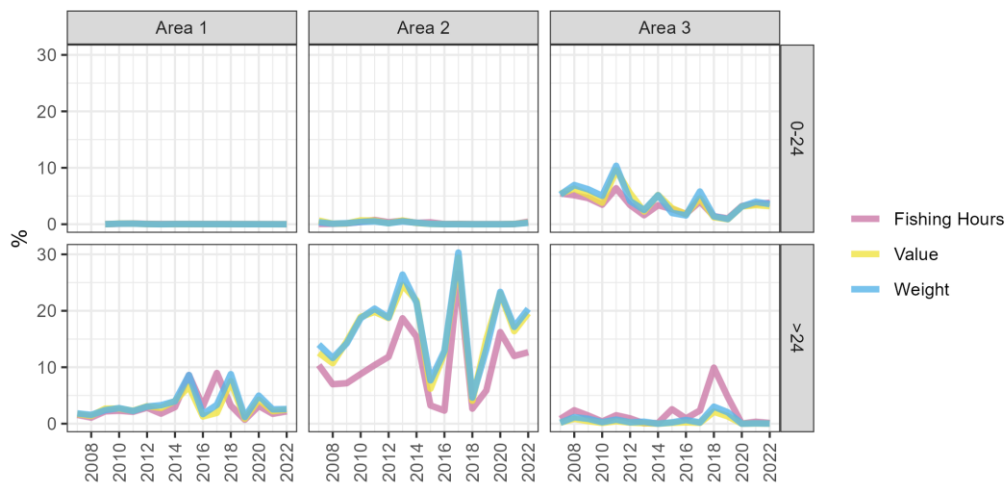
Figure 42 Percent of effort, landed weight and value of landings in the different management areas relative to the BPNS for beam trawls between 2007 and 2022, for vessels ≤ 24 m and > 24 m (all countries combined).
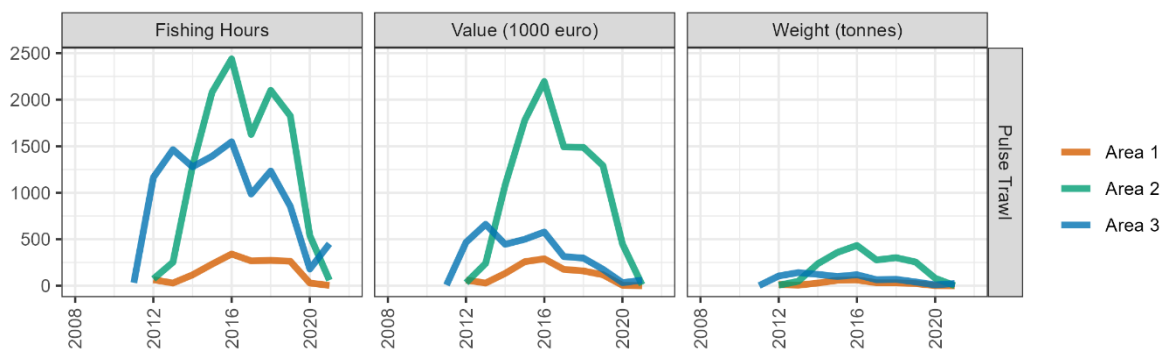
Figure 43 Effort, weight and value of landings for beam trawls in the proposed management areas for pulse trawl.
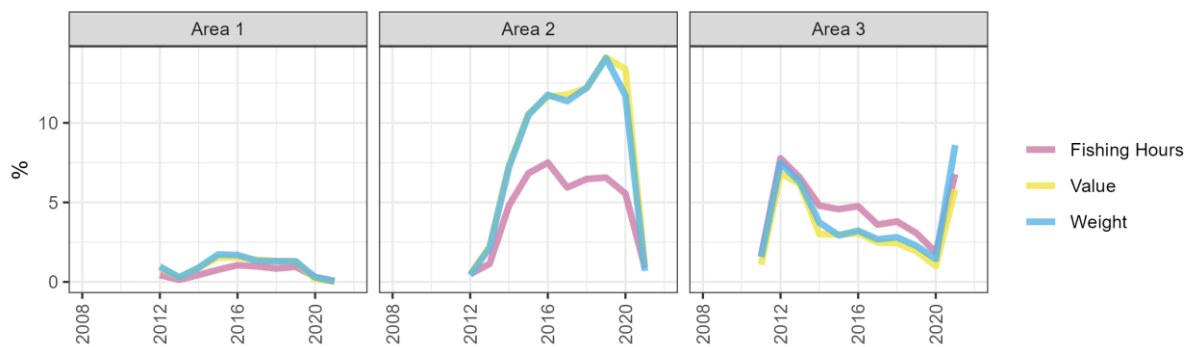
Figure 44 Percent of effort, weight and value of landings in the different management areas relative to the BPNS for pulse trawls between 2007 and 2022.

Otter trawl

Area 1 and especially Area 2 were important for otter trawls. Values fluctuate over the years and no clear trend could be observed (Figure 45). Average weight and effort from Area 1 was 4%, while landed value was 5% relative to the BPNS (Table 7). For Area 2, the average landed weight was 11%, the landed value 16% and the effort 13% relative to the BPNS (Figure 46). The spatial distribution can be seen in Figure 19 and Figure 20.
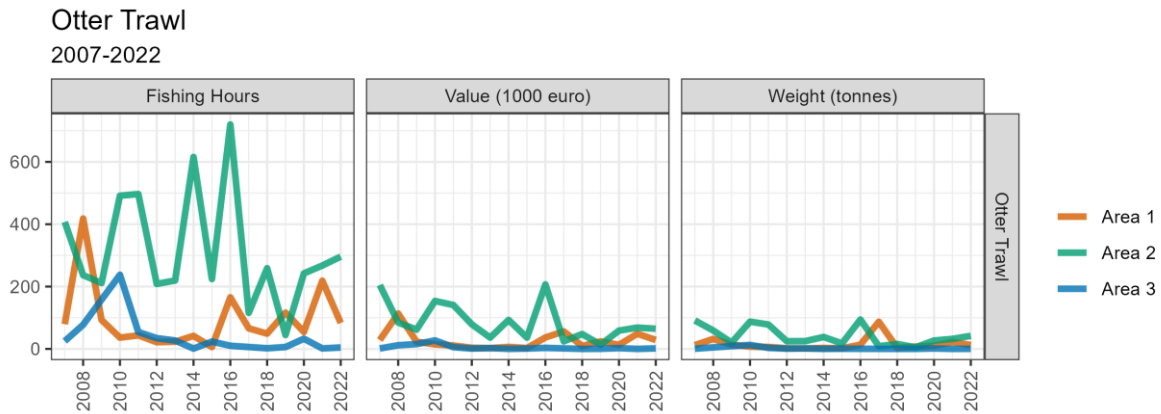
Figure 45 Effort, value of landings and landed weight for otter trawls in the proposed management areas between 2007 and 2022.
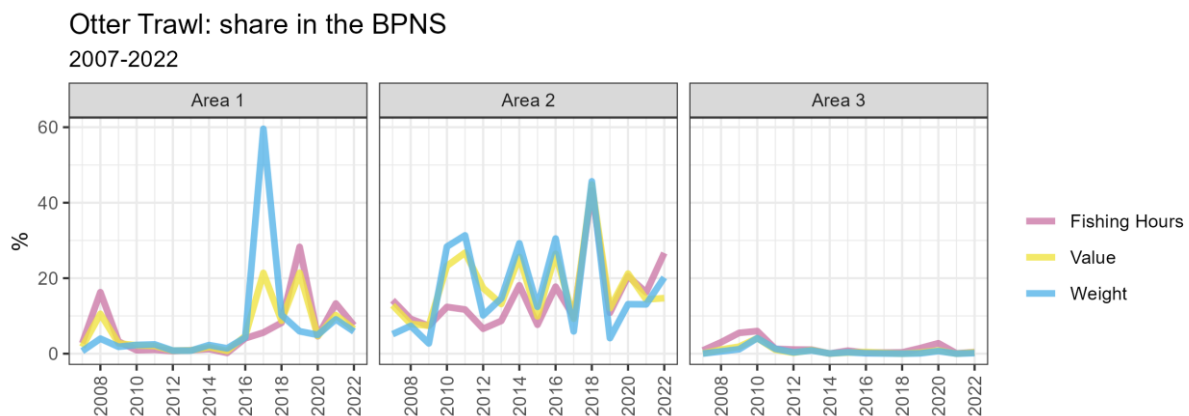
Figure 46 Percent of effort, weight and value of landings in Area 1 and Area 2 relative to the BPNS for otter trawls between 2007 and 2022 (all countries combined).

Seine fishing

Area 1 and Area 2 were important for seine fishing. Seine fishing has increased in the BPNS and so has seine activity in Area 1 and Area 2, both in absolute terms and in relative terms (Figure 47 & Figure 48). This indicates that seine fishing is increasing more rapidly in both areas compared to the rest of the BPNS. From 2018 to 2022, the average landed weight and value from Area 1 relative to the BPNS was 13%, while the average effort was 14.5% (Table 38). For Area 2, the landed weight was 14%, the landed value 13%, while the effort was 11.5% (2008-2022). An all-time high share was observed in 2022 with more than 21% for all variables in Area 1 and about 18% in terms of landings and 14.5% in effort in Area 2 (Figure 48). The spatial distribution can be seen in (Figure 21).
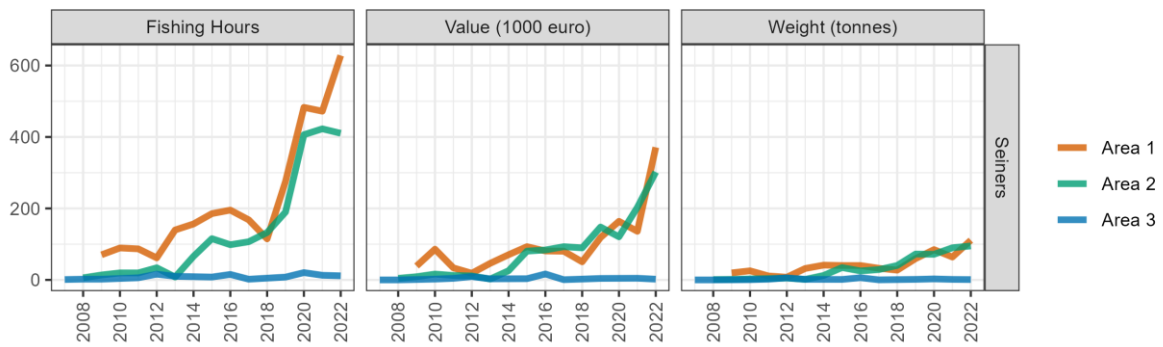
Figure 47 Effort, value of landings and landed weight for seine fishing in the proposed management areas between 2007 and 2022.
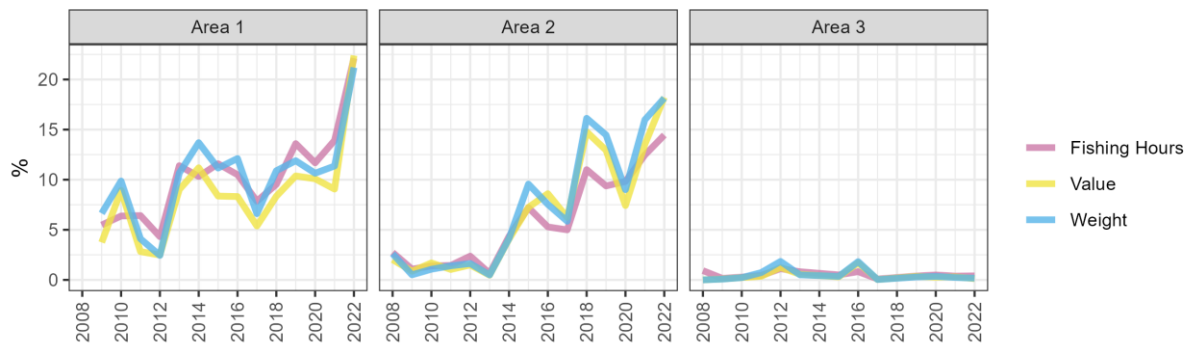
Figure 48 Percent of effort, weight and value of landings in Area 1 and Area 2 relative to the BPNS for seine fishing between 2007 and 2022 (all countries combined).

Passive gears

The activities of passive gears have declined in the BPNS. Especially Area 2 was of relative importance for vessels using passive gears during the entire time period (Figure 49 & Figure 50). The average share in the BPNS of Area 2 was around 17% of the landed weight and value and 15% of the effort (Table 7). From 2016 onwards, Area 3 has gained importance for these gears. The average share of Area 3 from 2018 to 2022 was about 2-3% for all variables, while it was around 1% from 2007 to 2022 (Table 7 and Table 38). The spatial distribution can be seen in Figure 15 and Figure 16.
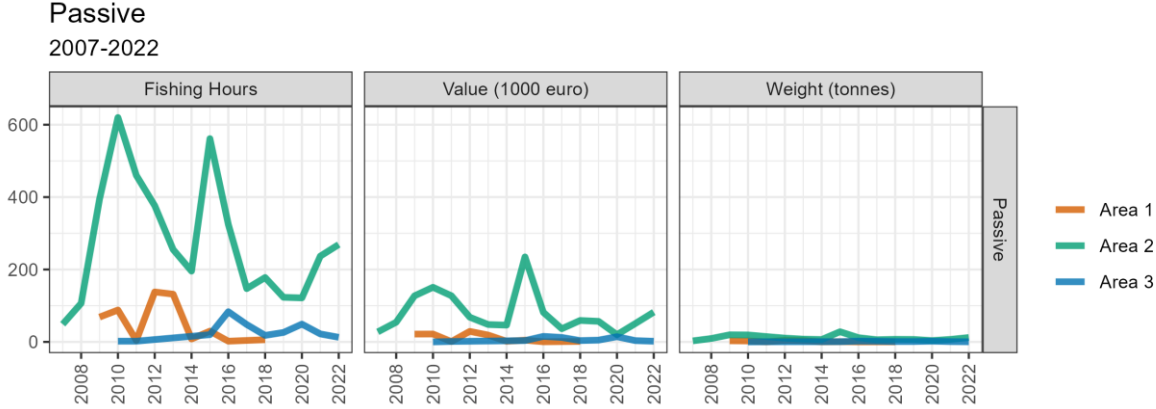
Figure 49 Effort, value of landings and landed weight for passive gear in the proposed management areas between 2007 and 2022.
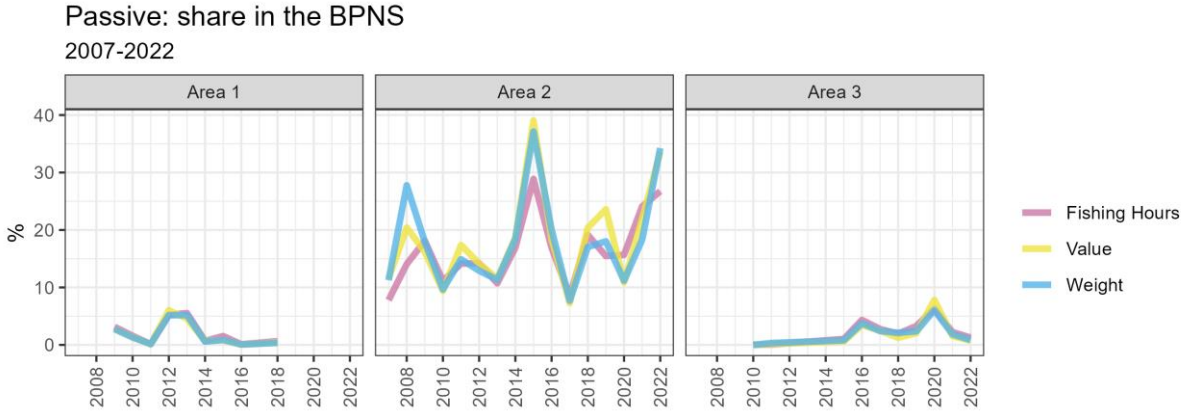
Figure 50 Percent of effort, weight and value of landings in Area 1, Area 2 and Area 3 relative to the BPNS for passive gear between 2007 and 2022 (all countries combined).

4 Discussion

The BPNS can be divided into the territorial waters (within 12 NM from the coast) and the Exclusive Economic Zone (EEZ, seaward from 12 NM onwards). All Member States of the European Union have unlimited free access to the EEZ, with the exception of Spain, Portugal and Finland (Douvere & Maes 2005).

In the territorial waters, fisheries are exclusively reserved for Belgian vessels, although multilateral agreements and European legislation allow some other member states to fish in this area. Between 3 and 12 NM, based on the CFP, Dutch fishing vessels have unlimited fishing rights and French fishing vessels have fishing rights for herring (Douvere & Maes 2005). The German, Danish and British fleets are not allowed in the Belgian territorial sea, where fisheries are regulated by Belgian national legislation (law of 19 August 1891). Vessels fishing in the territorial sea may not have an engine power larger than 221 kW. All vessels fishing between 0 and 3 NM may not exceed the limit of 70 GT (Douvere & Maes 2005). Dutch vessels may conduct fishing activities between 0 and 3 NM, based on the Treaty of the Benelux Economical Union (1958).

4.1 The BPNS

An overall declining trend in fishing activity and landings, especially in the period 2017-2020, could be observed in the **BPNS**. The patterns in total number of vessels, effort and landings are highly linked with changes in the Dutch fleet, the most important player. In a second instance the Belgian fleet influences the overall trends, the Belgian contribution becoming more apparent in later years. There are a number of factors that may have contributed to the overall declining trend.

- During the time period 2007-2022 new/other maritime players received a designated area to conduct their activities in the BPNS and became competitors for space, for e.g. the wind farms. The available fishing grounds are shrinking due to those other uses of space in the BPNS and in the neighbouring vicinity. From 2020 onwards, the wind farm area on the eastern border was completely lost as fishing grounds. This was most important for beam trawl and pulse trawl and did not seem important for shrimp trawl.
- Pulse trawling for flatfish was largely adopted by the Dutch fleet from 2011 onwards (Haasnoot *et al.*, 2016). The pulse trawl had a higher catch efficiency for the high value target species sole (*Solea solea*) compared to other gears (Rijnsdorp *et al.*, 2020, van Overzee *et al.*, 2023). Germany also had a few pulse trawls that sporadically conducted fishing activities in the BPNS. Belgium never adopted the pulse trawl for flatfish. In 2019, the EU decided to definitively ban pulse trawl fishing and this was implemented in the following years (Regulation (EU) 2019/1241 of the EP and of the Council of 20 June 2019). Pulse trawls were then (partly) replaced by beam trawls again. The rise and fall of pulse trawling between 2011 and 2019 is visible in the data and we also see a transition from beam trawling to pulse trawling in the initial years. Pulse trawls were mostly larger vessels and did not appear in the 3 NM zone.
- Since 2017, the overall landings are clearly lower for rather the same effort. This could be an indication that there is an issue with the health of the fish stocks, an aspect that requires further investigation. The spawning-stock size for sole in the North Sea (ICES Subarea 4) has been estimated to be below desired limits during the last two decades, while the fishing pressure on the stock was esteemed too high (ICES 2023). However, the BPNS only represents a small fraction of ICES Subarea 4.

On the other hand lower landings for the same effort, can also be explained by a change in catch efficiency within the BPNS, such as a switch to 'normal' beam trawl again after the pulse ban. Moreover, if vessels become smaller and have less catch capacity, by definition, more effort is needed for the same amount of landings. Furthermore, smaller species such as common shrimp (*Crangon crangon*) have a low weight for a high value of landings. Therefore, if target species composition changes, this will also influence trends. The years 2021 and 2022 were exceptional years for shrimp in the BPNS, especially for smaller Belgian vessels, influencing the total trends.

- In 2022 a decommissioning scheme was approved for vessels of the Dutch fleet targeting demersal fish in the greater North Sea (Hamon *et al.*, 2023). Eligible vessels included beam trawls, otter trawls and seiners. Vessels targeting shrimp were not eligible. 50% of the eligible vessels (71 out of 139) were registered to be scrapped on 1 April 2023, representing 13% of the total Dutch fleet (Hamon *et al.*, 2023). This is in effect a consequence of Brexit as the UK has claimed a larger share of the total allowable catch (TAC) than was agreed upon at the time of its membership. A permanent cessation of a part of the fleet mitigates the risk of shortage of fishing opportunities (van Oostenbrugge *et al.*, 2022). The decline in Dutch effort in the years prior to this decision could have been affected by this situation as well, due to uncertainty around the Brexit policy.

- The Covid-19 pandemic especially influenced the trends in 2020. We see a dip for this year in the trend figures. During the pandemic, the demand for fresh seafood products was much lower and this initially affected the market prices. Consequently, different EU fishing fleets adopted alternative strategies to mitigate potential impacts (Carpenter *et al.*, 2023). For e.g., the Belgian fleet organized a vessel rotation system in order to limit landings and maintain high prices (STECF 2020). During this period effort and landings were indeed lower, however, during the first lockdown the economic performance was not as impacted as one could have expected (Carpenter *et al.*, 2023; STECF 2020).

In contrast of the overall declining trend, we see an increase in the number of active UK vessels in the BPNS in post Brexit years. The reason for this increase is not known. However, it concerned larger vessels that mainly used seining gear, a practice that has seen an increase in activity since its introduction in the BPNS around 2009. Over time, we also saw a relative increase of seining activity of the Dutch fleet, both in effort and landings as well as in number of vessels. The combined seining activity seems to take place in a number of hotspots in the BPNS, including Area 1 and spots in Area 2. Due to their large gear coverages, seining gear have a high swept area ratio.

The shrimp fishery in the BPNS only concerns the Netherlands and Belgium and showed an increasing trend in absolute as well as in relative terms for both countries (Figure 10 and Figure 11). Shrimp are caught in coastal areas and are important for smaller vessels that are allowed in the 3 NM zone (Figure 16). The shrimp fishery is very important for the Belgian fleet as a whole. Despite its limited size, common shrimp (*Crangon crangon*) was in the top ten species of the entire Belgian fleet both in terms of weight and value of landings between 2007 and 2022 (Tessens & Velghe 2012, Tessens & Velghe 2015, Velghe & Scherrens 2019, Scherrens 2023). Shrimp prices are volatile and are influenced by supply and demand as the preservation time for fresh shrimp is limited. High values of landing will not necessarily reflect high total catches. Yearly average Belgian prices were relatively high in 2016, 2017, 2020, 2021 and 2022 (not corrected for inflation) (Scherrens 2023). In 2022 total landed shrimp weight was double the landed weight in 2021, while the price remained stable, leading to a high value of landings in 2022. This is also reflected in the trends for the shrimp fishery in the BPNS. In 2022 the

shrimp fishery even accounted for 85% of the landed value and 84% of the landed weight by the Belgian fleet in the BPNS (Table 17).

A seasonal pattern was observed for the Belgian fleet in the BPNS, with highest effort and landings in the summer and lowest in the winter. This pattern can be attributed to the seasonal shrimp fishery (Tessens & Velghe 2012, Tessens & Velghe 2015, Velghe & Scherrens 2019, Velghe *et al*. 2020, Scherrens 2023). Additionally, gross tonnage and engine power were lowest in the summer, indicating that relatively smaller vessels were used. Given this seasonal nature, these vessels alternate between targeting shrimp and flatfish, the latter with beam trawls. Therefore, the beam trawls that conducted their activity close to the coast (Figure 17) may be the same vessels as the shrimp trawls.

The 0-3 NM zone is reserved for Belgian and Dutch vessels with a gross tonnage < 70 (Douvere & Maes 2005). We saw that the smaller beam trawls were pushed inside the line of the 3 NM from 2012 onwards until 2020, probably due to competition with pulse trawling. The pulse trawls were most likely ≥ 70 GT, as they conducted their activity up to a limit coinciding with the 3 NM line. In this study it was not possible to verify this as data on Dutch GT was missing. After the disappearance of the pulse trawl, the beam trawl activity had more options and we see that they spread out again going beyond the 3NM zone. We see that their activity also disperses more over the Flemish Banks and Area 3. Competition between Belgian beam trawlers and Dutch pulse trawlers (>221 kW) has also been observed in the Southern Bight of the North Sea (Sys *et al*. 2016).

The relative share of the Dutch shrimp trawls has increased as the share of other Dutch activities has decreased. Not only small vessels target shrimp. There were a number of Belgian vessels ≥ 70 GT that also targeted shrimp (Platteau *et al*. 2014). It would be interesting to follow-up whether Dutch shrimp trawl vessels with a larger capacity are increasing in the BPNS as this may lead to a new competing factor for the existing Belgian shrimp fishery.

4.2   Flemish Banks

We also see a decline in the landings from the **Flemish Banks** overall and a dip in the effort in 2020. The declining trend for the landed weight seems steeper for the BPNS than for the Flemish Banks. The closure of the offshore wind farm area in the eastern part of the BPNS may have had more influence on fisheries in the BPNS as a whole than on the Flemish Banks in the western part of the BPNS. The overall decline in landings from the Flemish Banks can mainly be attributed to the decline in effort and landings of larger (> 24 m) Dutch vessels.

Possibly, with the declining contribution of the Dutch fleet targeting flatfish, relatively more of the overall weight was contributed by the shrimp fisheries. Shrimp is a high value species with a lower weight than flatfish. So for a same amount of effort a shrimp trawl will land less weight. The shrimp trawls are active inside the Flemish Banks, but not exclusively (between 13 and 36% of their fishing effort in the BPNS).

However, in relative terms the decline in the Flemish Banks compared to the BPNS is less apparent. The Flemish Banks accounted for 33% of the fishing effort in the BPNS between 2007 and 2022, while the area also represents 30% of the area of the BPNS (Pecceu *et al*., 2016). The Flemish Banks hold some important fishing grounds for the fishing industry. The share of fishing effort in the Flemish Banks remained relatively stable over time and its importance relative to the BPNS did not diminish. On the other hand, no relative increases were observed either, indicating that there are no sudden claims on the area.

The French data showed a relative increase followed by a decline, but a lot of variation is seen from year to year. It was also difficult to see a trend in absolute terms. It is likely that not all relevant French vessels had VMS systems installed for the entire period considered. Implementing VMS systems in the EU happened in several phases. It first became mandatory for vessels ≥ 24 m (2000-2004), then for vessels ≥ 15 m (2005-2011) and finally for vessels ≥ 12 m (2012 onwards) (European Commission 2003, European Commission 2009, Lee *et al.* 2010, European Commission 2011). In the data, French 0-12 m vessels appeared from 2015 onwards. They were mostly active in the Flemish Banks and used mostly passive gears. The methodology of defining activity based on speeds, may not be very well adapted to passive gears. Therefore, the image of French fishing activity in the Flemish Banks may be distorted. Vessels < 12 m for all countries may also be generally underrepresented in the analysis as to date, these vessels are not obliged to have VMS systems on board.

4.3   The Proposed Management Areas

It is important to note that values are estimates as the proposed management areas are very small when comparing to the resolution of the logbook information. Therefore we cannot say with certainty that the landed amounts were truly caught in the areas. On the other hand, there is no reason to believe that amounts would be systematically included or left out.

Area 1 is a relatively small area located further offshore in the EEZ, representing 30.66 km² or 0.89% of the total area of the BPNS. All countries have fishery activities in this area, but it is mainly important for the Dutch fleet with beam trawl, pulse trawl and seiners and for the French fleet with otter trawlers and seiners. For the Netherlands, we see an increasing trend in the number of vessels present in the area, while for France, the number of vessels fluctuated over time. In recent years, there is an increase in the number of UK vessels, mainly seine fishers.

Generally, the most important metiers in Area 1 were pulse trawl, beam trawl and seine fishery. For pulse trawlers, the fishing activity appeared in 2012 and remained somewhat constant over time until the pulse ban (2019). Beam trawl fishery was also important in Area 1. It decreased over time but since 2019 it slowly increased again. For seiners, the area is of relative importance since 2009 and is also increasing over time. Otter trawls were also present in the area, their effort fluctuated over time. Passive gear fishery was low and disappeared after 2017.

Area 2 is with 224 km² the largest of the three management areas (i.e. 6.48% of the area of the BPNS). All countries had fishing activities in the area. Area 2 was mainly important for the Netherlands (beam trawlers, pulse trawlers and seiners), France (otter trawlers and passive gear) and Belgium (beam trawlers and passive gear). Pulse trawl fishery was the most important metier in Area 2 and landings were very high between 2012 and 2019. The beam trawl fishery was also important but decreased until 2019 and recently slightly increased again. Seine fishery increased since 2014. Otter trawl fishery was variable over time. A decline in total landings was observed for a rather similar effort. However, relative efficient fishing vessels (pulse trawl, larger beam trawl and seiners) were active in Area 2 resulting in proportional high landings compared to effort in the global picture of Area 2 (Figure 30).

Area 3 has an area of 82.37 km² or 2.38% of the total area of the BPNS. Fishing activity in Area 3 remained relatively stable over time, with a dip in 2020 and a peak in 2022. Area 3 is located nearest to the shore, within the territorial waters crossing the border of the 3 NM. As a consequence, less member states were active in this area. The area was mostly important for the Netherlands (pulse, beam and shrimp trawl) and Belgium (shrimp and beam trawl). As the distribution of brown shrimp is

limited compared to other target species and as Area 3 is located within its habitat (coastal area), closing the area will have an impact on fishers targeting shrimp.

For the Netherlands all areas are important. The three management areas combined represent on average 13-14% of their landings (weight and value) in the BPNS. The closure of Areas 1 and 2 has clear consequences for France, as the majority of their activities occurs in those zones relative to their totals in the BPNS. The fact that most of their activities are in these areas is a logical consequence of the direct border between France and the Flemish Banks. Considering the relative shares to the French activities in the BPNS is perhaps not the most adequate representation for France as it is not known what the activities in Area 1 and Area 2 represent for the fleet segments concerned. For the Belgian fleet, Area 3 is the most important area within the proposed management areas, mainly for shrimp trawlers and demersal beam trawlers. In 2022, about 12% of the Belgian landings in the BPNS originated from Area 3, with an average of 5% between 2017 and 2022. In terms of value of landings the shrimp caught in Area 3 by Belgian vessels represented 8.5% of the Belgian shrimp landings in the BPNS from 2018 to 2022 and even 13% in 2022.

The three management areas combined represent roughly 10% of the area of the BPNS with 8% of the total effort and 13% of the total value of landings. When areas are closed for fisheries, then fishers will need to seek alternative locations in order to remain viable. However, with increasing competition for space with other maritime players, fishing grounds become more and more scarce as uses for other purposes accumulate. This is especially an issue of the BPNS, a relative small area that is intensely used (MSP 2020-2026; Vanden Eede *et al.*, 2014).

4.4   Methodology

The number of vessels may not be the best metric to investigate trends over time. This number might be inflated as any vessel sending out VMS signals in the BPNS is counted. For e.g., if a vessel only went fishing for 2 hours in the BPNS, it will be included. On the other hand small vessels might be left out, as there is no general European obligation for vessels below 12 m to carry a VMS system. However, under national legislation, Belgian commercial vessels under 12 m are obliged to have a functioning VMS on board. Also, the obligation of carrying a VMS was first introduced for large vessels and gradually for smaller vessels. Therefore, the first registration years may be incomplete. Moreover, non-commercial fishing is not included in these data, as these don't send out VMS signals and do not need to report catches.

In this analysis, the length of the vessel is used as a proxy for its size as gross tonnage was not available for Dutch and French vessels and engine power (kWh) was not available for France. The amount of the catch in weight and value in the BPNS may be underestimated as it was not possible to match all logbook and VMS data. A possibility could be to redistribute the remaining catches to VMS points inside the BPNS proportionally to the size of the area of the BPNS that falls in the given rectangle, excluding area on land and areas where fishing is prohibited. For e.g. one could redistribute about 40% of the non-matched catches in 32F2 to the VMS points inside the BPNS in this rectangle (see Figure 5). Especially for Belgium and the Netherlands this could be investigated as on average 11% of the Belgian landed weight and 7% of the Dutch landed weight from ICES rectangles 31F2, 31F3, 32F2 and 32F3 could not be coupled to VMS pings. However, with this redistribution exercise, only an upward correction of 2-2.5% of the total catches can be expected.

5 Conclusion

The BPNS is an area with intense fishing activity. The main players between 2007 and 2022 were the Netherlands (≈80% of the landings) and Belgium (≈17%), and to a much lesser extent France (≈1%). The overall declining trends are highly linked to the Dutch trends reflecting several changes that occurred or are occurring in the Dutch fleet. As a consequence, the Belgian contribution to the overall trends has become more apparent in the latest years. The combined contribution of Denmark, Germany and the UK represented only 2% of the effort and 2% of the landings both in weight and in value from 2009 to 2022. In the period between 2007 and 2022, the main gears in the BPNS were pulse trawls, beam trawls, shrimp trawls, seine gear, otter trawls and passive gear. Different vessel sizes are allowed to operate in different parts of the BPNS.

Fishing in the proposed management areas is not negligible and occurs equally frequent as in other areas of the BPNS. Combined Area 1, Area 2 and Area 3 represent 10% of the area of the BPNS and on average 13% of the total value of landings and 8% of the total fishing effort in the BPNS.

There does not seem to be a claim on the proposed management areas and changes or shifts over time can be linked to interactions with multiple other events and players. An example is the introduction of new gears. Competition with pulse trawlers kept coastal trawling vessels (< 70 GT) contained within the 3 NM zone. After the disappearance of pulse trawling, their activity dispersed beyond this limit. Between 2018 and 2022, an increase in Belgian activity in Area 3 can be observed. Seine fishing was introduced in 2009 in the BPNS and its activity is rising (especially after 2019) both in absolute and relative terms having an effect on Area 1 and Area 2. Other activities such as the introduction of wind farms has lead and may still lead in the future to competition for space resulting in effort displacements over time.

Not all areas are equally important to all countries or used gears.

For the Netherlands the share of their landings from the 3 areas in the BPNS was on average 13% in weight and 14% in value. Given that the Netherlands accounted for about 80% of the landings in the BPNS, both in weight and in value, the amount of landings from the 3 areas is substantial: on average 566 tonnes per year with an average value of 2.3 million euro per year. On the other hand overall Dutch activity in the BPNS is decreasing. Area 1 and Area 2 were important for beam trawls (> 24 m) and seine fishing. Area 3 was more important for smaller beam trawls (≤ 24 m) and shrimp trawls.

For Belgium landings from the three areas combined were around 5% of the total landings in the BPNS (2007-2022), with an important increase in 2022. Area 3 is of importance for shrimp trawl and smaller beam trawls (≤ 24 m). Between 2018 and 2022, on average 6.6% of the value of landings generated by Belgian vessels in the BPNS originated from Area 3. This was 8.5% of the value of landings for shrimp generated by Belgian vessels, with an all-time high of 13% in 2022.

For France, closing the 3 management areas will have a relative important impact, as combined they host on average 54% of the effort and 52% of the value of landings in the BPNS for France. Area 1 and Area 2 were of importance to otter trawls and Area 2 to passive gears. The fact that most French activities are in the vicinity of Area 1 and Area 2 is a logical consequence of the direct border between France and the Flemish Banks. However, the French contribution in absolute terms was limited and it is not known what the activities in Area 1 and Area 2 represent for the fleet segments concerned.

For other countries, on average 16%-17% of the landed weight and value in the BPNS originated from the three proposed management areas (2007-2022). Only Area 1 and Area 2 are important and an increasing trend was observed, especially between 2019 and 2022. This can mainly be attributed to an increased activity of seine fishing by the UK in Area 1.

6   References

Amoroso, R. O., Pitcher, C. R., Rijnsdorp, A. D., McConnaughey, R. A., Parma, A. M., Suuronen, P., *et al*. (2018). Bottom trawl fishing footprints on the world's continental shelves. *Proc. Natl. Acad. Sci.* **115**:(43), E10275–E10282. doi:10.1073/pnas.1802379115

Ban, N.C., Gurney, G.G., Marshall, N.A., Whitney, C. K., Mills, M., Gelcich, S., Bennett, N. J., Meehan, M. C., Butler,C., Ban, S., Tran, T. C., Cox, M. E., Breslow, S. J. (2019). Well-being outcomes of marine protected areas. *Nature Sustainability*, **2**: 524–532.

Belgian State (2008). *Determination of Good Environmental Status and establishment of Environmental Targets for the Belgian marine waters*: Article 9 and 10.

Birchenough, S. N. R., Degraer, S., Reiss, H., Borja, Á., Braeckman, U., Craeymeersch, J., De Mesel, I., Kerckhof, F.,Kröncke I., Mieszkowska, N., Parra, S., Rabaut, M., Schröder, A., Van Colen, C., Van Hoey, G., Vincx, M., Wätjen,K. (2011). *Responses of marine benthos to climate change*. ICES Status Report on Climate Change in the NorthAtlantic.

Breine, N.T., De Backer, A., Van Colen, C., Moens, T., Hostens, K., Van Hoey, G. (2018). Structural and functional diversity of soft-bottom macrobenthic communities in the Southern North Sea. *Estuarine, Coastal and Shelf Science*, **214**: 173-184.

Bruns I., Bartholoma A., Menjua F., Kofp A., (2023) Physical impact of bottom trawling on seafloor sediments in the German North Sea. *Front.Earth Science. Sec Marine Geoscience* vol11-2023

Carpenter, G., Carvalho, N., Guillen, J., Prellezo, R., Villasante, S., Andersen, J. L., Mravlje E.A., Berkenhagen J., Brigaudeau C., Burke B., Santos A.C., Cano S., Contini F., Da-Rocha J-M, Davidjuka I., Martínez F.M.F., Fontaneda-López I., Gambino M., Caballero E.G., Guyader O., Herring J., Hoekstra G., Ioannou M., Jackson E., Jung A., Kazlauskas E., Keatinge M., Kuzebski E., Leonardi S., Le Grand C., Lees J., Mancebo-Robledo C.M., Minne M-D, Mol A., Quintana M.M., Nicheva S., Pokki H., Do Ó J.R., Rodríguez A., Sabatella R.F., Sciberras A., Souffez A., Stroie C., Swahnberg H., Tzouramani I., Viana M.V., Verlé K., Virtanen J., Vukov I., & Zhelev, K. (2023). The economic performance of the EU fishing fleet during the COVID-19 pandemic. *Aquatic Living Resources*, **36:** 2.

De la Torriente, A., Aguilar, R., González-Irusta, J. M., Blanco, M., & Serrano, A. (2020). Habitat forming species explain taxonomic and functional diversities in a Mediterranean seamount. *Ecological Indicators*, **118**: 106747.

De Smet B., D'Hondt A-S., Verhelst P., Fournier-Sowinski J., Godet L., Desroy N., Rabaut M., Vincx., M., Vanaverbeke J. (2014) Biogenic reefs affect multiple components of intertidal soft-bottom benthic assemblages: the *Lanice conchilega* case study. *Estuarine Coastal and Shelf Science* **152**: 44-55.

Degraer, S., Verfaillie, E., Willems, W., Adriaens, E., Van Lancker, V., & Vincx, M. (2008). Habitat suitability as amapping tool for macrobenthic communities: An example from the Belgian part of the North Sea. *Continental Shelf Research*, **28**: 369–379.

Degraer, S., U. Braeckman, J. Haelters, K. Hostens, T. Jacques, F. Kerckhof, B. Merckx, M. Rabaut, E. Stienen, G. Van Hoey, V. Van Lancker & M. Vincx (2009). *Studie betreffende het opstellen van een lijst met potentiële Habitatrichtlijn gebieden in het Belgische deel van de Noordzee*. Eindrapport in opdracht van de Federale Overheidsdienst Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu, Directoraat-generaal Leefmilieu. Brussel, België. 93 pp.

Douvere, F., & Maes, F. (2005). *Commercial fisheries*. In: Maes F, De Batist M, Van Lancker V *et al*(eds). *Towards a spatial structure plan for sustainable management of the Sea*: Mixed actions–Final report: SPSD II (MA/02/006). Belgian Science Policy, Brussels, 115-123.

Eigaard, O. R., Bastardie, F., Breen, M., Dinesen, G. E., Hintzen, N. T., Laffargue, P., ... & Rijnsdorp, A. D. (2016). Estimating seabed pressure from demersal trawls, seines, and dredges based on gear design and dimensions. *ICES Journal of Marine Science*, **73**: 27-43.

European Commission (1992). Council Directive 92/43/EEC of 21 May 1992 *on the conservation of natural habitats and of wild fauna and flora*.

European Commission (2003). Commission Regulation (EC) N° 2244/2003 of 18 December 2003 laying down detailed provisions regarding satellite-based vessel monitoring systems, *Official Journal of the European Union*, vol. L **333**: 17-27.

European Commission (2009) Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 *on the conservation of wild birds*

European Commission (2009). Council Regulation (EC) No 1224/2009 establishing a Community control system for ensuring compliance with the rules of the Common Fisheries Policy, amending Regulations (EC) No. 847/96, (EC) No 2371/2002, (EC) No. 811/2004, (EC) No. 768/2005, (EC) No. 2115/. 2005, (EC) No. 2166/2005, (EC) No. 388/2006, (EC) No. 509/2007, (EC) No. 676/2007, (EC) No. 1098/2007, (EC) No. 1300/2008, (EC) No. 1342/2008 and repealing Regulations (EEC) No. 2847/93, (EC) No. 1627/94 and (EC) No. 1966/2006. *Official Journal of the European Union*. L **343**, 22.12.2009.

European Commission (2011). Commission Implementing Regulation (EU) No 404/2011 of 8 April 2011 laying down detailed rules for the implementation of Council Regulation (EC) No 1224/2009 *establishing a Community control system for ensuring compliance with the rules of the Common Fisheries Policy*

EC (2020). EU Biodiversity Strategy for 2030. *Bringing nature back into our lives*. Brussels, 20.5.2020 COM(2020) 380 final

Haasnoot T., Kraan, M., & S. R. Bush, (2016). Fishing gear transitions: lessons from the Dutch flatfish pulse trawl, *ICES Journal of Marine Science*, **73**(4): 1235-1243, https://doi.org/10.1093/icesjms/fsw002.

Hamon, K.G., Hoekstra, F.F., Klok, A., Kraan, M., van der Veer, S., van Wonderen, D., Deetman, B., van Oostenbrugge, J.A.E., Taal, K., (2023). *Decommissioning of the Dutch cutter sector: Impact analysis of management measures on the fishery*. Wageningen, Wageningen Economic Research, Rapport 2023-068. 68 pp. ISBN 978-94-6447-718-4.

Hiddink, J. G., Jennings, S., Sciberras, M., Szostek, C. L., Hughes, K. M., Ellis, N., Rijnsdorp, A. D., McConnaughey,R. A., Mazor, T., Hilborn, R., Collie, J. S., Pitcherd, C. R., Amoroso, R. O., Parma, A. M., Suuronen, P., Kaiser, M. J.(2017). Global analysis of depletion and recovery of seabed biota after bottom trawling disturbance. *Proceedings of the National Academy of Sciences*, **114**: 8301–8306.

Hintzen, N. T., Bastardie, F., Beare, D., Piet, G. J., Ulrich, C., Deporte, N., Egekvist, J., & Degel, H. (2012). VMStools: Open-source software for the processing, analysis and visualization of fisheries logbook and VMS data. *Fisheries Research*, **115-116:** 31-43. https://doi.org/10.1016/j.fishres.2011.11.007

Hintzen, N. T., Piet, G. J., & Brunel, T. (2010). Improved estimation of trawling tracks using cubic Hermite spline interpolation of position registration data. *Fisheries research*, **101**(1-2): 108-115.

ICES (2015). *Report of the Working Group on Spatial Fisheries Data (WGSFD)*, 8–12 June 2015, ICES Headquarters, Copenhagen, Denmark. ICES CM 2015/SSGEPI:18. 150pp.

ICES (2023). Sole (Solea solea) in Subarea 4 (North Sea). Replacing advice provided in June 2023 In Report of the ICES Advisory Committee, 2023. ICES Advice 2023, sol.27.4 https://doi.org/10.17895/ices.advice.24258793.

Landbouw en Visserij, afdeling Monitoring en Studie, Brussel, p 55

Lee, J., South, A. B., & Jennings, S. (2010). Developing reliable, repeatable, and accessible methods to provide high-resolution estimates of fishing-effort distributions from vessel monitoring system (VMS) data. *ICES Journal of Marine Science*, **67**(6): 1260-1271.

Lester, S.E., Halpern, B.S., Grorud-Colvert, K., Lubchenco, J., Ruttenberg, B.I., Gaines, S.D., Airamé, S., Warner, R.R., 2009. Biological Effects Within No-take Marine Reserves: A global Synthesis. Marine Ecology Progress Series 384, 33-46

Marine Spatial Planning 2020-2026. Something is moving at sea. Brochure FOD Environment

Mazor, T., Pitcher, C. R., Rochester, W., Kaiser, M. J., Hiddink, J. G., Jennings, S. et al. (2020). Trawl fishing impacts on the status of seabed fauna in diverse regions of the globe. *Fish and Fisheries*, **22**: 72-86.

McConnaughey, R. A., Hiddink, J. G., Jennings, S., Pitcher, C. R., Kaiser, M. J., Suuronen, P., Sciberras, M.,Rijnsdorp, A. D., Collie, J. S., Mazor, T., Amoroso, R. O., Parma, A., Hilborn, R. (2019). Choosing best practices for managing impacts of trawl fishing on seabed habitats and biota. *Fish and Fisheries*, **21**: 319-337.

Montereale Gavazzi, G.; Paoletti, S.; Podholova, P.; Kapasakali, D.-A.; Kerckhof, F. (2023). Protected yet unmanaged: insights into the ecological status of conservation priority stony reefs in Belgian waters based on the integrative use of remote sensing technologies. *Frontiers in Environmental Science* **11**: 1253932. https://dx.doi.org/10.3389/fenvs.2023.1253932

Papenmeier, S., Darr, A., Feldens, P., and Michaelis, R. (2020). Hydroacoustic mapping of geogenic hard substrates: Challenges and review of German approaches. *Geosciences* **10(3)**: 100. doi:10.3390/geosciences10030100

Pitcher, C. R., Hiddink, J. G., Jennings, S., Collie, J., Parma, A. M., Amoroso, R., et al. (2022). Trawl impacts on the relative status of biotic communities of seabed sedimentary habitats in 24 regions worldwide. *Proc. Natl. Acad. Sci.* **119 (2)**, e2109449119. doi:10.1073/pnas.2109449119

Pecceu, E.; Vanelslander, B.; Vandendriessche, S.; Van Hoey, G.; Hostens, K.; Torreele, E.; Polet, H. (2014). *Beschrijving van de visserijactiviteiten in het Belgisch deel van de Noordzee in functie van de aanvraag bij de Europese Commissie voor visserijmaatregelen in de Vlaamse Banken (Habitatrichtlijngebied).* ILVO Mededeling, 156. ILVO: Merelbeke. 92 + Bijlagen

Pecceu E, Hostens K, Maes F (2016). Governance analysis of marine protected areas (MPAs) in the Belgian part of the North Sea. *Mar Policy* **71**: 265–274

Pecceu E, Paoletti S, Van Hoey G, Vanelslander B, Verlé K, Degraer S, Van Lancker V, Hostens K, Polet H (2021). *Scientific background report in preparation of fisheries measures to protect the bottom*

integrity and the different habitats within the Belgian part of the North Sea. ILVO Mededeling 277, ILVO, Merelbeke, Wettelijk Depot: D/2021/10.970/277, p 196

Pecceu E, Vanelslander B, Vandendriessche S, Van Hoey G, Hostens K, Torreele E, & Polet H (2014). *Beschrijving van de visserijactiviteiten in het Belgisch deel van de Noordzee in functie van de aanvraag bij de Europese Commissie voor visserijmaatregelen in de Vlaamse Banken (Habitatrichtlijngebied).* ILVO Mededeling 156, ILVO, Merelbeke, p 92

Platteau J, Van Gijseghem D, Van Bogaert T (eds) (2014) Visserijrapport 2014. Departement

Poos, J. J., Turenhout, M. N., AE van Oostenbrugge, H., & Rijnsdorp, A. D. (2013). Adaptive response of beam trawl fishers to rising fuel cost. *ICES Journal of Marine Science*, **70**(3): 675-684. https://doi.org/10.1093/icesjms/fss196

Rabaut, M., Degraer, S., Schrijvers, J., Derous, S., Bogaert, D., Maes, F., Vincx, M., Cliquet, A. (2009). Policy analysis of the "MPA-process" in temperate continental shelf areas. Aquatic Conservation: *Marine and Freshwater Ecosystems*, **19**: 596-608.

Rabaut, M., Guilini, K., Van Hoey, G., Vincx, M., & Degraer, S. (2007). A bio-engineered soft-bottom environment:The impact of Lanice conchilega on the benthic species-specific densities and community structure. *Estuarine,Coastal and Shelf Science*, **75**: 525–536.

Rijnsdorp, A.D., Boute P., Tiano J., Lankheet M., Soetaert K., Beier U., de Borger E., Hintzen N., Molenaar P., Polet H., Poos JJ., Schram E., Soetaert M., van Overzee H., van de Wolfshaar K., van Kooten T. (2020). *The implications of a transition from tickler chain beam trawl to electric pulse trawl on the sustainability and ecosystem effects of the fishery for North Sea sole: an impact assessment.* Wageningen University & Research Report C037/20

Rijnsdorp, A. D., Hiddink, J. G., van Denderen, P. D., Hintzen, N. T., Eigaard, O. R., Valanko, S., Bastardie, F., Bolam,S. G., Boulcott, P., Egekvist, J., Garcia, C., Van Hoey, G., Jonsson, P., Laffargue, P., Nielsen, J. R., Piet, G. J., Sköld,M., van Kooten, T. (2020b). Different bottom trawl fisheries have a differential impact on the status of the North Sea seafloor habitats. *ICES Journal of Marine Science*, **77**: 1772-1786.

Scherrens, N. (2023). De Belgische zeevisserij 2022: Aanvoer en besomming: Vloot, quota, vangsten, visserijmethoden en activiteit. *De Belgische zeevisserij: aanvoer en besomming*. Departement Landbouw en Visserij: Brussel. 89 pp.

Scientific, Technical and Economic Committee for Fisheries (STECF) (2019). *The 2019 Annual Economic Report on the EU Fishing Fleet* (STECF 19-06), Carvalho, N., Keatinge, M. and Guillen Garcia, J. editor(s), EUR 28359 EN, Publications Office of the European Union, Luxembourg, 2019

Scientific, Technical and Economic Committee for Fisheries (STECF) (2020). *The 2020 Annual Economic Report on the EU Fishing Fleet* (STECF 20-06), EUR 28359 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-27164-2, doi:10.2760/500525, JRC123089

Sala, E., Giakoumi, S. (2017). No-take marine reserves are the most effective protected areas in the ocean. ICES Journal of Marine Science, 75: 1166–1168.

Sys, K., Poos, J.J., Van Meensel, J., Polet, H., Buysse, J. (2016). Competitive interactions between two fishing fleets in the North Sea. *ICES J. Mar. Sci./J. Cons. int. Explor. Mer* **73(6)**: 1485-1493. https://dx.doi.org/10.1093/icesjms/fsw008

Tiano J., De Borger E., O'Flynn S., Chen C., van oevelen D., Soetaert K. (2021) Physical and electrical disturbance experiments uncover potential bottom fishing impacts on benthic ecosystem functioning. Journal of Experimental Marine Biology and ecology.

Tessens, E.; Velghe, M. (2012). De Belgische zeevisserij 2011: Aanvoer en besomming. Vloot, quota, vangsten, visserijmethoden en activiteit. *De Belgische zeevisserij: aanvoer en besomming*, 2011. Dienst Zeevisserij: Oostende. 120 pp.

Tessens, E.; Velghe, M. (2015). De Belgische zeevisserij 2014: Aanvoer en besomming: Vloot, quota, vangsten, visserijmethoden en activiteit. *De Belgische zeevisserij: aanvoer en besomming*. Departement Landbouw en Visserij: Brussel. 116 pp.

Van Hoey, G., Guilini, K., Rabaut, M., Vincx, M., Degraer, S. (2008). Ecological implications of the presence of the tube-building polychaete *Lanice conchilega* on soft-bottom benthic ecosystems. *Marine Biology*, **154**: 1009-1019.

van Oostenbrugge, J. A. E., van Asseldonk, M. A. P. M., Klok, A. J., Roos, F. D. M., & Mol, A. (2022). *Analysing the restructuring of the Dutch fishing fleet under the BAR scheme, update 2022*. Wageningen Economic Research. https://edepot.wur.nl/573868

van Overzee, H. M., Rijnsdorp, A. D., & Poos, J. J. (2023). Changes in catch efficiency and selectivity in the beam trawl fishery for sole when mechanical stimulation is replaced by electrical stimulation. *Fisheries Research*, **260**: 106603.

Vanden Eede, S., Laporta, L., Deneudt, K., Stienen, E., Derous, S., Degraer, S., & Vincx, M. (2014). Marine biological valuation of the shallow Belgian coastal zone: A space-use conflict example within the context of marine spatial planning. *Ocean & Coastal Management*, **96**: 61–72.

Velghe, M.; Scherrens, N. (2019). De Belgische zeevisserij 2017: Aanvoer en besomming: Vloot, quota, vangsten, visserijmethoden en activiteit. *De Belgische zeevisserij: aanvoer en besomming*. Departement Landbouw en Visserij: Brussel. 121 pp.

Velghe, M.; Scherrens, N.; De Temmerman, P-J. (2020). De Belgische zeevisserij 2019: Aanvoer en besomming: Vloot, quota, vangsten, visserijmethoden en activiteit. *De Belgische zeevisserij: aanvoer en besomming*. Departement Landbouw en Visserij: Brussel. 108 pp

7   Annex: Methodology

Table 8   Simplified overview of the speed thresholds (knots) to define fishing activity for gears used in and around the BPNS between 2007–2022. Not all countries used all gears, but respective thresholds are given whenever possible to allow for comparison.

Gear Type	Gear Code	Threshold	Belgium	Denmark	Germany	The Netherlands
Dredges						
Boat dredge	DRB	min	1.4*	2	0.5	**
		max	5*	4	5	**
Mechanised/ Suction dredge	HMD	min	0	NA	0	**
		max	3	NA	3	**
Bottom trawls						
Beam trawl (demersal fish)	TBB	min	2.39*	5	2	**
		max	7*	7	4	**
Shrimp Trawl	TBS	min	2*	2	2	**
		max	5*	4	4	**
Pulse Trawl (demersal fish)	PUL	min	NA	NA	2	**
		max	NA	NA	4	**
Bottom otter trawl	OTB	min		2~	2	**
		max		4~	4	**
Crustaceans	OTB_CRU	min	1.59	~	§	§
		max	4.2	~	§	§
Demersal fish	OTB_DEF	min	1.8*	~	§	§
		max	5.2*	~	§	§
Mixed crustaceans and demersal fish	OTB_MCD	min	1.59*	§	§	§
		max	4.6*	§	§	§
Multi-rig otter trawl	OTT	min	1	2	1	**
		max	5	4	6	**
Bottom pair trawl	PTB	min	1	2	2	**
		max	5	4	4	**
Pelagic trawls						
Midwater otter trawl	OTM	min	1	2~	2	**
		max	7	4~	6.5	**
Midwater pair trawl	PTM	min	1	2	2	**
		max	7	4	5	**
Seines						
Anchored seine	SDN	min	0.2	0	0	0.5
		max	7	4	4.5	6
Fly shooting seine	SSC	min	0.19*	0	0	**
		max	6.6*	4	5.5	**
Passive gear						

Gear Type	Gear Code	Threshold	Belgium	Denmark	Germany	The Netherlands
Pots and Traps	FPO	min	0.1	2	0	0
		max	6	4	5	20
Gillnets (not specified)	GN	min	0	0	0	0
		max	20	4	20	20
Set gillnet	GNS	min	0.3	0	0	0
		max	5.5	4	5	20
Trammel net	GTR	min	0.3	0	0.3	0
		max	5.5	4	5.5	20
Mechanized handlines and pole-lines	LHM	min	0	NA	0	0
		max	4	NA	4	4
Hand and Pole lines	LHP	min	0.1	0	0	0
		max	7	0.1	1	5
Other						
Miscellaneous gear	MIS	min	0.5	NA	2	0.5
		max	5	NA	6	4

*Variable from year to year using a normal density curve. For Belgium values represent the range in the period 2007-2022.

**Variable from year to year using a normal density curve and segmentations by engine power. Details not available.

~Different according to metier level 6, i.e. depending on the target species and used mesh size. For e.g., Denmark defines speeds between 1.5 and 4 knots for OTB_DEF_32-69 and speeds between 2.5 and 5 for OTM_SPF_32-69. These further details are not included in the table.

NA: no defined speed thresholds for this gear type

§ No more detailed information on this level

8 Annex: Fishing Activity in the Belgian part of the North Sea

8.1 Overview in the BPNS

8.1.1 Overall trends and trends per country

Table 9   Number of vessels with a fishing activity in the Belgian part of the North Sea per country between 2007 and 2022, all gears combined.

Year	Belgium	Denmark	France	Germany	Netherlands	United Kingdom	Total
2007	73	0	37	-	81	-	191
2008	64	0	34	-	89	-	187
2009	71	0	21	5	99	4	200
2010	69	11	28	5	98	0	211
2011	59	9	31	5	92	2	198
2012	64	4	24	6	74	1	173
2013	51	6	30	5	70	1	163
2014	54	5	31	5	67	2	164
2015	57	3	39	5	79	2	185
2016	40	0	43	3	75	5	166
2017	44	0	38	4	73	3	162
2018	31	0	35	1	66	2	135
2019	31	0	21	3	74	7	136
2020	39	0	33	4	68	10	154
2021	50	0	44	2	72	14	182
2022	42	2	42	0	91	15	192

Table 10 Number of fishing hours, value of landings and landed weight in the Belgian part of the North Sea per country between 2007 and 2022, all gears combined. 'Other' includes Denmark, Germany and the United Kingdom.

	Fishing Hours					Value of landings (thousand euro)					Landed Weight (tonnes)				
Year	Belgium	France	Other	Netherlands	Total	Belgium	France	Other	Netherlands	Total	Belgium	France	Other	Netherlands	Total
2007	22139	1214	-	30956	54309	3029	490	-	18053	21572	666	158	-	5375	6199
2008	23840	1245	-	39809	64894	3360	354	-	20996	24710	913	132	-	5690	6735
2009	24427	322	1821	45461	72030	2913	104	581	19514	23112	863	53	80	5646	6642
2010	22982	633	4672	41812	70100	4263	170	1305	17656	23394	1381	100	155	4557	6193
2011	19880	652	2087	42662	65280	2890	173	428	17902	21394	1019	100	57	4570	5745
2012	21862	283	2382	45334	69860	3577	92	413	18428	22510	1120	28	88	4516	5752
2013	26367	285	2018	43596	72266	4283	52	342	17525	22202	1304	43	99	4259	5705
2014	21761	850	1329	44500	68440	3733	136	400	19848	24118	1259	57	188	4899	6403
2015	17897	887	1483	44158	64425	3363	403	545	18912	23223	942	92	85	4217	5336
2016	21817	2179	1046	48838	73880	4963	586	344	23984	29877	1049	193	79	4980	6301
2017	20306	1058	235	38171	59770	3728	344	135	15823	20030	725	86	48	3337	4196
2018	17609	602	*	43881	62417	3062	122	*	17400	20673	875	37	*	3675	4608
2019	15936	331	470	40501	57238	2109	71	181	11953	14314	628	25	143	2962	3757
2020	12565	670	1014	36598	50847	1898	193	220	10435	12745	535	94	202	3227	4058
2021	18133	1304	536	46981	66955	2493	351	89	11336	14270	687	203	137	3330	4357
2022	21247	1232	1322	47292	71093	4760	324	829	9352	15265	1145	181	280	3325	4930
Average	20548.0	859.2	1481.4	42534.4	65237.8	3401.5	247.8	421.6	16819.8	20838.1	944.4	98.9	118.7	4285.3	5432.3
Std Error	867.2	126.1	305.9	1133.6	1697.9	219.5	40.4	87.7	1015.9	1142.5	63.9	14.8	18.7	224.2	246.8

*Less than 5 vessels

Table 11 Average fishing hours, landed value (thousand euro), landed weight (tonnes), number of vessels, engine power (kilowatt) and gross tonnage (GT) per country and per quarter in the BPNS between 2007 and 2022. 'Other' includes activities of the Danish and German fleet (2009–2022). France and the UK could not be included.

Country	Quarter	fishing hours	landed weight (tonnes)	landed value (thousand euro)	number of vessels	number of kW	GT
Belgium	1	2674	92	341	33.7	16078	5038
Belgium	2	6241	268	882	28.3	10120	3151
Belgium	3	6666	322	1296	28.6	9211	2976
Belgium	4	4967	262	913	34.2	15925	5002
Other	1	66	11	23	1.5	2557	2677
Other	2	254	10	71	2.7	692	255
Other	3	812	27	178	4.7	1670	1042
Other	4	84	15	25	1.8	1788	1596
Netherlands	1	11192	1146	4663	51	44565	-
Netherlands	2	13211	1038	4270	52.8	38955	-
Netherlands	3	10613	1070	3988	49.2	30338	-
Netherlands	4	7519	1031	3680	49	35503	-

Table 12 Average engine power (kilowatt) per vessel, average gross tonnage per vessel, average number of vessels per year and number of vessels per length category (%) per country and length category, for vessels in the Belgian part of the North Sea between 2007 and 2022. NA = not available.

Country	Length Category	Average Kw per vessel	Average GT per vessel	Average number of vessels per year	% vessels per category
Belgium	0-12	221.0	25.0	0.4	0.7
Belgium	12-18	199.9	35.5	4.0	7.6
Belgium	18-24	227.9	82.1	27.6	52.6
Belgium	> 24	985.9	303.1	20.5	39.1
Denmark	12-18	192.5	60.5	1.1	42.5
Denmark	18-24	276.7	115.4	1.1	45.0
Denmark	> 24	514.6	260.1	0.3	12.5
France	0-12	NA	NA	3.8	11.3
France	12-18	NA	NA	3.3	10.0
France	18-24	NA	NA	14.4	43.3
France	> 24	NA	NA	11.8	35.4
Germany	12-18	215.0	47.6	1.1	30.2
Germany	18-24	216.1	101.9	1.0	26.4
Germany	> 24	2583.3	2699.0	1.6	43.4
Netherlands	0-12	136.4	NA	1.8	2.3
Netherlands	12-18	82.6	NA	0.9	1.1
Netherlands	18-24	219.0	NA	32.6	41.1
Netherlands	> 24	1219.4	NA	38.1	48.0
Netherlands	Unknown	795.0	NA	5.9	7.5
United Kingdom	12-18	*	*	0.1	2.9

Country	Length Category	Average Kw per vessel	Average GT per vessel	Average number of vessels per year	% vessels per category
United Kingdom	18-24	*	*	0.3	5.9
United Kingdom	> 24	1253.3	490.0	4.3	88.2
United Kingdom	Unknown	*	*	0.1	2.9

* < 5 vessels

8.1.2 Temporal fishing patterns per gear and country

Table 13 Number of fishing vessels in the Belgian part of the North Sea per gear and per country between 2007 and 2022.

Belgium							
Year	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl
2007	65	5	3	25	0	0	0
2008	57	7	2	25	0	0	0
2009	61	10	2	28	0	1	0
2010	59	6	4	28	1	0	0
2011	52	5	1	23	1	0	0
2012	54	9	2	21	2	0	0
2013	39	8	3	26	1	0	0
2014	48	4	2	18	1	0	0
2015	40	2	2	19	1	0	0
2016	34	3	2	19	1	0	0
2017	32	4	3	18	1	0	0
2018	21	2	3	19	0	0	0
2019	19	2	4	14	1	0	0
2020	16	7	3	16	4	0	0
2021	29	4	4	18	2	1	0
2022	29	4	1	16	3	0	0

France

Year	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl
2007	2	29	5	0	1	0	0
2008	1	28	5	0	0	0	0
2009	0	19	1	0	1	0	0
2010	1	26	0	0	1	0	0
2011	0	30	1	0	0	0	0
2012	1	18	4	0	1	0	0
2013	1	22	4	0	1	2	0
2014	3	23	2	0	1	2	0
2015	2	19	13	0	4	1	0
2016	0	20	15	0	6	2	0
2017	1	18	11	0	7	1	0
2018	0	18	9	0	8	0	0
2019	0	14	5	0	2	0	0
2020	0	21	6	0	4	2	0
2021	0	25	9	0	6	4	0
2022	0	24	9	0	5	4	0

Other Countries

Year	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl
2007	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-
2009	0	1	7	0	1	0	0
2010	0	0	16	0	0	0	0
2011	2	0	16	0	0	0	0
2012	1	1	10	0	0	0	0
2013	1	2	9	0	0	0	0
2014	2	0	8	0	0	1	1
2015	3	0	5	0	0	0	3
2016	2	0	3	0	2	0	1
2017	1	0	2	0	2	0	2
2018	1	0	1	0	1	0	0
2019	1	4	1	0	5	0	0
2020	1	4	0	0	8	1	0
2021	0	4	0	0	10	2	0
2022	0	6	0	0	12	0	0

Netherlands

Year	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl
2007	57	16	0	13	2	2	0
2008	58	16	0	21	4	2	0
2009	61	21	4	20	6	2	0
2010	59	20	6	29	7	0	0
2011	57	15	8	18	7	0	7
2012	27	12	2	18	7	0	22
2013	19	10	6	22	7	0	23
2014	24	5	2	23	9	0	36
2015	7	10	0	32	7	0	44
2016	10	10	2	39	9	0	35
2017	6	6	0	29	8	0	42
2018	10	2	0	28	11	0	37
2019	19	2	0	28	14	2	38
2020	19	10	2	30	17	0	19
2021	33	14	0	32	14	0	9
2022	28	12	0	52	17	2	0

Total

Year	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl
2007	124	50	8	38	3	2	0
2008	116	51	7	46	4	2	0
2009	122	51	14	48	8	3	0
2010	119	52	26	57	9	0	0
2011	111	50	26	41	8	0	7
2012	83	40	18	39	10	0	22
2013	60	42	22	48	9	2	23
2014	77	32	14	41	11	3	37
2015	52	31	20	51	12	1	47
2016	46	33	22	58	18	2	36
2017	40	28	16	47	18	1	44
2018	32	22	13	47	20	0	37
2019	39	22	10	42	22	2	38
2020	36	42	11	46	33	3	19
2021	62	47	13	50	32	7	9
2022	57	46	10	68	37	6	0

Table 14 Number of fishing hours in the Belgian part of the North Sea per gear between 2007 and 2022, all countries combined. 'Other gears' is not shown.

Year	Beam Trawl	Otter Trawl	Passive	Seiners	Shrimp Trawl	Pulse Trawl
2007	37111	2876	628	*	13677	0
2008	48455	2567	759	*	12862	0
2009	47851	2864	2179	1283	17845	0
2010	36320	3971	5567	1402	22840	0
2011	39318	4247	3254	1353	15104	2005

Year	Beam Trawl	Otter Trawl	Passive	Seiners	Shrimp Trawl	Pulse Trawl
2012	24978	3156	2645	1429	22646	15006
2013	15454	2525	2382	1226	28345	22326
2014	14769	3399	1154	1517	20917	26660
2015	7264	2922	1944	1600	20247	30445
2016	8894	4057	1920	1862	24609	32515
2017	6443	1180	1737	2139	20883	27386
2018	6316	599	929	1205	20892	32476
2019	10170	411	796	2026	15986	27849
2020	17699	1181	776	4134	17319	9723
2021	26812	1645	983	3392	27399	6663
2022	24279	1109	1006	2839	41806	0

* < 5 vessels

Table 15 Value of landings and landed weight in the Belgian part of the North Sea per gear between 2007 and 2022, all countries combined. 'Other gears' is not shown.

Year	Value of landings (thousand euro)						Landed weight (tonnes)					
	Beam Trawl	Otter Trawl	Passive	Seiners	Shrimp Trawl	Pulse Trawl	Beam Trawl	Otter Trawl	Passive	Seiners	Shrimp Trawl	Pulse Trawl
2007	18455	1597	239	*	1182	0	4005	1766	25	*	275	0
2008	21468	1073	266	*	1412	0	5051	803	34	*	417	0
2009	18245	836	788	1040	2184	0	4600	743	109	296	866	0
2010	15216	661	1609	963	4945	0	3562	308	199	258	1867	0
2011	16164	526	734	1193	1982	795	4248	249	99	269	750	129
2012	10626	454	482	750	3342	6856	2840	242	81	311	866	1412
2013	6272	275	415	514	3975	10748	1863	170	68	300	1041	2262
2014	4260	362	248	630	3783	14797	1361	131	35	302	1169	3279
2015	1829	366	601	1113	2484	16830	602	141	76	361	740	3416
2016	2139	783	442	973	6667	18867	683	308	58	333	1223	3687
2017	1397	263	501	1492	3717	12660	366	146	78	493	673	2440
2018	1174	106	290	606	6272	12224	373	34	42	250	1433	2476
2019	1417	112	241	1144	2244	9157	428	123	38	501	850	1817
2020	4969	277	183	1626	2331	3349	1433	204	33	796	891	694
2021	6616	475	232	1501	4370	1039	1605	245	38	563	1554	284
2022	4834	440	245	1657	8040	0	1416	207	35	524	2689	0

* < 5 vessels

Table 16 Yearly distribution of the relative number of fishing hours per gear (%) per country in the Belgian part of the North Sea between 2007 and 2022. Other countries includes Denmark, Germany and the United Kingdom.

Fishing hours %								
Year	Country	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl
2007	Belgium	38	4	2	56	0	0	0
2008	Belgium	52	2	2	44	0	0	0
2009	Belgium	47	3	1	49	0	0	0
2010	Belgium	27	2	2	68	0	0	0
2011	Belgium	34	6	2	58	0	0	0
2012	Belgium	32	3	1	64	0	0	0
2013	Belgium	27	2	1	70	0	0	0
2014	Belgium	39	2	1	58	0	0	0
2015	Belgium	28	2	4	66	0	0	0
2016	Belgium	30	2	5	64	0	0	0
2017	Belgium	25	2	7	66	0	0	0
2018	Belgium	23	0	4	72	0	0	0
2019	Belgium	20	0	5	75	0	0	0
2020	Belgium	25	3	4	67	1	0	0
2021	Belgium	32	0	2	65	0	0	0
2022	Belgium	17	0	2	81	1	0	0
2007	France	0	82	18	0	0	0	0
2008	France	0	86	14	0	0	0	0
2009	France	0	98	1	0	2	0	0
2010	France	0	92	0	0	7	0	0
2011	France	0	100	0	0	0	0	0
2012	France	0	80	19	0	0	0	0
2013	France	0	91	5	0	1	2	0
2014	France	1	94	1	0	3	2	0
2015	France	0	30	43	0	26	0	0
2016	France	0	59	23	0	17	1	0
2017	France	0	61	17	0	22	0	0
2018	France	0	83	11	0	5	0	0
2019	France	0	93	4	0	3	0	0
2020	France	0	59	30	0	10	2	0
2021	France	0	47	42	0	7	4	0
2022	France	0	44	49	0	2	4	0
2007	Netherlands	93	3	0	4	0	0	0
2008	Netherlands	91	3	0	6	1	0	0
2009	Netherlands	80	4	0	13	3	0	0
2010	Netherlands	72	7	1	17	3	0	0
2011	Netherlands	76	6	2	9	3	0	5
2012	Netherlands	40	5	0	19	3	0	33

Fishing hours %							
Year	Country	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl
2013	Netherlands	19	4	0	23	3	0	51
2014	Netherlands	13	5	0	19	3	0	60
2015	Netherlands	4	5	0	19	3	0	68
2016	Netherlands	4	5	0	22	3	0	67
2017	Netherlands	4	0	0	20	5	0	72
2018	Netherlands	5	0	0	19	3	0	74
2019	Netherlands	16	0	0	10	5	0	69
2020	Netherlands	39	1	0	24	9	0	27
2021	Netherlands	45	2	0	33	6	0	14
2022	Netherlands	44	1	0	52	3	0	0
2009	Other Countries	0	1	99	0	1	0	0
2010	Other Countries	0	0	100	0	0	0	0
2011	Other Countries	3	0	97	0	0	0	0
2012	Other Countries	0	0	100	0	0	0	0
2013	Other Countries	0	0	99	0	0	0	0
2014	Other Countries	23	0	76	0	0	1	1
2015	Other Countries	26	0	54	0	0	0	19
2016	Other Countries	58	0	36	0	5	0	0
2017	Other Countries	8	0	48	0	40	0	5
2018	Other Countries	63	0	33	0	4	0	0
2019	Other Countries	76	2	5	0	18	0	0
2020	Other Countries	35	1	0	0	64	0	0
2021	Other Countries	0	28	0	0	71	1	0
2022	Other Countries	0	18	0	0	82	0	0

Table 17 Yearly distribution of the relative value of landings and landed weight per gear (%) per country in the Belgian part of the North Sea between 2007 and 2022. Other countries includes Denmark, Germany and the United Kingdom.

		Value of landings (%)							Landed Weight (%)						
Year	Country	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl
2007	Belgium	59	3	5	33	0	0	0	58	5	2	34	0	0	0
2008	Belgium	64	2	6	27	0	0	0	66	3	3	29	0	0	0
2009	Belgium	57	3	7	33	0	0	0	51	6	3	40	0	0	0
2010	Belgium	26	1	4	68	1	0	0	20	1	1	76	1	0	0
2011	Belgium	40	4	3	51	1	0	0	40	6	1	51	2	0	0
2012	Belgium	35	3	2	60	0	0	0	46	6	1	47	1	0	0
2013	Belgium	42	1	2	54	0	0	0	54	2	1	43	0	0	0
2014	Belgium	47	1	1	51	0	0	0	53	1	0	45	1	0	0
2015	Belgium	43	1	9	46	0	0	0	53	2	4	41	0	0	0
2016	Belgium	34	1	5	60	0	0	0	48	1	3	47	0	0	0
2017	Belgium	30	2	12	57	0	0	0	40	1	9	48	1	0	0
2018	Belgium	25	0	8	66	0	0	0	26	0	4	70	0	0	0
2019	Belgium	23	0	11	65	0	0	0	24	0	6	70	0	0	0
2020	Belgium	34	2	8	52	5	0	0	39	3	5	48	6	0	0
2021	Belgium	29	1	5	64	1	0	0	33	1	3	61	2	0	0
2022	Belgium	11	0	2	85	2	0	0	12	1	1	84	2	0	0

		Value of landings (%)							Landed Weight (%)						
Year	Country	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl
2007	France	0	80	20	0	0	0	0	0	94	6	0	0	0	0
2008	France	0	86	14	0	0	0	0	0	94	6	0	0	0	0
2009	France	0	97	1	0	1	0	0	0	98	0	0	1	0	0
2010	France	0	98	0	0	2	0	0	0	99	0	0	1	0	0
2011	France	0	100	0	0	0	0	0	0	100	0	0	0	0	0
2012	France	0	88	10	0	1	0	0	0	93	6	0	1	0	0
2013	France	0	91	3	0	2	3	0	0	95	1	0	2	2	0
2014	France	0	90	1	0	5	3	0	0	87	1	0	9	3	0
2015	France	0	19	30	0	50	0	0	0	50	19	0	31	0	0
2016	France	0	56	21	0	21	1	0	0	71	8	0	16	4	0
2017	France	0	41	14	0	45	0	0	0	54	8	0	37	0	0
2018	France	0	80	10	0	10	0	0	0	83	3	0	13	0	0
2019	France	0	87	3	0	10	0	0	0	86	1	0	13	0	0
2020	France	0	66	17	0	12	5	0	0	77	7	0	9	8	0
2021	France	0	51	30	0	9	10	0	0	54	7	0	7	32	0
2022	France	0	37	47	0	1	15	0	0	53	12	0	2	33	0

Year	Country	Value of landings (%)							Landed Weight (%)						
		Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl
2009	Other Countries	0	1	97	0	2	0	0	0	4	91	0	5	0	0
2010	Other Countries	0	0	100	0	0	0	0	0	0	100	0	0	0	0
2011	Other Countries	2	0	98	0	0	0	0	9	0	91	0	0	0	0
2012	Other Countries	2	3	95	0	0	0	0	4	30	67	0	0	0	0
2013	Other Countries	1	8	92	0	0	0	0	1	44	56	0	0	0	0
2014	Other Countries	38	0	52	0	0	9	1	17	0	16	0	0	67	0
2015	Other Countries	28	0	31	0	0	0	42	33	0	26	0	0	0	41
2016	Other Countries	67	0	17	0	15	0	0	60	0	10	0	29	0	0
2017	Other Countries	1	0	14	0	60	0	25	1	0	6	0	80	0	14
2018	Other Countries	73	0	23	0	3	0	0	70	0	11	0	18	0	0
2019	Other Countries	48	24	1	0	27	0	0	15	69	0	0	16	0	0
2020	Other Countries	10	14	0	0	75	0	0	12	36	0	0	52	0	0
2021	Other Countries	0	29	0	0	71	1	0	0	47	0	0	52	1	0
2022	Other Countries	0	26	0	0	74	0	0	0	18	0	0	82	0	0

		Value of landings (%)							Landed Weight (%)						
Year	Country	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl	Beam Trawl	Otter Trawl	Passive	Shrimp Trawl	Seiners	Other Gear	Pulse Trawl
2007	Netherlands	92	6	0	1	0	1	0	67	30	0	1	0	2	0
2008	Netherlands	92	3	0	2	1	1	0	78	11	0	3	1	7	0
2009	Netherlands	85	3	0	6	5	0	0	74	11	0	9	5	0	0
2010	Netherlands	80	3	1	12	5	0	0	72	4	1	18	5	0	0
2011	Netherlands	84	1	1	3	6	0	4	84	2	1	5	6	0	3
2012	Netherlands	51	1	0	6	4	0	37	51	3	0	8	7	0	31
2013	Netherlands	25	1	0	9	3	0	61	27	1	0	11	7	0	53
2014	Netherlands	12	1	0	10	3	0	75	14	1	0	12	6	0	67
2015	Netherlands	1	1	0	5	5	0	88	2	2	0	8	8	0	80
2016	Netherlands	1	2	0	15	3	0	79	3	3	0	15	6	0	74
2017	Netherlands	2	0	0	10	8	0	80	2	3	0	10	13	0	73
2018	Netherlands	2	0	0	24	3	0	70	4	0	0	22	7	0	67
2019	Netherlands	7	0	0	7	9	0	77	9	0	0	14	16	0	61
2020	Netherlands	41	1	0	13	13	0	32	37	1	0	20	20	0	22
2021	Netherlands	52	2	0	24	12	0	9	41	2	0	34	14	0	9
2022	Netherlands	46	1	0	43	10	0	0	38	2	0	52	8	0	0

8.2 Fishing activities in the Flemish Banks

8.2.1 Overall trends

Table 18 Fishing hours, landed value and landed weight inside the Flemish Banks as well as the respective percent in the Flemish Banks relative to the BPNS between 2007 and 2022. The data includes Belgian, French and Dutch vessels (2007 – 2022) as well as the German, Danish and British vessels (2009 – 2022).

Year	Fishing Hours	landed value (thousand euro)	landed weight (tonnes)	%Fishing Hours	%Value	%Weight
2007	19450	6685	1897	35.8	31.0	30.6
2008	22837	8612	2264	35.2	34.9	33.6
2009	26185	8085	2158	36.4	35.0	32.5
2010	22992	8053	2108	32.8	34.4	34.0
2011	23621	8137	2363	36.2	38.0	41.1
2012	22268	7304	2032	31.9	32.4	35.3
2013	27125	8072	2265	37.5	36.4	39.7
2014	21032	7181	2034	30.7	29.8	31.8
2015	20276	8161	1849	31.5	35.1	34.7
2016	22478	9274	2027	30.4	31.0	32.2
2017	18174	6781	1399	30.4	33.9	33.3
2018	24444	7310	1678	39.2	35.4	36.4
2019	18663	5267	1297	32.6	36.8	34.5
2020	14477	4174	1199	28.5	32.7	29.5
2021	21839	4455	1264	32.6	31.2	29.0
2022	23060	4895	1342	32.4	32.1	27.2

8.2.2 Trends per country
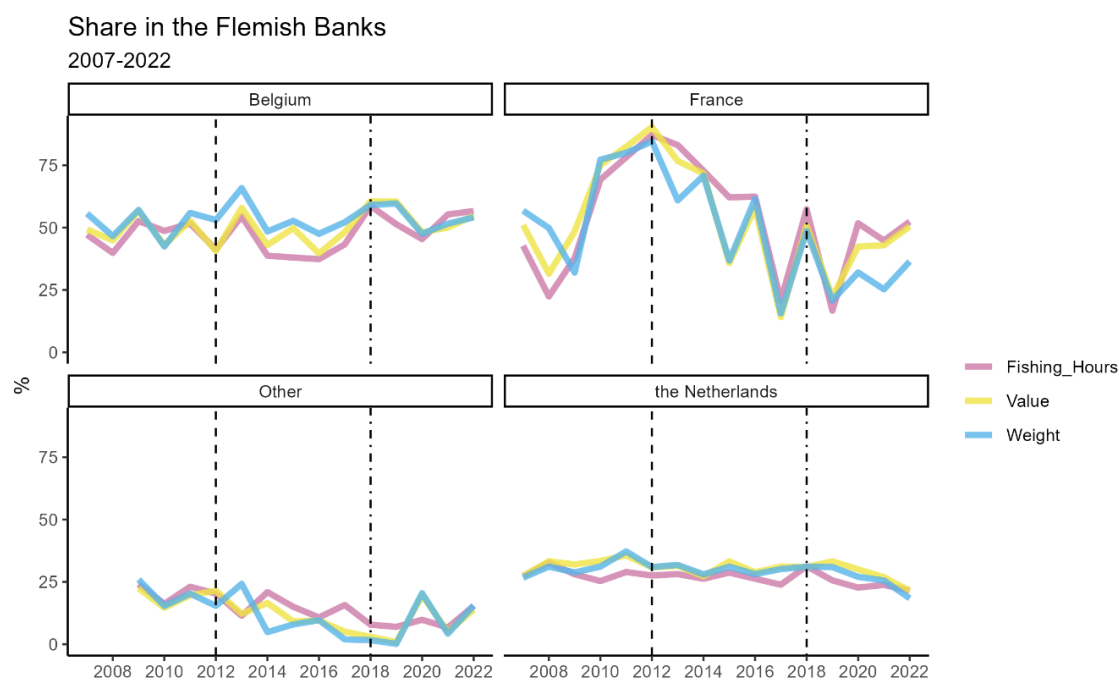
Figure 51 Percent of effort, weight and value of landings in the Flemish Banks relative to the BPNS per country between 2007 and 2022 (all gears combined). "Other" includes Germany, Denmark and the UK.

Table 19 Fishing hours per country and vessel length inside the Flemish Banks between 2007 and 2022. The data includes Belgian, French and Dutch vessels (2007 – 2022) as well as the German, Danish and British vessels (2009 – 2022).

| | Belgium | | France | | Other countries | | the Netherlands | |
Year	0-24	> 24	0-24	> 24	0-24	> 24	0-24	> 24
2007	10352	88	428	92	-	-	3103	5387
2008	9371	138	170	109	-	-	5283	7761
2009	12584	276	*	105	316	*	6313	6404
2010	11064	130	79	360	735	*	4770	5431
2011	10187	80	175	334	412	*	7034	5328
2012	8952	72	162	85	342	*	7480	5032
2013	14318	69	188	48	201	*	8325	3945
2014	8379	58	425	194	205	*	6950	4747
2015	6735	72	498	53	*	*	7598	5097
2016	8093	61	921	441	*	*	6613	6237
2017	8680	115	196	24	*	*	4823	4299
2018	10287	48	285	*	*	*	7976	5761
2019	8145	43	39	*	*	33	5538	4849
2020	5686	21	183	*	*	99	3945	4378
2021	9990	38	466	*	*	36	6585	4605
2022	11999	44	536	*	*	200	7464	2705

* < 5 vessels

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Table 20 Landed value and landed weight per country and vessel length inside the Flemish Banks between 2007 and 2022. The data includes Belgian, French and Dutch vessels (2007 – 2022) as well as the German, Danish and British vessels (2009 – 2022).

	Landed value (thousand euro)								Landed weight (tonnes)							
	Belgium		France		Other countries		Netherlands		Belgium		France		Other countries		Netherlands	
Year	0-24	>24	0-24	>24	0-24	>24	0-24	>24	0-24	>24	0-24	>24	0-24	>24	0-24	>24
2007	1413	78	223	27	-	-	609	4334	359	11	82	8	-	-	140	1296
2008	1471	39	56	56	-	-	1898	5091	411	15	47	19	-	-	514	1259
2009	1495	158	*	43	87	*	1413	4825	426	67	*	14	13	*	468	1147
2010	1732	100	20	108	183	*	912	4841	553	34	10	67	23	*	314	1044
2011	1438	86	29	114	69	*	1961	4425	543	27	20	60	9	*	644	1058
2012	1406	49	63	20	59	*	2397	3280	579	16	14	10	9	*	553	847
2013	2404	75	30	10	28	*	2887	2624	825	33	20	6	6	*	644	711
2014	1515	92	60	37	52	*	2187	3222	577	33	26	14	7	*	535	839
2015	1474	201	133	11	*	*	2475	3817	449	48	27	7	*	*	469	842
2016	1694	275	249	91	*	*	2138	4795	454	44	73	46	*	*	414	987
2017	1510	287	41	7	*	*	1525	3403	335	43	10	3	*	*	292	714
2018	1754	100	52	*	*	*	1859	3533	498	19	15	*	*	*	384	759
2019	1239	36	10	*	*	1.6	1177	2798	369	6	3	*	*	0.2	277	640
2020	904	10	42	*	*	43	576	2560	251	4	15	*	*	41	166	707
2021	1219	29	115	*	*	5	827	2226	346	9	32	*	*	6	295	558
2022	2583	24	140	*	*	115	694	1315	614	6	49	*	*	43	243	371

* < 5 vessels

8.2.3 Trends per gear

Table 21 Fishing hours in the Flemish Banks per gear between 2007 and 2022, all countries combined. 'Other gears' is not shown.

Fishing Hours						
Year	Beam Trawl	Otter Trawl	Passive	Pulse Trawl	Seiners	Shrimp Trawl
2007	13815	1350	84	0	*	4194
2008	19665	608	211	0	*	2274
2009	19457	982	503	0	*	4884
2010	13180	1386	868	0	337	7222
2011	16168	1231	727	321	*	4785
2012	11617	709	549	4757	*	4134
2013	9355	410	307	7984	*	8650
2014	7017	729	289	8534	474	3978
2015	3505	497	1076	11233	548	3414
2016	4382	898	1546	11850	629	3158
2017	3093	215	1383	8197	574	4713
2018	3276	350	740	12140	398	7539
2019	3226	116	647	8372	521	5783
2020	6460	540	679	2191	1249	3358
2021	10892	332	595	2560	999	6457
2022	8893	354	553	0	607	12642

* < 5 vessels

Table 22 Percent fishing hour per gear in the Flemish Banks relative to the BPNS between 2007 and 2022. The data includes Belgian, French and Dutch vessels (2007 – 2022) as well as the German, Danish and British vessels (2009 – 2022).

Fishing Hours %

Year	Beam Trawl	Otter Trawl	Passive	Pulse Trawl	Seiners	Shrimp Trawl
2007	37	47	13	0	*	31
2008	41	24	28	0	*	18
2009	41	34	23	0	*	27
2010	36	35	16	0	24	32
2011	41	29	22	16	*	32
2012	47	22	21	32	*	18
2013	61	16	13	36	*	31
2014	48	21	25	32	31	19
2015	48	17	55	37	34	17
2016	49	22	81	36	34	13
2017	48	18	80	30	27	23
2018	52	58	80	37	33	36
2019	32	28	81	30	26	36
2020	36	46	87	23	30	19
2021	41	20	61	38	29	24
2022	37	32	55	0	21	30

Table 23 Landed value and landed weight per gear given as the respective percent in the Flemish Banks relative to the BPNS between 2007 and 2022. The data includes Belgian, French and Dutch vessels (2007 – 2022) as well as the German, Danish and British vessels (2009 – 2022).

	Value of landings (%)						Landed weight (%)					
Year	Beam Trawl	Otter Trawl	Passive	Pulse Trawl	Seiners	Shrimp Trawl	Beam Trawl	Otter Trawl	Passive	Pulse Trawl	Seiners	Shrimp Trawl
2007	31	36	17	0	*	24	34	26	18	0	*	25
2008	38	14	29	0	*	9	40	10	37	0	*	10
2009	39	19	21	0	*	17	40	10	22	0	*	16
2010	40	43	16	0	30	24	40	46	19	0	27	24
2011	41	45	35	9	*	26	45	51	36	11	*	25
2012	43	39	20	26	*	13	47	34	19	27	*	12
2013	60	27	14	29	*	22	65	34	14	30	*	20
2014	55	28	28	26	35	14	60	32	27	28	32	13
2015	62	18	69	35	30	12	65	19	68	34	37	11
2016	62	31	83	35	31	7	60	34	84	35	30	6
2017	64	15	83	35	26	15	65	8	84	35	27	14
2018	58	51	85	40	36	20	54	52	87	39	39	25
2019	41	18	84	36	30	35	41	6	84	37	31	29
2020	41	33	86	31	28	17	40	27	84	30	28	12
2021	39	19	65	33	35	18	41	16	69	40	35	14
2022	34	18	52	0	23	33	33	25	59	0	24	25

8.3 Fishing activity in the proposed management areas

8.3.1 Overall trend

Table 24 Fishing hours, value of landings and landed weight in the proposed management areas between 2007 and 2022, all countries combined.

	Fishing hours			Value of landings (thousand euro)			Weight (tonnes)		
Year	Area 1	Area 2	Area 3	Area 1	Area 2	Area 3	Area 1	Area 2	Area 3
2007	431	2805	1656	291	2179	230	72	567	50
2008	703	2170	2213	368	1946	508	117	566	153
2009	709	2212	1969	449	2203	331	115	507	126
2010	652	2826	1853	447	2612	362	108	601	144
2011	550	3047	1806	320	2642	498	81	672	182
2012	628	2133	2201	344	1594	714	84	398	169
2013	452	2088	2588	215	1375	823	79	377	193
2014	443	2777	1777	293	1689	577	97	422	167
2015	523	3032	1832	389	2158	560	111	447	116
2016	733	3620	1917	415	2646	647	118	585	138
2017	525	2069	1456	322	1784	377	155	346	85
2018	469	2693	2420	248	1699	597	72	370	151
2019	662	2242	1545	264	1556	281	91	349	74
2020	757	2294	981	312	1356	155	139	381	46
2021	885	2256	1750	288	1089	224	114	300	85
2022	867	1962	3395	478	1068	676	146	333	190

Table 25. Percent of effort, weight and value of landings per proposed management zone relative to totals in the BPNS between 2007 and 2022. The data includes Belgian, French Dutch and Danish vessels (2007 – 2022) as well as the German and British vessels (2009 – 2022).

Management Zone	Year	Weight (%)	Value (%)	Fishing Hours (%)
Area 1	2007	1.2	1.3	0.8
Area 1	2008	1.7	1.5	1.1
Area 1	2009	1.7	1.9	1
Area 1	2010	1.7	1.9	0.9
Area 1	2011	1.4	1.5	0.8
Area 1	2012	1.5	1.5	0.9
Area 1	2013	1.4	1	0.6
Area 1	2014	1.5	1.2	0.6
Area 1	2015	2.1	1.7	0.8
Area 1	2016	1.9	1.4	1
Area 1	2017	3.7	1.6	0.9
Area 1	2018	1.6	1.2	0.8
Area 1	2019	2.4	1.8	1.2
Area 1	2020	3.4	2.5	1.5
Area 1	2021	2.6	2	1.3

Management Zone	Year	Weight (%)	Value (%)	Fishing Hours (%)
Area 1	2022	3	3.1	1.2
Area 2	2007	9.1	10.1	5.2
Area 2	2008	8.4	7.9	3.3
Area 2	2009	7.6	9.5	3.1
Area 2	2010	9.7	11.2	4
Area 2	2011	11.7	12.4	4.7
Area 2	2012	6.9	7.1	3.1
Area 2	2013	6.6	6.2	2.9
Area 2	2014	6.6	7	4.1
Area 2	2015	8.4	9.3	4.7
Area 2	2016	9.3	8.9	4.9
Area 2	2017	8.2	8.9	3.5
Area 2	2018	8	8.2	4.3
Area 2	2019	9.3	10.9	3.9
Area 2	2020	9.4	10.6	4.5
Area 2	2021	6.9	7.6	3.4
Area 2	2022	6.8	7	2.8
Area 3	2007	0.8	1.1	3
Area 3	2008	2.3	2.1	3.4
Area 3	2009	1.9	1.4	2.7
Area 3	2010	2.3	1.5	2.6
Area 3	2011	3.2	2.3	2.8
Area 3	2012	2.9	3.2	3.2
Area 3	2013	3.4	3.7	3.6
Area 3	2014	2.6	2.4	2.6
Area 3	2015	2.2	2.4	2.8
Area 3	2016	2.2	2.2	2.6
Area 3	2017	2	1.9	2.4
Area 3	2018	3.3	2.9	3.9
Area 3	2019	2	2	2.7
Area 3	2020	1.1	1.2	1.9
Area 3	2021	1.9	1.6	2.6
Area 3	2022	3.8	4.4	4.8

8.3.2   Relative shares per management area and country

Table 26 Average percent per country of fishing effort, value of landings and landed weight in the proposed management areas relative to the BPNS (2018–2022).

		Area 1	Area 2	Area 3	Area 1+2+3
Belgium	Fishing Hours	0.1	0.4	5.3	5.8
	Value	0.4	1.1	6.6	8.2
	Weight	0.4	0.8	6.6	7.8
France	Fishing Hours	7.8	41.3	0	49.1
	Value	8.6	40.2	0	48.8
	Weight	9.4	28.7	0	38.1
Netherlands	Fishing Hours	1.2	4.2	2.6	8
	Value	2	10	1.6	13.6
	Weight	2.3	9	1.7	13
Other countries	Fishing Hours	18.4	8.8	0	27.2
	Value	16.8	10.4	0	27.2
	Weight	15	8.3	0	23.3

8.3.2.1 Area 1

Table 27 Percent of effort, weight and value of landings per country for proposed management zone Area 1 relative to totals in the BPNS between 2007 and 2022.

Management Zone	Year	Belgium			France			Other countries			Netherlands		
		Fishing Hours	Value	Weight	Fishing Hours	Value	Weight	Fishing Hours	Value	Weight	Fishing Hours	Value	Weight
Area 1	2007	0.0	0.0	0.0	6.5	5.8	7.6	-	-	-	1.1	1.5	1.1
Area 1	2008	0.1	0.3	0.3	33.6	32.0	24.2	-	-	-	0.6	1.2	1.4
Area 1	2009	0.2	1.2	0.9	28.9	22.1	25.7	3.9	4.6	5.9	1.1	1.9	1.6
Area 1	2010	0.2	0.5	0.5	5.1	5.7	5.1	1.8	1.6	1.6	1.2	2.2	2.1
Area 1	2011	0.1	0.2	0.2	6.7	6.2	6.1	0.2	0.2	0.3	1.1	1.7	1.6
Area 1	2012	0.1	0.1	0.1	7.3	4.9	8.2	5.8	7.0	4.8	1.0	1.7	1.7
Area 1	2013	0.0	0.0	0.0	9.5	7.2	5.3	6.5	5.5	3.5	0.6	1.1	1.7
Area 1	2014	0.2	0.4	0.5	7.6	10.0	13.8	0.6	0.4	0.1	0.7	1.3	1.7
Area 1	2015	0.4	0.9	1.0	1.1	0.6	1.8	2.0	0.9	0.8	0.9	1.9	2.4
Area 1	2016	0.1	0.1	0.1	9.4	9.6	11.9	0.2	0.1	0.0	1.0	1.5	1.9
Area 1	2017	0.0	0.0	0.0	13.9	14.1	20.9	0.0	0.0	0.0	1.0	1.7	4.1
Area 1	2018	0.0	0.0	0.0	10.8	12.9	17.2	1.9	1.4	0.7	0.9	1.3	1.8
Area 1	2019	0.0	0.0	0.0	36.7	41.7	40.6	1.0	0.8	0.2	1.3	1.9	2.7
Area 1	2020	0.3	1.0	1.1	7.5	11.9	14.2	13.6	16.0	10.5	1.4	2.3	3.0
Area 1	2021	0.1	0.3	0.2	4.3	4.9	7.7	45.3	37.5	29.4	1.2	2.0	1.7
Area 1	2022	0.2	0.6	0.7	2.3	2.0	3.0	21.4	20.0	19.8	1.1	3.0	2.3

8.3.2.2 Area 2

Table 28 Percent of effort, weight and value of landings per country for proposed management zone Area 2 relative to totals in the BPNS between 2007 and 2022.

Management Zone	Year	Belgium			France			Other countries			Netherlands		
		Fishing Hours	Value	Weight	Fishing Hours	Value	Weight	Fishing Hours	Value	Weight	Fishing Hours	Value	Weight
Area 2	2007	0.3	1.6	1.0	36.3	44.7	50.2	-	-	-	7.4	10.6	8.9
Area 2	2008	0.7	1.7	1.4	20.6	29.2	47.8	-	-	-	4.4	8.5	8.6
Area 2	2009	0.5	1.6	1.4	32.3	41.7	28.6	18.7	17.4	21.3	3.6	10.3	8.2
Area 2	2010	0.4	1.4	1.3	61.5	67.4	71.5	12.7	10.9	11.5	4.2	13.0	10.9
Area 2	2011	1.1	2.6	1.4	74.6	79.7	77.3	14.6	13.2	13.4	4.8	13.2	12.5
Area 2	2012	0.3	0.2	0.2	77.3	81.6	80.1	14.0	15.2	10.8	3.4	7.9	8.0
Area 2	2013	0.4	1.8	1.8	80.0	73.5	58.9	9.2	6.9	4.7	3.6	7.0	7.6
Area 2	2014	0.2	0.7	0.4	70.9	69.0	69.1	14.4	11.4	3.4	4.4	7.7	7.6
Area 2	2015	1.3	4.7	2.3	48.3	27.3	30.4	10.1	6.0	5.0	5.0	9.8	9.3
Area 2	2016	0.5	2.1	1.8	41.6	42.6	54.6	5.9	2.8	1.7	5.2	9.5	9.2
Area 2	2017	0.5	2.8	2.1	17.7	11.5	13.8	9.8	3.1	1.2	4.6	10.3	9.5
Area 2	2018	0.7	1.6	0.7	51.2	46.8	45.0	5.9	2.3	1.1	5.1	9.1	9.4
Area 2	2019	0.8	3.3	1.4	11.7	18.3	18.8	3.6	0.7	0.1	5.1	12.3	11.3
Area 2	2020	0.0	0.4	0.5	43.3	40.0	30.3	8.6	12.3	8.8	5.2	11.9	10.3
Area 2	2021	0.2	1.1	1.2	38.8	36.7	22.3	5.6	4.5	3.8	3.6	8.2	7.3
Area 2	2022	0.1	0.3	0.3	45.9	46.3	33.0	12.8	13.5	15.0	2.5	8.5	6.9

8.3.2.3   Area 3

Table 29 Percent of effort, weight and value of landings per country for proposed management zone Area 3 relative to totals in the BPNS between 2007 and 2022.

Management Zone	Year	Belgium			France			Netherlands		
		Fishing Hours	Value	Weight	Fishing Hours	Value	Weight	Fishing Hours	Value	Weight
Area 3	2007	4.1	2.4	2.6	0.1	0.0	0.0	2.4	0.9	0.6
Area 3	2008	3.6	3.5	4.3	0.0	0.0	0.0	3.4	1.9	2.0
Area 3	2009	2.6	2.5	3.2	0.0	0.0	0.0	3.0	1.3	1.7
Area 3	2010	3.5	3.2	3.7	0.0	0.0	0.0	2.5	1.3	2.0
Area 3	2011	0.8	1.7	1.8	0.0	0.0	0.0	3.8	2.5	3.6
Area 3	2012	2.0	1.9	1.8	0.0	0.0	0.0	3.9	3.5	3.3
Area 3	2013	3.9	3.4	3.5	0.0	0.0	0.0	3.6	3.9	3.5
Area 3	2014	1.3	1.7	2.1	0.0	0.0	0.0	3.4	2.6	2.9
Area 3	2015	1.8	1.6	1.4	0.0	0.0	0.0	3.4	2.7	2.4
Area 3	2016	1.5	1.0	1.1	0.1	0.1	0.0	3.3	2.4	2.4
Area 3	2017	2.0	1.7	2.7	0.0	0.0	0.0	2.7	2.0	2.0
Area 3	2018	4.6	6.1	6.4	0.0	0.0	0.0	3.7	2.4	2.6
Area 3	2019	3.6	4.2	4.4	0.0	0.0	0.0	2.4	1.6	1.6
Area 3	2020	3.3	3.5	3.0	0.0	0.0	0.0	1.5	0.9	0.9
Area 3	2021	3.4	2.4	2.3	0.0	0.0	0.0	2.4	1.4	2.1
Area 3	2022	10.1	11.5	12.2	0.1	0.0	0.0	2.6	1.4	1.5

8.3.2.4 All Areas combined

Table 30 Percent of effort, weight and value of landings per country for all proposed management areas combined relative to totals in the BPNS between 2007 and 2022.

Management Zone	Year	Belgium			France			Other countries			Netherlands		
		Fishing Hours	Value	Weight	Fishing Hours	Value	Weight	Fishing Hours	Value	Weight	Fishing Hours	Value	Weight
Areas combined	2007	4.4	4.0	3.6	42.9	50.5	57.8	-	-	-	11.0	12.9	10.7
Areas combined	2008	4.4	5.6	6.0	54.2	61.1	72.0	-	-	-	8.4	11.5	12.1
Areas combined	2009	3.3	5.3	5.5	61.2	63.8	54.3	22.5	22.0	27.1	7.7	13.5	11.5
Areas combined	2010	4.2	5.1	5.4	66.7	73.1	76.6	14.5	12.5	13.1	7.8	16.5	15.0
Areas combined	2011	2.0	4.5	3.5	81.3	85.9	83.5	14.8	13.4	13.7	9.8	17.4	17.7
Areas combined	2012	2.4	2.3	2.2	84.6	86.5	88.3	19.8	22.2	15.6	8.2	13.0	13.0
Areas combined	2013	4.4	5.3	5.3	89.6	80.6	64.3	15.8	12.4	8.2	7.8	12.0	12.8
Areas combined	2014	1.7	2.8	3.0	78.5	79.0	82.9	15.0	11.9	3.5	8.4	11.6	12.1
Areas combined	2015	3.5	7.1	4.7	49.4	27.9	32.2	12.1	6.9	5.8	9.4	14.4	14.1
Areas combined	2016	2.1	3.1	3.0	51.1	52.3	66.6	6.5	6.9	7.9	9.5	13.4	13.6
Areas combined	2017	2.6	4.5	4.9	31.6	25.6	34.7	9.8	3.1	1.2	8.3	14.0	15.6
Areas combined	2018	5.2	7.7	7.1	62.0	59.7	62.2	7.8	3.7	1.8	9.7	12.8	13.8
Areas combined	2019	4.4	7.5	5.9	48.4	60.0	59.4	4.6	1.5	0.4	8.8	15.9	15.6
Areas combined	2020	3.6	4.9	4.6	50.8	51.9	44.5	22.2	28.4	19.3	8.2	15.0	14.3
Areas combined	2021	3.6	3.9	3.7	43.1	41.5	30.0	50.9	42.0	33.2	7.2	11.7	11.0
Areas combined	2022	10.5	12.3	13.2	48.4	48.3	36.0	34.2	33.5	34.8	6.2	12.8	10.7

8.3.3 Per gear

Table 31 Fishing hours, value of landings and landed weight per gear in the proposed management zone Area 1 between 2007 and 2022, all countries combined. Passive gear were not included as the number of vessels was consistently very low. There was no shrimp trawl activity in Area 1.

Management Zone	Year	Beam Trawl			Otter Trawl			Seiners			Pulse Trawl		
		Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)	Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)	Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)	Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)
Area 1	2007	351.5	262.7	60.5	79.3	28.4	12.0	0	0	0	0	0	0
Area 1	2008	278.9	223.3	55.3	418.1	113.3	32.0	0	0	0	0	0	0
Area 1	2009	477.6	365.5	78.3	93.0	22.9	13.5	*	*	*	0	0	0
Area 1	2010	438.1	324.8	72.9	36.2	14.5	7.1	*	*	*	0	0	0
Area 1	2011	416.2	274.4	64.2	43.4	10.8	6.1	*	*	*	0	0	0
Area 1	2012	341.8	232.4	56.8	21.5	3.5	2.0	61.6	18.6	7.6	64.6	60.6	13.6
Area 1	2013	127.4	117.5	35.9	23.0	2.5	1.4	139.7	46.3	32.0	*	*	*
Area 1	2014	115.2	80.1	23.2	41.7	6.3	3.0	156.6	70.5	41.3	117.1	133.2	29.3
Area 1	2015	69.4	29.4	9.3	5.9	2.7	2.0	185.5	93.1	40.3	232.6	258.6	59.0
Area 1	2016	28.7	7.5	2.0	165.3	36.6	13.3	195.4	81.0	40.3	341.4	290.1	62.3
Area 1	2017	*	*	*	66.0	56.2	87.0	168.1	80.3	32.5	267.7	176.3	32.5
Area 1	2018	*	*	*	49.0	9.3	3.5	114.8	50.6	27.3	273.2	159.6	32.2
Area 1	2019	*	*	*	116.3	24.0	7.3	275.5	118.7	59.6	263.5	118.4	23.5
Area 1	2020	*	*	*	54.4	12.9	10.2	482.9	164.0	84.7	*	*	*
Area 1	2021	184.1	102.1	24.9	218.9	48.6	22.3	472.2	136.0	64.0	*	*	*
Area 1	2022	155.3	77.7	22.4	83.2	28.6	12.2	628.1	371.1	111.1	0	0	0

* < 5 vessels

Table 32 Fishing hours, value of landings and landed weight per gear in the proposed management zone Area 2 between 2007 and 2022, all countries combined. Shrimp trawl was not included as the activity was very limited.

Management Zone	Year	Beam Trawl			Otter Trawl			Passive			Seiners			Pulse Trawl		
		Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)	Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)	Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)	Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)	Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)
Area 2	2007	2345.2	1944.1	468.3	407.5	204.9	91.3	*	*	*	0	0	0	0	0	0
Area 2	2008	1813.6	1718.0	415.7	236.4	84.6	59.1	106.7	54.4	9.4	*	*	*	0	0	0
Area 2	2009	1586.8	2003.9	466.0	211.4	61.9	20.2	394.3	127.4	19.6	*	*	*	0	0	0
Area 2	2010	1695.2	2290.9	492.2	491.5	153.7	87.4	620.0	150.9	19.2	*	*	*	0	0	0
Area 2	2011	2071.0	2361.5	575.5	496.8	140.7	78.1	460.1	127.5	14.7	*	*	*	0	0	0
Area 2	2012	1440.9	1403.9	351.5	208.4	78.9	24.6	376.3	68.2	10.5	*	*	*	73.7	32.2	6.0
Area 2	2013	1346.4	1046.7	294.0	219.5	36.2	24.9	255.3	48.0	7.7	*	*	*	253.3	240.4	48.5
Area 2	2014	601.8	437.7	125.8	615.8	92.9	38.2	195.5	46.3	6.5	*	*	*	1283.0	1083.8	237.2
Area 2	2015	48.0	28.6	8.6	224.0	36.2	17.6	561.6	234.8	28.1	*	*	*	2079.6	1778.0	358.6
Area 2	2016	24.8	74.2	15.3	720.0	206.9	94.1	324.6	81.6	11.7	*	*	*	2438.6	2195.4	433.5
Area 2	2017	72.4	137.8	25.0	115.6	24.3	8.6	147.1	36.3	6.0	*	*	*	1626.5	1492.1	277.4
Area 2	2018	22.5	15.0	4.7	258.7	47.6	15.6	177.9	59.3	7.1	*	*	*	2101.0	1488.0	302.2
Area 2	2019	57.7	45.9	8.9	44.5	13.5	5.1	*	*	*	189.9	147.9	72.5	1826.6	1292.1	255.6
Area 2	2020	983.8	708.7	197.7	242.2	58.7	26.8	*	*	*	406.4	120.6	71.7	539.8	448.3	81.3
Area 2	2021	1267.1	755.3	168.5	267.5	68.3	32.1	236.9	50.8	6.9	422.8	203.0	89.9	*	*	*
Area 2	2022	977.6	612.9	177.7	296.0	64.7	41.8	269.0	82.3	12.1	410.4	301.9	95.0	0	0	0

* < 5 vessels

Table 33 Fishing hours, value of landings and landed weight per gear in the proposed management zone Area 3 between 2007 and 2022, all countries combined. Passive gear and seiners were not included as the number of vessels was consistently very low.

		Beam Trawl			Otter Trawl			Shrimp Trawl			Pulse Trawl		
Management Zone	Year	Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)	Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)	Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)	Fishing Hours	Value of landings (1000 euro)	Weight (tonnes)
Area 3	2007	985.7	195.0	41.5	24.9	1.4	0.6	644.5	33.9	8.0	0	0	0
Area 3	2008	1777.3	484.6	144.5	77.5	11.7	4.8	356.1	12.2	4.0	0	0	0
Area 3	2009	1496.7	292.7	108.4	157.7	15.5	8.7	312.8	21.8	8.3	0	0	0
Area 3	2010	689.7	140.0	54.7	237.7	27.2	12.7	920.0	193.0	75.9	0	0	0
Area 3	2011	1607.4	470.6	171.3	54.1	5.5	3.2	103.9	8.3	3.0	*	*	*
Area 3	2012	559.1	187.2	44.7	34.5	1.1	0.8	425.8	49.4	12.2	1165.3	467.6	105.5
Area 3	2013	140.3	50.8	23.0	27.0	2.6	1.4	948.0	106.1	25.5	1463.1	660.9	141.7
Area 3	2014	375.3	117.9	40.4	*	*	*	122.2	13.2	3.9	1278.8	445.8	122.5
Area 3	2015	193.7	39.8	10.1	23.5	1.1	0.5	194.9	12.4	3.4	1392.5	499.7	100.0
Area 3	2016	156.1	29.1	9.6	*	*	*	104.2	4.7	0.9	1547.9	577.9	118.7
Area 3	2017	254.2	43.3	16.6	0.0	0.0	0.0	165.3	6.8	1.2	986.1	313.9	65.4
Area 3	2018	158.4	17.7	6.9	*	*	*	1007.9	277.9	73.3	1233.7	297.8	69.6
Area 3	2019	140.9	13.8	4.7	*	*	*	510.1	80.5	25.5	854.5	177.5	41.2
Area 3	2020	376.5	59.7	18.5	32.6	2.4	1.4	322.1	41.6	11.0	180.4	33.1	10.0
Area 3	2021	624.0	70.4	25.3	*	*	*	637.9	85.3	32.9	451.6	60.5	24.5
Area 3	2022	661.6	56.0	19.7	*	*	*	2704.4	614.5	168.5	0	0	0

* < 5 vessels

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Table 34 Percent of effort, weight and value of landings per gear for proposed management Area 1 relative to totals in the BPNS between 2007 and 2022.

	Year	Beam Trawl			Otter Trawl			Passive			Seiners			Pulse Trawl		
		Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)
Area 1	2007	0.9	1.4	1.5	2.8	1.8	0.7	0	0	0	0	0	0	0	0	0
Area 1	2008	0.6	1.0	1.1	16.3	10.6	4.0	0	0	0	0	0	0	0	0	0
Area 1	2009	1.0	2.0	1.7	3.2	2.7	1.8	3.1	2.7	2.8	5.5	3.7	6.6	0	0	0
Area 1	2010	1.2	2.1	2.0	0.9	2.2	2.3	1.6	1.4	1.3	6.4	8.9	9.9	0	0	0
Area 1	2011	1.1	1.7	1.5	1.0	2.0	2.5	0.1	0.1	0.2	6.4	2.8	4.1	0	0	0
Area 1	2012	1.4	2.2	2.0	0.7	0.8	0.8	5.2	6.0	5.2	4.3	2.5	2.4	0	0	0
Area 1	2013	0.8	1.9	1.9	0.9	0.9	0.8	5.5	4.5	5.2	11.4	9.0	10.7	0	0	0
Area 1	2014	0.8	1.9	1.7	1.2	1.7	2.3	0.7	0.7	0.6	10.3	11.2	13.7	0	0	0
Area 1	2015	1.0	1.6	1.5	0.2	0.7	1.4	1.5	0.8	0.9	11.6	8.4	11.2	0.8	1.5	1.7
Area 1	2016	0.3	0.4	0.3	4.1	4.7	4.3	0.1	0.1	0.1	10.5	8.3	12.1	1.0	1.5	1.7
Area 1	2017	0.4	0.6	0.7	5.6	21.4	59.6	0	0	0	7.9	5.4	6.6	1.0	1.4	1.3
Area 1	2018	0.4	2.4	2.4	8.2	8.7	10.3	0.6	0.4	0.4	9.5	8.3	10.9	0.8	1.3	1.3
Area 1	2019	0.1	0.2	0.2	28.3	21.4	5.9	0	0	0	13.6	10.4	11.9	0.9	1.3	1.3
Area 1	2020	1.1	2.6	2.9	4.6	4.7	5.0	0	0	0	11.7	10.1	10.6	0.3	0.2	0.3
Area 1	2021	0.7	1.5	1.6	13.3	10.2	9.1	0	0	0	13.9	9.1	11.4	0.1	0.0	0.0
Area 1	2022	0.6	1.6	1.6	7.5	6.5	5.9	0	0	0	22.1	22.4	21.2	0	0	0

Table 35 Percent of effort, weight and value of landings per gear for proposed management Area 2 relative to totals in the BPNS between 2007 and 2022. There was no shrimp trawl activity in Area 1.

		Beam Trawl			Otter Trawl			Passive			Seiners			Pulse Trawl		
	Year	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)
Area 2	2007	6.3	10.5	11.7	14.2	12.8	5.2	7.8	11.5	11.2	0	0	0	0	0	0
Area 2	2008	3.7	8.0	8.2	9.2	7.9	7.4	14.1	20.4	27.8	2.7	2.0	2.6	0	0	0
Area 2	2009	3.3	11.0	10.1	7.4	7.4	2.7	18.1	16.2	17.9	1.1	0.9	0.5	0	0	0
Area 2	2010	4.7	15.1	13.8	12.4	23.3	28.4	11.1	9.4	9.7	1.4	1.7	1.1	0	0	0
Area 2	2011	5.3	14.6	13.5	11.7	26.8	31.3	14.1	17.4	14.9	1.4	1.0	1.4	0	0	0
Area 2	2012	5.8	13.2	12.4	6.6	17.4	10.2	14.2	14.2	12.9	2.4	1.5	1.6	0.5	0.5	0.4
Area 2	2013	8.7	16.7	15.8	8.7	13.2	14.7	10.7	11.6	11.4	0.7	0.5	0.5	1.1	2.2	2.1
Area 2	2014	4.1	10.3	9.2	18.1	25.6	29.2	16.9	18.7	18.5	4.3	4.1	4.1	4.8	7.3	7.2
Area 2	2015	0.7	1.6	1.4	7.7	9.9	12.4	28.9	39.1	37.1	7.2	7.2	9.6	6.8	10.6	10.5
Area 2	2016	0.3	3.5	2.2	17.7	26.4	30.5	16.9	18.5	20.0	5.3	8.6	7.5	7.5	11.6	11.8
Area 2	2017	1.1	9.9	6.8	9.8	9.3	5.9	8.5	7.3	7.7	5.0	6.2	5.8	5.9	11.8	11.4
Area 2	2018	0.4	1.3	1.3	43.2	44.8	45.7	19.2	20.4	17.0	11.0	14.8	16.1	6.5	12.2	12.2
Area 2	2019	0.6	3.2	2.1	10.8	12.0	4.1	15.5	23.6	18.0	9.4	12.9	14.5	6.6	14.1	14.1
Area 2	2020	5.6	14.3	13.8	20.5	21.2	13.1	15.7	10.9	11.2	9.8	7.4	9.0	5.6	13.4	11.7
Area 2	2021	4.7	11.4	10.5	16.3	14.4	13.1	24.1	21.9	18.3	12.5	13.5	16.0	0.9	1.0	0.7
Area 2	2022	4.0	12.7	12.6	26.7	14.7	20.2	26.7	33.6	34.2	14.5	18.2	18.1	0	0	0

Table 36 Percent of effort, weight and value of landings per gear for proposed management Area 3 relative to totals in the BPNS between 2007 and 2022.

	Year	Beam Trawl			Otter Trawl			Passive			Seiners			Shrimp Trawl			Pulse Trawl		
		Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)
Area 3	2007	2.7	1.1	1.0	0.9	0.1	0.0	0	0	0	~	~	~	4.7	2.9	2.9	0	0	0
Area 3	2008	3.7	2.3	2.9	3.0	1.1	0.6	0	0	0	0.9	0.0	0.0	2.8	0.9	1.0	0	0	0
Area 3	2009	3.1	1.6	2.4	5.5	1.9	1.2	0	0	0	0.2	0.1	0.1	1.8	1.0	1.0	0	0	0
Area 3	2010	1.9	0.9	1.5	6.0	4.1	4.1	0.0	0.0	0.0	0.3	0.2	0.2	4.0	3.9	4.1	0	0	0
Area 3	2011	4.1	2.9	4.0	1.3	1.0	1.3	0.1	0.2	0.3	0.4	0.4	0.7	0.7	0.4	0.4	1.6	1.1	1.6
Area 3	2012	2.2	1.8	1.6	1.1	0.2	0.3	0	0	0	1.1	1.2	1.8	1.9	1.5	1.4	7.8	6.8	7.5
Area 3	2013	0.9	0.8	1.2	1.1	1.0	0.8	0	0	0	0.8	0.6	0.5	3.3	2.7	2.4	6.6	6.1	6.3
Area 3	2014	2.5	2.8	3.0	0.0	0.0	0.0	0	0	0	0	0	0	0.6	0.3	0.3	4.8	3.0	3.7
Area 3	2015	2.7	2.2	1.7	0.8	0.3	0.4	1.0	0.6	0.8	0.5	0.3	0.4	1.0	0.5	0.5	4.6	3.0	2.9
Area 3	2016	1.8	1.4	1.4	0.2	0.4	0.1	4.3	3.5	3.8	0.8	1.7	1.8	0.4	0.1	0.1	4.8	3.1	3.2
Area 3	2017	3.9	3.1	4.5	0	0	0	2.8	2.5	2.4	0.1	0.0	0.0	0.8	0.2	0.2	3.6	2.5	2.7
Area 3	2018	2.5	1.5	1.8	0.3	0.0	0.0	1.9	1.2	2.1	0	0	0	4.8	4.4	5.1	3.8	2.4	2.8
Area 3	2019	1.4	1.0	1.1	1.5	0.3	0.1	3.3	2.0	2.4	0.4	0.4	0.3	3.2	3.6	3.0	3.1	1.9	2.3
Area 3	2020	2.1	1.2	1.3	2.8	0.9	0.7	6.3	7.8	6.0	0.5	0.3	0.4	1.9	1.8	1.2	1.9	1.0	1.4
Area 3	2021	2.3	1.1	1.6	0.1	0.0	0.0	2.2	1.5	1.8	0.4	0.3	0.2	2.3	2.0	2.1	6.8	5.8	8.6
Area 3	2022	2.7	1.2	1.4	0.4	0.4	0.1	1.3	0.7	0.9	0.4	0.1	0.2	6.5	7.6	6.3	0	0	0

~ Very limited activity in the BPNS

Table 37 Percent of effort, weight and value of landings per gear for all proposed management areas combined relative to totals in the BPNS between 2007 and 2022.

	Year	Beam Trawl			Otter Trawl			Passive			Seiners			Shrimp Trawl			Pulse Trawl		
		Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)	Fishing Hours (%)	Value (%)	Weight (%)
Area 1 + 2 + 3	2007	9.9	13.0	14.2	17.8	14.7	5.9	7.8	11.5	11.2	~	~	~	4.7	2.9	2.9	0	0	0
Area 1 + 2 + 3	2008	8.0	11.3	12.2	28.5	19.5	11.9	14.1	20.4	27.8	3.7	2.0	2.6	2.8	0.9	1.0	0	0	0
Area 1 + 2 + 3	2009	7.4	14.6	14.2	16.1	12.0	5.7	21.2	18.9	20.7	6.7	4.7	7.2	1.8	1.0	1.0	0	0	0
Area 1 + 2 + 3	2010	7.8	18.1	17.4	19.3	29.6	34.8	12.8	10.7	11.0	8.1	10.9	11.2	4.0	3.9	4.1	0	0	0
Area 1 + 2 + 3	2011	10.4	19.2	19.1	14.0	29.9	35.1	14.3	17.7	15.4	8.3	4.2	6.2	0.7	0.4	0.4	1.6	1.1	1.6
Area 1 + 2 + 3	2012	9.4	17.2	16.0	8.4	18.4	11.3	19.4	20.2	18.1	7.8	5.2	5.9	1.9	1.5	1.4	8.7	8.2	8.9
Area 1 + 2 + 3	2013	10.4	19.4	18.9	10.7	15.0	16.3	16.3	16.1	16.5	12.9	10.0	11.7	3.3	2.7	2.4	7.8	8.7	8.7
Area 1 + 2 + 3	2014	7.4	14.9	13.9	19.4	27.4	31.6	17.6	19.4	19.0	14.7	15.3	17.8	0.6	0.3	0.3	10.0	11.2	11.9
Area 1 + 2 + 3	2015	4.3	5.3	4.7	8.7	10.9	14.2	31.4	40.5	38.8	19.3	15.9	21.1	1.0	0.5	0.5	12.2	15.1	15.2
Area 1 + 2 + 3	2016	2.4	5.2	3.9	22.1	31.5	34.9	21.4	22.0	23.9	16.6	18.6	21.5	0.4	0.1	0.1	13.3	16.2	16.7
Area 1 + 2 + 3	2017	5.4	13.6	12.1	15.4	30.7	65.5	11.2	9.7	10.1	12.9	11.6	12.5	0.8	0.2	0.2	10.5	15.7	15.4
Area 1 + 2 + 3	2018	3.3	5.1	5.5	51.7	53.6	55.9	21.7	22.1	19.5	20.5	23.1	27.0	4.8	4.4	5.1	11.1	15.9	16.3
Area 1 + 2 + 3	2019	2.0	4.4	3.3	40.6	33.8	10.1	18.7	25.6	20.4	23.4	23.7	26.7	3.2	3.6	3.0	10.6	17.3	17.6
Area 1 + 2 + 3	2020	8.8	18.1	18.0	27.9	26.8	18.8	22.0	18.7	17.2	22.0	17.8	20.0	1.9	1.8	1.2	7.7	14.5	13.5
Area 1 + 2 + 3	2021	7.7	14.0	13.6	29.6	24.6	22.2	26.3	23.4	20.1	26.8	22.9	27.6	2.3	2.0	2.1	7.7	6.9	9.3
Area 1 + 2 + 3	2022	7.4	15.4	15.5	34.6	21.6	26.2	28.0	34.3	35.1	37.0	40.7	39.5	6.5	7.6	6.3	0	0	0

~ Very limited activity in the BPNS

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Table 38 Average percent per gear group of fishing effort, value of landings and landed weight in the proposed management areas relative to the BPNS (2018−2022).

		Area 1	Area 2	Area 3	Area 1+2+3
Beam Trawl	Fishing Hours	0.7	3.9	2.3	6.8
	Value	1.8	11.2	1.1	14.2
	Weight	1.9	10.6	1.4	13.9
Otter Trawl	Fishing Hours	10.5	22.4	0.9	33.9
	Value	8.8	17.9	0.3	27
	Weight	6.8	14.9	0.2	21.9
Passive	Fishing Hours	0.1	20.7	2.8	23.7
	Value	0.1	22.6	2.4	25.1
	Weight	0.1	19.7	2.6	22.4
Seiners	Fishing Hours	14.5	11.5	0.4	26.4
	Value	12.9	13.2	0.2	26.3
	Weight	13.2	14	0.2	27.4
Shrimp Trawl	Fishing Hours	0	0	4.2	4.2
	Value	0	0	4.7	4.7
	Weight	0	0	4.2	4.2
Pulse Trawl	Fishing Hours	0.7	5.9	3.5	10.2
	Value	1.1	12.6	2.2	15.9
	Weight	1.1	12.2	2.8	16

Table 39 Average percent of fishing effort, value of landings and landed weight in the proposed management areas relative to the BPNS for beam trawls with a vessel length up to 24 m and more than 24 m (2007− 2022).

			Area 1	Area 2	Area 3	Area 1+2+3
Beam Trawl	0-24 m	Fishing Hours	0.03	0.25	3.91	4.19
		Value	0.03	0.29	4.89	5.21
		Weight	0.03	0.22	5.14	5.38
Beam Trawl	>24 m	Fishing Hours	2.02	10.1	1.14	13.26
		Value	2.36	16.21	0.35	18.92
		Weight	2.5	16.93	0.52	19.96

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Limitation of liability: