

# A quantification of bottom towed fishing activity in marine Natura 2000 sites

To effectively protect benthic MPAs against the impact of destructive fishing, especially bottom trawling.

A report by The Marine Conservation Society



# Headline figures



**4.4 million hours of bottom towed fishing** were recorded within marine Natura 2000 sites in MPA Project partners<sup>1</sup> waters under the Habitats Directive since 2015 (or since designation where sites are newer).

**90% offshore** marine Natura 2000 sites designated under the Habitats Directive in MPA Project partners waters have experienced bottom towed fishing since 2015 (or since designation where sites are newer).

## Between 2015 and 2023:



**Danish** marine Natura 2000 sites experienced over **650,000 hours** of bottom towed fishing.



**German** marine Natura 2000 sites experienced over **730,000 hours** of bottom towed fishing.



**Irish** marine Natura 2000 sites experienced over **19,000 hours** of bottom towed fishing.



**Dutch** marine Natura 2000 sites experienced over **2.1 million hours** of bottom towed fishing.



**Portuguese** marine Natura 2000 sites experienced over **150,000 hours** of bottom towed fishing.



**Spanish** marine Natura 2000 sites experienced over **460,000 hours** of bottom towed fishing.



**Swedish** marine Natura 2000 sites experienced over **180,000 hours** of bottom towed fishing.

1. 'From paper parks to effective protection,' (MPA Project partners) is a project bringing together NGOs from across the EU to fight for marine areas that are protected in practice, not just on paper. The project focuses on Marine Protected Areas (MPAs) at both EU and national level in Denmark, France, Germany, Ireland, the Netherlands, Portugal, Spain, and Sweden. Marine Protected Areas - From paper parks to effective protection - Seas At Risk ([seas-at-risk.org](https://seas-at-risk.org))



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# Introduction

**There are over 2100 marine Natura 2000 sites designated across Europe’s seas under the EU Habitats Directive (Figure 1). Member States have designated such sites to protect and recover both important marine habitats such as reefs and sandbanks and a range of iconic species including the bottlenose dolphin (*Tursiops truncatus*), harbour porpoise (*Phocoena phocoena*) and grey and common seal (*Halichoerus grypus* and *Phoca vitulina*).**

Whilst on paper, this network of Marine Protected Areas (MPAs) seems both extensive and comprehensive, very few sites actually have the management plans or measures needed to offer real protection to the habitats and species that not only desperately need it, but that Member States have a legal responsibility to provide. As many of these sites lack sufficient management, they fail to prevent harmful human activities such as bottom towed fishing methods like bottom trawling and dredging from taking place within them. Bottom trawling and dredging are fishing methods that involve one or more boats pulling weighted fishing nets along the ocean floor in an effort to catch fish and other marine species like shrimp. Bottom trawling is the widest source of physical disturbance to seabed habitats worldwide and has been found to cause significant changes in the composition of benthic ecosystems (Hiddink et al., 2017; Kaiser et al., 2006). This is not only to the detriment of the marine wildlife and habitats, but also to the people who rely upon them for income, leisure, health, and coastal protection. It is therefore paramount that these sites be closed to bottom towed fishing activity in accordance with a whole-site approach to protect the diverse and important habitats and species the sites have been designated to protect (Solandt et al., 2019).

In February 2023, the European Commission announced its EU Action Plan on ‘Protecting and restoring marine ecosystems for sustainable and resilient fisheries’ (EC, 2023a). Among other measures, the plan calls upon Member States to “phase out mobile bottom fishing in all MPAs by 2030 at the latest” starting by “[prohibiting] mobile bottom fishing in the MPAs that are Natura 2000 sites designated under the Habitats Directive that protect the seabed and marine species”. This ambitious call to action aims to encourage countries to comply with the existing environmental binding legislation to secure the protection of sites designated under the Habitats Directive from bottom towed fishing gears; this report finds to be widely used in European seas.

Using fishing effort data from the Global Fishing Watch (GFW) database<sup>2</sup>, this report quantifies the extent to which bottom towed fishing gear has been used within marine Natura 2000 sites designated under the Habitats Directive over the past nine years in MPA Project partners countries: Denmark, Germany, Ireland, Netherlands, Portugal, Spain, and Sweden. The GFW database is an internationally recognised tool, based on satellite vessel tracking data and other sources which is used by various governments (e.g. Norway, Indonesia, Brazil) to assess fishing activity inside and outside protected areas at sea.




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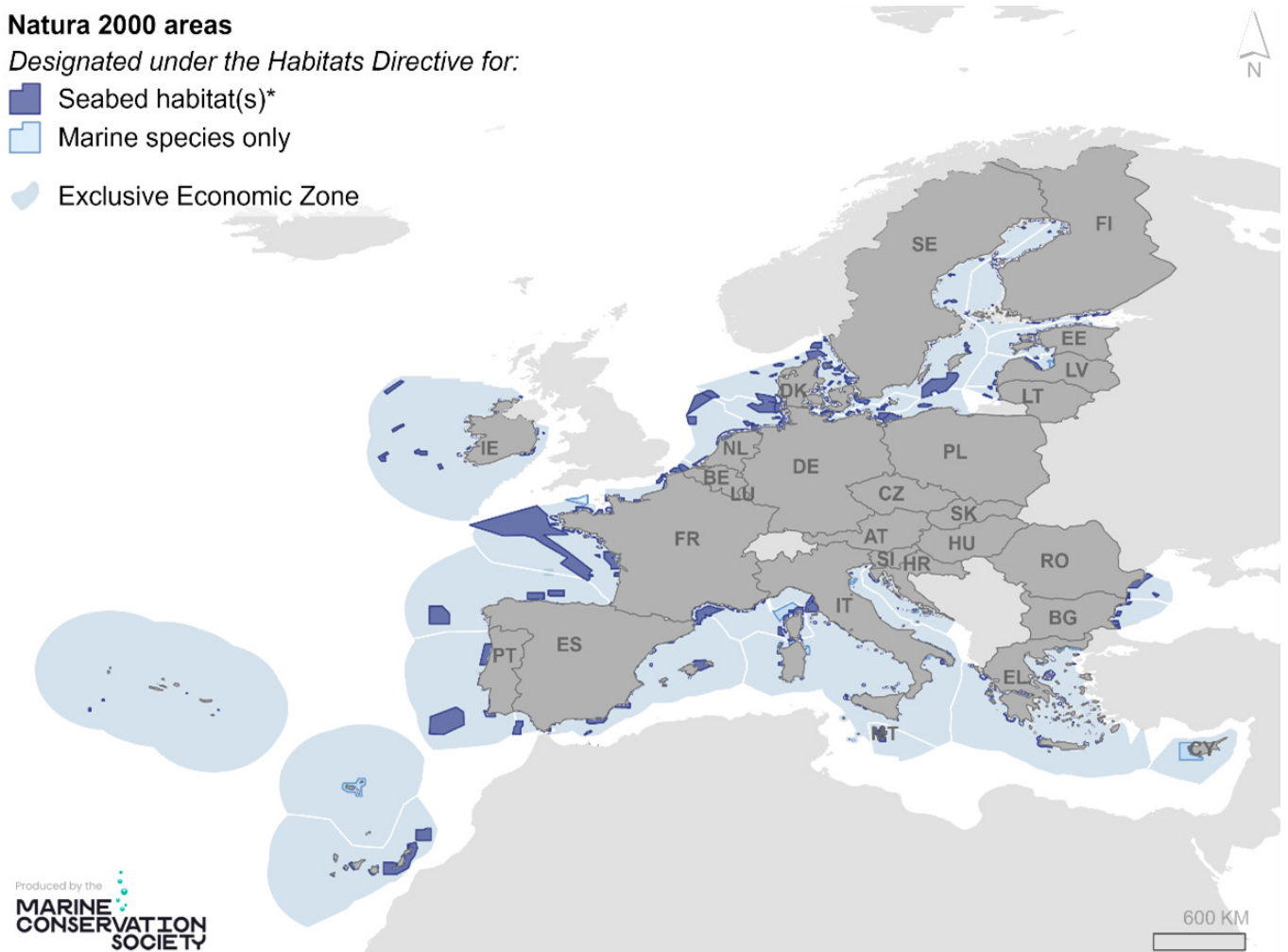
2. A publicly available spatial database of worldwide fishing effort: <https://globalfishingwatch.org/>



## Natura 2000 areas

Designated under the Habitats Directive for:

-  Seabed habitat(s)\*
-  Marine species only
-  Exclusive Economic Zone



Contains European Environment Agency (2021) data. Contains European Commission – Eurostat/GISCO data (2021). Contains EEZ boundary data from Flanders Marine Institute [2019]. Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <https://www.marineregions.org/>. <https://doi.org/10.14284/386>. Contains Global Fishing Watch data [2023].

Figure 1 Marine Natura 2000 sites across the EU, designated under the Habitats Directive for seabed habitats and marine species.

# Methodology

Global Fishing Watch (GFW) fishing effort data were used to quantify total fishing hours (hours/km<sup>2</sup>) and fishing rates within marine Natura 2000 sites<sup>3</sup> designated under the Habitats Directive for the seven MPA Project partners countries.

GFW processes vessel tracking data collected from onboard Automatic Identification Systems (AIS) using “convolutional neural networks” to extract only “apparent” fishing activity (data excludes steaming activity) and vessel characteristics (e.g. fishing gear in use) (Kroodsma et al., 2018). Apparent fishing effort (henceforth referred to as “fishing effort”) data covering the period 1st January 2015 – 30th June 2023 for each MPA partner country EEZ were downloaded from the GFW database<sup>4</sup> on 25th August 2023 using R version 4.3.1. A data update for the period 1st July 2023 – 31st December 2023 was later downloaded on 1st February 2024. Data were filtered to extract vessels categorised by GFW as using trawl, dredge, and demersal seine nets (0.01 dd resolution) for the period 1st January 2015 to 30th December 2023. Pre-2015 data was omitted from analysis as there was no legal obligation to use AIS equipment on EU vessels ( $\geq 15$  meters) prior to 2015. Furthermore, due to there being no legal obligation for vessels smaller than 15 meters in length to have AIS equipment installed on board, this does mean that small vessels are underrepresented in the fishing effort data. As a result, the fishing hours presented in this report is likely to underestimate the true level of fishing taking place within the Natura 2000 sites, particularly those located close to shore.

Prior to mapping, data were cross-referenced with the EU Fleet Register (EC, 2023b), and UK vessel register post Brexit to identify the activity attributed specifically to vessels registered using demersal towed gear as their *main gear*. This ensured that any activity attributed to vessels registered using pelagic towed gear as their main gear could be excluded from analysis<sup>5</sup>. Due to this step in the data processing, any vessels not listed in EU or UK vessel registries were

also removed. Therefore, the activity presented in this report is from EU and UK vessels. Finally, all vessels identified in the GFW database as ‘Guard’ vessels (i.e. vessels employed to patrol marine areas undergoing development to prevent fishing activity) were removed from the data. The fishing effort (in total hours per km<sup>2</sup>) from the remaining vessels was then split by country fleet before an overlay analysis was conducted using the boundary data of all marine Natura 2000 site designated under the Habitats Directive (EEA, 2022) to determine total fishing hours by each fleet within every site for each year between 2015 and 2023 (January 2015 to December 2023). Any activity that was recorded prior to a site being designated was not included in the total fishing hours. The fishing effort data were also used to determine an approximate total bottom towed fishing footprint by area (km<sup>2</sup>) for each country’s marine Natura 2000 sites designated under the Habitats Directive. This analysis of fishing extent is likely to overestimate the true fishing footprint in some areas as the fishing data are in a resolution much coarser than the total swept area for each vessel (Amoroso et al., 2018).

All data processes were conducted using Python version 3.12.0, and Excel (Version 2309) and spatial analysis was completed using ArcPro 2.9.5.

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**This analysis of fishing extent is likely to overestimate the true fishing footprint in some areas as the fishing data is in a resolution much coarser than the total swept area for each vessel**

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3. Sites were included if they were marked as ‘marine’ in the European Environment Agency Natura 2000 site dataset: <https://www.eea.europa.eu/data-and-maps/data/natura-14/natura-2000-spatial-data-sites> were excluded on the advice of MPA Project partners (e.g. if marine habitat features were not present)

4. Global Fishing Watch. [2024]. Accessed on [25th August 2023 and 1st February 2024]. <https://globalfishingwatch.org/>

5. Vessels with a subsidiary pelagic gear were included in the data.

## A note on GFW data usage

Fishing activity data derived from AIS were used in preference to Vessel Monitoring System (VMS) data as the spatial coverage of the AIS data was more spatially consistent across all partners' waters compared to VMS. This is due to limitations in the availability of VMS data in each partner's jurisdiction, while the GFW database is publicly available and covers fishing activity across the globe. Despite VMS having better representation of smaller vessels, because it is required on all fishing vessels >12 meters in length, using the AIS data allowed for comparisons to be made between partner countries. Consequently, the results presented here are not directly comparable to other reports and data sources<sup>6</sup> where measures of activity have been derived from VMS data. This is due to differences in the way VMS data are transmitted (i.e. with a less frequent 'ping' rate) and the type of vessels that are required to use it. The results presented in this report therefore come with the following caveats:

- ▶ All fishing activity recorded in the GFW data is derived using a series of algorithms and therefore only represents 'apparent' fishing activity.
- ▶ Vessels smaller than 15 meters length fishing in EU waters are underrepresented as smaller vessels are not required by law to use AIS on board. This means inshore coverage of the data may underestimate true fishing activity.
- ▶ Whilst it is a legal requirement for vessels over 15 meters length fishing in EU waters to use AIS, the equipment can be switched off, resulting in the vessels 'going dark' in the data.

The fishing data are available in a minimum resolution of 0.01 decimal degree – this equates to approximately 1 km<sup>2</sup>. Fishing activity recorded in MPAs smaller than this resolution may therefore be overestimated.

GFW also note that the number of satellites and quantity of data available on GFW has changed from year to year and this report should be considered a snapshot of visible, apparent fishing activity at the time of this report. An increase in visible apparent fishing, especially for 2015-2017, may not be an increase in apparent fishing activity.

6. E.g. DTU Aqua's online tool: <https://ono.dtuqua.dk/DDFAM/> or the CRANIMPACT report (<https://www.thuenen.de/en/institutes/sea-fisheries/projects/impact-of-brown-shrimp-fishery-on-benthic-habitats-cranimpact>)



# Cross-partner comparison

This analysis investigated bottom towed fishing activity in 1061 marine Natura 2000 sites designated under the Habitats Directive in the waters covered by the seven MPA Project partner organisations: Denmark, Germany, Ireland, Netherlands, Portugal, Spain, and Sweden (Table 1). A total of 4.4 million fishing hours by vessels using bottom towed gear were recorded within 252 of these sites between January 2015 and December 2023 (Figure 2). Ninety percent offshore Natura 2000 sites designated in MPA Project partners waters have experienced bottom towed fishing since since 2015 (or since designation where sites are newer). Furthermore, approximately 38% of the area protected in the MPA Project partner countries experienced bottom towed fishing activity between 2015 and 2023.

Overall, the Netherlands had the highest number of bottom towed fishing hours recorded within its marine Natura 2000 sites between 2015 and 2023 followed by Germany, Denmark, and Spain (Figures 3 and 4). The Netherlands also had the greatest fished proportion of ‘protected’ seabed (Figure 5).

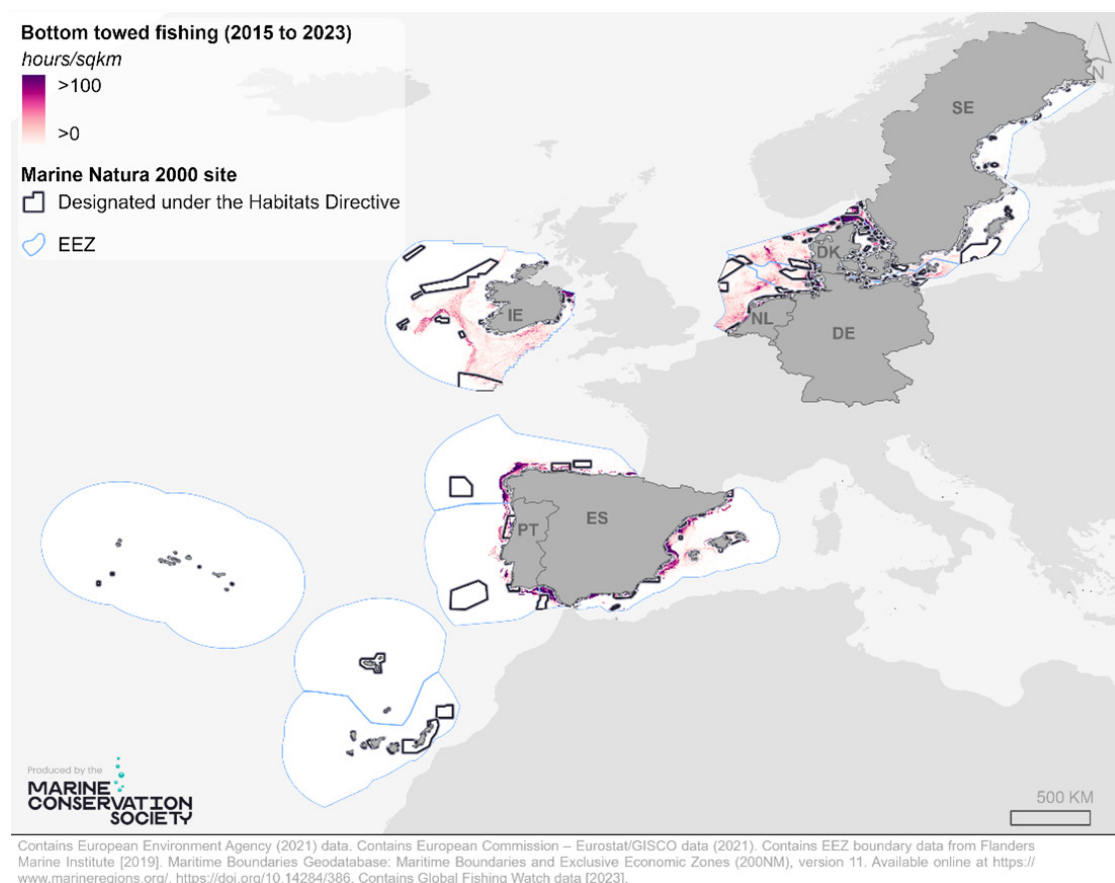


Figure 2 Cumulative bottom towed fishing activity in MPA Project partners waters between January 2015 and December 2023.

<b>Habitats Directive sites</b> (seabed habitats and marine species)					
<b>Country</b>	<b>Inshore (&lt;12 nm)</b>	<b>Offshore (&gt;12 nm)</b>	<b>Total</b>	<b>% Inshore</b>	<b>% Offshore</b>
DEU	67	7	74	91%	9%
DNK	83	10	93	89%	11%
ESP	163	10	173	94%	6%
IRL	135	9	144	94%	6%
NLD	8	2	10	80%	20%
PRT	30	3	33	91%	9%
SWE	523	11	534	98%	2%
<b>Total</b>	<b>1009</b>	<b>52</b>	<b>1061</b>	<b>95%</b>	<b>5%</b>

*Table 1 Number of inshore and offshore marine Natura 2000 areas designated under the Habitats Directive across the MPA Project partner countries (correct as of 31st of March 2024).*

Sites were included if they were marked as ‘marine’ in the European Environment Agency Natura 2000 site dataset<sup>7</sup>, but excluded where partners advised that marine habitat features were not present.

7. <https://www.eea.europa.eu/data-and-maps/data/natura-14/natura-2000-spatial-data>

**Total bottom towed fishing hours recorded within Natura 2000 sites (Habitats Directive) between 2015-2023**

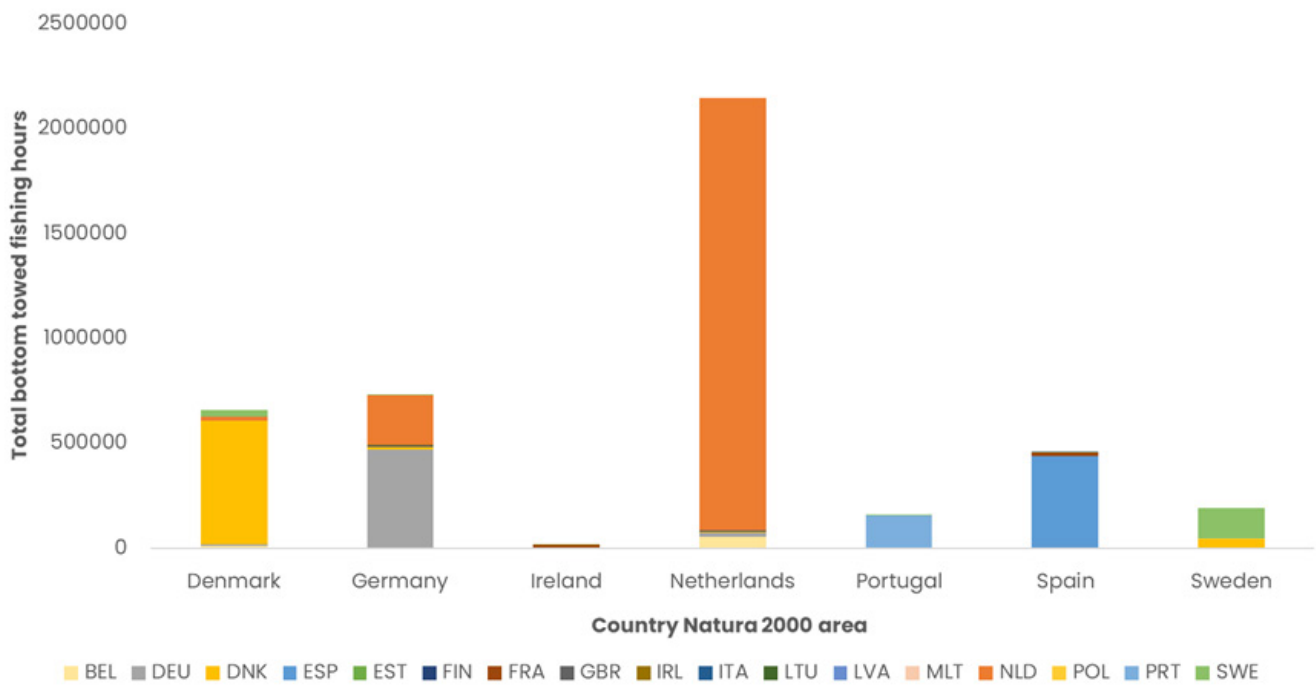


Figure 3 Total bottom towed fishing hours recorded within marine Natura 2000 sites designated under the Habitats Directive between 2015-2023.

**Total fishing hours in Marine Natura 2000 Areas - Partner country % breakdown**

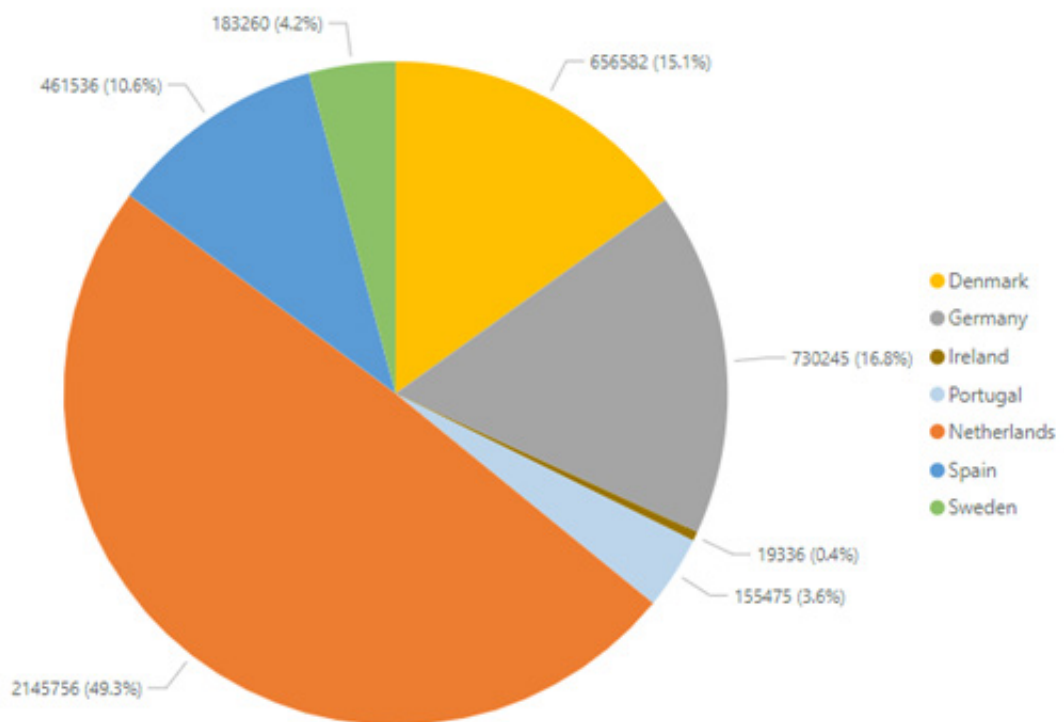


Figure 4 Total bottom towed fishing hours within marine Natura 2000 sites in the waters of the countries listed in the legend (MPA Project Partners) designated under the Habitats Directive (top/middle).



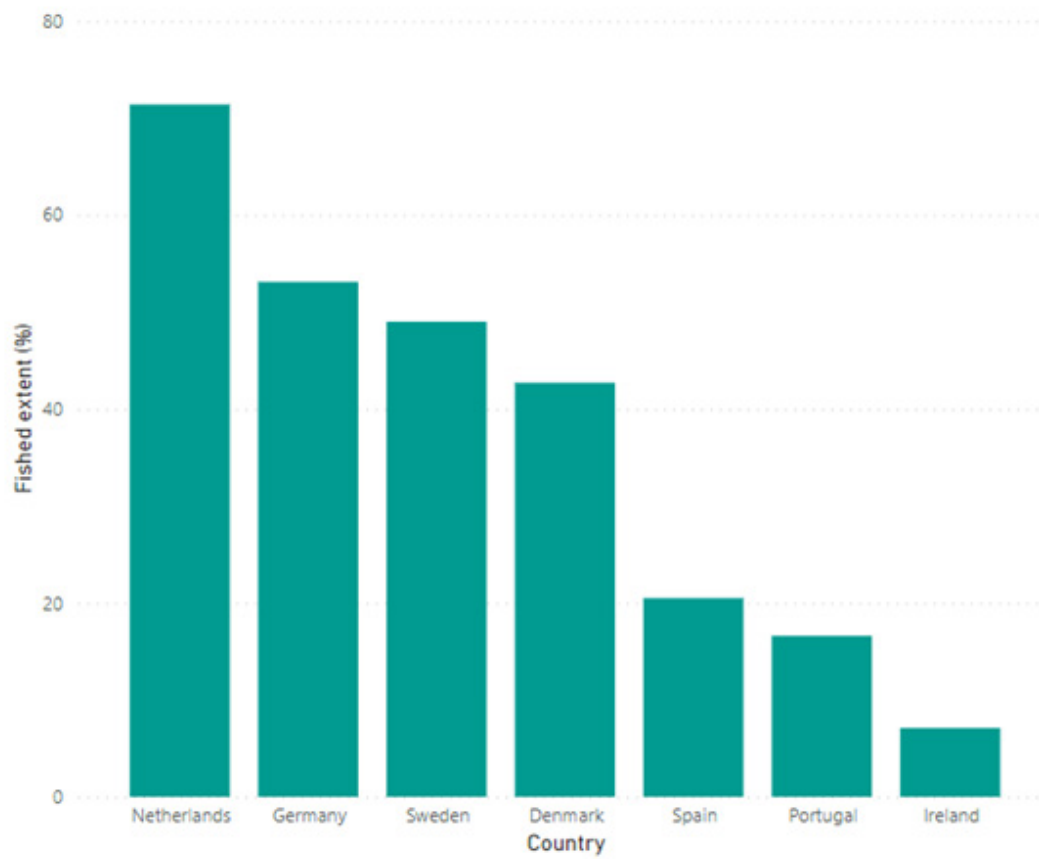


Figure 5 Approximate total fished extent as a percentage of total protected area (bottom).



## Denmark

Denmark has 93 marine Natura 2000 sites designated under the Habitats Directive (Figure 6). Between January 2015 and December 2023, vessels fished in marine **Natura 2000 sites designated under the Habitats Directive for 656,582** hours using bottom towed gears (Figure 7) some of which was recorded within Natura 2000 sites that are currently involved in the joint recommendation process under the EU common fisheries policy or have plans to become strictly protected areas across the whole or part of the site (Figure 8). Fishing effort is concentrated to the north and west of the Danish coast (Figure 6) and can predominantly be attributed to the Danish fleet (90% of total hours) with the Dutch, Swedish, Belgian, and German fleets responsible for the remaining 10% of fishing hours. Between 2015 and 2023, Danish marine Natura 2000 sites designated under the Habitats Directive were fished at an average rate of 4 hours/km<sup>2</sup>/year with bottom towed fishing hours (Figure 7) and rate (Figure 7c) remaining largely consistent between 2015 and 2023, and peaking slightly in 2018 with a fishing rate of 5 hours/km<sup>2</sup>.

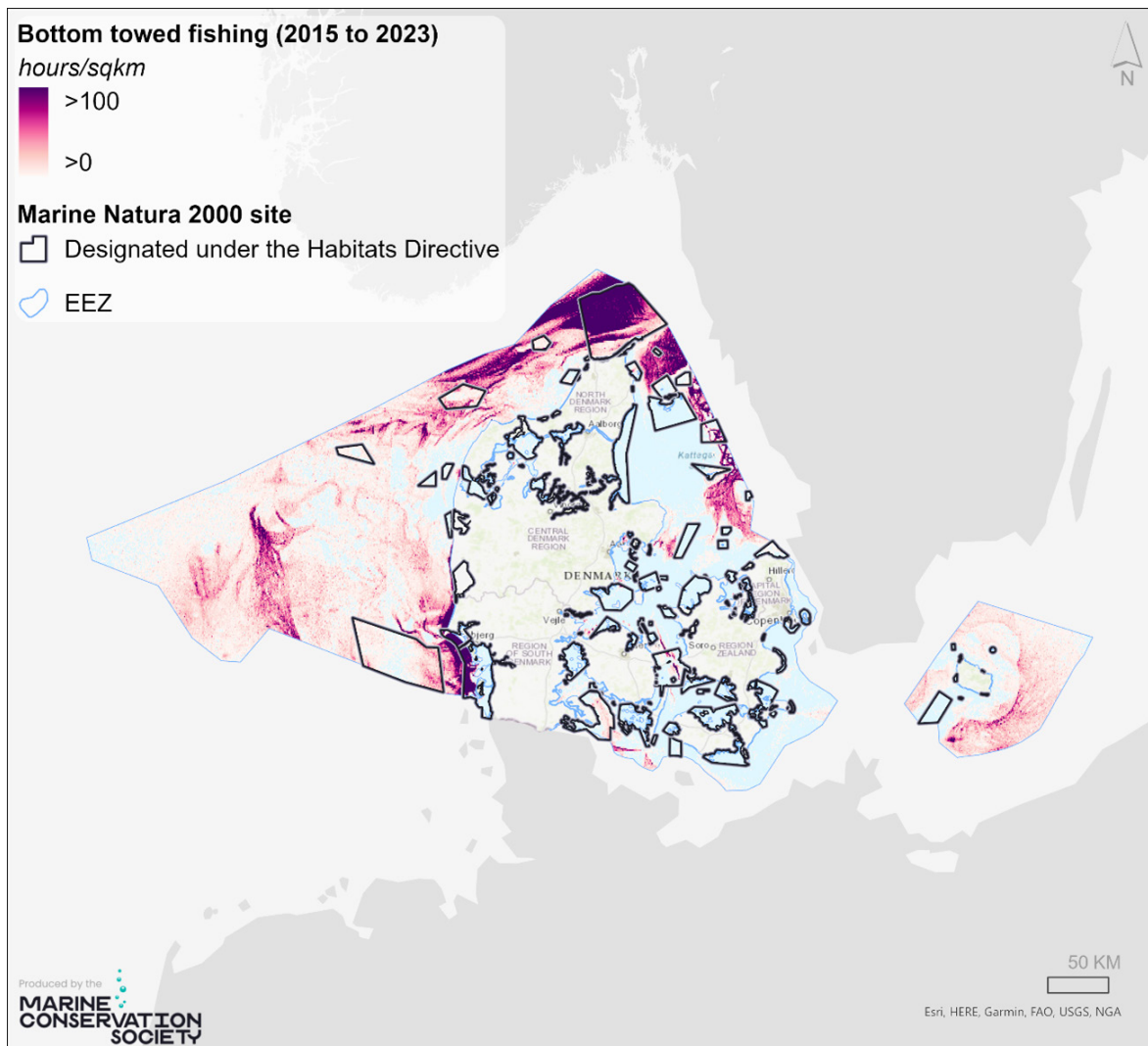
Between 2015 and 2023, Skagens Gren og Skagerak SAC (Site code: DK00FX112)<sup>8</sup>, a site designated on

the northern coast of Jutland in 1998, experienced the highest number of bottom towed fishing hours (Figures 8 and 9). **The site is designated for reefs (1170), sandbanks which are slightly covered by sea water all the time (1110), as well as harbour porpoise (*Phocoena phocoena*).** The fishing recorded within the site can predominantly be attributed to the Danish (93% of activity) and Swedish fleets (6% of activity) with German and Dutch fleets contributing the remaining 1% of activity. Together these fleets fished the site for a total of 426,828 hours between 2015 and 2023 (Figure 8), however this value could be higher due to the known presence of smaller Danish seine vessels nearer the coast not captured by the data.

**Bottom towed fishing activity overlapped with up to 7600km<sup>2</sup> of Danish seabed protected under the Habitats Directive (43% of the total area covered by marine Natura 2000 sites) between 2015 and 2023.** As with total fishing hours, Skagens Gren og Skagerak SAC had the largest spatial overlap with the fishing footprint **with bottom towed gear being used across 2600 km<sup>2</sup>** of the site; equivalent to approximately 98% of its area (Figure 10).

8. Including Habitats Directive Annex I 'Open Sea and tidal areas' habitats.

9. <https://eunis.eea.europa.eu/sites/DK00FX113>



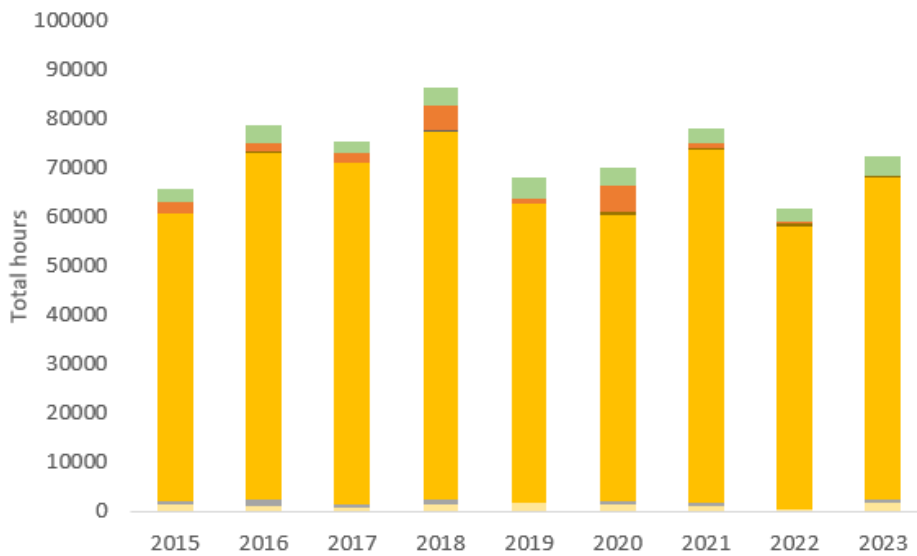
Contains European Environment Agency (2021) data. Contains European Commission – Eurostat/GISCO data (2021). Contains EEZ boundary data from Flanders Marine Institute [2019]. Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <https://www.marineregions.org/>. <https://doi.org/10.14284/386>. Contains Global Fishing Watch data [2023].

Figure 6 Cumulative bottom towed fishing activity in Danish waters between January 2015 and December 2023

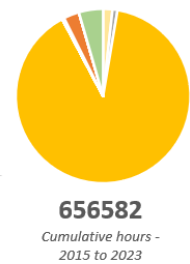


**A**

**Total bottom towed fishing hours within all Natura 2000 Sites designated under the Habitats Directive**



**B**



**C**

**Bottom towed fishing rate within all Natura 2000 Sites designated under the Habitats Directive**

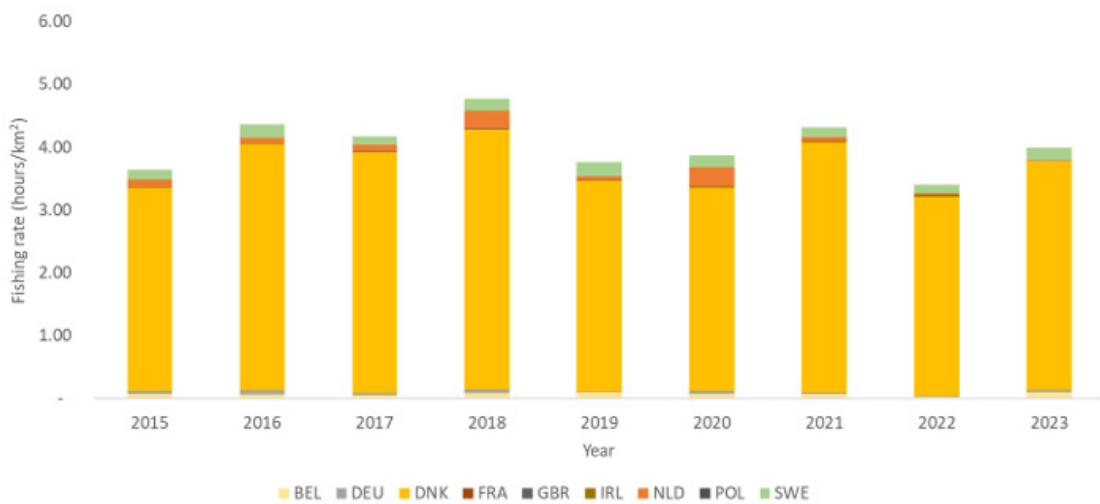


Figure 7 Total bottom towed fishing hours within all Danish marine Natura 2000 sites designated under the Habitats Directive by fleet [A]. Fleet composition of cumulative hours recorded between 2015 and 2023 within all Danish marine Natura 2000 sites designated under the Habitats Directive [B]. Bottom towed fishing rate within all Danish marine Natura 2000 Sites designated under the Habitats Directive by fleet [C].

# Top Natura 2000 sites: Bottom towed fishing hours

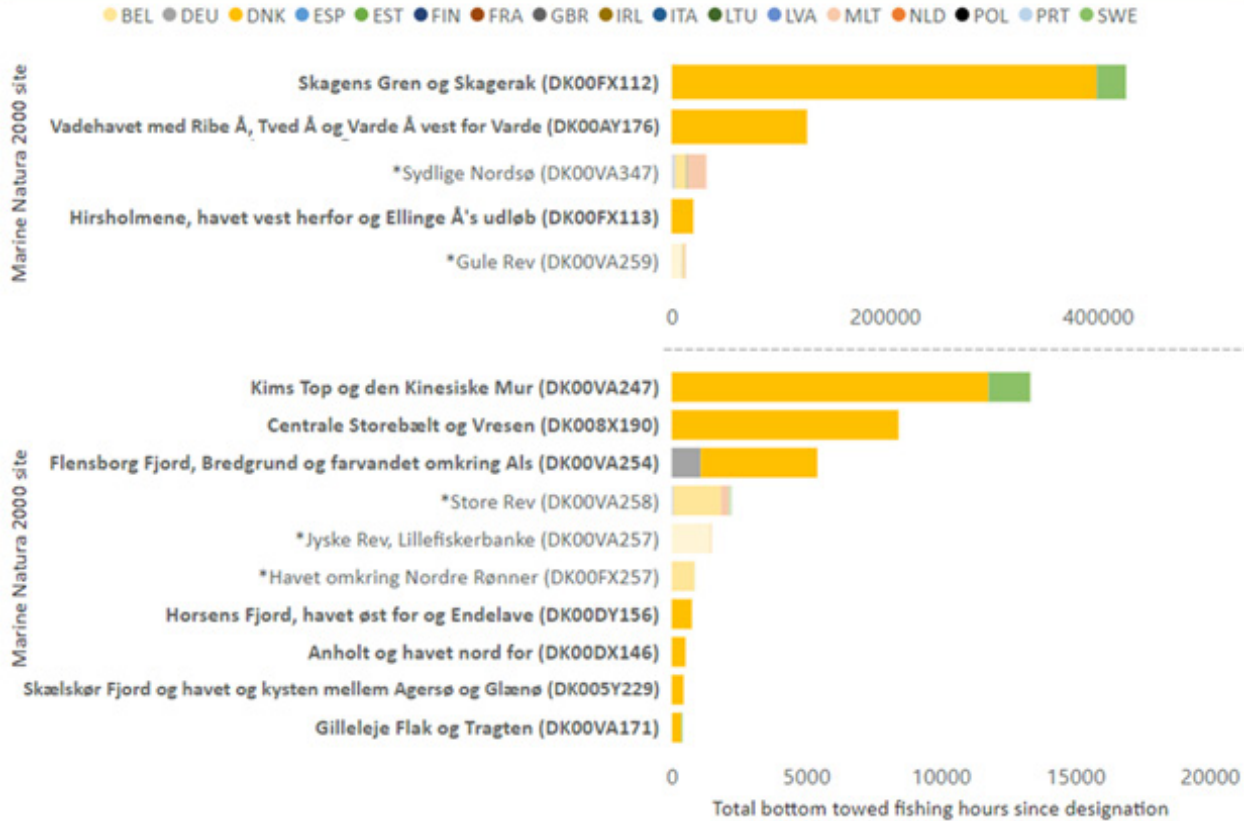


Figure 8 Total bottom towed fishing hours within each Danish marine Natura 2000 sites, by fleet. Sites marked with \* are currently involved in the judicial review process or have plans to become strictly protected areas across the whole or part of the site. Sites are presented across two separate x-axes to ensure visibility of fishing hours values on the lower end of the scale.

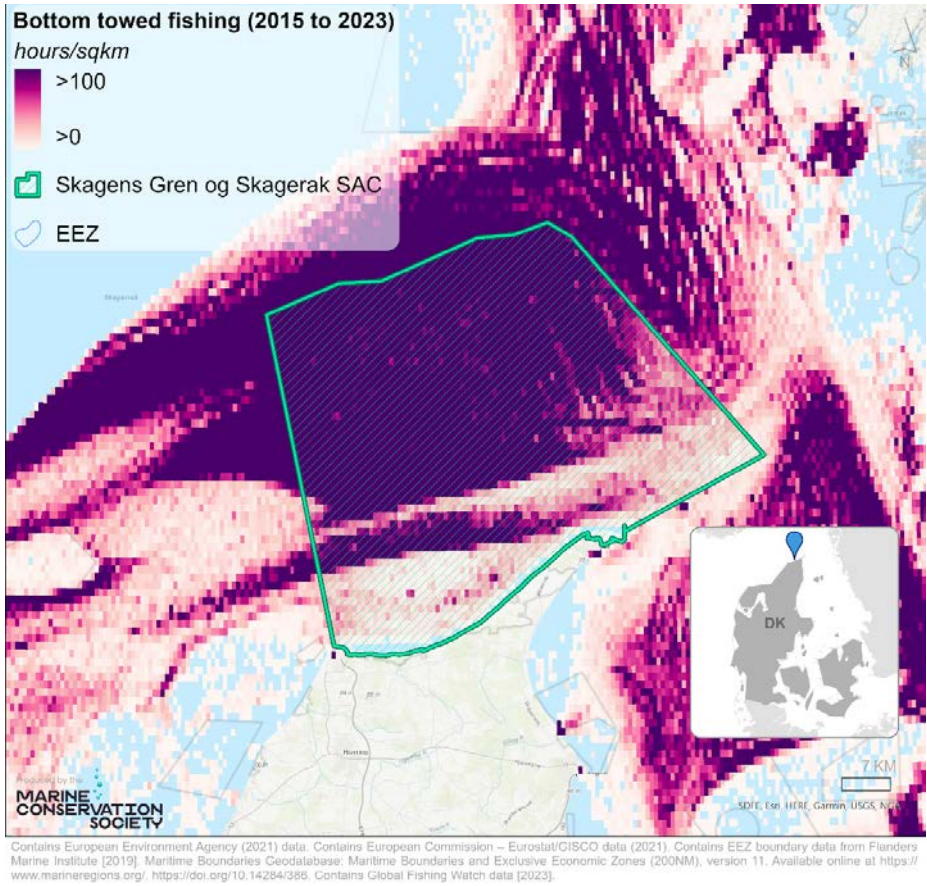


Figure 9 Cumulative bottom towed fishing activity in Skagens Gren og Skagerak SAC between January 2015 and December 2023

## Top Natura 2000 sites: Fished area

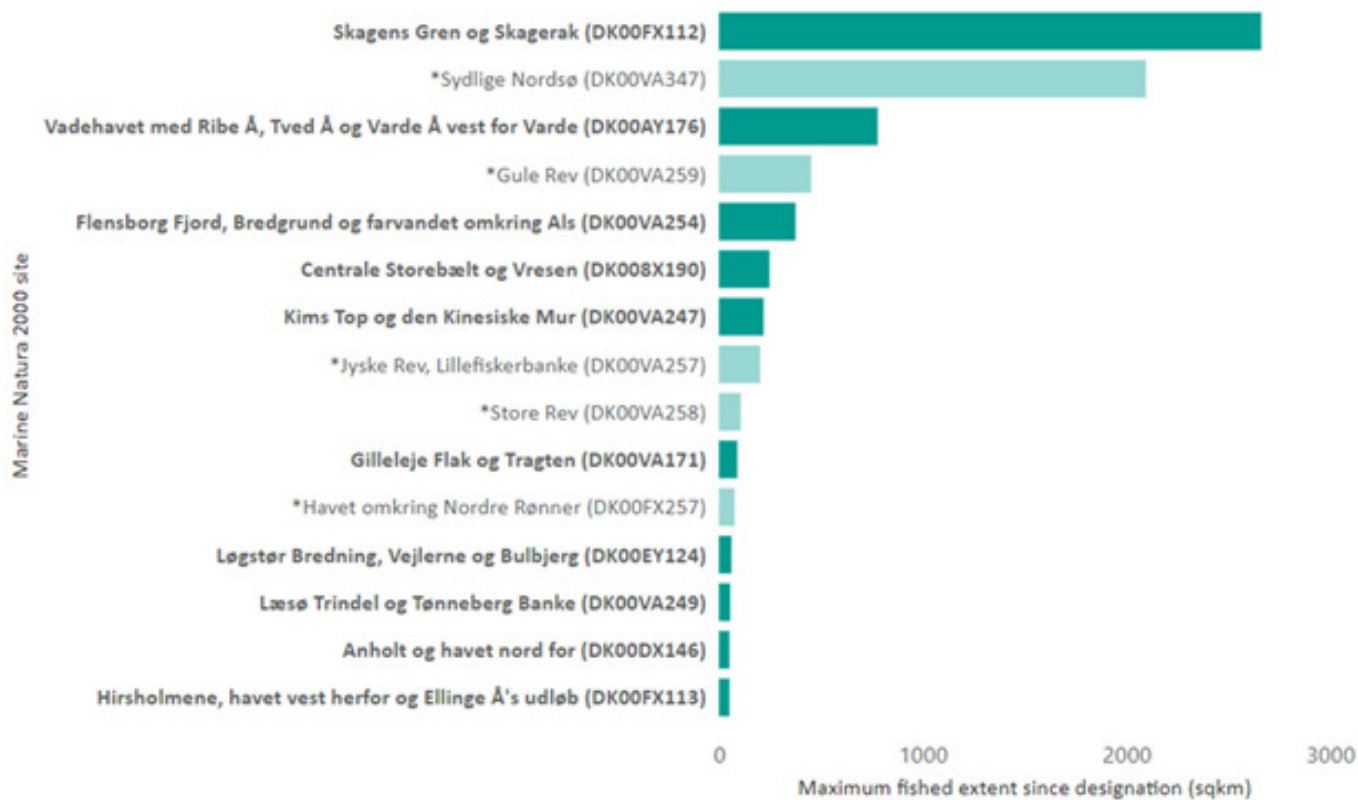


Figure 10 Danish marine Natura 2000 sites designated under the Habitats Directive that have the highest bottom fished area. Sites marked with \* are currently involved in the judicial review process or have plans to become strictly protected areas across the whole or part of the site.





## Germany

Germany has 74 marine Natura 2000 sites designated under the Habitats Directive, 93% of which list at least one seabed habitat as a designated feature (Figure 11). Between January 2015 and December 2023, vessels fished in marine Natura 2000 sites designated under the Habitats Directive for 730,245 hours using bottom towed gears (Figure 12). **Fishing effort is concentrated along Germany's North Sea coast (Figure 11) and can predominantly be attributed to the German and Dutch fleets (64% and 32% of total hours respectively)** with the Danish, UK, and Irish fleets responsible for the remaining 4% of activity. Between 2015 and 2023, German marine Natura 2000 sites designated under the Habitats Directive were fished at an average rate of 3 hours/km<sup>2</sup>/year with bottom towed fishing hours (Figure 12A) and rate (Figure 12C) remaining largely consistent, peaking slightly in 2018 with a fishing rate of 4 hours/km<sup>2</sup>.

**The Nationalpark Schleswig-Holsteinisches Wattenmeer und angrenzende Küstengebiete SAC<sup>10</sup>** (Site code: DE0916391), a large site that spans inshore and offshore waters around 40 km northeast of Helgoland, experienced the highest number of bottom towed fishing hours with

**demersal trawlers and dredgers fishing the site for a total of 342,213 hours between 2015 and 2023.**

The site was designated in 2004 to protect a range of habitat features including sandbanks (1110), estuaries (1130), and reefs (1170) as well as species such as harbour porpoise (*Phocoena phocoena*) and common seal (*Phoca vitulina*). Between 2015 and 2023, the German fleet were responsible for 66% of the total bottom towed fishing hours, the Dutch fleet were responsible for 32%, and the Danish, Belgian, and Irish fleets were responsible for the remaining 2% of fishing hours (Figures 13 and 147).

**Bottom towed fishing activity overlapped with up to 11,700 km<sup>2</sup> of German seabed protected under the Habitats Directive (53% of the total area covered by marine Natura 2000 sites) between 2015 and 2023. Sylter Außenriff SCI (Site code: DE1209301)<sup>11</sup>, an offshore site designated off the northwest German coast for reefs (1170) and sandbanks (1110), had the greatest spatial overlap with the fishing footprint with bottom towed gear used across 38,200km<sup>2</sup> of the site between 2015 and 2023. This is equivalent to approximately 72% of its area (Figures 15 and 16).**

10. <https://eunis.eea.europa.eu/sites/DE0916391>

11. <https://eunis.eea.europa.eu/sites/DE1209301>

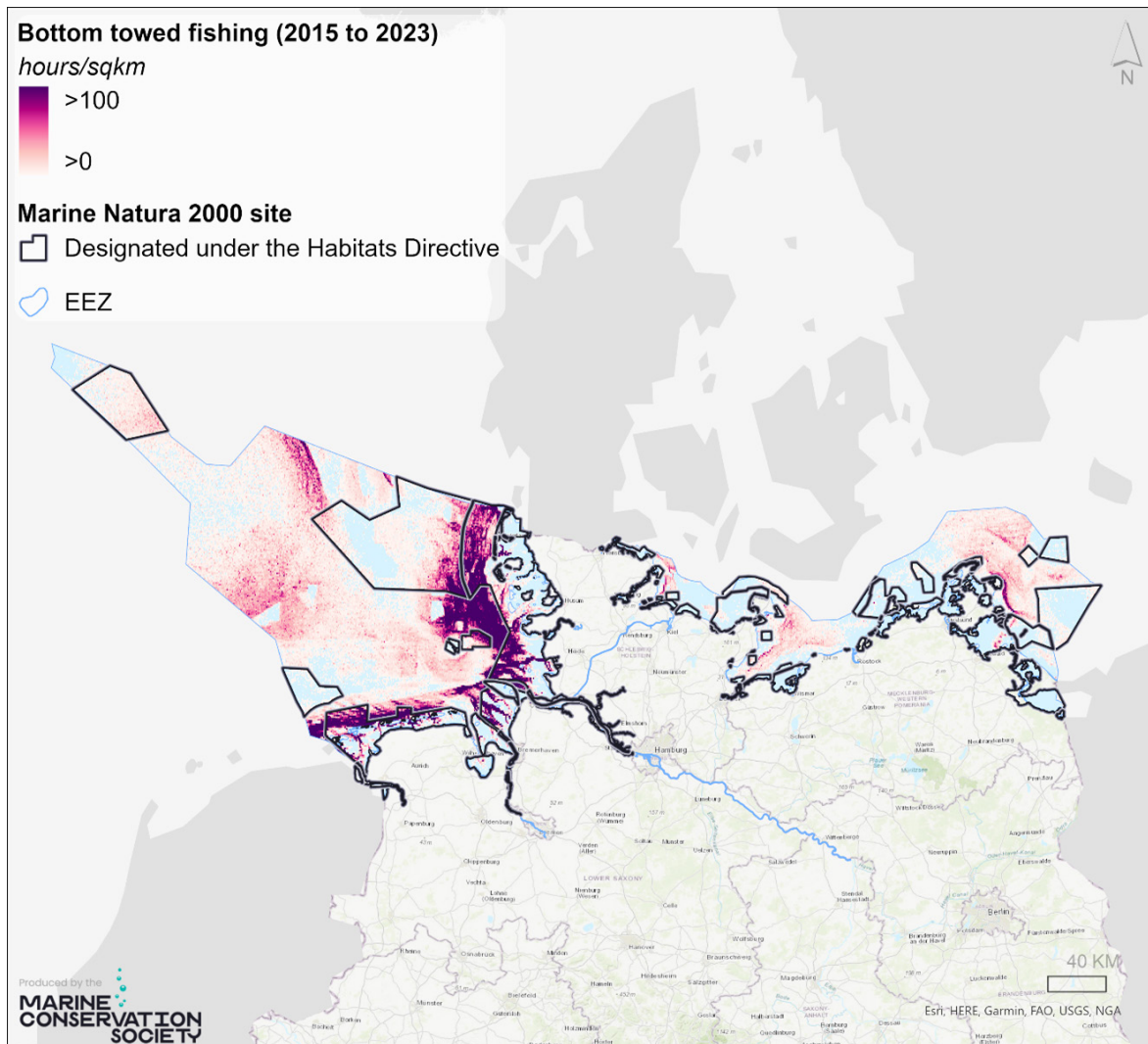
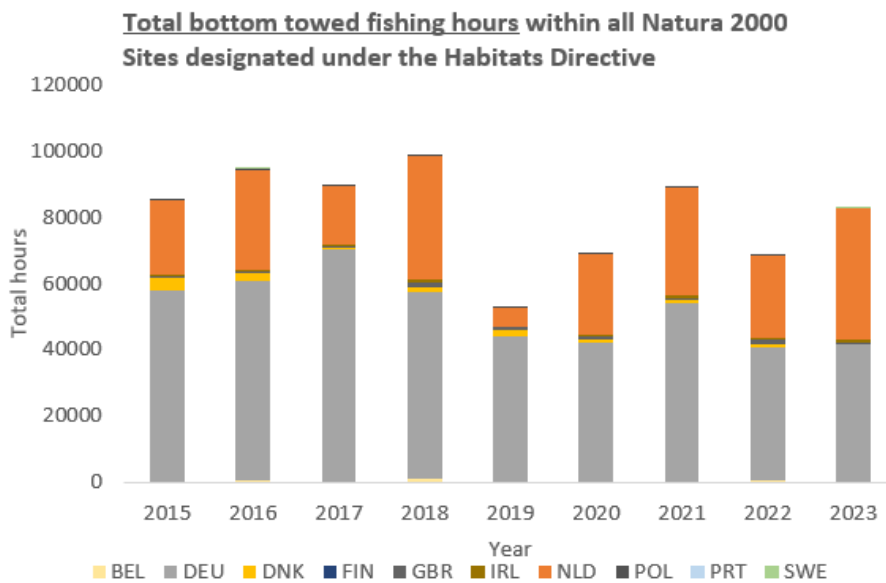
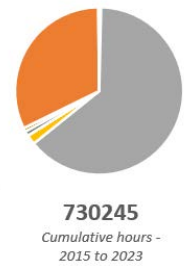


Figure 11 Cumulative bottom towed fishing activity in German waters between January 2015 and December 2023.

**A**



**B**



**C**

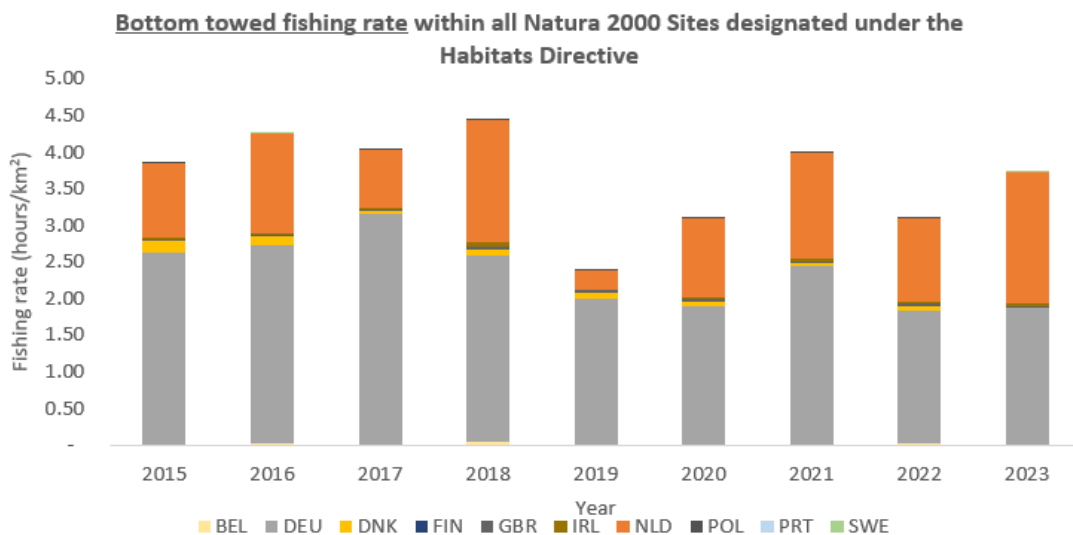


Figure 12 Total bottom towed fishing hours within all German marine Natura 2000 sites designated under the Habitats Directive by fleet [A]. Fleet composition of cumulative hours recorded between 2015 and 2023 within all German marine Natura 2000 sites designated under the Habitats Directive [B]. Bottom towed fishing rate within all German marine Natura 2000 sites designated under the Habitats Directive by fleet [C].



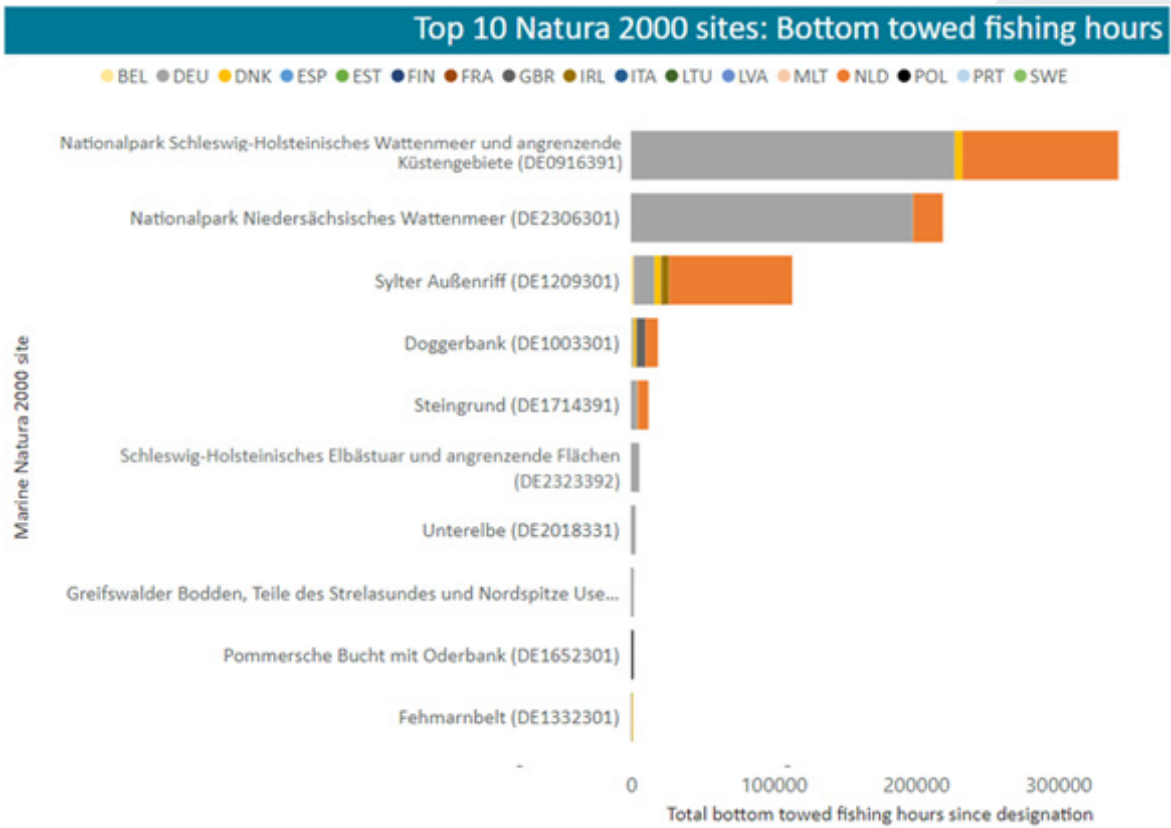


Figure 13 Total bottom towed fishing hours within each German marine Natura 2000 site by fleet.

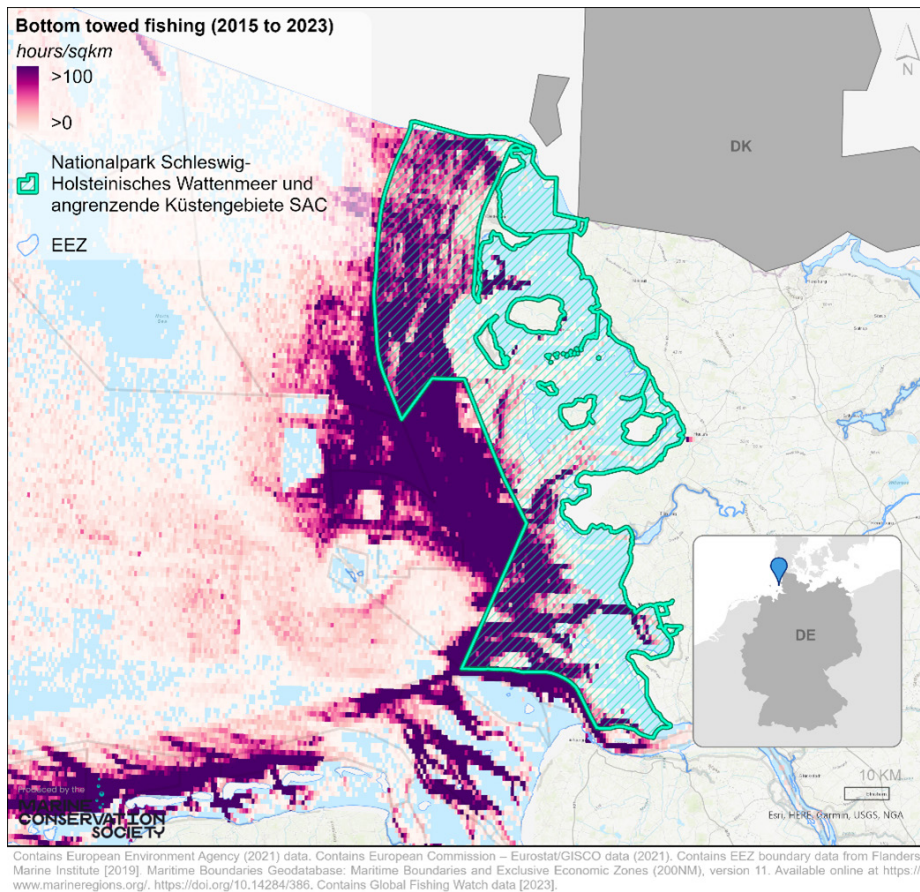


Figure 14 Cumulative bottom towed fishing activity in Nationalpark Schleswig-Holsteinisches Wattenmeer und angrenzende Küstengebiete SAC between January 2015 and December 2023.



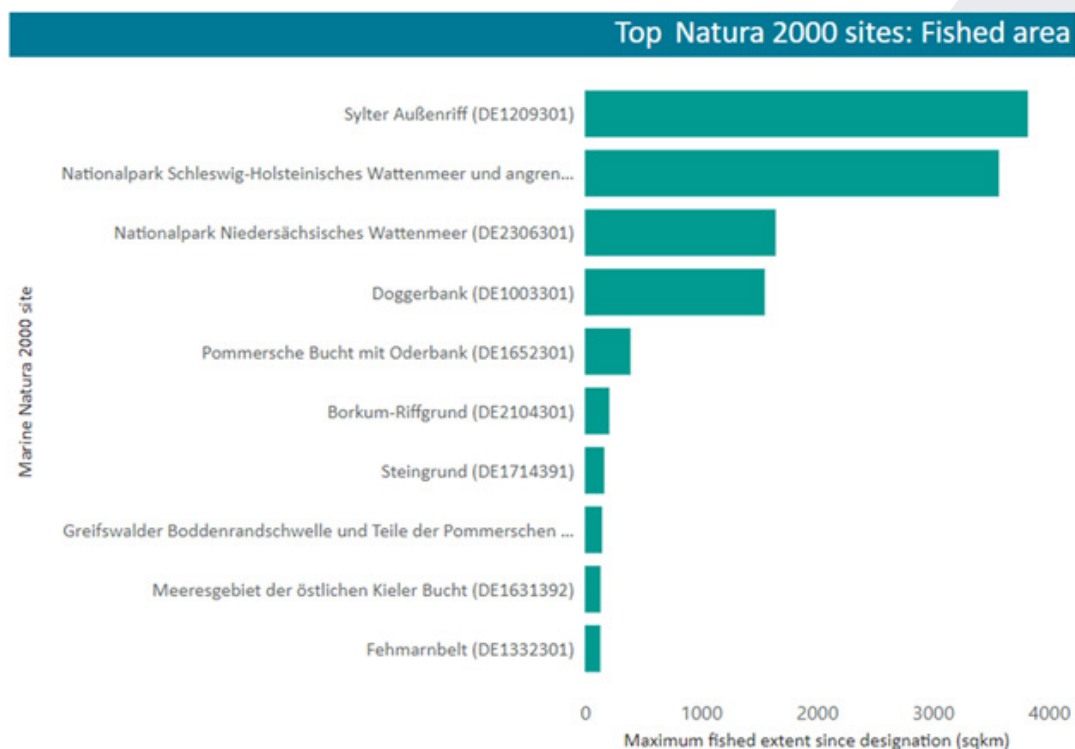


Figure 15 German marine Natura 2000 sites designated under the Habitats Directive that have the largest bottom fished area.

Marine Natura 2000 site	Maximum fished extent since designation	
	Area (km <sup>2</sup> )	Proportion (%)
<u>Sylter Außenriff (DE1209301)</u>	3821	72
<u>Nationalpark Schleswig-Holsteinisches Wattenmeer und angrenzende Küstengebiete (DE0916391)</u>	3571	62
<u>Nationalpark Niedersächsisches Wattenmeer (DE2306301)</u>	1646	59
<u>Doggerbank (DE1003301)</u>	1552	92
<u>Pommersche Bucht mit Oderbank (DE1652301)</u>	394	36
<u>Borkum-Riffgrund (DE2104301)</u>	211	34
<u>Steingrund (DE1714391)</u>	167	96
<u>Greifswalder Boddenrandschwelle und Teile der Pommerschen Bucht (DE1749302)</u>	148	37
<u>Meeresgebiet der östlichen Kieler Bucht (DE1631392)</u>	135	22
<u>Fehmarnbelt (DE1332301)</u>	133	47
<u>Greifswalder Bodden, Teile des Strelasundes und Nordspitze Usedom (DE1747301)</u>	83	14
<u>Untereibe (DE2018331)</u>	74	43
<u>Schleswig-Holsteinisches Elbästuar und angrenzende Flächen (DE2323392)</u>	70	36

Table 2 Maximum fished extent since designation - Top 10 marine Natura 2000 sites by site area

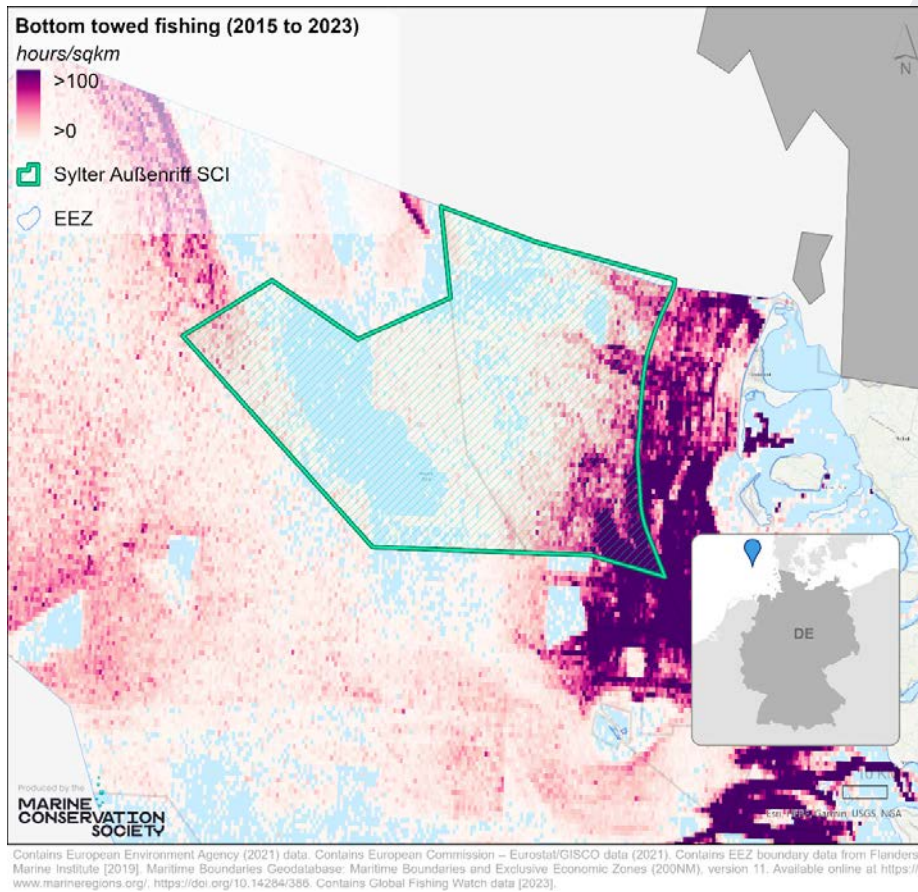


Figure 16 Cumulative bottom towed fishing effort overlap with the Sylter Außenriff SCI.

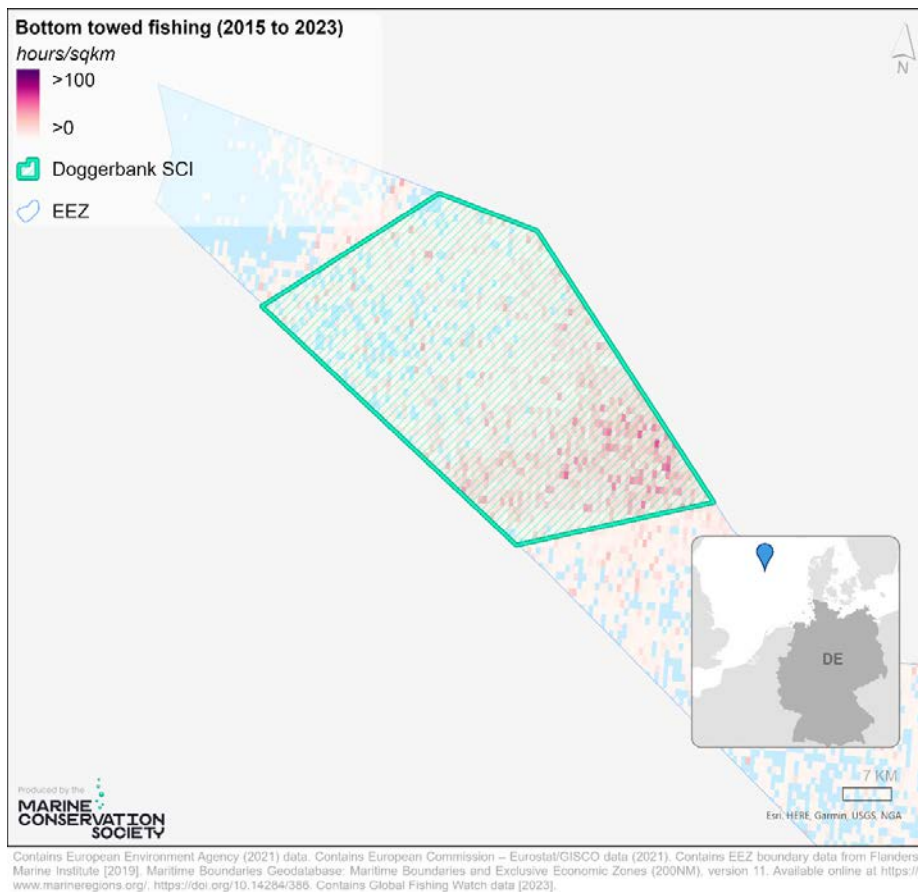


Figure 17 Cumulative bottom towed fishing effort overlap with the Doggerbank SCI.





## Ireland

Ireland has 144 marine Natura 2000 sites designated under the Habitats Directive, 58% of which list at least one seabed habitat as a designated feature (Figure 18). Between January 2015 and December 2023, vessels fished in marine Natura 2000 sites designated under the Habitats Directive for 19,336 hours using bottom towed gears (Figure 19B). Fishing effort is concentrated in the Irish Sea, and along the continental shelf edge to the west of Ireland (Figure 18) and can predominantly be attributed to the French and Irish fleets (59% and 28% of total hours respectively) with the Spanish, UK, Danish and Belgian fleets responsible for the remaining 13% of activity. Between 2015 and 2023, Irish marine Natura 2000 sites designated under the Habitats Directive were fished at an average rate of 0.07 hours/km<sup>2</sup>/year. **Bottom towed fishing hours (Figure 19A) and rate (Figure 19C) have increased since 2019** with fishing rate reaching 0.1 hours/km<sup>2</sup>/year in 2022. **A sharp increase in total bottom towed fishing hours was recorded between 2022 and 2023 due to the designation of two large offshore sites in November 2022:** Porcupine Shelf SAC and Southern Canyons SAC. As these sites together cover an additional 29000 km<sup>2</sup> of Irish seabed much more of the 2023 fishing effort extent was captured within the analysis than in previous years. As a result, a fishing rate of 0.2 hours/km<sup>2</sup>/year was recorded in 2023. **The addition of these two sites also changed**

**the fleet profile of the fishing activity. Prior to 2023, the Irish fleet was the dominant fleet active within Irish marine Natura 2000 sites, however in 2023 the French fleet dominated the fishing activity.** This is due to the designation of the large Southern Canyons SAC at the southernmost extent of the Irish EEZ where French vessels fished for around 10,697 hours within the site in 2023 (a fishing rate of 0.74 hours/km<sup>2</sup>).

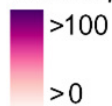
**The highest number of fishing hours was recorded in the recently designated Southern Canyons SAC<sup>12</sup>** (Site code: 002278), a large offshore site designated to protect reefs at the southern-most extent of the Irish EEZ. The fishing recorded within the site has been recorded since its designation in 2022, and can be attributed predominantly to the French fleet (90% of total activity), the Spanish fleet (6% of activity), and the UK fleet (3% of activity), with the Irish and Belgian fleets making up the remaining 1% of activity (Figures 20 and 21).

**Bottom towed fishing activity overlapped with up to 4000 km<sup>2</sup> of Irish seabed protected under the Habitats Directive between 2015 and 2023. As with total fishing hours, Southern Canyons SAC had the greatest spatial overlap with the fishing footprint with bottom towed gear being used across 2600 km<sup>2</sup> of the site; equivalent to approximately 14% of its area (Figures 21 and 22).**

12. <https://www.npws.ie/protected-sites/sac/002278>

**Bottom towed fishing (2015 to 2023)**

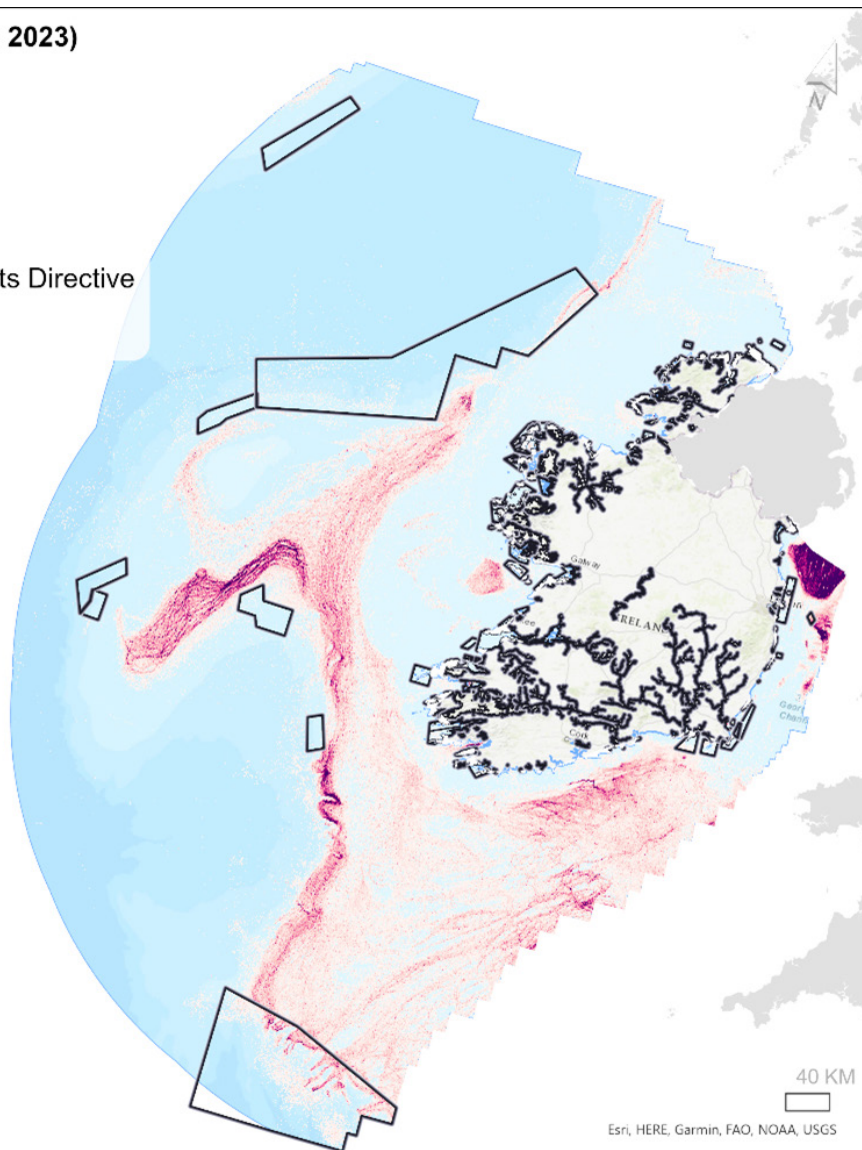
hours/sqkm



**Marine Natura 2000 site**

☐ Designated under the Habitats Directive

📍 EEZ

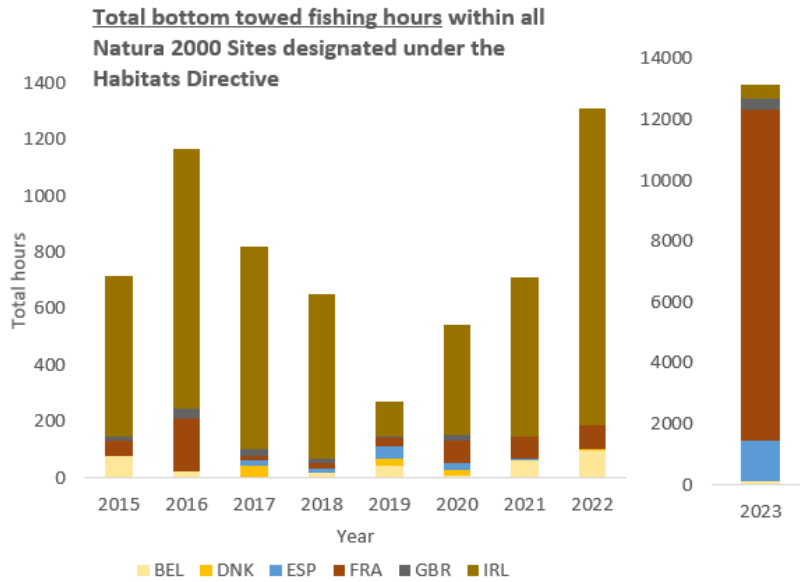


40 KM  
Esri, HERE, Garmin, FAO, NOAA, USGS

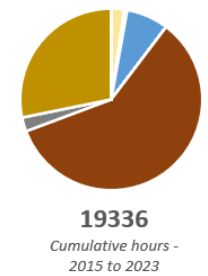
Contains European Environment Agency (2021) data. Contains European Commission – Eurostat/GISCO data (2021). Contains EEZ boundary data from Flanders Marine Institute [2019]. Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <https://www.marinerregions.org/>. <https://doi.org/10.14284/386>. Contains Global Fishing Watch data [2023].

*Figure 18 Cumulative bottom towed fishing activity in Irish waters between January 2015 and December 2023.*

**A**



**B**



**C**

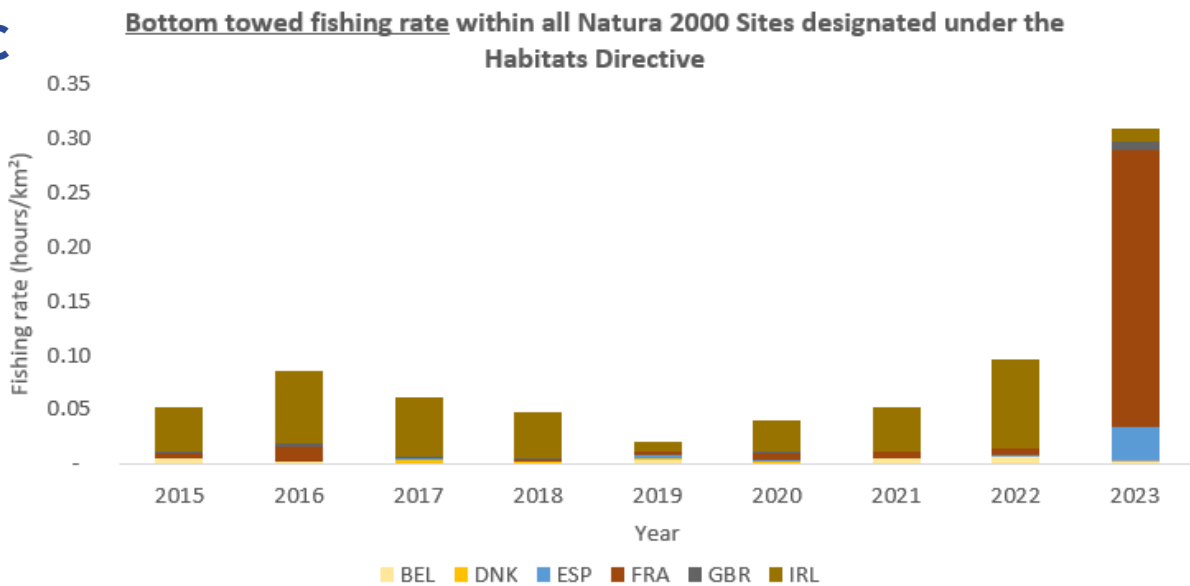


Figure 19 Total bottom towed fishing hours within all Irish marine Natura 2000 sites designated under the Habitats Directive by fleet [A]. Fleet composition of cumulative hours recorded between 2015 and 2023 within all Irish marine Natura 2000 sites designated under the Habitats Directive [B]. Bottom towed fishing rate within all Irish marine Natura 2000 sites designated under the Habitats Directive by fleet [C].

NB. Bottom towed fishing hours recorded in 2023 includes the area covered by the newly designated Porcupine Shelf SAC and Southern Canyons SAC, hence the substantial increase in fishing activity. [C].



## Top 10 Natura 2000 sites: Bottom towed fishing hours

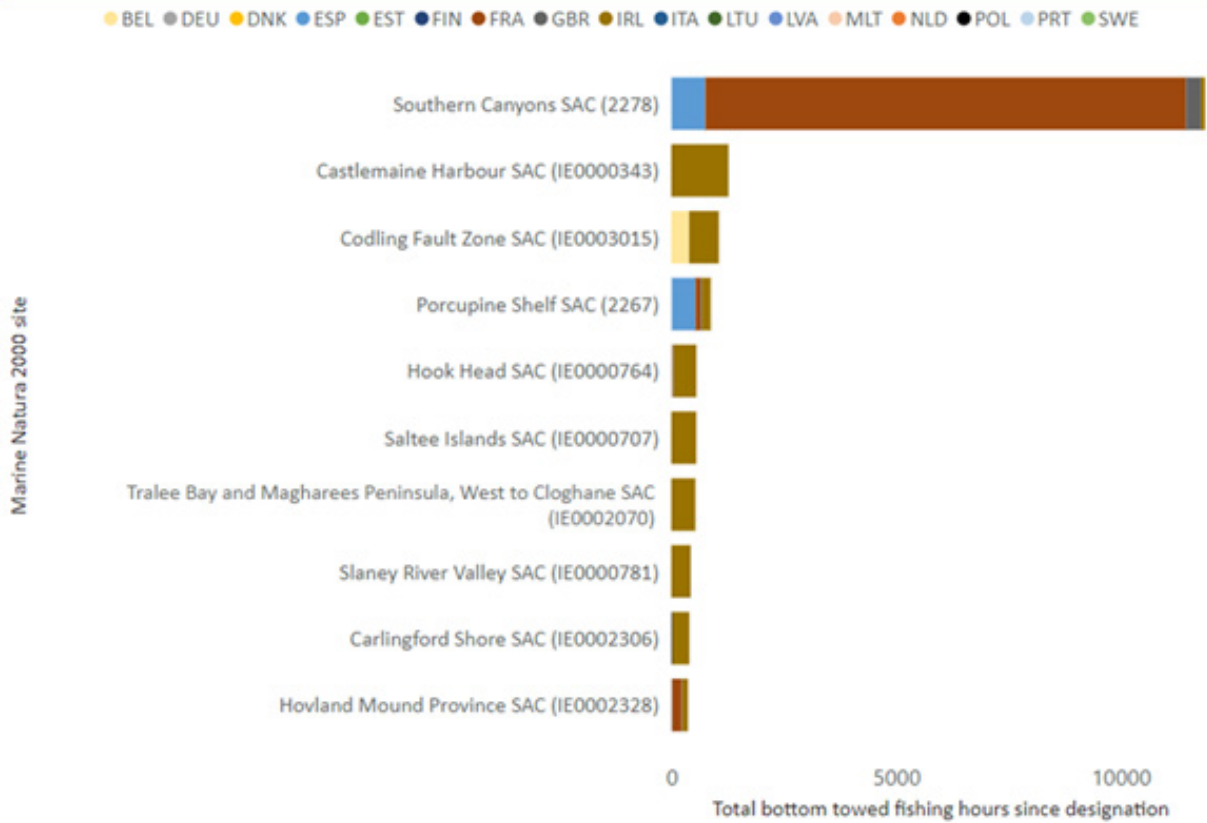


Figure 20 Total bottom towed fishing hours within each Irish marine Natura 2000 site by fleet.

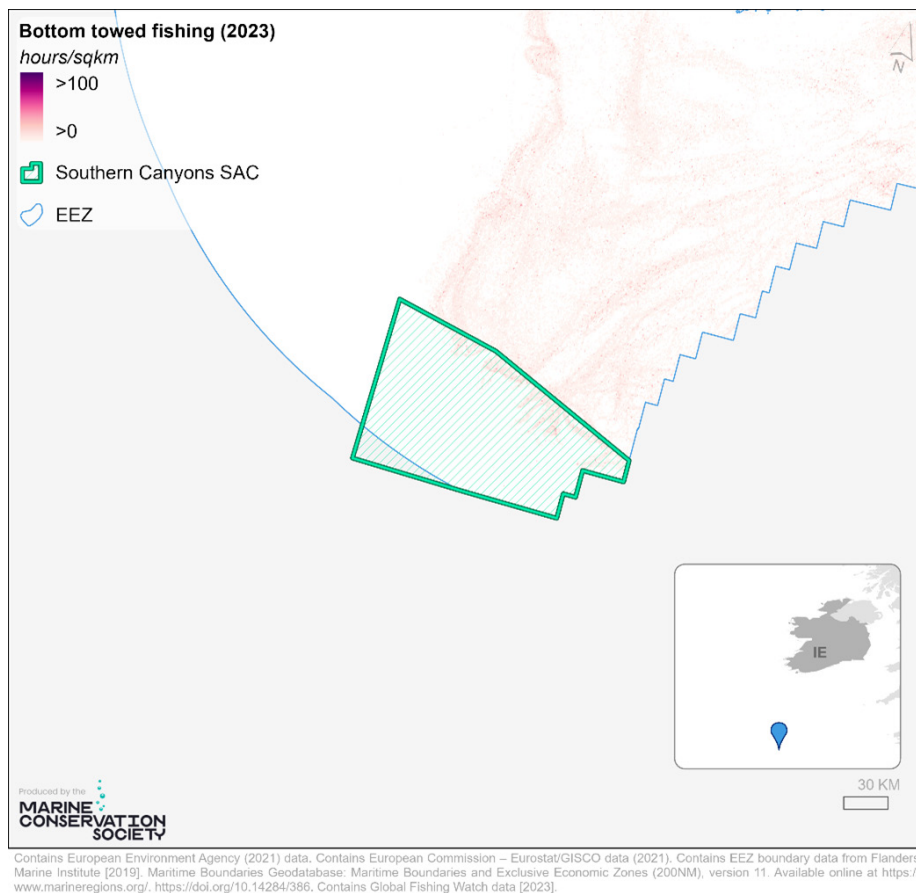


Figure 21 Cumulative bottom towed fishing activity in Southern Canyons SAC since its proposal in November 2022 to December 2023.

## Top Natura 2000 sites: Fished area

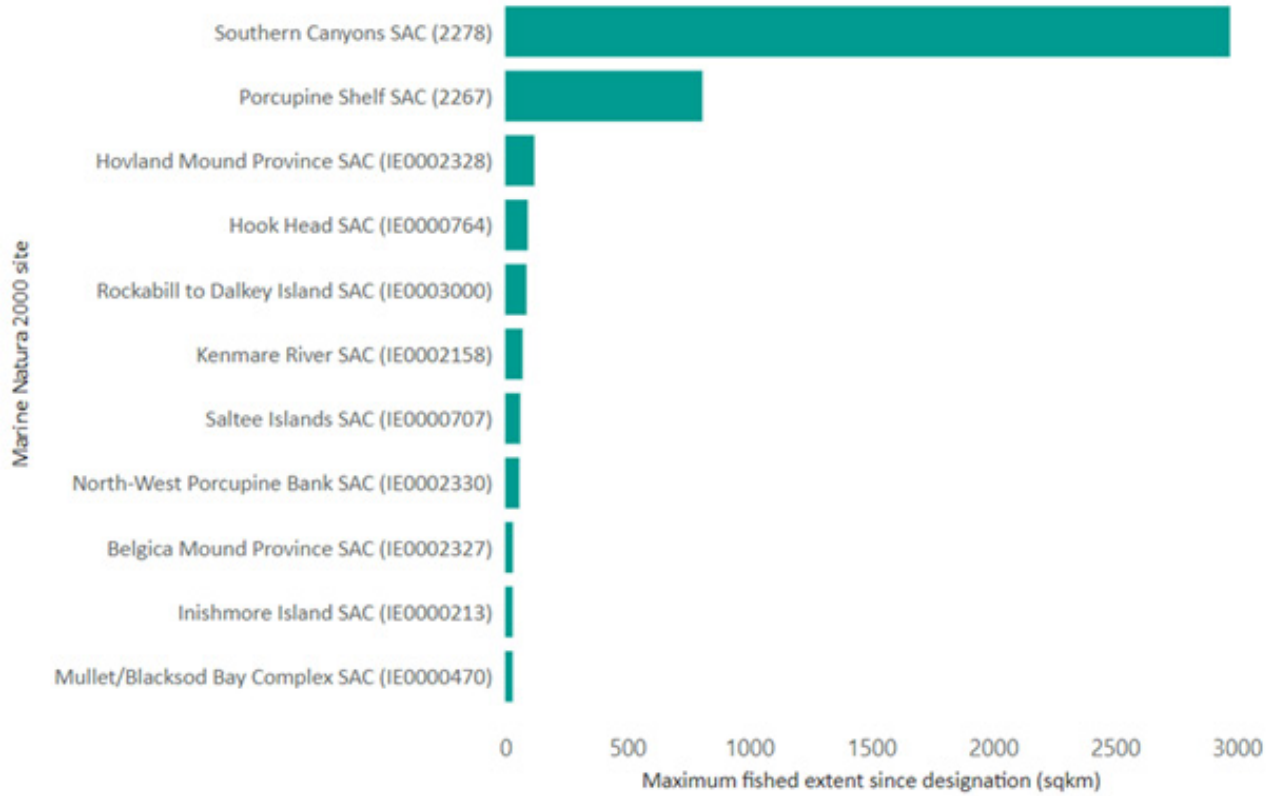


Figure 22 Irish marine Natura 2000 sites designated under the Habitats Directive that have the 10 largest bottom fished areas.



## The Netherlands

The Netherlands has 10 marine Natura 2000 sites designated under the Habitats Directive, all of which list at least one seabed habitat as a designated feature (Figure 23). **Between January 2015 and December 2023, vessels fished in Natura 2000 sites designated under the Habitats Directive for over 2 million hours using bottom towed gears** (Figure 24). Fishing effort is concentrated along the Dutch coast (Figure 23) and can predominantly be attributed to the Dutch fleet (96% of total hours) with the Belgian, German and UK fleets responsible for the remaining 4% of activity. Between 2015 and 2023, Dutch marine Natura 2000 sites designated under the Habitats Directive were fished at an average rate of 19 hours/km<sup>2</sup>/year with bottom towed fishing hours (Figure 24A) and rate (Figure 24C) generally declining slightly since 2016.

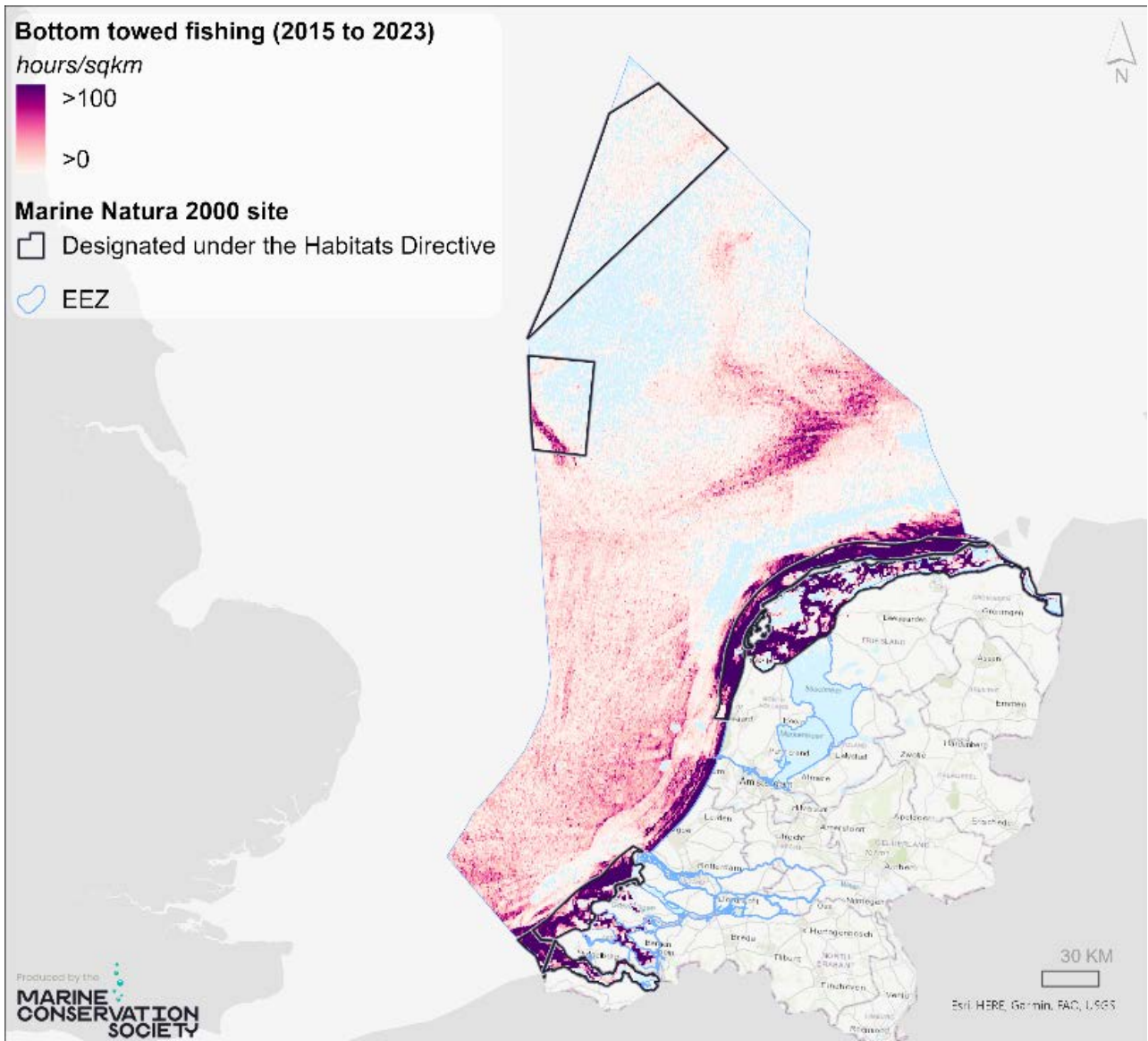
**Between 2015 and 2023, the highest fishing rate was recorded in Waddenzee SAC** (Site code: NL1000001)<sup>13</sup>, a site designated in Dutch **internal waters in 2018 to protect benthic habitats such as**

**sandbanks (1110), and estuaries** (Figures 25 and 26), **where 935,761 hours of bottom towed fishing were recorded**. The fishing recorded within the site can mainly be attributed to the Dutch fleet (98% of activity) with the German, UK and Belgian fleets being responsible for the remaining 2% of activity (Figure 25).

**Bottom towed fishing activity overlapped with up to 9400km<sup>2</sup> of Dutch seabed protected under the Habitats Directive (~71% of the total area covered by marine HD Natura 2000 sites) between 2015 and 2023. Doggersbank SAC** (Site code: NL2008001)<sup>14</sup> **had the greatest spatial overlap by area with the fishing footprint with bottom towed gear being used in up to 3100 km<sup>2</sup> of its area; equivalent to ~65% of the site** (Figure 27 and 28). The offshore site, designated to protect sandbanks (1110), is located in northern Dutch waters between the UK and German borders (Figure 28).

13. <https://eunis.eea.europa.eu/sites/NL1000001>

14. <https://eunis.eea.europa.eu/sites/NL2008001>

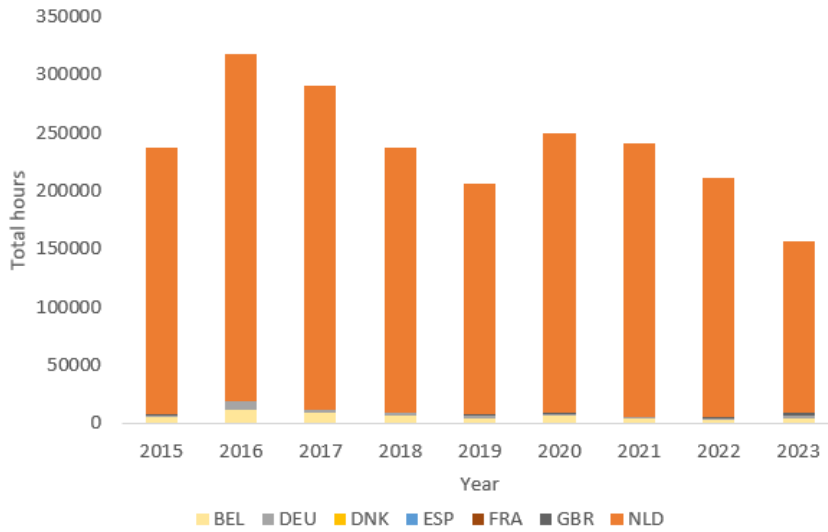


Contains European Environment Agency (2021) data. Contains European Commission – Eurostat/GISCO data (2021). Contains EEZ boundary data from Flanders Marine Institute [2019]. Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <https://www.marineregions.org/>. <https://doi.org/10.14284/386>. Contains Global Fishing Watch data [2023].

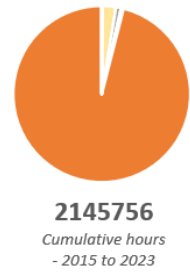
Figure 23 Cumulative bottom towed fishing activity in Dutch waters between January 2015 and December 2023.

**A**

**Total bottom towed fishing hours within all Natura 2000 Sites designated under the Habitats Directive**



**B**



**C**

**Bottom towed fishing rate within all Natura 2000 Sites designated under the Habitats Directive**

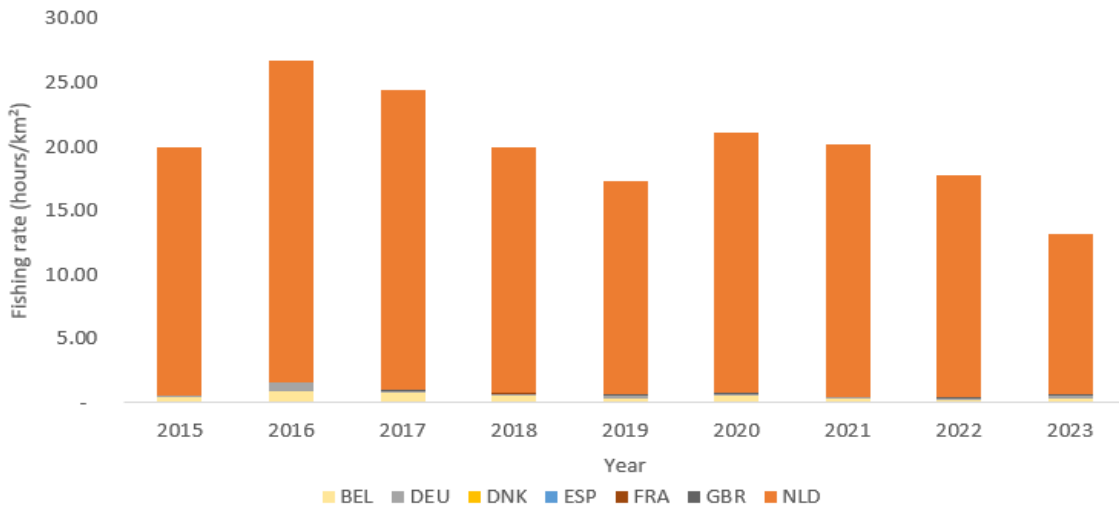


Figure 24 Total bottom towed fishing hours within all Dutch marine Natura 2000 sites designated under the Habitats Directive by fleet [A]. Fleet composition of cumulative hours recorded between 2015 and 2023 within all Dutch marine Natura 2000 sites designated under the Habitats Directive [B]. Bottom towed fishing rate within all Dutch marine Natura 2000 sites designated under the Habitats Directive by fleet [C].



## Top Natura 2000 sites: Bottom towed fishing hours

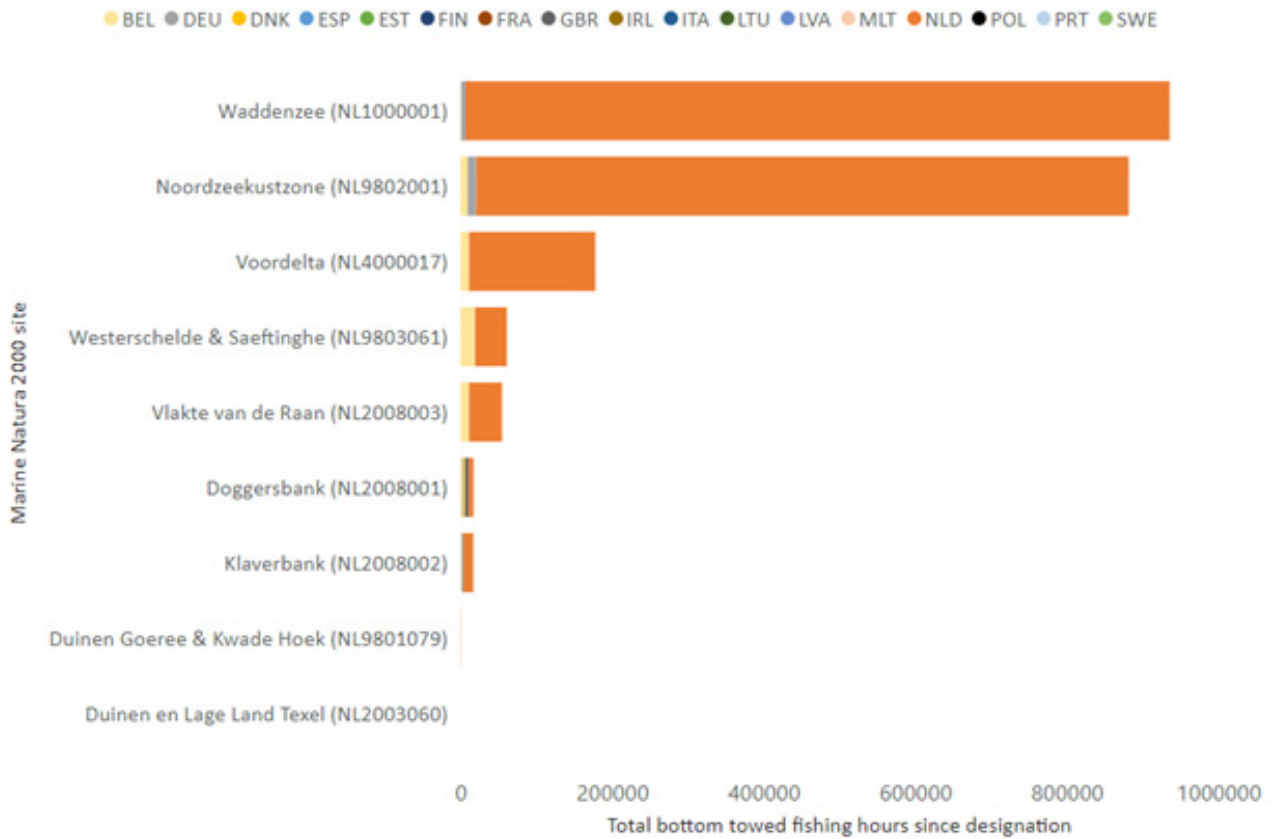


Figure 25 Total bottom towed fishing hours within each Dutch marine Natura 2000 site by fleet (only nine had bottom towed fishing recorded within them)

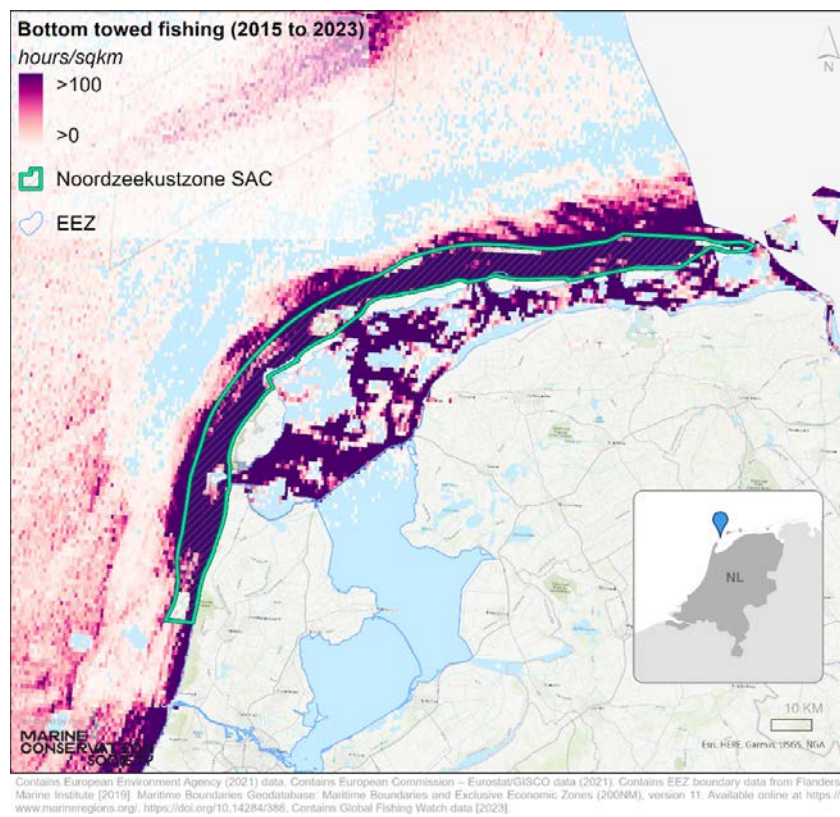
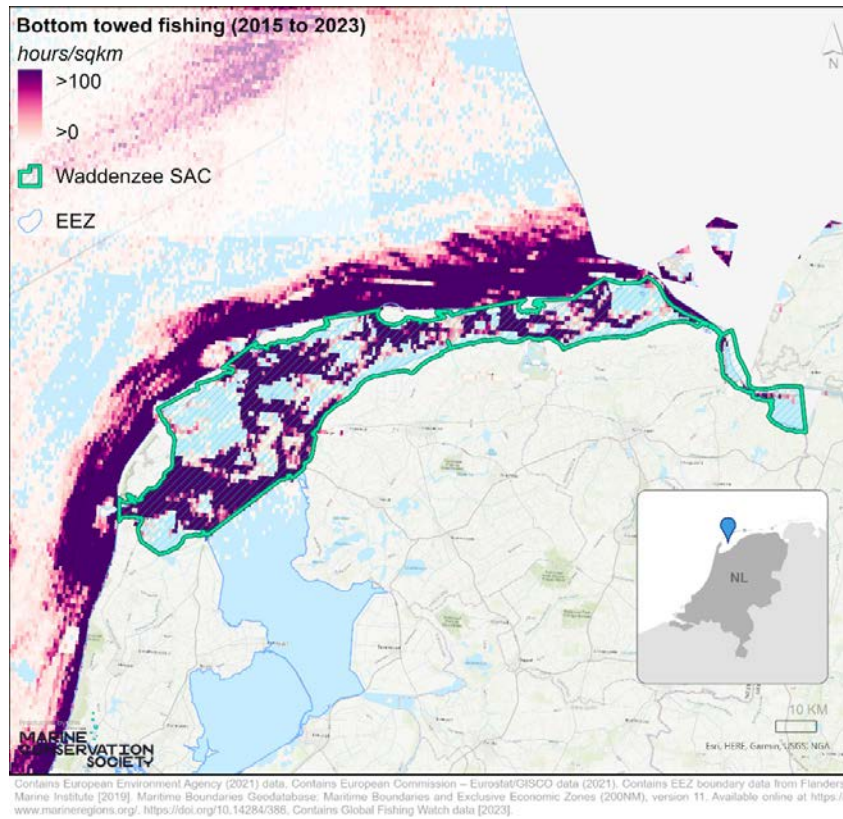


Figure 26 Cumulative bottom towed fishing activity in Waddenzee SAC (top) and Noordzeekustzone SAC (bottom) between January 2015 and December 2023.

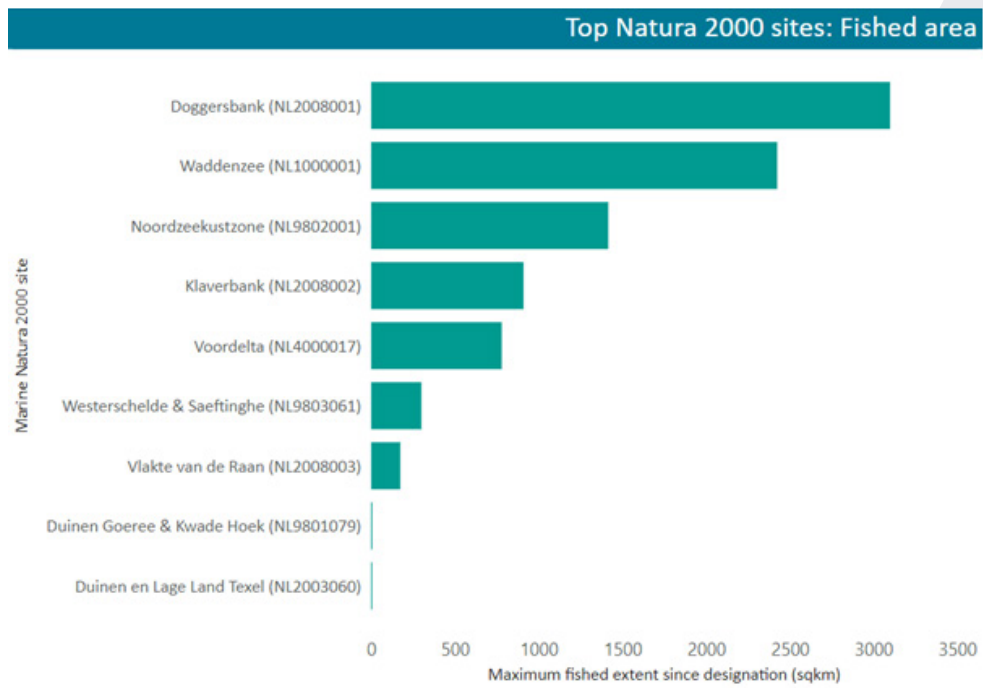


Figure 27 Dutch marine Natura 2000 sites designated under the Habitats Directive that have the largest bottom fished areas.

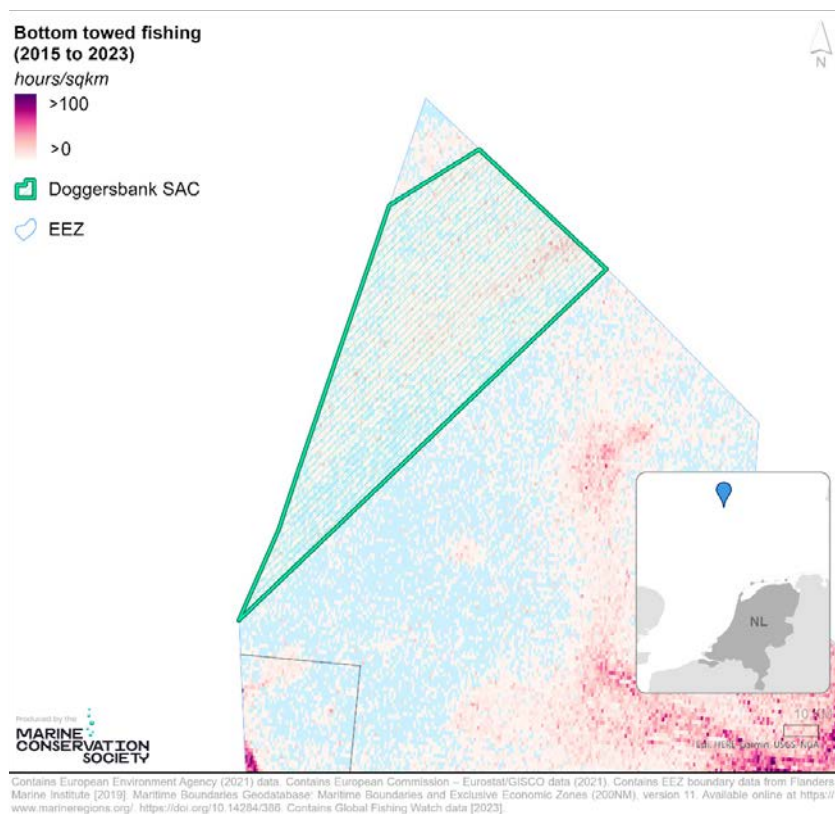
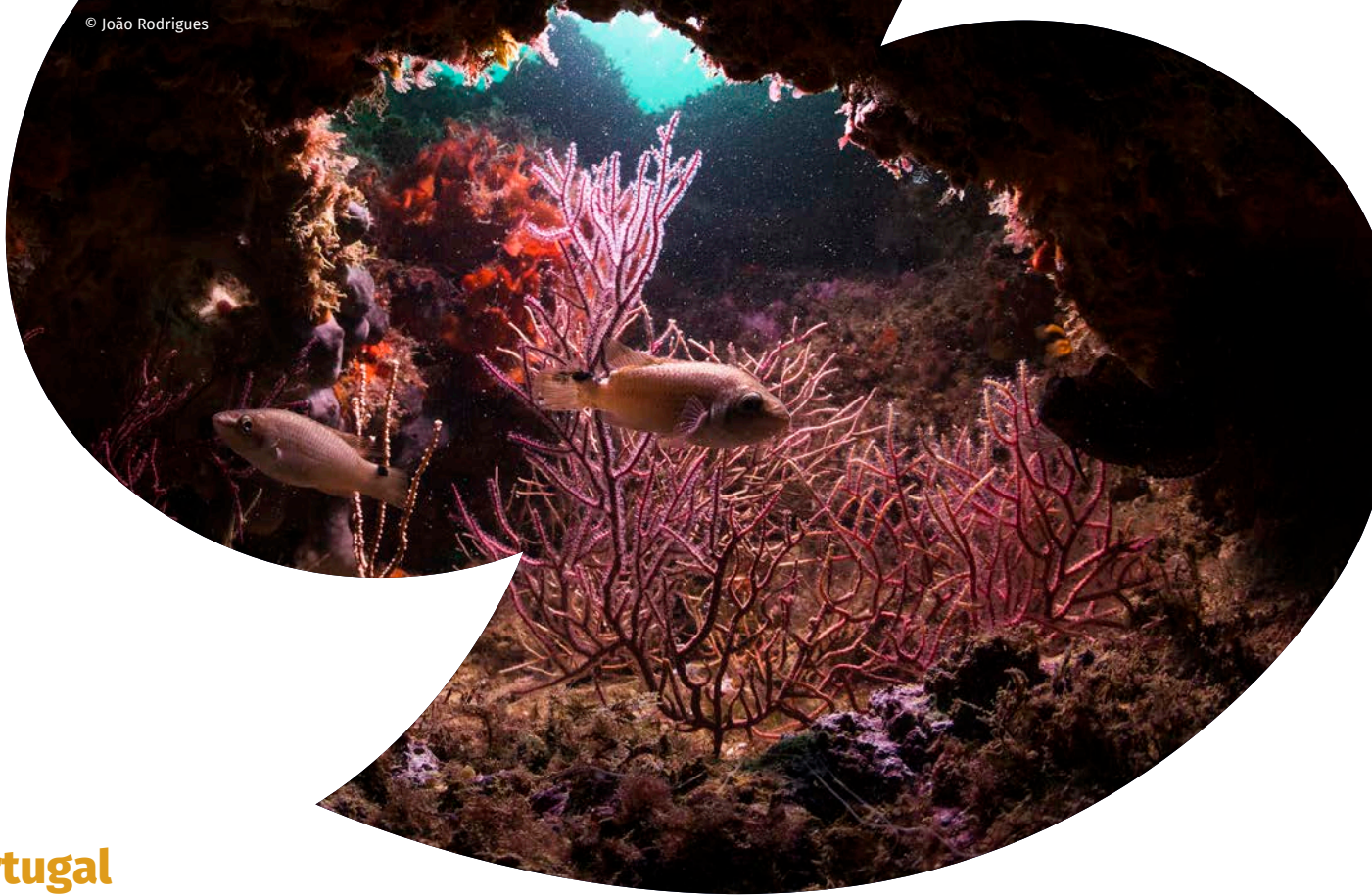


Figure 28 Cumulative bottom towed fishing effort overlap with the Doggersbank SAC





## Portugal

There are 33 marine Natura 2000 sites designated under the Habitats Directive within the Portuguese continental EEZ (9 sites), and around Madeira (5 sites) and the Azores (19 sites) (Figure 29); all but two list at least one seabed habitat as a designated feature. Between January 2015 and December 2023, vessels fished for 155,475 hours using bottom towed gears predominantly in two sites off the coast of the Portuguese mainland (Figure 30): *Costa Sudoeste SCI* and *Maceda - Praia da Vieira SCI*. Fishing effort is largely concentrated along Portugal's mainland coast beyond the 6nm limit (none was recorded around the Azores or Madeira where the practice is prohibited) and can be attributed to the Portuguese fleet (97% of total hours) with the Spanish fleet predominantly responsible for the remaining 3% of activity, with some minor fishing from UK, Swedish and French vessels (Figures 29 and 30). Between 2015 and 2023, Portuguese marine Natura 2000 sites designated under the Habitats Directive were fished at an average rate of 0.5 hours/km<sup>2</sup>/year. Total fishing hours increased between 2015 and 2018 before generally declining between 2018 and 2023. This can be attributed to the designation of additional Natura 2000 sites in 2016 and 2017 (Figure 30A) increasing the area covered by MPAs from 4100 km<sup>2</sup> in 2015 to 27,900 km<sup>2</sup> in 2016 and then 34,700 km<sup>2</sup> in 2017. This therefore means a greater extent of the fishing activity was captured as more sites were designated. The fishing rate (Figure 30C) has actually declined since

2015 with the Portuguese fleet dominating activity throughout the 2015-2023 period.

Between 2015 and 2023, the highest fishing rate was recorded in *Maceda - Praia da Vieira SCI* (Site code: PTCO0063)<sup>15</sup>, a site that spans the 12nm limit designated on the northwest coast of Portugal in 2016 (Figures 31 and 32), where vessels using bottom towed gear fished for 124,449 hours. The site is designated under the Habitats Directive for sandbanks which are slightly covered by sea water all the time (1110) and reefs (1170), as well as a range of species including the bottlenose dolphin (*Tursiops truncatus*), loggerhead turtle (*Caretta caretta*) and harbour porpoise (*Phocoena phocoena*). The fishing recorded within the site can mainly be attributed to the Portuguese fleet (96% of activity) and the Spanish fleet (4% of activity) which, together fished the site for an average of 3 hours/km<sup>2</sup>/year between the site's designation in 2016 and 2023.

Bottom towed fishing activity overlapped with up to 3400km<sup>2</sup> of Portuguese seabed protected under the Habitats Directive between 2015 and 2023 (~17% of the total area covered by marine HD Natura 2000 sites). As with total fishing hours, *Maceda - Praia da Vieira SAC* had the greatest overlap by area with bottom towed gear being used across 2700 km<sup>2</sup> of the site; this is the equivalent to approximately 91% of its area (Figures 32 and 33).

15. <https://eunis.eea.europa.eu/sites/PTCO0063>



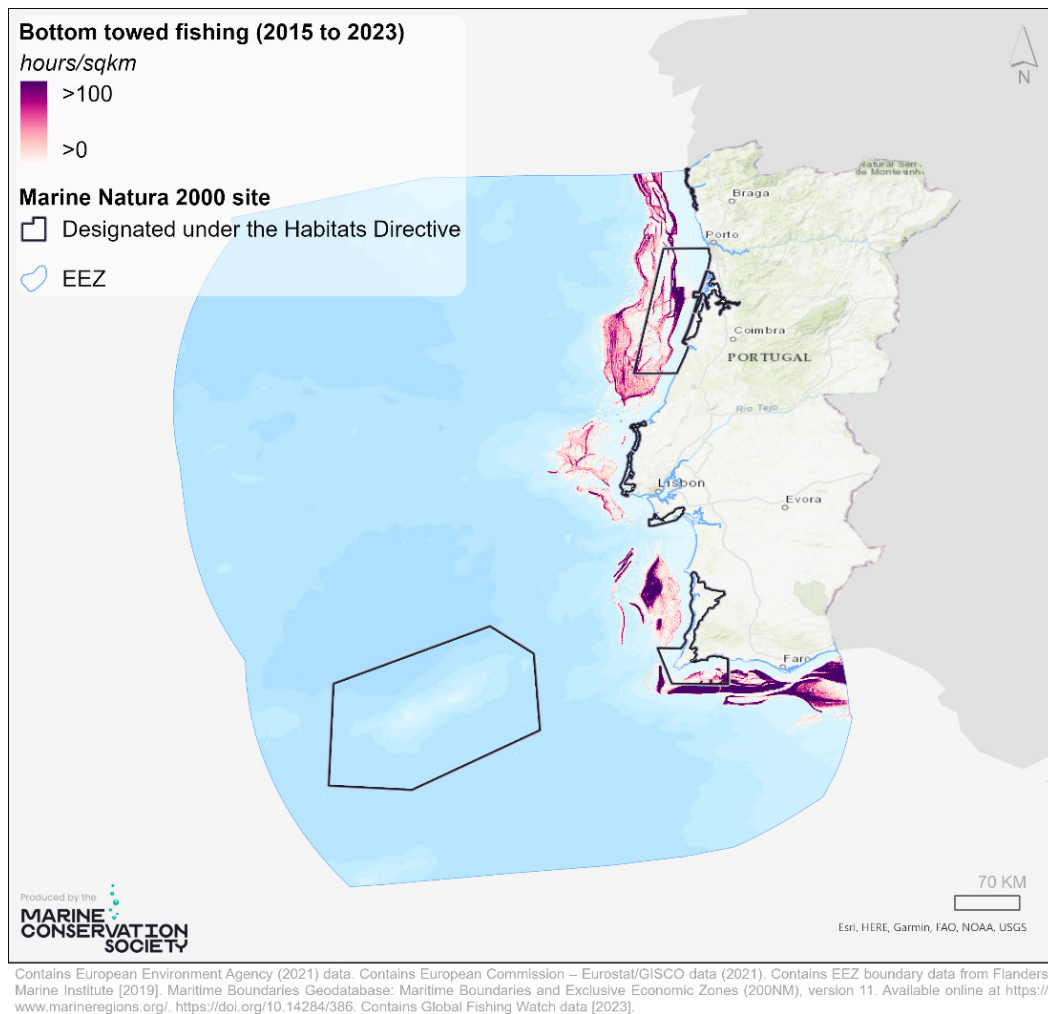
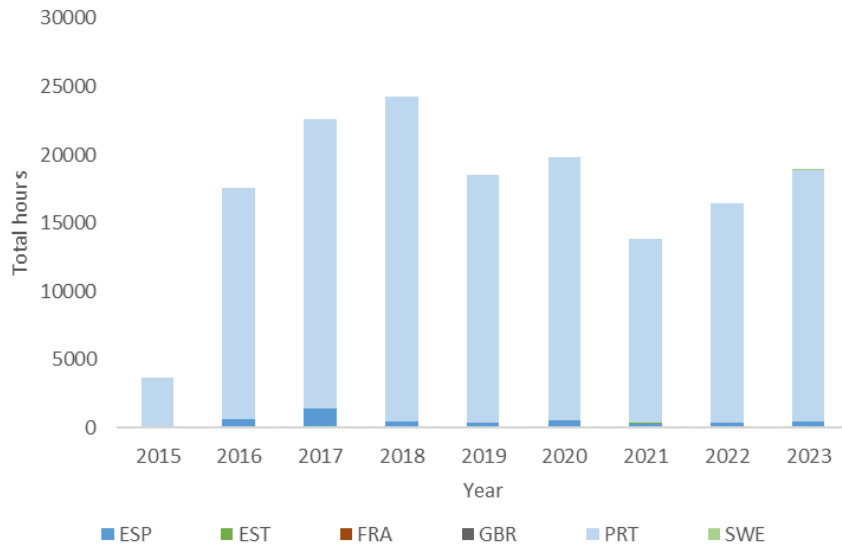
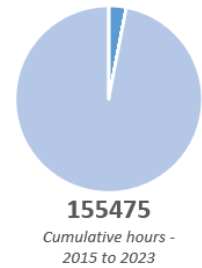


Figure 29 Cumulative bottom towed fishing activity in mainland Portuguese waters between January 2015 and December 2023. The Azores and Madeira have not been included in this map as no bottom towed fishing activity was recorded within their marine Natura 2000 sites.

**A**

**Total bottom towed fishing hours within all Natura 2000 Sites designated under the Habitats Directive**

**B****C**

**Bottom towed fishing rate within all Natura 2000 Sites designated under the Habitats Directive**



Figure 30 Total bottom towed fishing hours within all Portugal Natura 2000 sites designated under the Habitats Directive by fleet [A]. Fleet composition of cumulative hours recorded between 2015 and 2023 within all Portugal Natura 2000 sites designated under the Habitats Directive [B]. Bottom towed fishing rate within all Portugal Natura 2000 sites designated under the Habitats Directive by fleet [C].

## Top Natura 2000 sites: Bottom towed fishing hours

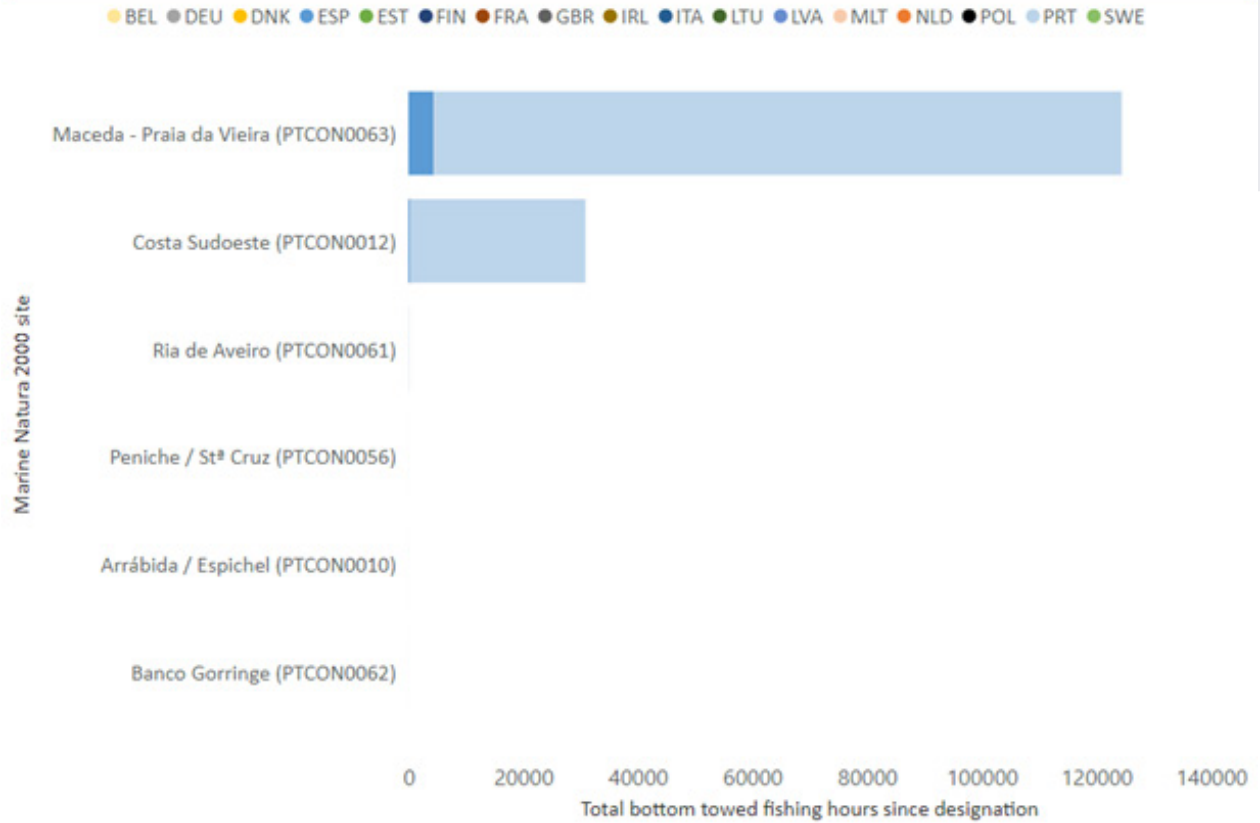


Figure 31 Total bottom towed fishing hours within each Portuguese marine Natura 2000 sites by fleet (only 6 Natura 2000 sites had bottom towed fishing recorded within them).

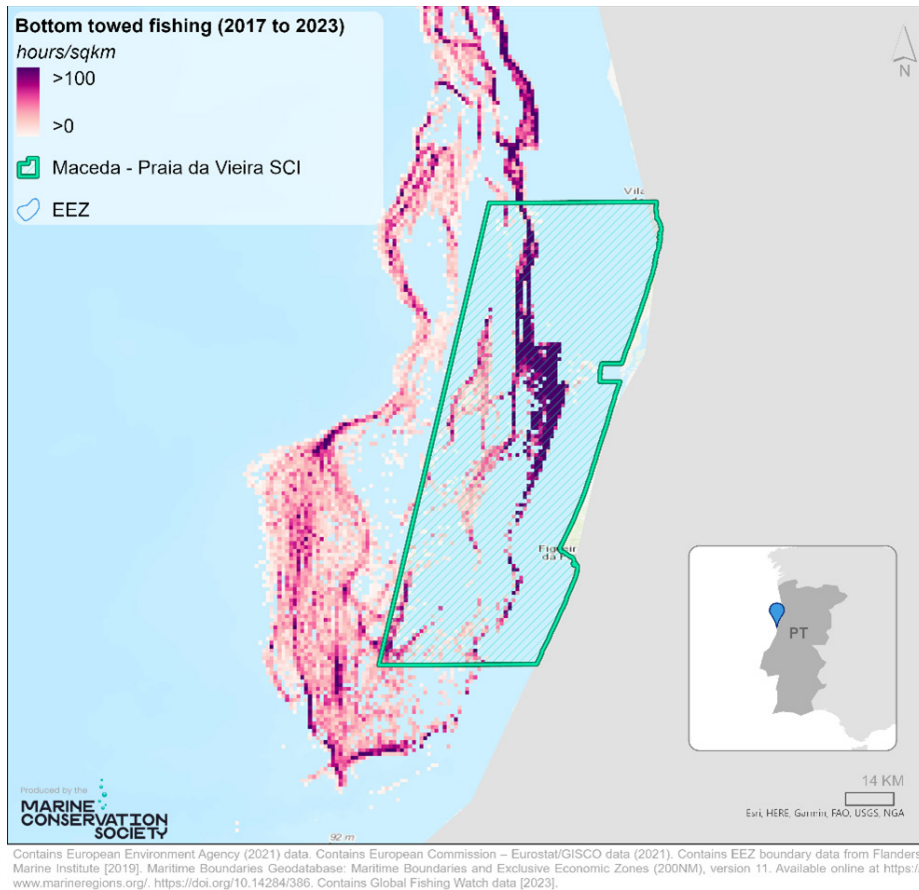


Figure 32 Cumulative bottom towed fishing activity in Maceda - Praia da Vieira SCI between January 2015 and December 2023.

## Top Natura 2000 sites: Fished area

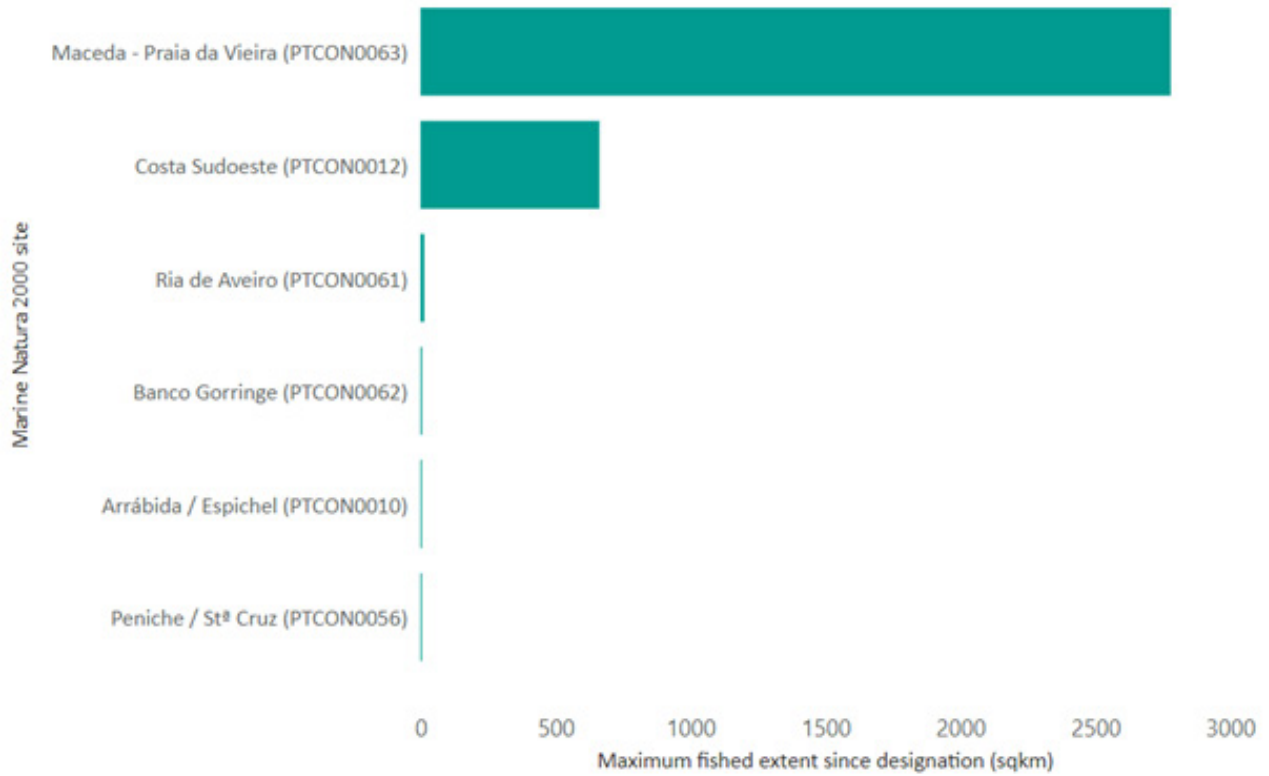


Figure 33 Portuguese marine Natura 2000 sites designated under the Habitats Directive that have the largest bottom fished area





## Spain

**Spain has 173 marine Natura 2000 sites designated under the Habitats Directive, and all but one of them list at least one seabed habitat as a designated feature** (Figure 34). **Between January 2015 and December 2023, vessels fished in Natura 2000 sites designated under the Habitats Directive for 461,554 hours using bottom towed gears** (Figure 35). **Fishing effort is largely concentrated close to shore particularly along Spain's Mediterranean and northwest coasts** (Figure 34). Fishing activity can mainly be attributed to the Spanish fleet (95% of total hours) with the French, Irish and Portuguese fleets responsible for the remaining 5% of activity (Figure 35B). Between 2015 and 2023, Spanish marine Natura 2000 sites designated under the Habitats Directive were fished at an average rate of 0.8 hours/km<sup>2</sup>/year. **Total fishing hours and rate have been declining since a peak in 2019** (Figures 35A and 35C).

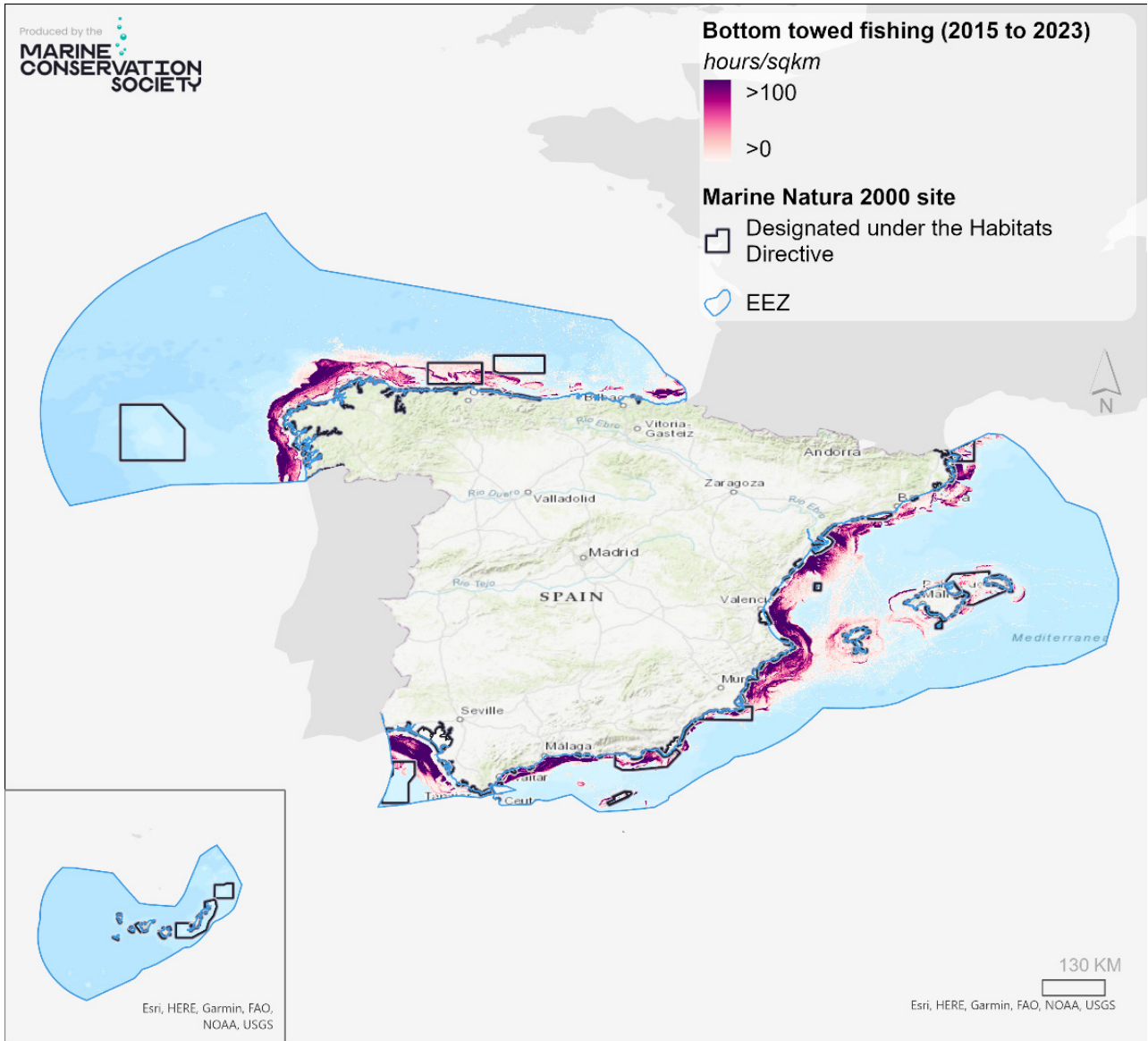
**Between 2015 and 2023, the highest total fishing hours were recorded in Sur de Almería – Seco de los Olivos SCI** (Site code: ESZZ16003)<sup>16</sup>, a site spanning inshore and offshore waters designated on the southern Mediterranean coast, **where 120,826 hours**

**of bottom towed fishing were recorded** (Figures 36 and 37). The site is designated under the Habitats Directive for reefs (1170) and Posidonia beds (1120), as well as bottlenose dolphin (*Tursiops truncatus*), and loggerhead turtle (*Caretta caretta*). All the fishing recorded within the site can be attributed to the Spanish fleet.

**Bottom towed fishing activity overlapped with up to 21% (11,900 km<sup>2</sup>) of Spanish seabed protected under the Habitats Directive between 2015 and 2023. Sistema de cañones submarinos de Avilés SCI<sup>17</sup>** (Site code: ESZZ12003) **had the largest spatial overlap with the fishing footprint**, with bottom towed gear being used across approximately 95% of the site (Figure 38). **The site spans 3390 km<sup>2</sup> inshore and offshore waters off the northern Spanish coast**, and is designated to protect reef (1170) features and a range of species including bottlenose dolphins (*Tursiops truncatus*), harbour porpoise (*Phocoena phocoena*) and loggerhead turtle (*Caretta caretta*) (Figure 39).

16. <https://eunis.eea.europa.eu/sites/ESZZ16003>

17. <https://eunis.eea.europa.eu/sites/ESZZ12003>



Contains European Environment Agency (2021) data. Contains European Commission – Eurostat/GISCO data (2021). Contains EEZ boundary data from Flanders Marine Institute [2019]. Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <https://www.marinerregions.org/>. <https://doi.org/10.14284/386>. Contains Global Fishing Watch data [2023].

Figure 34 Cumulative bottom towed fishing activity in Spanish waters between January 2015 and December 2023 .

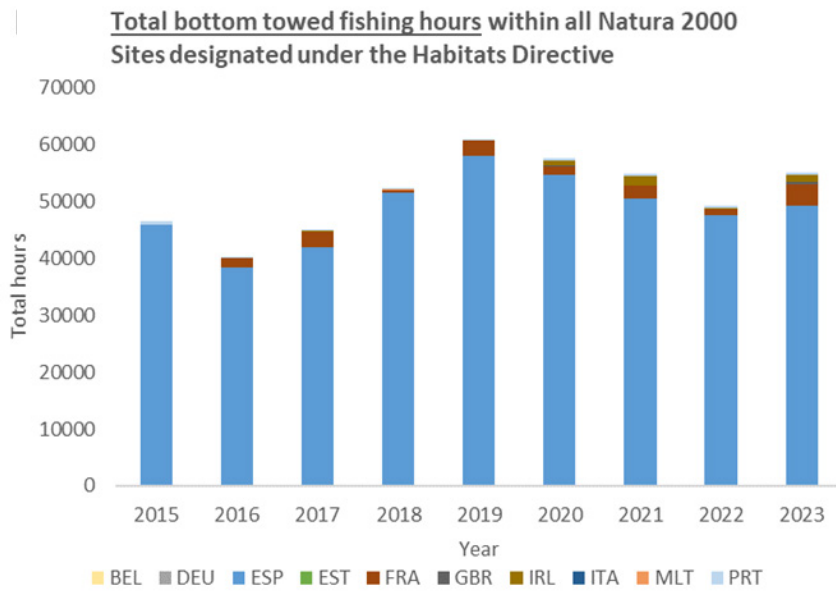
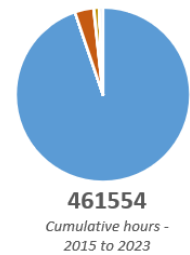
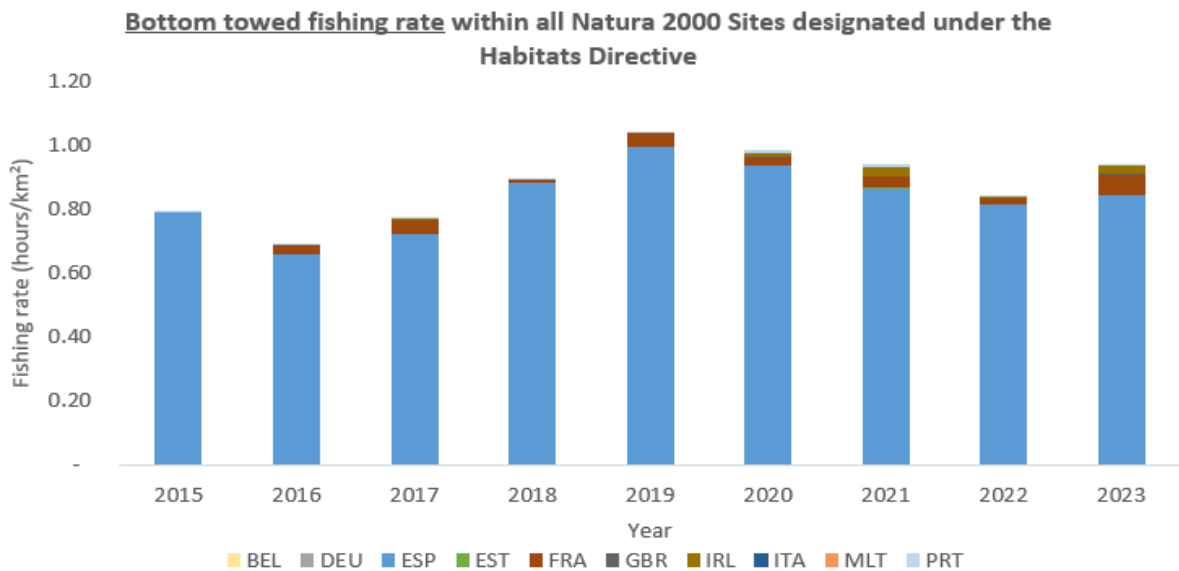
**A****B****C**

Figure 35 Total bottom towed fishing hours within all Spanish marine Natura 2000 sites designated under the Habitats Directive by fleet [A]. Fleet composition of cumulative hours recorded between 2015 and 2023 within all Spanish marine Natura 2000 sites designated under the Habitats Directive [B]. Bottom towed fishing rate within all Spanish marine Natura 2000 Sites designated under the Habitats Directive by fleet [C].



## Top Natura 2000 sites: Bottom towed fishing hours

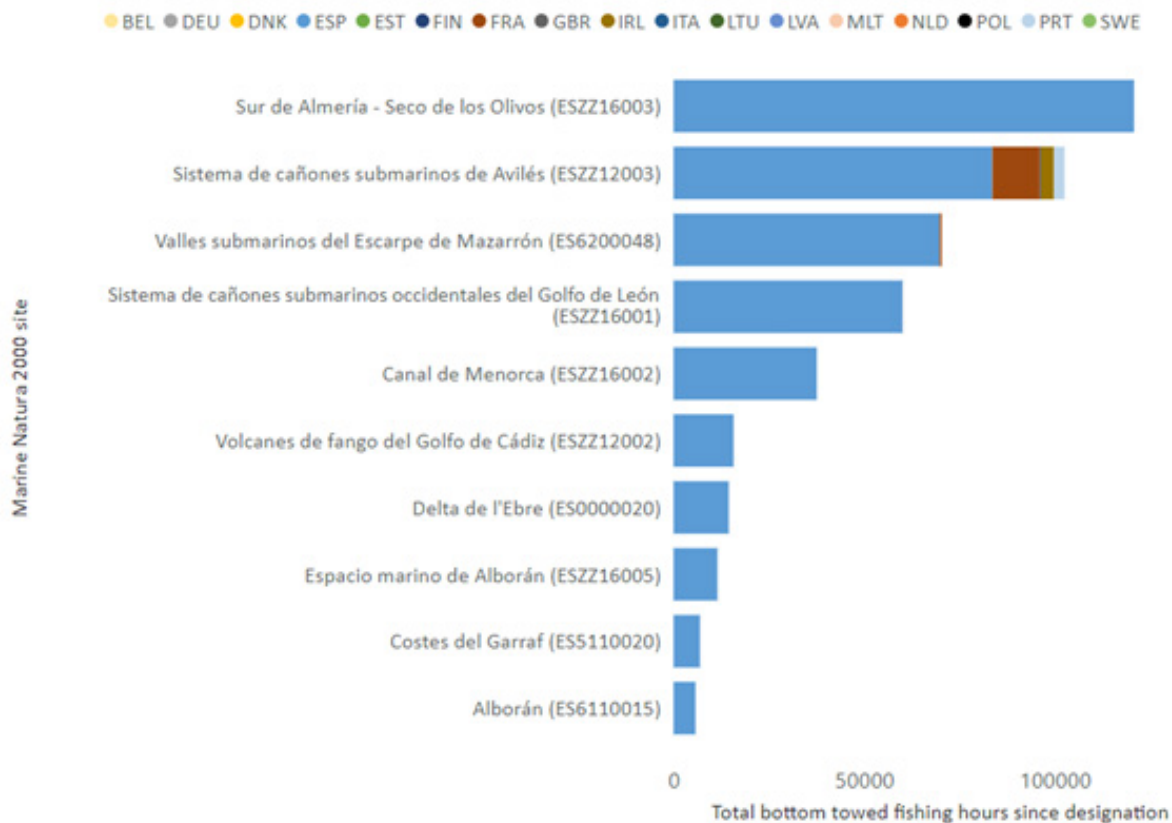


Figure 36 Total bottom towed fishing hours within each Spanish marine Natura 2000 site by fleet.

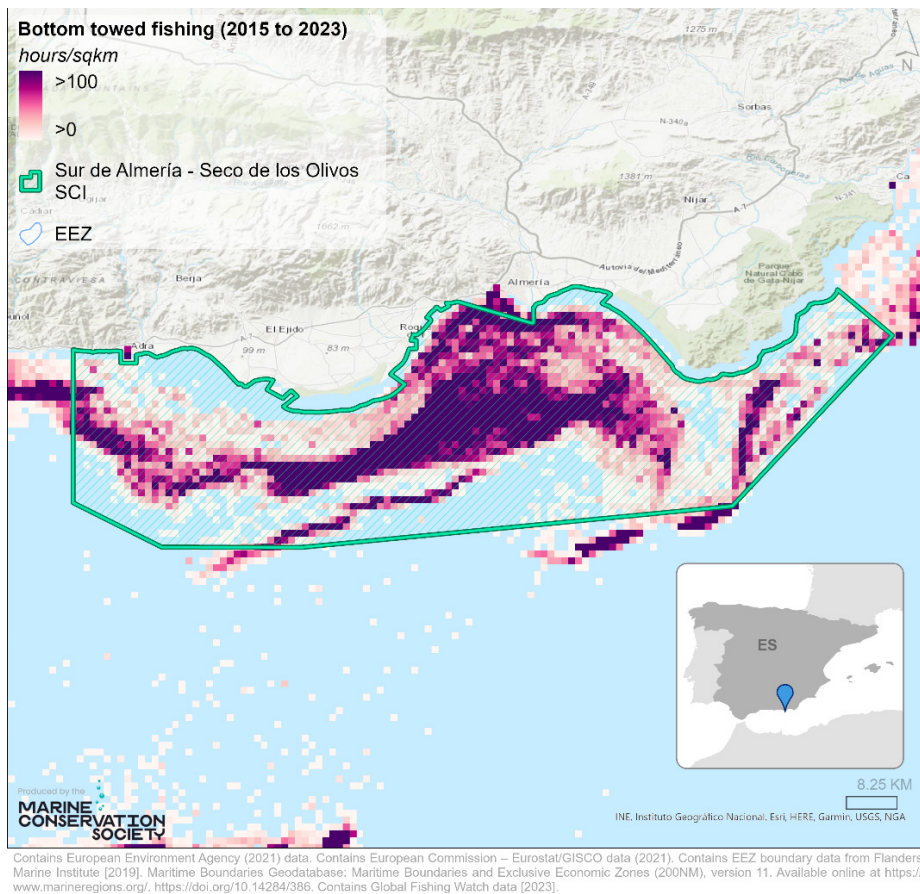


Figure 37 Cumulative bottom towed fishing activity in Sur de Almería - Seco de los Olivos SCI between January 2015 and December 2023.



## Top Natura 2000 sites: Fished area

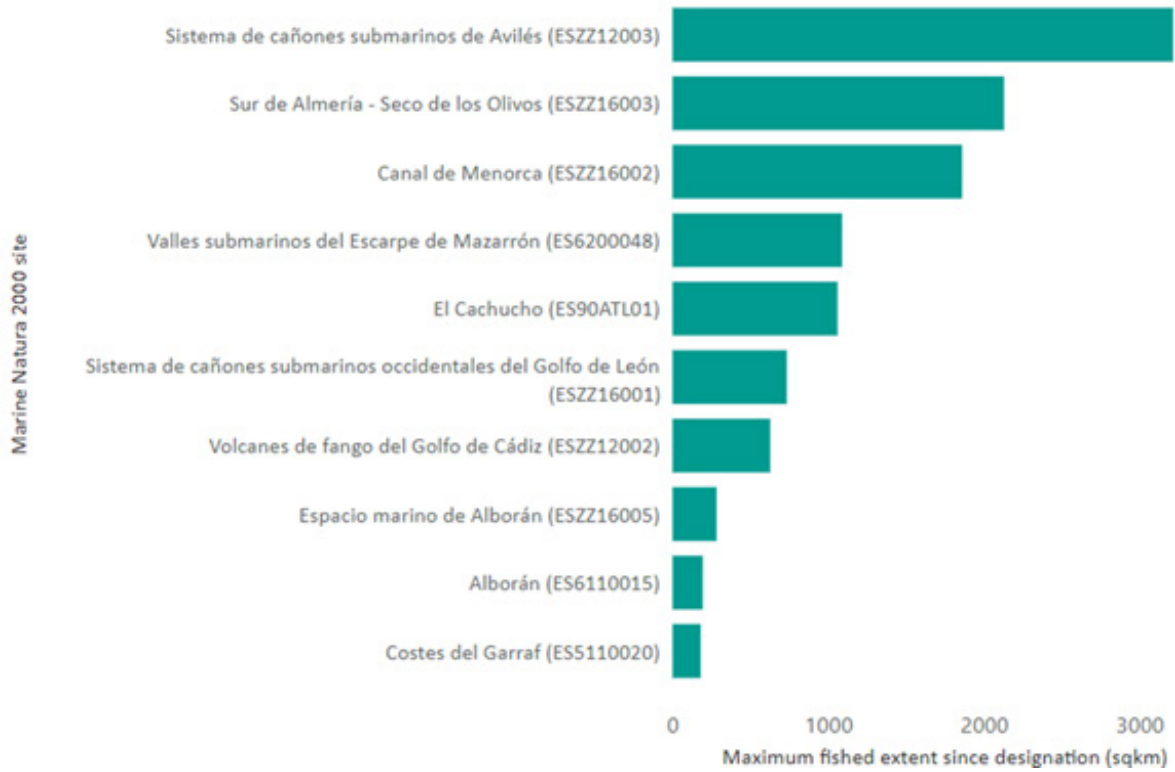


Figure 38 Spanish marine Natura 2000 sites designated under the Habitats Directive that have the largest bottom fished areas.

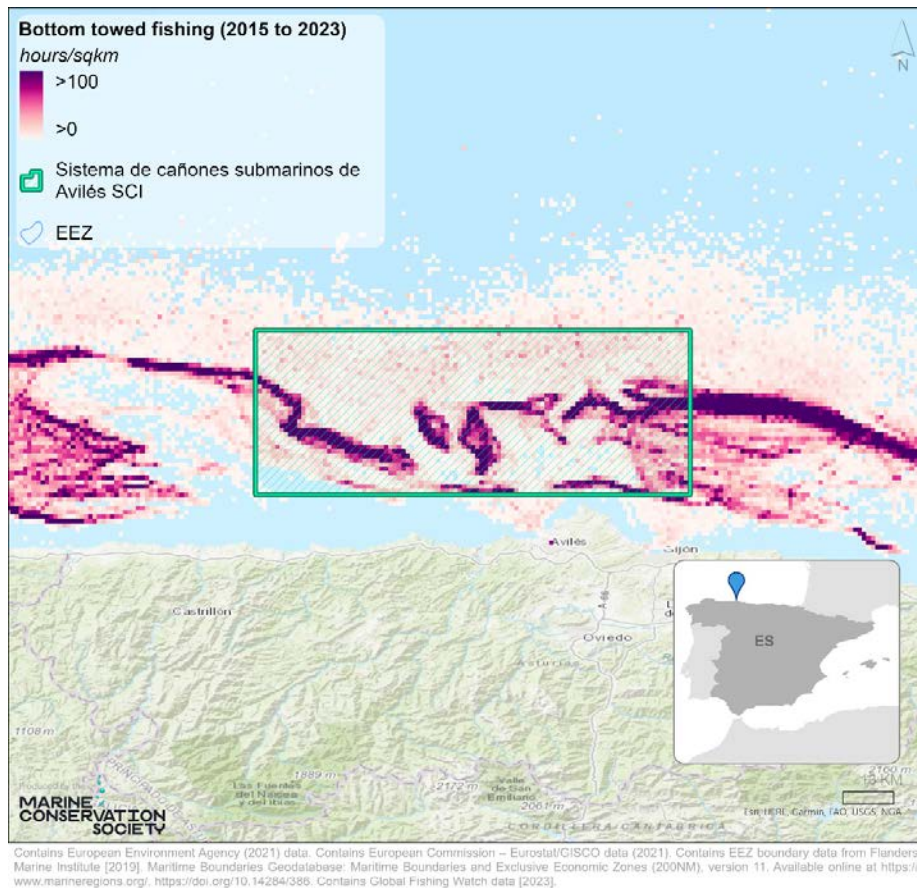


Figure 39 Cumulative bottom towed fishing effort overlap with the Sistema de cañones submarinos de Avilés SCI.



## Sweden

**Sweden has 534 marine Natura 2000 sites designated under the Habitats Directive, 57% of which list at least one seabed habitat as a designated feature** (Figure 40). Between January 2015 and December 2023, vessels fished for 190,690 hours using bottom towed gears (Figure 41). 96% of the total bottom towed fishing hours (183,260 hours) occurred within MPAs located in the Kattegat and Skagerrak (Figure 40) and can predominantly be attributed to the Swedish fleet (77% of total hours) and Danish fleet (22% of total hours), with Polish and German vessels responsible for the remaining 1%. The fishing hours recorded in the Baltic Proper are likely to mainly represent pelagic activity carried out by vessels with pelagic trawls registered as an auxiliary gear type.

Between 2015 and 2023, Swedish marine Natura 2000 sites designated under the Habitats Directive in the Kattegat and Skagerrak were fished at an average rate of 4 hours/km<sup>2</sup>/year. Total bottom towed fishing hours (Figure 41A) remained largely consistent despite additional Natura 2000 sites being designated in 2017 increasing the area covered by MPAs from 3540 km<sup>2</sup> in 2015 and 2016 to 6055 km<sup>2</sup> in 2017. This is reflected in the data for fishing rates recorded within the areas

covered by Natura 2000 sites dropping dramatically between 2016 and 2017 as the total area protected increased (Figure 41C).

**The Bratten SCI** (Site code: SE0520189)<sup>18</sup>, a site located off Sweden's west coast, experienced the highest number of bottom towed fishing hours with vessels fishing in the site for a total of 97,306 hours between 2015 and 2023 (Figures 42 and 43). The site is designated under the Habitats Directive for reefs (1170) and submarine structures made by leaking gases (1180). The fishing recorded within the site can be attributed to Swedish vessels (75% of activity) and Danish vessels (25% of activity).

**In the Kattegat and Skagerrak, bottom towed fishing activity overlapped with up to 2135 km<sup>2</sup> of Swedish seabed protected under the Habitats Directive** (~49% of the total area covered by marine HD Natura 2000 sites) **between 2015 and 2023. As with total fishing hours, Bratten SCI had the largest spatial overlap with the fishing footprint with bottom towed gear being used across 1200 km<sup>2</sup> of the site (equivalent to approximately 76% of its area; Figures 43 and 44).**

18. <https://eunis.eea.europa.eu/sites/SE0520189>



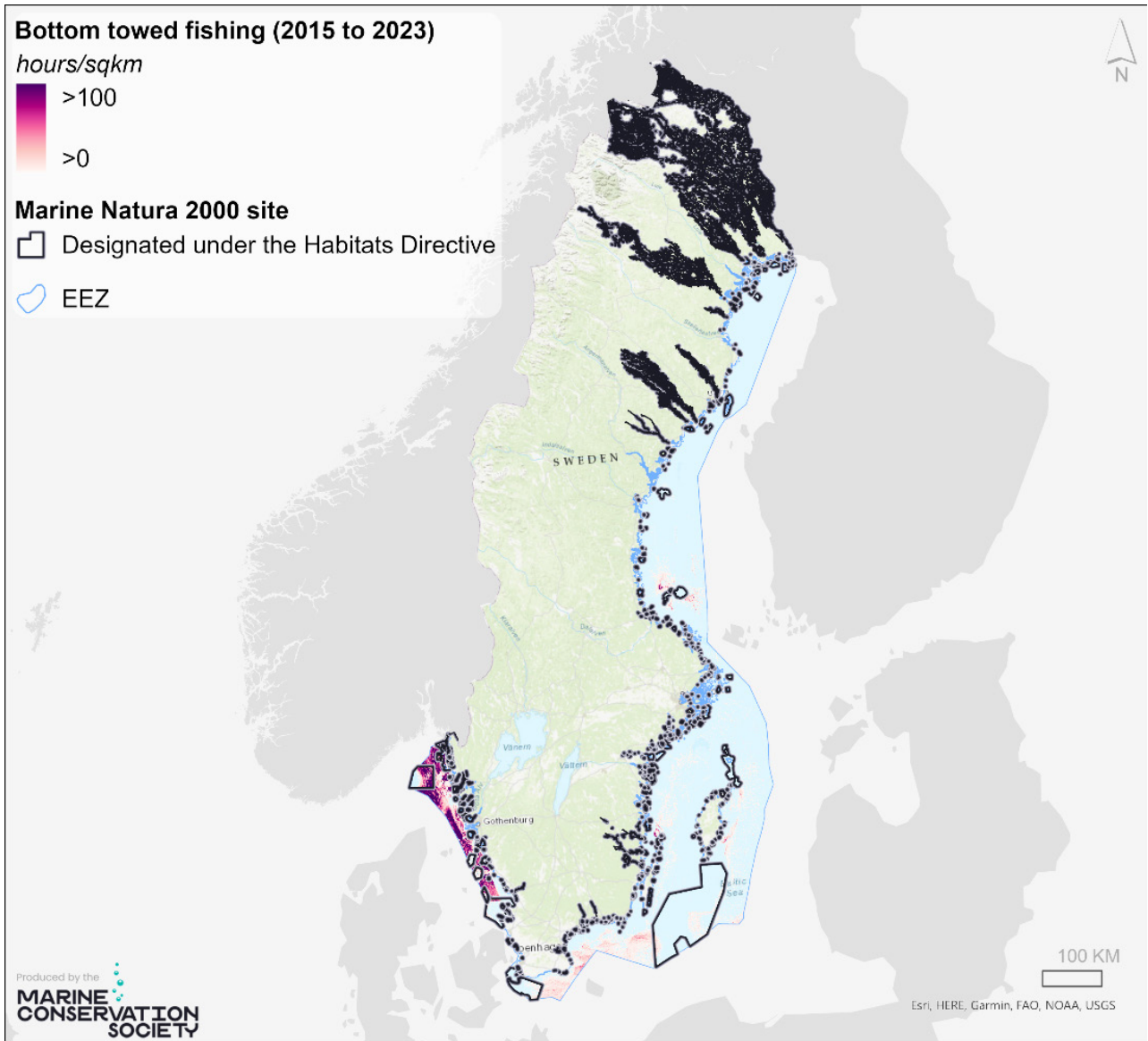
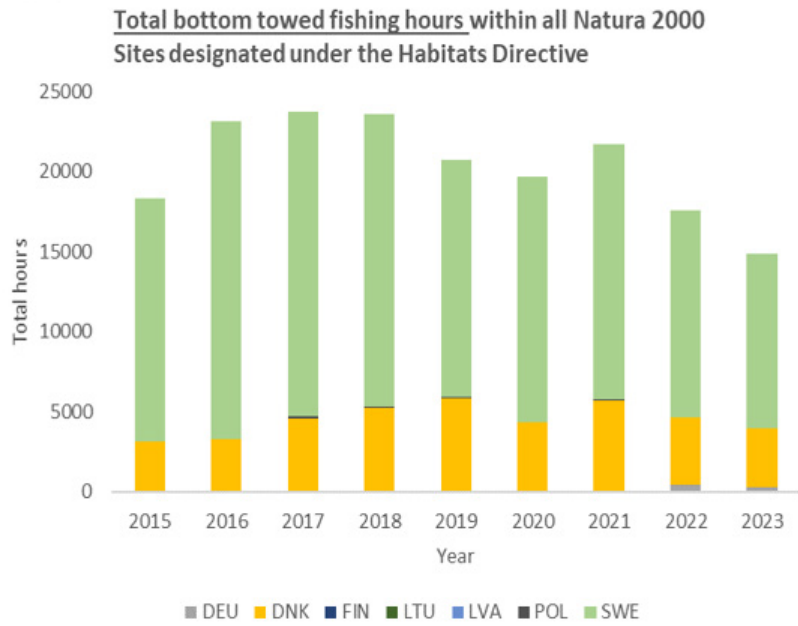
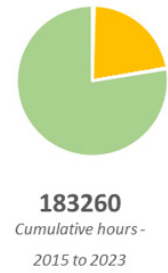


Figure 40 Cumulative bottom towed fishing activity in Swedish waters between January 2015 and December 2023.

**A**



**B**



**C**

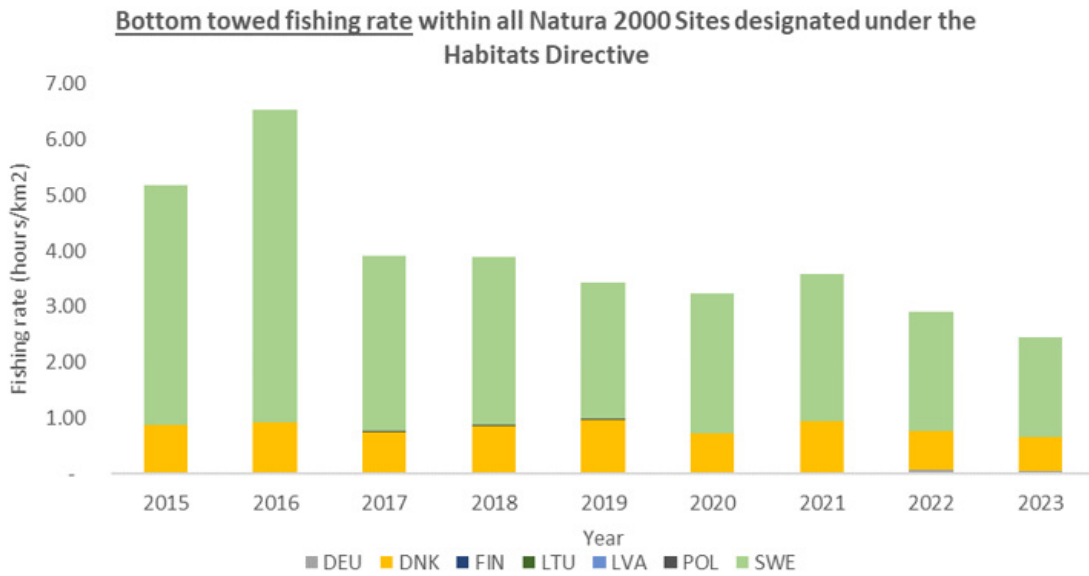


Figure 41 Total bottom towed fishing hours within Swedish marine Natura 2000 sites designated under the Habitats Directive in the Kattegat and Skagarrak by fleet [A]. Fleet composition of cumulative hours recorded between 2015 and 2023 within all Swedish marine Natura 2000 sites designated under the Habitats Directive [B]. Bottom towed fishing rate within all Swedish marine Natura 2000 sites designated under the Habitats Directive by fleet [C].



## Top Natura 2000 sites: Bottom towed fishing hours

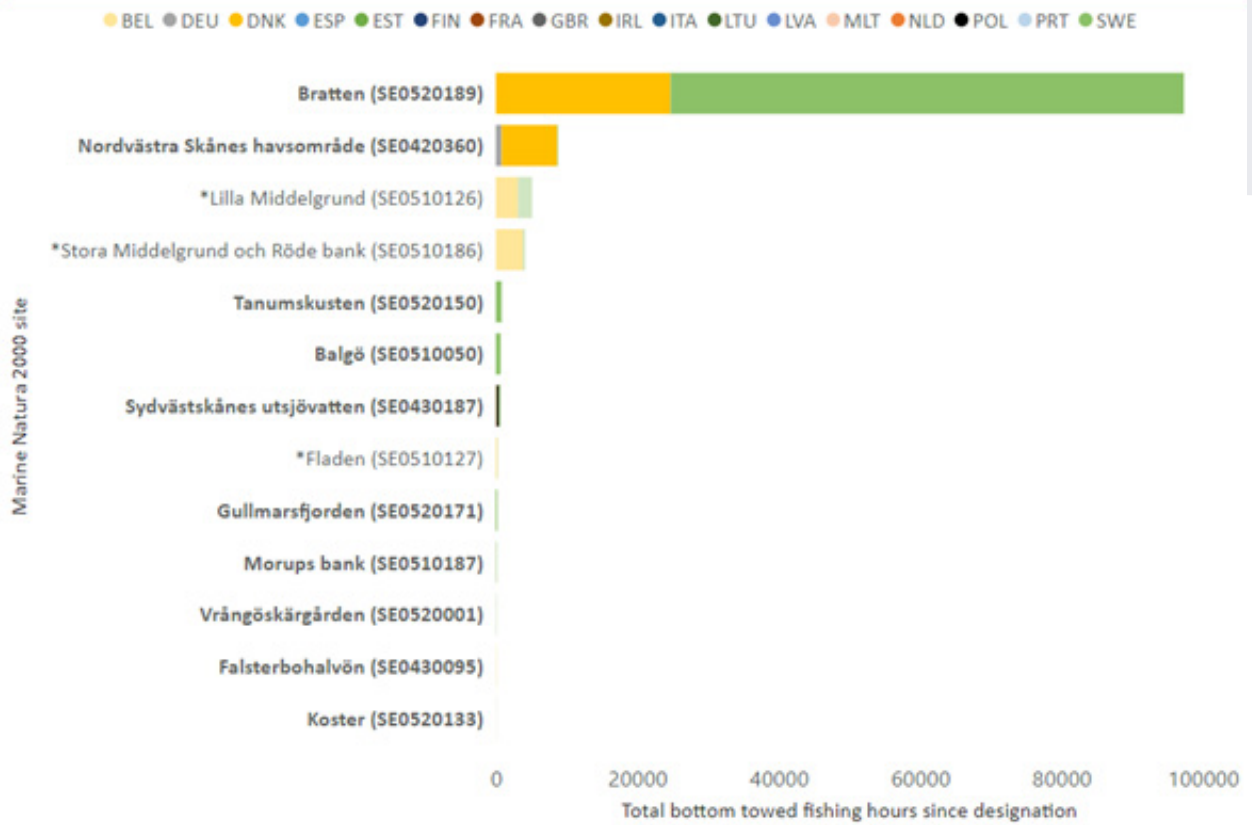


Figure 42 Bottom towed fishing hours within each marine Natura 2000 sites designated under the Habitats Directive in the Kattegat and Skagarrak by fleet. Sites marked with \* were closed to bottom towed fishing activity in 2022

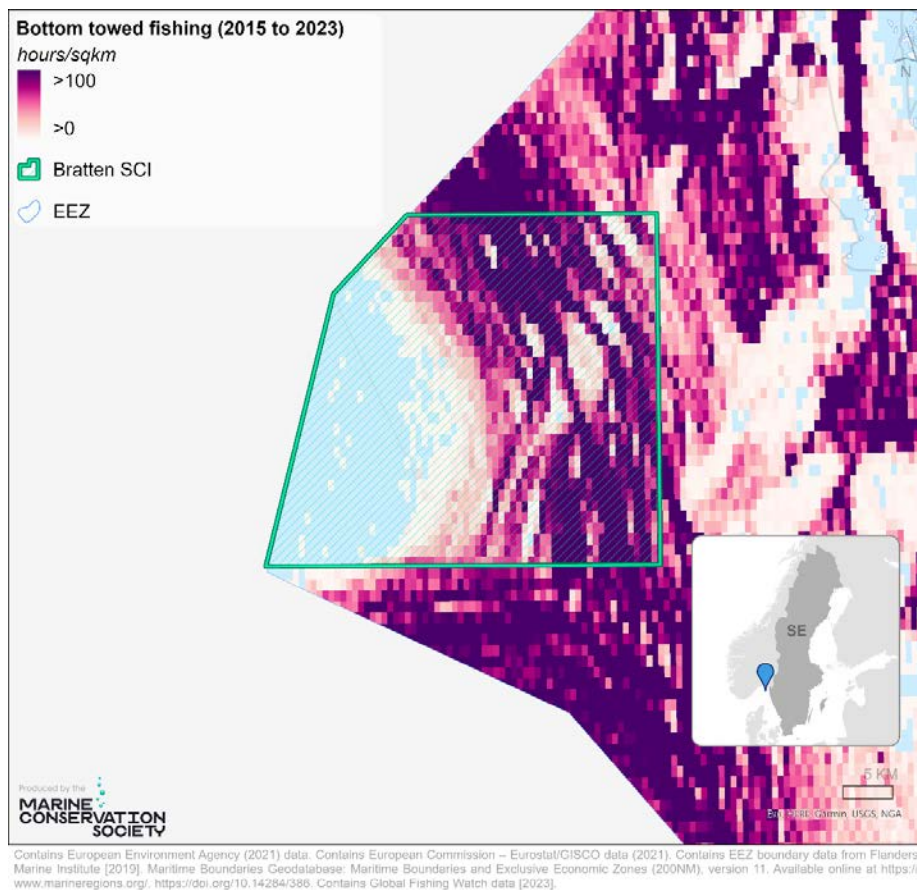


Figure 43 Cumulative bottom towed fishing activity in Kosterfjorden-Väderöfjorden SAC between January 2015 and December 2023.

## Top Natura 2000 sites: Fished area

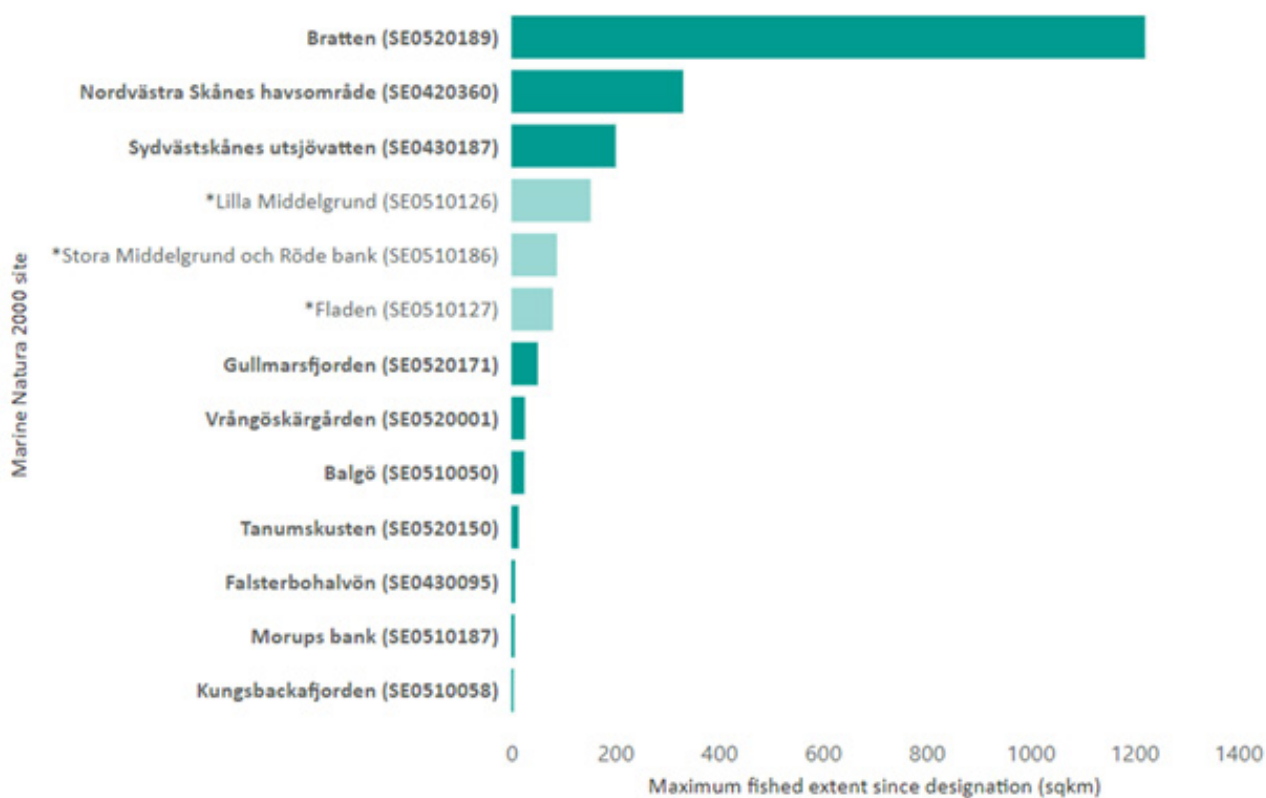


Figure 44 Swedish marine Natura 2000 sites designated under the Habitats Directive in the Kattegat and Skagarrak that have the largest bottom fished areas. Sites marked with \* were closed to bottom towed fishing activity in 2022.



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