ENERGINET - MARINE ENVIRONMENTAL STUDIES

Hesselø- fisheries report

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Objective:

The objective of this report is to provide baseline conditions on fishery activity in the Hesselø offshore wind farm area and export cable route in the Kattegat Sea.

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1 INTRODUCTION

To accelerate the expansion of Danish offshore wind production, it was decided with the agreement on the Finance Act for 2022 to offer an additional 2 GW of offshore wind for establishment before the end of 2030. In addition, the parties behind the Climate Agreement on Green Power and Heat 2022 of 25 June 2022 (hereinafter Climate Agreement 2022) decided), that areas that can accommodate an additional 4 GW of offshore wind must be offered for establishment before the end of 2030. Most recently, a political agreement was concluded on 30 May 2023, which establishes the framework for the Climate Agreement 2022 with the development of 9 GW of offshore wind, which potentially can be increased to 14 GW or more if the concession winners – i.e. the tenderers who will set up the offshore wind turbines – use the freedom included in the agreement to establish capacity in addition to the tendered minimum capacity of 1 GW per tendered area.

To enable the realization of the political agreements on significantly more energy production from offshore wind before the end of 2030, the Danish Energy Agency has drawn up a plan for the establishment of offshore wind farms in three areas in the North Sea, the Kattegat and the Baltic Sea respectively.

The Hesselø offshore wind farm (OWF) will consist of an area covering 166 km² in the Kattegat Sea. The area is located 30 km off the coast of Zealand and will connect to land via a subsea cable north of Zealand.

The objective of this baseline report is to present an overview of fishery activities in the OWF area Hesselø (Figure 1-1). This baseline study will contribute to a future project-specific environmental impact assessment (EIA) for the Hesselø area, enabling offshore wind farm (OWF) developers to evaluate the project's potential impact on fisheries and plan for appropriate mitigation measures.

A scope study report on fish and fisheries activities in and around the planned OWF area Hesselø was previously conducted (DNV, 2023). This report concluded that there are no significant knowledge gaps in the area and that a combination of existing baseline data, interviews with local fishers, and data analysis would provide a comprehensive overview of the fishery activities in the area. These conclusions were presented to and agreed upon with the Danish Energy Agency in a meeting held in January 2024.

Fishery activities are generally conducted in regulated areas where catch rates are optimal in relation to sailing distance. Additionally, the distance to shore and landing ports partly determines the size of vessels fishing in relevant areas. Fisheries must also adapt to the distribution of target species, reduced stocks, and/or low availability of a given target species. The fishing industry is also subject to extensive regulations concerning gear type, access to fishing areas, fishing periods, quotas, etc. Conditions that reduce the profitability of fisheries in each area, such as access restrictions and tool restrictions, could potentially increase fishing pressure to an unfavourable level in other waters.

This report presents data compiled from publicly available sources and previous studies in the relevant area, commercial fishery statistics from the Kattegat Sea, and relevant harbours. Interviews with local fishers have provided supplemental information about the distribution and characteristics of different fisheries in the Hesselø OWF area and its region.

1.1 Abbreviations

Abbreviation	Explanation
AIS	Automatic Identification Systems
CFP	European Union's Common Fisheries Policy
DMA	Danish Maritime Authority (Søfartsstyrelsen, SFS)
DPFO	Danmarks Fiskeriforening
EIA	Environmental Impact Assessment
GPS	Global Positioning System
GW	Giga watt
ICES	International Council for the Exploration of the Sea
Landfall	Is where the cable transfers from sea to land
MSP	Marine Spatial Plan
OWF	Offshore Wind Farm
VMS	Vessel Monitoring System

2 HESSELØ

The planned Hesselø OWF is located in the Kattegat Sea (Figure 2-1). Figure 2-1 also indicates the ICES rectangles included in Kattegat. Details on the OWF area size, water depths, and cable corridors are given in Table 2-1.

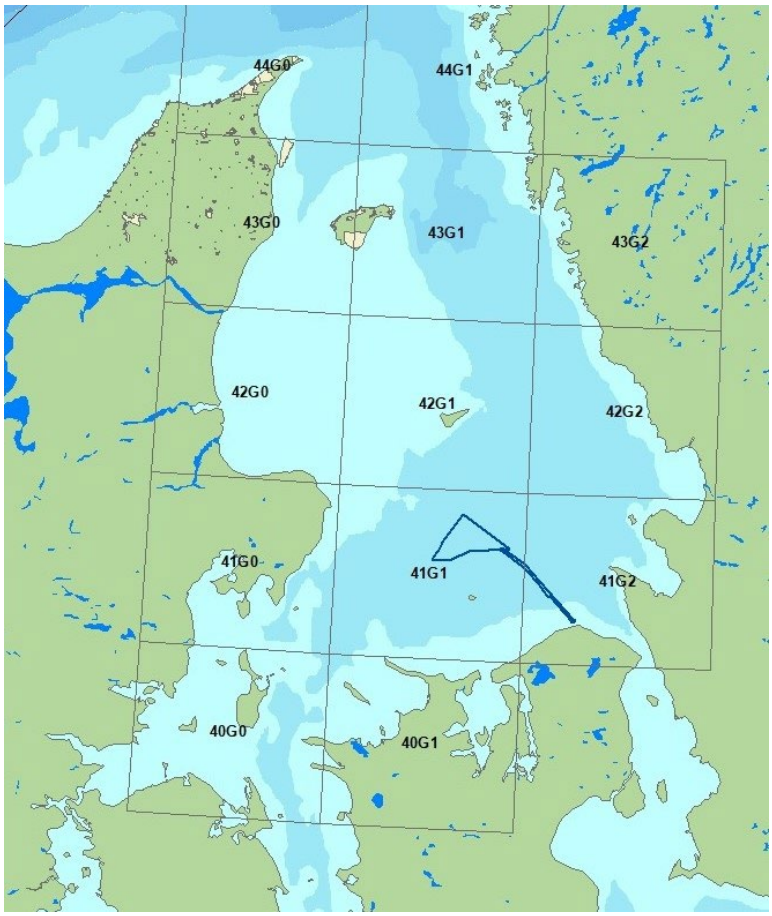


Figure 2-1. Hesselø OWF area and export cable route. Source: Energinet, 2023.

Table 2-1. Hesselø OWF area and export cable route. Source: Energinet, 2022.

Offshore wind farm	Area (km^2)	Water depths (m)	Export cable corridor	Shortest distance to shore (km)
Hesselø	166	10-40	North coast of Zealand	30

2.1 Hydrography

In Kattegat, there is a mixing of the brackish water of the Baltic Sea and salt water of the North Sea. Depending on outflow and inflow events and their extent, the salinity can vary considerably and there is typically a stratification with more salty bottom water, which is most prevalent during summer (Figure 2-2). The biological diversity is strongly regulated by the salinity, but also light (depth), water flow, and oxygen are conditions that may affect both the diversity and the density of the individual organisms.

The depths in the planned Hesselø OWF area range from 10- 40 m (Table 2-1). The hydrography of the water column in the original planned Hesselø OWF area was permanently stratified with a halocline situated at about 15 meters depth separating a bottom water mass of high saline water originating from the Skagerrak/North Sea from the brackish less

saline surface water layer that represents a mix of Baltic water and more saline bottom water (NIRAS, 2022a). Bottom salinity was approximately 30 ppt or above while the surface salinity was approximately 20 ppt; however, with considerably more temporal variation than the bottom water. Oxygen conditions were generally good and oxygen depletion events occurred only rarely in original Hesselø OWF area. Figure 2-2 and Figure 2-3 shows the currents and average current speed in the Kattegat and specifically for the Hesselø OWF area.

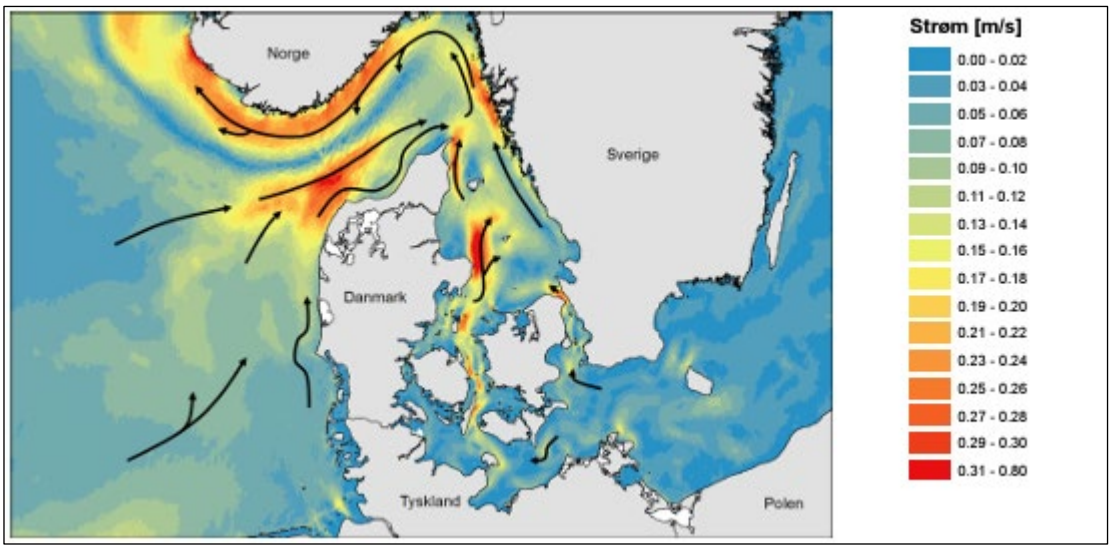


Figure 2-2. Currents and the average current speed, 2013 -2016. Source: DHI, 2017 in Miljø- og Fødevareministeriet, 2019.

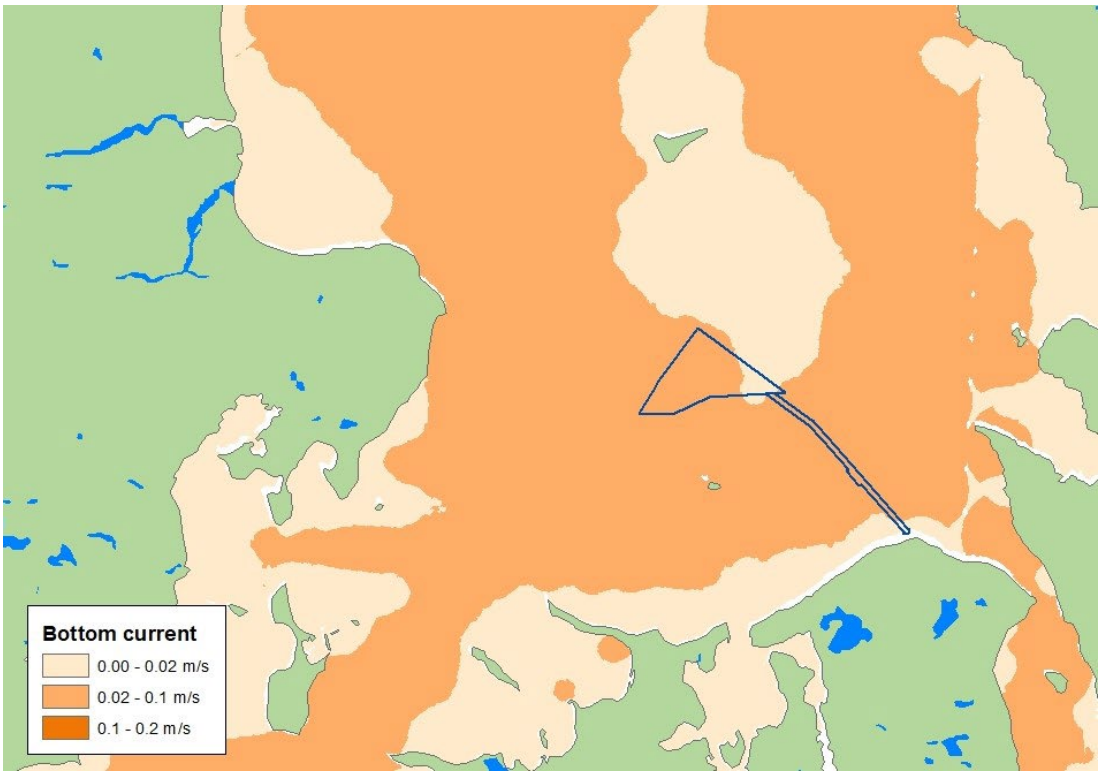


Figure 2-2. Annual mean bottom current velocity in the Hesselø OWF area. Source: The Danish Spatial and Environmental Planning Agency, 2007.

2.2 Marine substrate

A larger part of the seabed in the planned Hesselø OWF area consists of sand (Figure 2-4). In the central and southern part of the area the seabed consists of gravel and coarse sand, with till/diamicton (contains particles ranging in size from clay to boulders) and stones in the central part of the area. A channel structure consisting of muddy sand runs through the area with a north-south orientation. The export cable corridor passes through an area of sand, muddy sand, till/diamicton and gravel and coarse sand. Landfall is planned on the north coast of Zealand, where the coast alternates between sandy beaches and stony coast (COWI, 2022).

Flatfish are typically found on sandy bottoms, which are crucial for their ability to hide by covering themselves or burrowing into the sand. This is also important for sandeel, which burrow at night and during long periods in winter. Usually, a more varied seabed closer to the coast, like what is found in the Kattegat OWF area, create a variety of habitats, often leading to high fish species diversity. For instance, common gobies (*Gobiidae* spp.), juvenile plaice, and flounder are likely abundant in these mixed habitats (Muus & Nielsen, 1999 in NIRAS, 2022b).

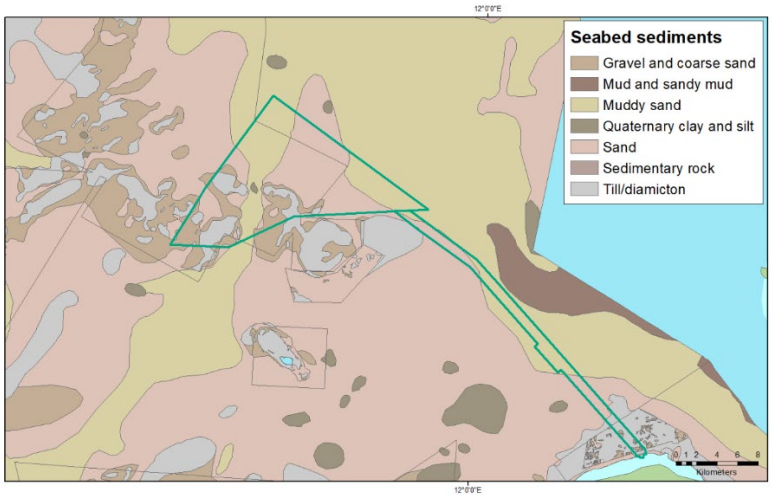


Figure 2-4. Seabed sediments in the Hesselø OWF area and export cable corridors. Source: GEUS, 2023.

3 DATA SOURCES

The characteristics of the fisheries are described using official fishery statistics obtained from Statistics Denmark and from interviews with several fishers who conduct their fisheries in and near the OWF area of Hesselø. Detailed catch, landings, and vessel information have been obtained from Statistics Denmark. AIS and VMS data have been used to illustrate the fishing intensity in these areas.

The Vessel Monitoring System (VMS) is a satellite-based global positioning system (GPS) used in commercial fishing to monitor the location of fishing vessels at sea. Since 2012, VMS monitoring has been applied to all vessels ≥12 m. By estimating the period of fishery activity according to vessel speed, this data can be used to indicate specific distributions of the fisheries according to gear. Because the VMS data only includes vessels ≥12 m, it is not possible to fully determine the distribution of smaller vessels and how often these may be fishing in the Hesselø area. However, because the OWF area is a considerable distance offshore and the predominant fisheries are by trawlers, which are generally large, the VMS data are considered to represent the fisheries in the OWF area. Furthermore, the landings by vessels < 10 m can be assumed to be considerably less than those from larger vessels and are considered of less relevance than those obtained from logbooks (all vessels ≥10 m).

3.1 Official fisheries statistics

In addition to VMS data, data on commercial fisheries, fleet statistics, along with data from the harbours in the regional area of the Hesselø OWF project area, were obtained from Statistics Denmark.

Only catches from larger vessels (≥12 m) are registered by VMS in the Kattegat (ICES subdivision 21). Given that the fishery statistical areas are relatively large compared to the area for Hesselø OWF (approximately 166 km²), and the official statistics from Kattegat does not provide subdivision according to ICES, the official fishing statistics can only provide a general insight into the extent and characteristics of the fisheries.

For a better resolution of specific fishing areas, Danish vessel monitoring system (VMS) data linked to logbook data by time - correlating the time and dates from fishing trips noted in logbook data with corresponding time and dates of VMS plots of the same vessel - was obtained from Statistics Denmark. This allowed for the association of VMS position points with the distribution of fisheries using specific gear and targeting specific species.

To further provide information on active fishing areas, a combination of AIS (Automatic Identification System) and VMS data has been utilized. AIS, developed as a collision avoidance system, complements the VMS data to give a more detailed view of fishing activities.

The landing data of smaller vessels from the local harbour of Gilleleje is presented to estimate the contribution to the fisheries potentially locally affected by the establishment of an OWF.

All values of landings and economic calculations are based on the average price per kilo for each commercial species over the past 10 years (2013-2023). The data was obtained from Statistics Denmark.

3.2 Information from fishers and their organisations

Fishers naturally possess extensive knowledge and experience regarding the occurrence of commercial fish species and the practice of fishing in specific areas. This knowledge is typically not documented and can only be obtained through interviews. Therefore, it was performed interviews with 9 fishers located in Bønnerup, Grenå and Gilleleje who have interests in the relevant waters should be conducted Krog Consult, represented by fishery consultant Carsten Krog, carried out these interviews in spring 2024.

Initially, the main organization for fishers, Danmarks Fiskeriforening (DFPO), was contacted to inform them about the ongoing project and to get suggestions for fishers who might be relevant to contact (Krog Consult, 2024). Subsequently,

contact was made with the local fishing association chairmen in the ports of Hundested, Grenå, and Gilleleje to arrange meetings with the fishers in the primary landing ports. Information from these interviews was noted and used as a source of confirmation.

During the meetings, fishers were asked about their interests in the Hesselø OWF area - where and when they fish (possibly documented with GPS data), which gear they use (possibly documented with photos), fish species and quantities, knowledge of spawning areas, etc. Furthermore, each fisherman was asked about their knowledge of other fishers, possibly from other ports (including foreign ones), who are also active in the area. Appendix 3 shows a comparison of landings from foreign and Danish vessels in the Kattegat area.

A meeting was held in Gilleleje on 7 May 2024 with the participation of the auctioneer, the Chairman of the Gilleleje Fishing Association, and two trawlers. Subsequently, contact was made with three other fishers with interests in and around the Hesselø OWF area. Electronic maps were obtained from several fishers. The names of the interviewed fishers and others are not publicly available, and the fishers are therefore indicated by a number which refers to a number on the list of participants (Krog Consult, 2024).

3.3 Fisheries control and regulations

The fishing effort in a given area is not only dependent on the available resources and the technical abilities of the fishers but has increasingly been subject to more comprehensive and detailed regulations. These regulations are predominantly based on the biological advice from the National Institute of Aquatic Resources (DTU Aqua) and the International Council for the Exploration of the Sea (ICES), but they also consider political and economic factors. This framework is crucial for the composition and amount of the catches; therefore, a brief description of these regulations is given in the following.

The National Institute of Aquatic Resources (DTU Aqua) and the International Council for the Exploration of the Sea (ICES) provide scientific advice to support sustainable fisheries management in Denmark. Their biological advice is based on comprehensive assessments of fish stocks, ecosystems, and environmental conditions. DTU Aqua conducts regular monitoring of fish stocks such as cod, herring, and sprat, providing data on population size, age structure, and reproductive status. They also conduct ecosystem considerations based on research on the impacts of fishing on the broader marine ecosystem, including bycatch, habitat destruction, and interactions with other species. ICES provides scientific advice to inform fisheries management decisions within the framework of the European Union’s Common Fisheries Policy (CFP). ICES recommends total allowable catches based on stock assessments, ensuring that fishing pressure is kept within sustainable limits, and reports on the status of key fish stocks, highlighting trends, stock health, and potential risks.

As an example, ICES have expressed concerns about the status of cod in the Kattegat Sea. ICES advises that there should be zero catch for cod in 2025 and 2026 (subdivision 21) (ICES, 2024a). There is no targeted cod fishery in the Kattegat at present and as a result catches of the stock are low and mostly discarded. Catches are mainly taken as bycatch in the Norway lobster fishery, which implies that the fishing mortality of the stock is linked to effort directed to the Norway lobster fishery (ICES, 2023). Another example is herring in the Kattegat, where ICES recommends zero catch in 2025 (ICES, 2024b). This advice also reflects a precautionary approach to ensure that the herring population can sustain itself and recover from previous declines.

By integrating these scientific recommendations into fisheries management policies, Denmark, and the EU aim to ensure the long-term sustainability and health of fish stocks and marine ecosystems in the Kattegat. These regulations can significantly influence the number of landings from year to year, and these mechanisms can create fluctuations in the total annual landings and value of the fisheries in the Kattegat Sea.

3.4 Commercial species

Information about the fish species in and near the Hesselø OWF area, including commercial fish species of interest, as well as an assessment of the sensitivities of these fish species to the construction, operation, and decommissioning of an OWF, is presented in a separate report (DNV, 2024).

To provide a comprehensive picture of the potential impacts on the fisheries, including their resources (fish and shellfish), the potential impacts of the Hesselø OWF on relevant commercial fish species will be assessed in a future project-specific EIA.

4 THE EXTENT OF FISHERIES IN THE KATTEGAT SEA

The commercial fishery in the Kattegat is similar to the North Sea and is dominated by a number of commercially valuable flatfish species (primarily plaice, dab, sole, flounder, turbot, brill), and codfish (haddock, whiting and pollack) and in recent years a large abundance of the greater weever. Because large part of the deeper parts of the southern Kattegat seabed are soft bottoms, a preferred habitat by the Norway lobster, this valuable commercial species is also very abundant and supports a lucrative fishery. Kattegat also has traditionally had a large abundance of the pelagic species sprat and herring and visited by seasonal migrants of commercial species that include lumpsucker, mackerel, garfish, and eel among others (NIRAS, 2022a).

This section gives an overview of different types of fishing gear and how they are used. Development of OWF could potentially have impact on fishing activities in the OWF area and the immediate surroundings. Furthermore, this section gives and overview of the landed catch in the OWF area in order to provide information of potential income loss for fishers in the OWF area.

The northern part of the Hesselø OWF area is an important area for trawling (Figure 4-1) (COWI, 2022). There is also extensive fishing for Norwegian lobster in the soft bottom areas. In addition, fishing also takes place in the southern part of the planned area for Hesselø OWF (Egekvist et al., 2017, in COWI, 2022). In the Marine Spatial Plan (MSP) in Denmark, areas for aquaculture have been reserved in the immediate vicinity and south-western part of project of the area. There are currently (summer 2024) no known plans for establishing aquaculture in these areas.

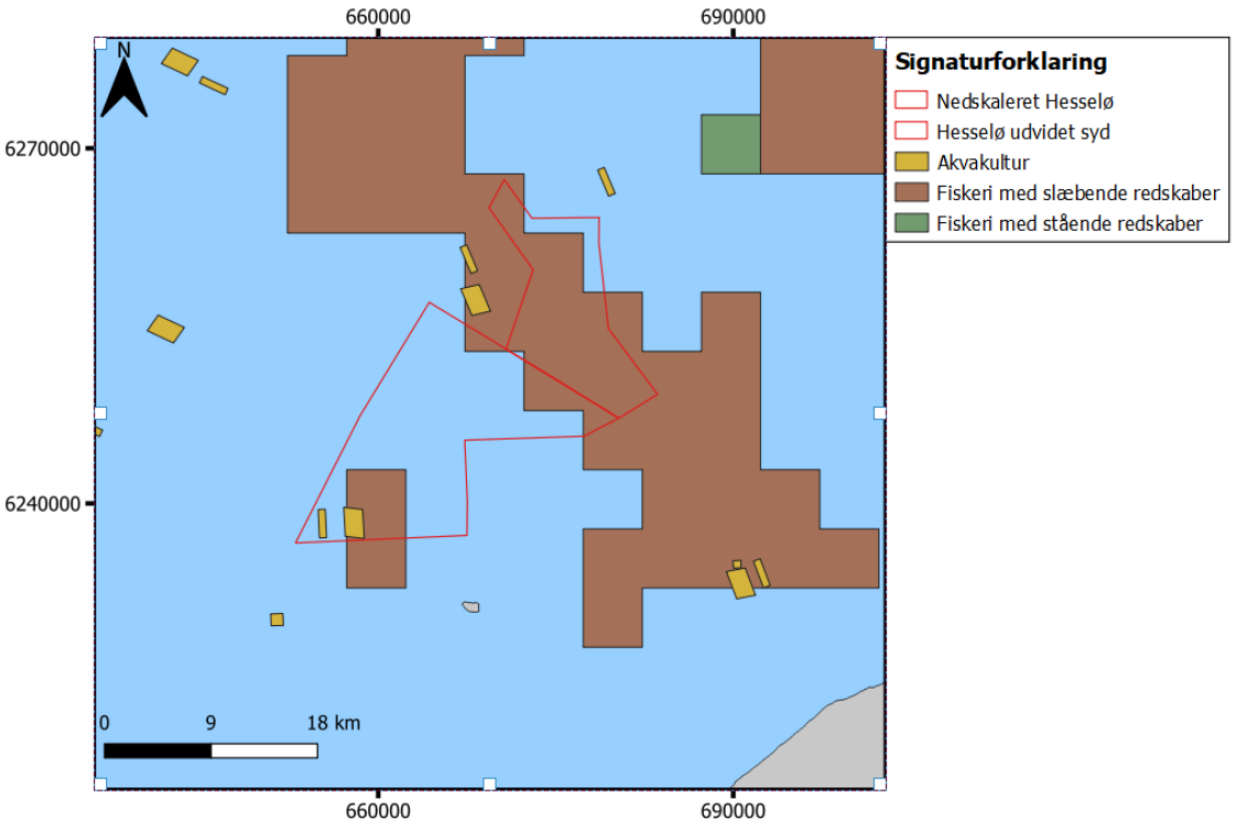


Figure 4-1. The most important fishing areas for trawling vessels (brown) and net fishing (green) in and around the Hesselø OWF area, in the period 2007-2015. A part of the original planned area for Hesselø OWF is shown in the north (Nedskaleret Hesselø). Areas reserved for aquaculture in the Danish MSP are shown in orange. Source: Egekvist et al., 2017 in COWI, 2022.

In the Kattegat there are a number of different types of commercial fisheries that are being undertaken. Fishery activities include using gear that are considered “active gear” (for example, bottom and pelagic trawls and occasionally seine nets) that are actively pulled along the bottom or through the water, and “passive gear” (gillnets, pots, etc.) which are stationary and dependent on movement of the target species to be captured. The following sections describe the most common types of fishing gear used in the Hesselø OWF area.

Trawl fishing is the predominant method in the northern part of the Hesselø OWF area. In trawl fishing, the trawl net is spread out using so-called trawl doors. When employing a multi-trawl, two or more trawls are connected with weights at the connection points, in addition to weights at the wing tips of the trawl (Figure 4-2). The trawls can be either bottom or floating (pelagic) trawls. On very uneven or rocky seabeds, some type of trawl protection is used on the lower part of the trawl (Figure 4-3).

When fishing for species like sandeel and sprat, floating trawls might occasionally touch the seabed, and the vessels must be cautious of larger structures to avoid hooking. This gear is characterized by relatively long towing times of 3.5 to 7 hours at a speed of approximately 3 knots (NIRAS, 2015).

Regardless of whether floating or bottom trawls are used, trawl doors are employed to spread the trawl. Trawl doors are steel plates of various shapes and weights, depending on the size of the vessel. Vessels aim to minimize drag, so it is crucial that the trawl blades do not hook on the seabed. Under normal conditions, the top few centimetres of the seabed can be affected. In shallower waters the trawl blades in floating trawling can also touch the seabed.

In double trawl fishing, trawl doors are not used. The fishing depth and the vertical opening of the trawl are regulated using chain blocks on the lower tip of the trawl. Depending on the water depth, these weights can drag along the seabed, but it is optimal to reduce drag as much as possible while maintaining the necessary fishing depth and vertical opening of the trawl (NIRAS, 2015). The distance between two vessels in double trawling depends on water depth and the size of the trawl, typically around 200 meters. In single trawl fishing, the distance between the trawl doors is usually around 100 meters. The distance between the vessel(s) and the trawl is typically around 500 meters (NIRAS, 2015).

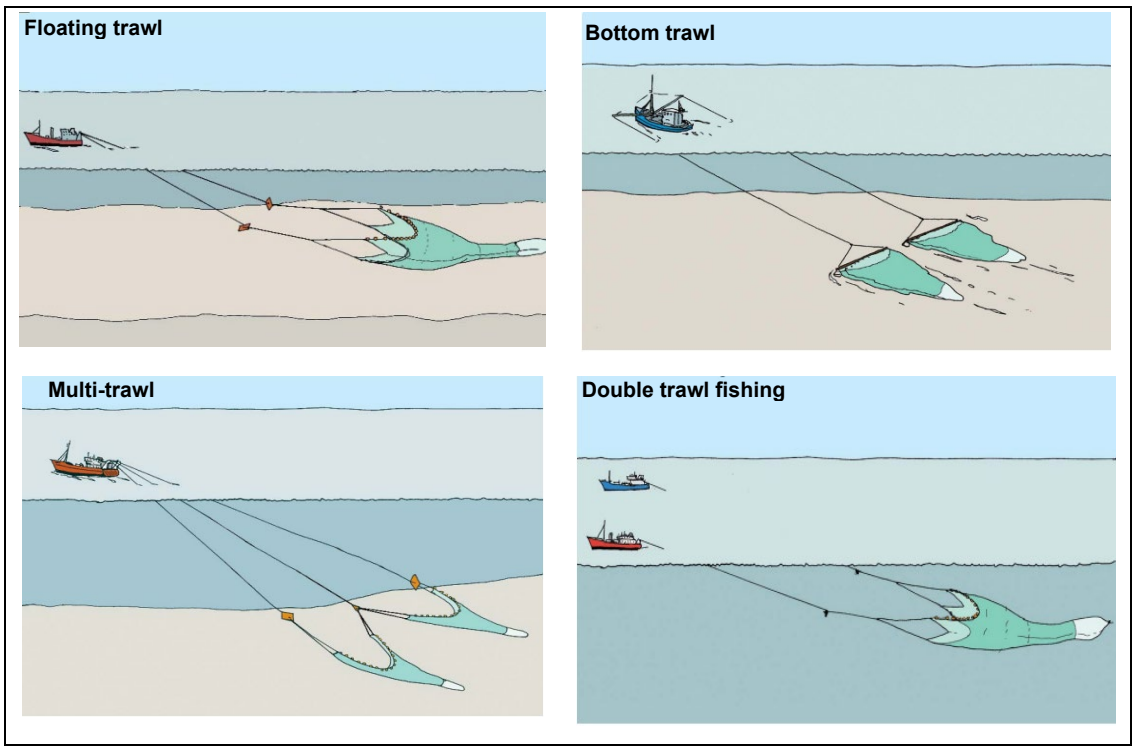


Figure 4-2. Illustration of different trawl gear and trawl fishing. Source: Korsgaard et. al., 2007.

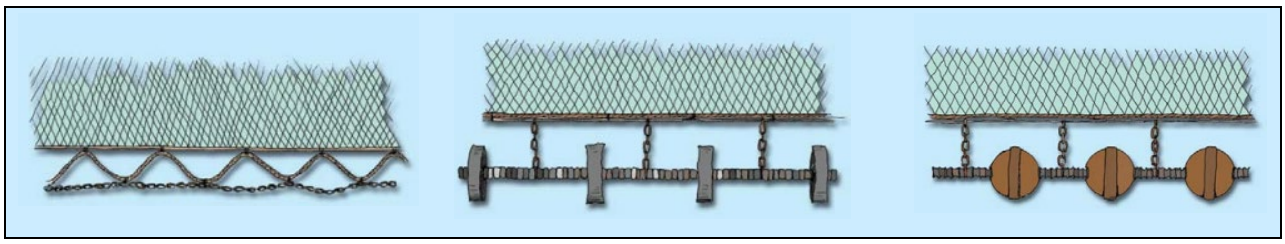


Figure 4-3. Different types of seabed protection on bottom trawls. Source: Korsgaard et.al., 2007.

Gillnet fishing is limited to a very few vessels in the North Zealand ports, and their fishing takes place outside the trawl areas and are predominantly more coastal (Krog Consult, 2024). Several nets, typically 10-20, are set together to form a chain. This chain of nets is anchored (Figure 4-4). Each net has a typical length of around 50-60 meters. From each end of the chain, a line is led up to a buoy. The nets are fitted at the bottom with a high-density line, which holds the net to the seabed, while a buoyant line at the top keeps the net in an upright position. The target species are primarily benthic species, such as flatfish, cod, and catfish.

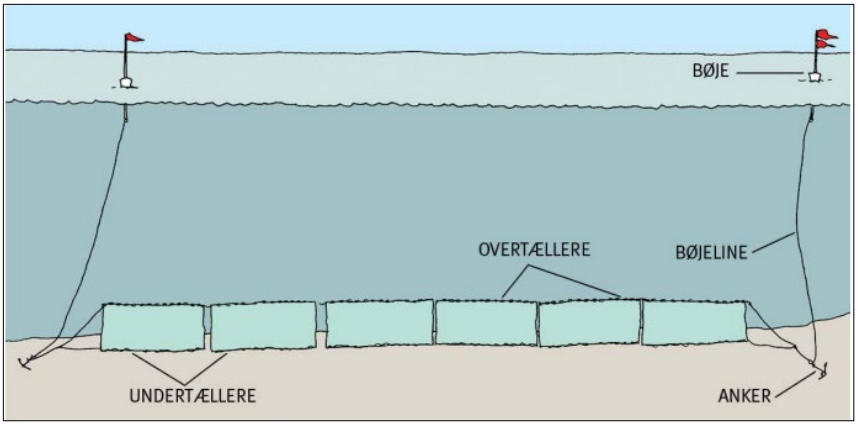


Figure 4-4. Net fishing. Source: Korsgaard et.al., 2007.

Bottom nets are deployed in coastal waters at depths of less than 10-15 meters. The gear consists of a long net leading into a main net (Figure 4-5). The long net, which can be up to 500 meters long, is mounted either on poles or on brackets at the bottom, extending from the shore out to the main net. The main net is a round net from which the fish cannot escape. Bottom nets are often set in extension of each other and can thus, depending on the water depth, extend several kilometres from the coast. In recent times, it has become very common to replace the poles with anchors (concrete blocks or anchors). The most important target species for bottom net fishing is the eel.

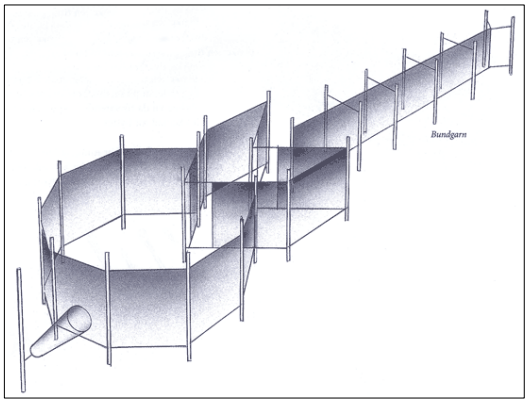


Figure 4-5. Bottom net. Source: NIRAS, 2015.

4.1 Vessels and gear use

In general, there has been a significant decline in the number of vessels (>10 m) reporting landings in Denmark (Figure 4-6). The statistics is shown for Denmark in total as fishing is not only carried out by vessels native to North Zealand, but periodically also by vessels from more distant ports. Between 2013 and 2023, the total number of trawling vessels decreased from 288 in 2013 to 190 in 2023. Additionally, vessels using net and longline gear declined from approximately 829 in 2013 to 647 in 2023. The combination of seine gear with other gear also saw a decrease, from 285 vessels in 2013 to 183 in 2023. Seine vessels specifically declined from 27 in 2013 to 12 in 2023.

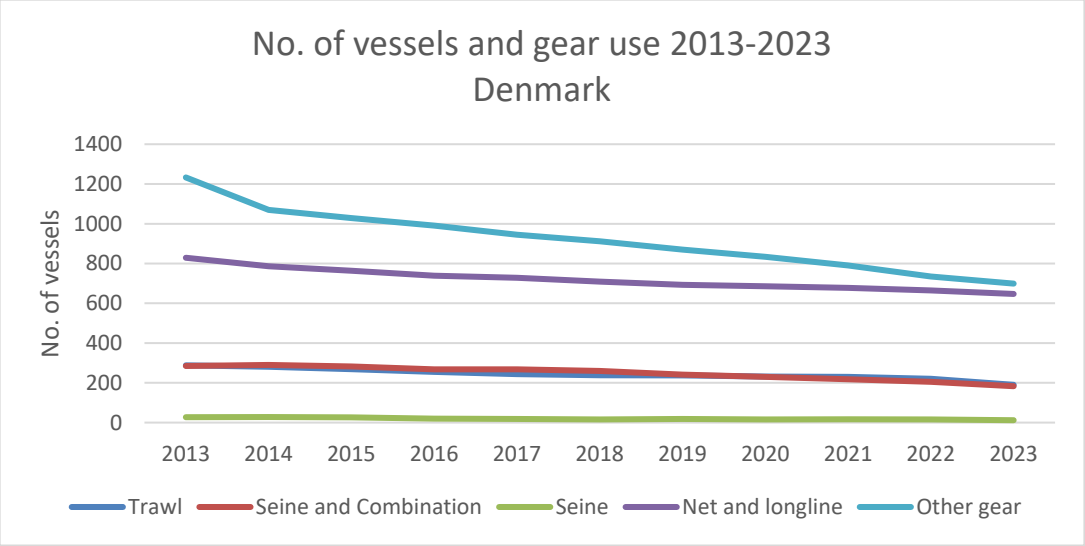


Figure 4-6. The number of vessels and primary gear types in Denmark in the period 2013-2023. Source: Statistics Denmark, 2024.

In Gilleleje, there are now seven locally based trawlers, but during the lobster season, there are often up to 15 trawlers from other parts of the country that operate from the Gilleleje harbour (Krog Consult, 2024). In each of the ports of Hundested and Odden, there are two locally based lobster trawlers. The dominant form of fishing is with special lobster trawls (Figure 4-7), and some of the trawlers also periodically engage in targeted fishing for commercial fish using bobbin trawls (trawls with bobbins/balls or discs), which allow fishing on rougher or rocky ground.

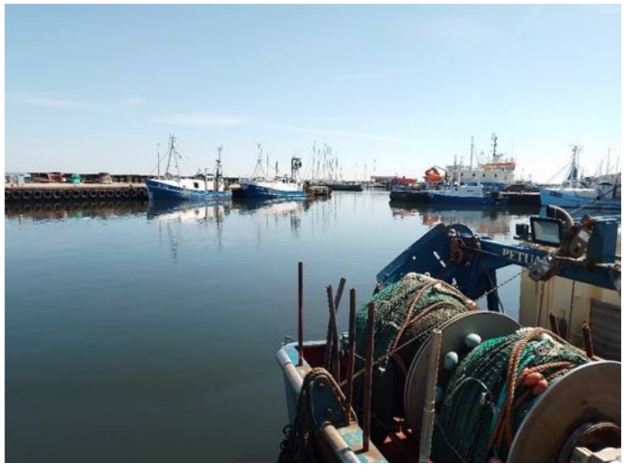


Figure 4-7. Lobster trawls in Gilleleje Harbour, May 2024. Source: Krog Consult, 2024.

In addition to lobster trawling, there is also some minor trawling using "fish trawls" (trawls with balls/discs), which allow fishing on more rocky or uneven seabed. Over the past four years, experimental fishing for greater weever has been conducted using special trawls with reduced mesh sizes. This and previous experiments have documented that the stock of greater weever is very large, and in early spring, they can be caught with minimal bycatch of other species. Furthermore, the market for greater weever has been good, though heavily dependent on fish size (preferably > 25 cm). Three of these areas are within the boundaries of the planned Hesselø OWF area.

In Gilleleje and in other ports on the northern coast of Zealand (Hundested and Sjællands Odde) - there are now only a handful of gillnet vessels left that can be described as full-time commercial operations. These vessels fish outside the trawl areas and mostly closer to the shore. Important species for this fishery are flatfish (especially sole in the spring) and lumpsucker in the first months of the year (this fishery has recently been heavily regulated/restricted). Gillnet fishers report seeing quite a few small cod, but only rarely cod above the minimum size. The fishers in the area rarely use more than 100 nets, which are anchored with small anchors (typically 3 kg) for every 10-15 nets (Krog Consult, 2024). There remains a significant number of single-person boats with fishing licenses equipped for gillnet fishing in these mentioned ports - the owners of these vessels are registered as part-time fishers or commercial fishers with modest activity, who earn a large part of their income from land-based jobs or from pensions (Krog Consult, 2024).

4.2 Landings and value of the fisheries

The most important fish species for fishing in the Kattegat Sea in 2023 were: sole (around 24 % of total landing value), plaice (18 %), brill (15 %), greater weever (12 %), turbot (10 %) and mackerel (9 %) (Figure 4-8). Fishing in Kattegat has generally declined significantly over the past 20 years, particularly in terms of fish catches, while landings of Norway lobster have increased markedly (Krogh Consult, 2024). Since Norway lobster is a high-value species, the total value of all landings of both fish and shellfish from Kattegat has only shown a relatively limited decrease from around 220 million DKK in the early 2000s to now around 150 million DKK (please see Appendix 1). The fishers in Gilleleje, along with many vessels from outside the area, land their catches at Gilleleje Fish Auction. The value of landings in Gilleleje has shown less dramatic and negative fluctuations than in Kattegat overall, but here too, landings of Norway lobster increasingly dominate (Figure 4-10). Over the past 10 years, the value of Norway lobster landings has nearly doubled from just over 26 million DKK (average 2012-2014) to approximately 47 million DKK (average 2021-2023). The value of Norway lobster landings now accounts for about 85 % of the total value of all landings, compared to about 75 % ten years ago (Gilleleje Fish Auction AS/Fiskeristyrelsen in Krog Consult, 2024).

The most important fish species for human consumption are now flatfish species such as sole, turbot, brill, and plaice. The value of landings in Gilleleje for these species has remained relatively constant or even increased for turbot and brill. In contrast, landings of cod at the Gilleleje auction have dramatically declined from a value of more than 5 million DKK in 2017 to just over 100,000 DKK in 2022 - 2023 (Krog Consult, 2024). This development in fishing was discussed with the fishers. The consequence has been that certain types of fishing, especially net fishing that does not target Norway lobster, have declined significantly.

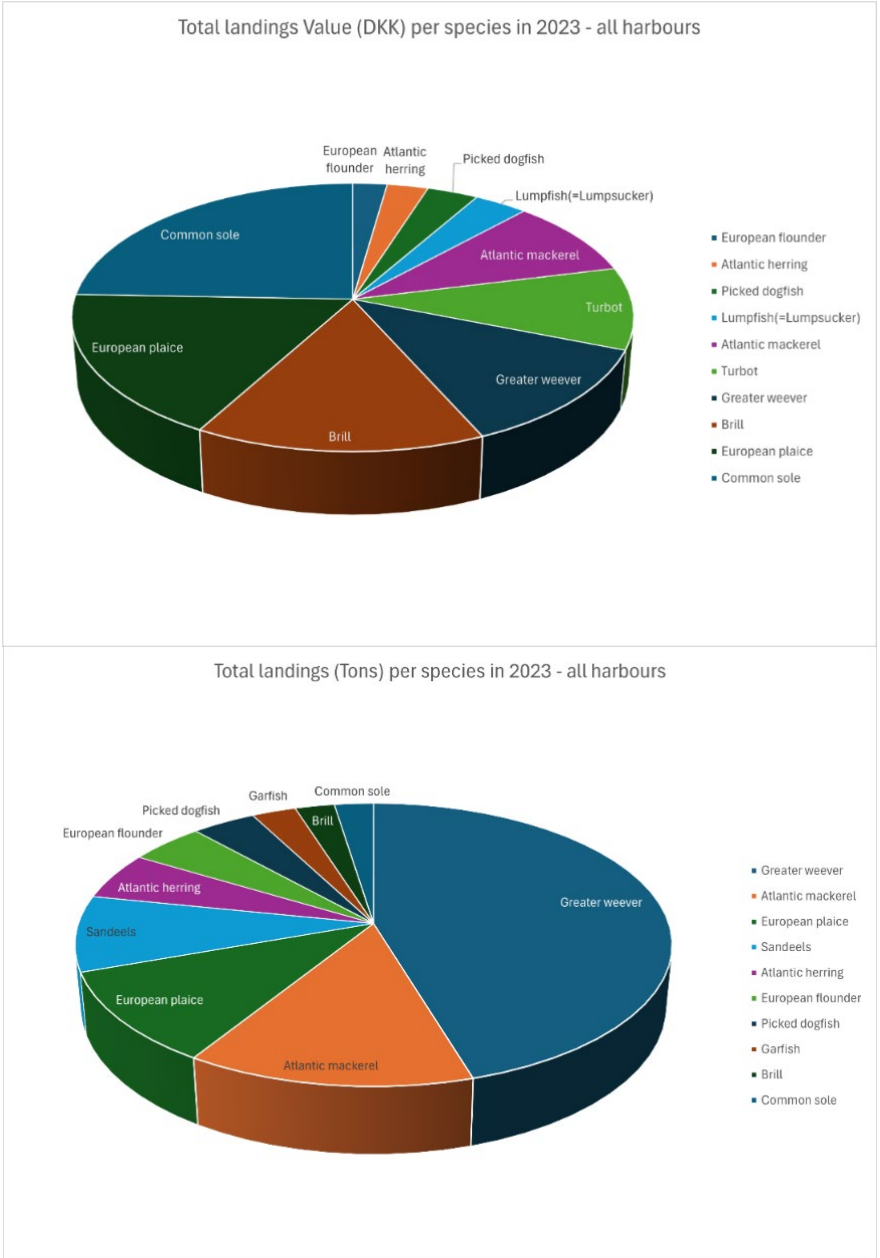
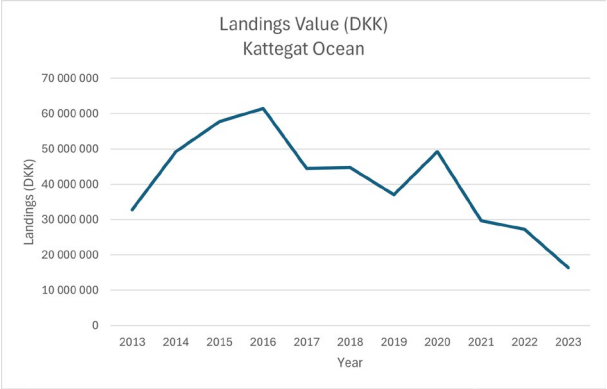


Figure 4-8. Total value (DKK) and total landings (tons) for the top 10 fish species landed in the Kattegat Sea in 2023. Source: Statistics Denmark, 2024.

Fishery in the Kattegat Sea, including the planned Hesselø OWF area, has experienced a drastic decline over the last decade (Figure 4-9). The total landings of Danish fisheries from Kattegat Sea have varied between 17 600 and 1600 tons in 2015 and 2023, respectively. The value of these landings has fluctuated between 61.470.994 and 16.353.588 DKK in 2016 and 2023.



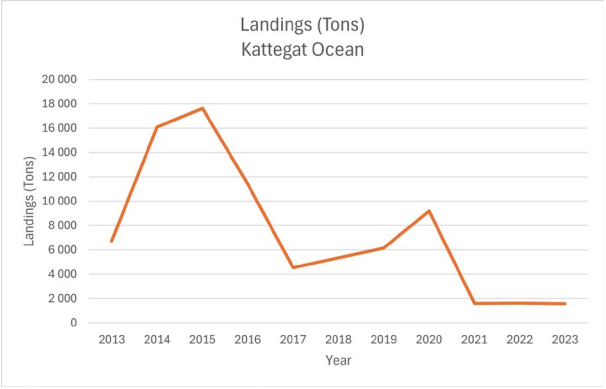
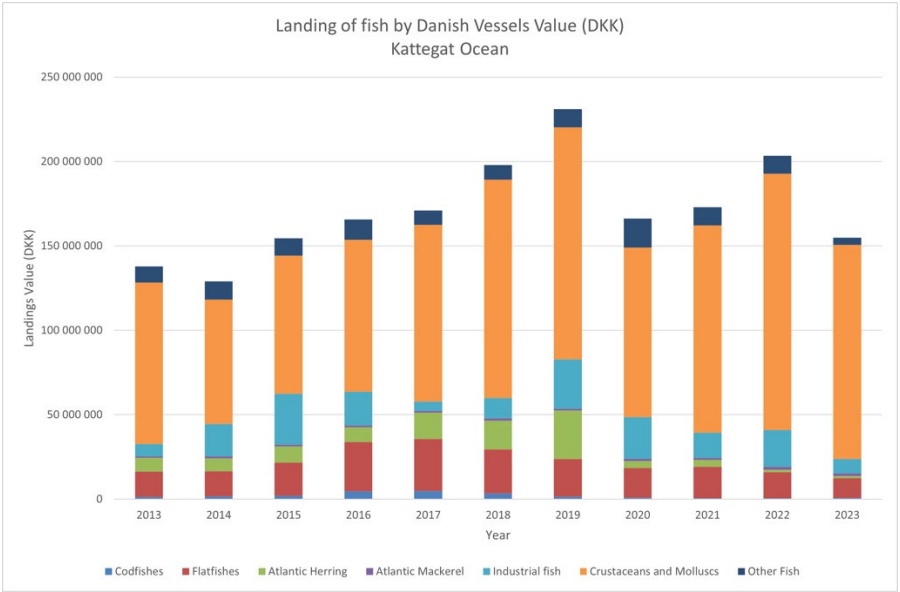


Figure 4-9. The development of the landings in the Kattegat Sea in the period 2013-2023. Data from logbooks, which include vessels ≥10 m. Source: Statistics Denmark, 2024.

The main trends for commercial fish species in the Kattegat are shown in Figure 4-10. Notably, mackerel and codfish show minimal landings volumes compared to the other species, with only small variations over the years. Similar trend is seen for flatfish; however, flatfish exhibit a small rise until 2016 at 1408 tons and reducing to 351 tons by 2023. Herring experienced a substantial peak in 2019 with landings of 15730 tons, nearly reaching the landings volume of industrial fish. After this peak, the landings volumes decreased significantly and remained lower in the following years. Industrial fish dominate the landings volumes, peaking twice: in 2015 and again in 2019, with landing volumes of 17182 tons and 16352 tons, respectively. After the second peak, there was a significant decline until 2023 with landing volumes of 2843 tons. Crustaceans and molluscs had a notable peak around 2018 landing 5321 tons, followed by a decline. Although there was a slight increase the following years, the landings volumes of crustaceans and molluscs generally trend downwards.

A combination of ecological, anthropogenic, and environmental factors shapes the landing value of the different fish species in the Kattegat. The landing value for codfish and flatfish show an overall decrease in landing value after 2017, with some fluctuations. Herring's values fluctuate year by year but show an overall downward trend, and the mackerel values are inconsistent. The landing value for industrial fish (such as sprat and other small pelagic species) the last decade experienced significant fluctuations; the initial period (2013-2015) saw a strong upward trend, while the period from 2016-2018 had a steep decline followed by partial recovery. The landing value for crustaceans and molluscs (such as shrimp, crab, and mussels) has remained relatively stable during the past decade, with an overall increase in landing values.



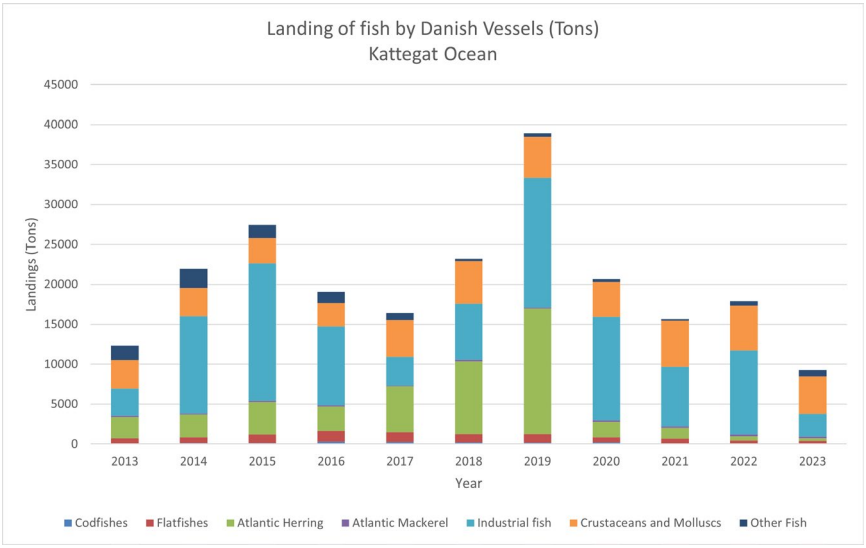


Figure 4-10. Landings (tons) and value (DKK) of commercial species from the Kattegat Sea from 2013-2023 by Danish fishers and vessels > 10 m. Source: Statistics Denmark, 2024.

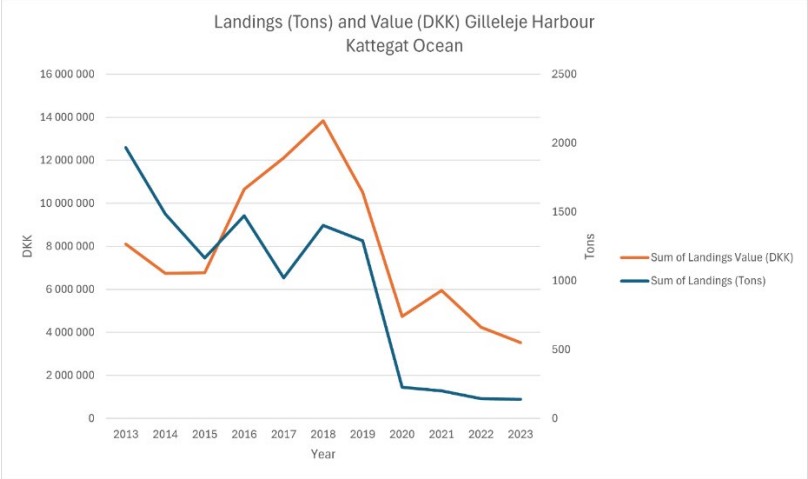


Figure 4-11. Landings (tons) and value (DKK) in Gilleleje harbour. Source: Statistics Denmark, 2024.

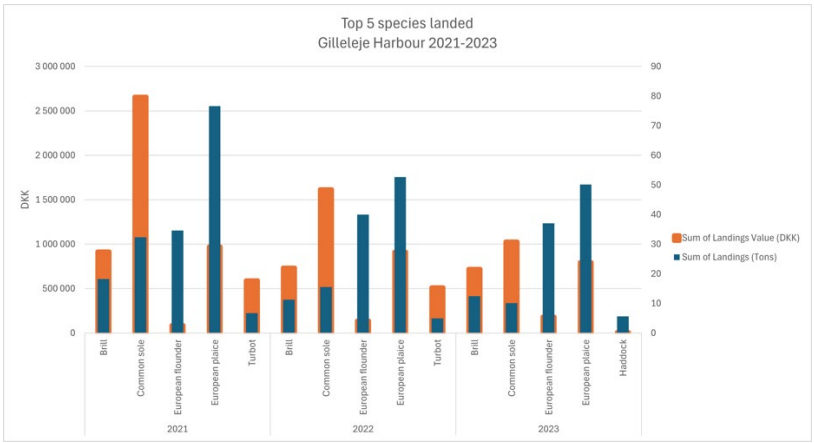


Figure 4-12. Top five fish species landed at Gilleleje harbour, 2021-2023. Source: Statistics Denmark, 2024.

The seasonal distribution of catches for the main species in Gilleleje over the last 10 years is shown in Figure 4-13. The results indicate that Atlantic herring catches predominantly occurs from September to March. Sprat landings primarily take place between July and January. Flounder and cod landings takes place mostly Oct-Nov to Mar-Apr and plaice peeks in October.

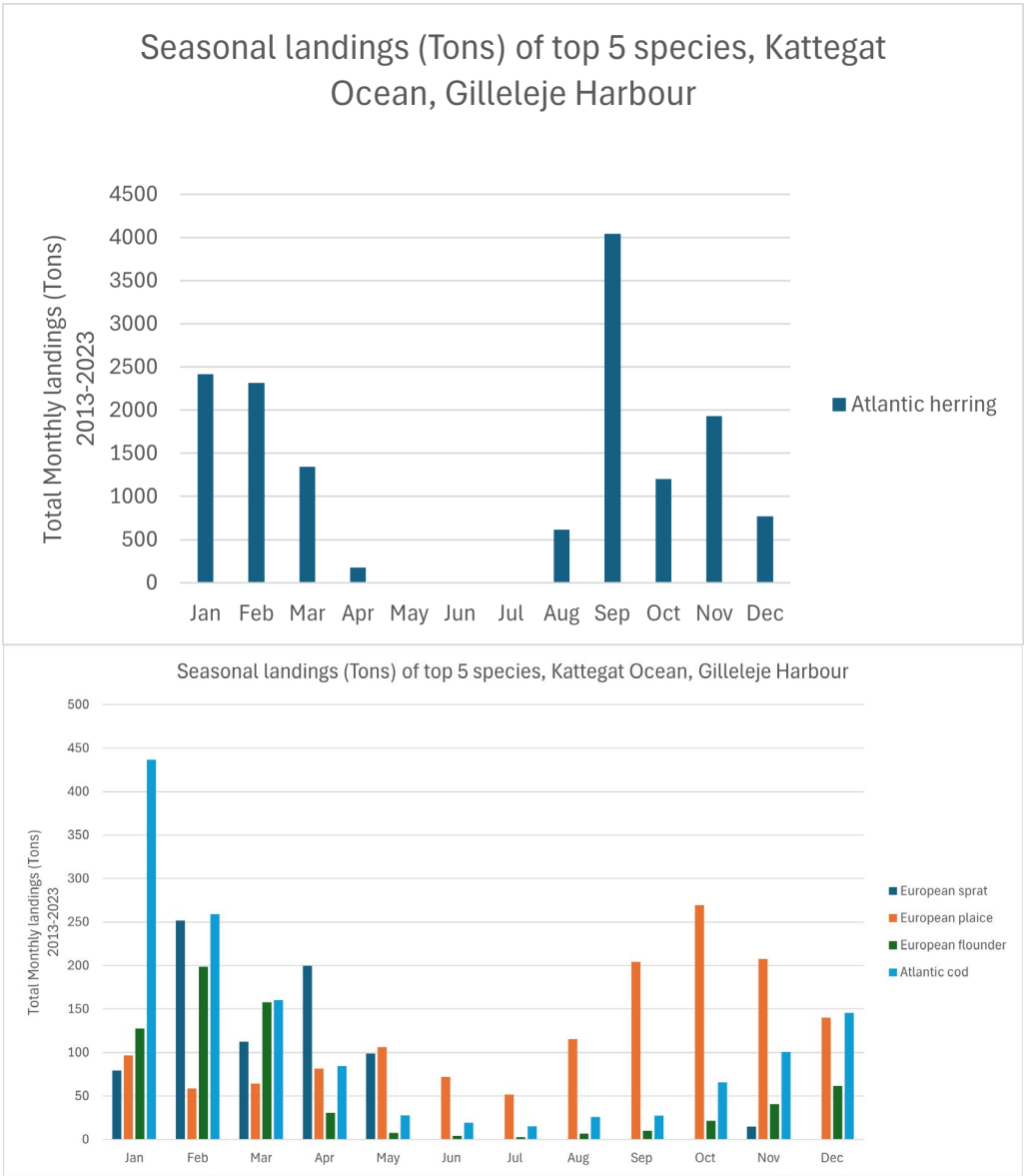


Figure 4-13. Monthly landings (tons) of the top five species in Gilleleje. Based on trends in total monthly landings from 2013-2023. Source: Statistics Denmark, 2024.

The harbours with the highest landings in tons in Denmark the past decade is Strandby (Nordjylland), Grenå, and Skagen (Figure 4-14). The harbour with the highest landings in value (DKK) are Strandby (Nordjylland), Gilleleje, and Grenå.

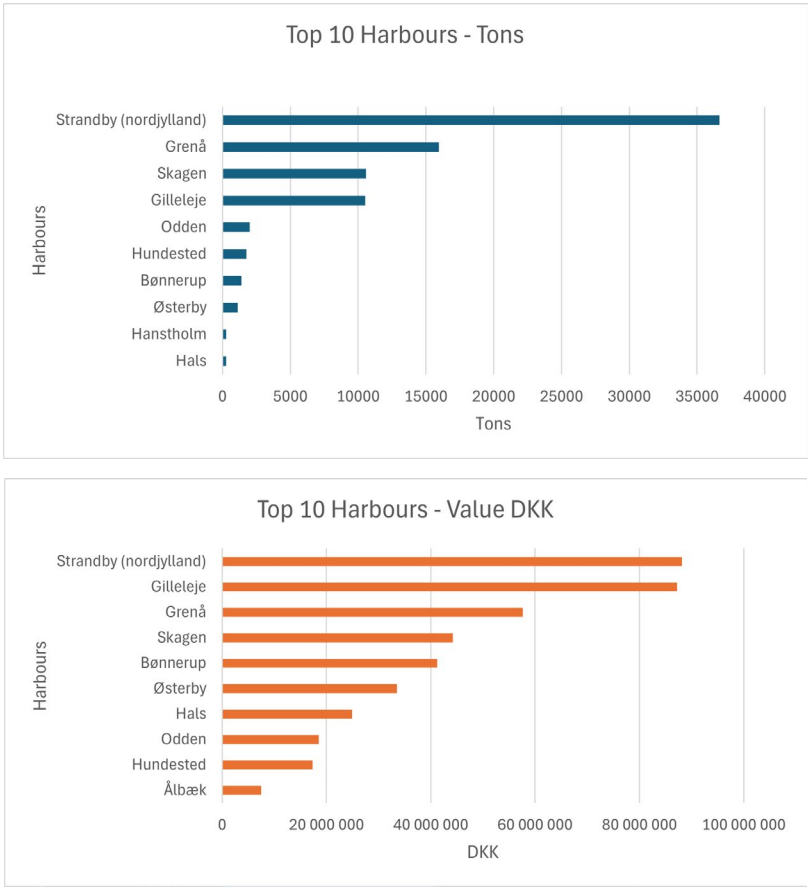
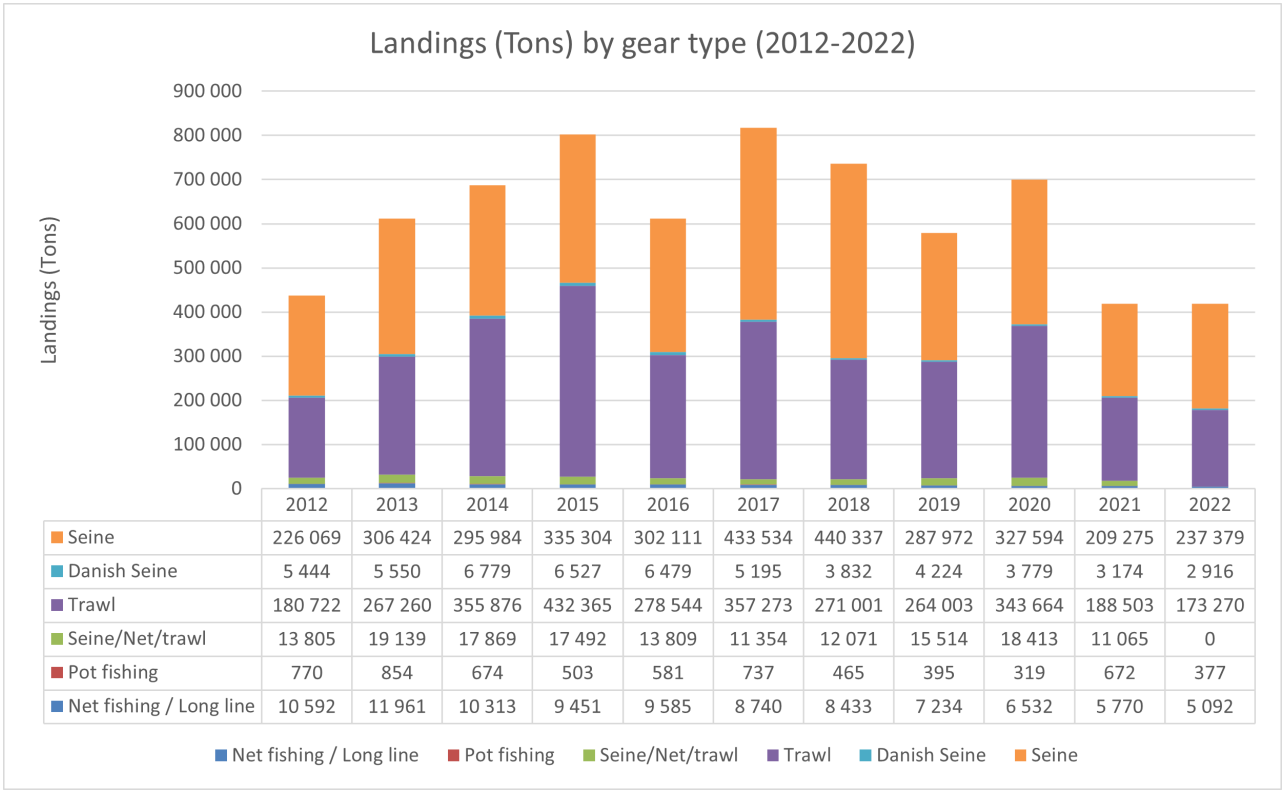


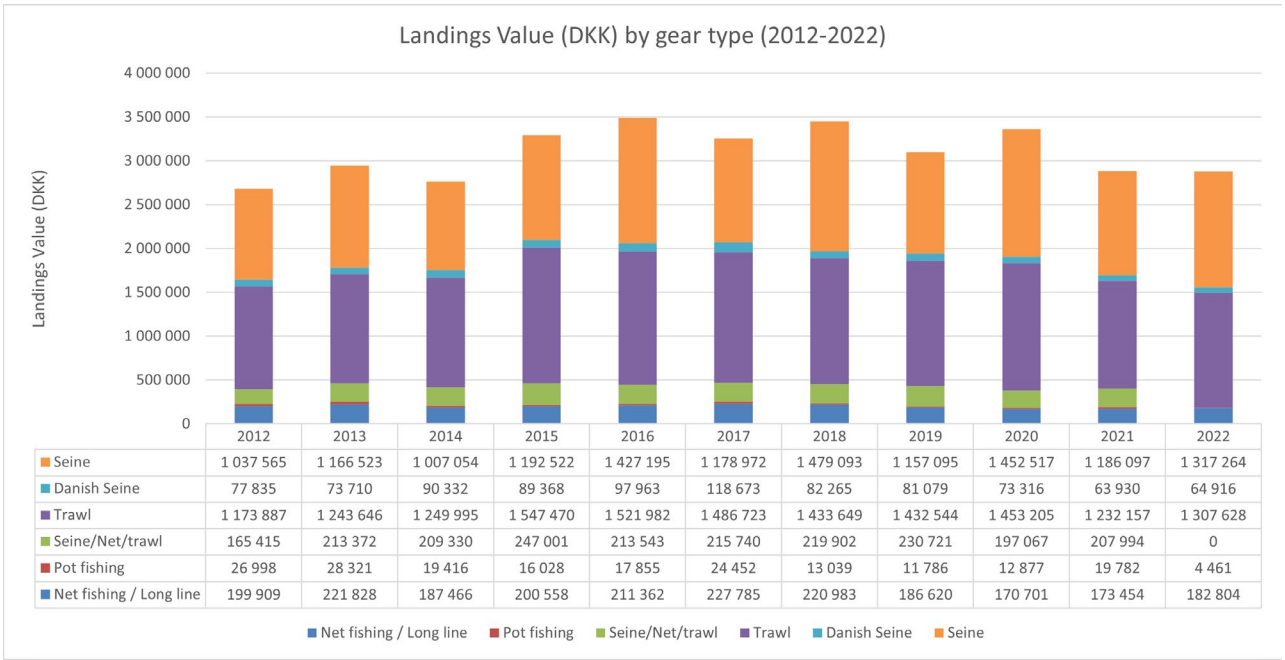
Figure 4-14. Top 10 harbours in tons and value (DKK) in Denmark in the period 2013-2023. Source: Statistics Denmark, 2024.

4.3 Landings by gear type

Fishing with seine have fluctuated in the period 2012-2022 with peaks in 2017 and 2018 and had a noticeable decline in use after 2018 with a slight increase in 2022 (Figure 4-14). Trawl fishing have consistently the highest landings, peaking in 2015 and showing a general decline thereafter, especially significant in 2020 and onwards. Fishing with Danish seine have been relatively stable, with slight increases in the early years and a noticeable decline after 2018. There was a general decline in total landings from 2019 onwards, with noticeable variability among different gear types.



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Seine	226 069	306 424	295 984	335 304	302 111	433 534	440 337	287 972	327 594	209 275	237 379
Danish Seine	5 444	5 550	6 779	6 527	6 479	5 195	3 832	4 224	3 779	3 174	2 916
Trawl	180 722	267 260	355 876	432 365	278 544	357 273	271 001	264 003	343 664	188 503	173 270
Seine/Net/trawl	13 805	19 139	17 869	17 492	13 809	11 354	12 071	15 514	18 413	11 065	0
Pot fishing	770	854	674	503	581	737	465	395	319	672	377
Net fishing / Long line	10 592	11 961	10 313	9 451	9 585	8 740	8 433	7 234	6 532	5 770	5 092



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Seine	1 037 565	1 166 523	1 007 054	1 192 522	1 427 195	1 178 972	1 479 093	1 157 095	1 452 517	1 186 097	1 317 264
Danish Seine	77 835	73 710	90 332	89 368	97 963	118 673	82 265	81 079	73 316	63 930	64 916
Trawl	1 173 887	1 243 646	1 249 995	1 547 470	1 521 982	1 486 723	1 433 649	1 432 544	1 453 205	1 232 157	1 307 628
Seine/Net/trawl	165 415	213 372	209 330	247 001	213 543	215 740	219 902	230 721	197 067	207 994	0
Pot fishing	26 998	28 321	19 416	16 028	17 855	24 452	13 039	11 786	12 877	19 782	4 461
Net fishing / Long line	199 909	221 828	187 466	200 558	211 362	227 785	220 983	186 620	170 701	173 454	182 804

Figure 4-14. Annual landings (tons) and value of landings (DKK) per gear type in Denmark. Source: Statistics Denmark, 2024.

5 THE DISTRIBUTION OF FISHING VESSELS IN THE HESSELØ OWF AREA

The planned Hesselø OWF area (approx. 166 km^2) will cover only a small part of Kattegat Sea (approx. 22 000 km^2). To get more accurate data concerning the fishing activities in the OWF area (than can be obtained from official catch statistic), information from the mapping of the distribution of the large vessels (>12 m) according to gear types in the entire ICES areas, (see Figure 2-1) by using VMS data. The most relevant ICES rectangles for the Hesselø OWF area are 41G1, 41G2, 42G1 and 42G2. However, the statistics do not provide details for the specific rectangles in Kattegat. These VMS data are supplemented by information collected from fishers in the area, including some electronic map plotter data showing their fish tracks and fishing grounds.

5.1 VMS data

Vessels with a length ≥12 m are required to carry an electronic vessel monitoring system (VMS). VMS data can be used both to locate the vessel, and to determine the speed with which vessels travel. Estimated vessel speeds, are used to indicate when vessels using different gear are assumed to be undertaking fishing activities. Based on the assumptions about the speed with which vessels normally undertake certain fisheries it is possible to plot where fishing vessels are actively fishing in the four quarters of a year (2020-2022) (Figure 5-1). Furthermore, by combining VMS data with logbook data it is possible to get an indication of which commercial species are being fished in specific areas. Fishing vessels are generally considered to be fishing when their speed is between 1- 5 knots (Kontopoulos, et al. 2020; Souza, et al., 2016; Gerritsen & Lordan, 2011). The speed range is commonly used to identify fishing activity through the analysis of AIS-data and other monitoring systems. All fishing vessels were therefore assumed to be fishing when their speed was < 6 knots speed.

The primary fishing areas are shown in Figure 5-1, which displays VMS records from 2021 and 2022 for all fishing vessels (≥12 m) in the southern part of Kattegat, in and around the planned Hesselø OWF area. It should be noted that the fishing activity of smaller vessels (< 12 m) in the area is not captured in this mapping, however, the value of the smaller vessels' landings is of minimal importance in the larger context (the value of landings from all Danish fishing vessels ≥12 meters accounts for only 5-10 % of the total value of all landings) (Krog Consult, 2024). There is intensive trawl fishing within the boundaries of the planned Hesselø OWF area and along the export cable route to shore. Several fishers have provided access to their GPS loggers, which support this VMS mapping (please see Chapter 5.4).

The fishing activities during 2020-2022 do not show a distinct seasonal pattern, as illustrated in Figure 5-1. Nevertheless, the time from July to December recorded higher fishing activity along the export cable route to shore than the earlier months of the year.

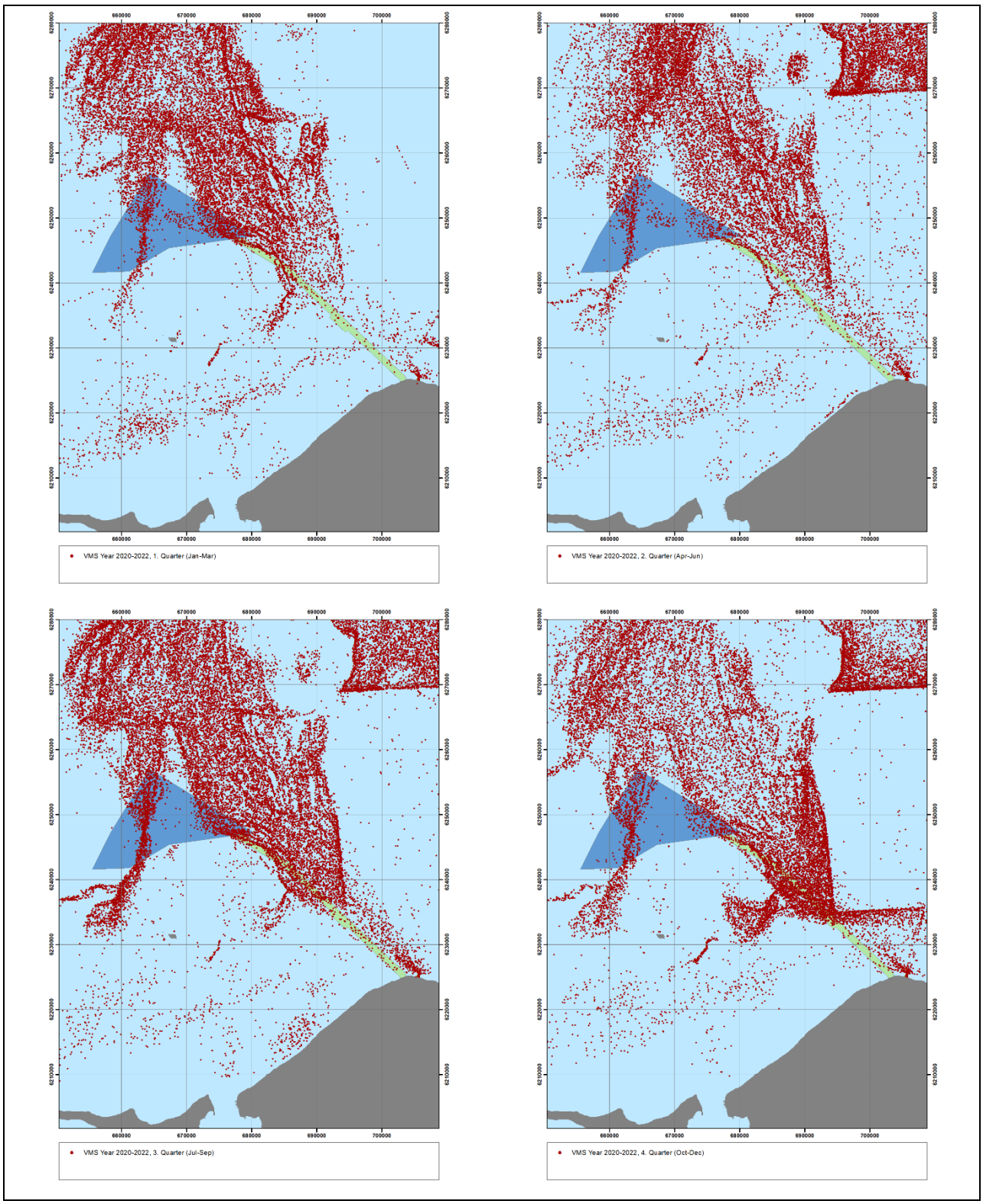


Figure 5-1. VMS registrations 1st Quarter (Jan – Mar), 2nd Quarter (Apr – Jun), 3rd Quarter (Jul – Sep), and 4th Quarter (Oct – Dec) in the period 2020 to 2022. Source: Danish Fisheries Agency, 2023

5.2 AIS data

AIS (Automatic Identification System), developed as a collision avoidance system, complements the VMS data to give a more detailed view of fishing activities. Figure 5-2 show the AIS tracking data in 2021 and 2022 for fishing vessels with less than 6 knots speed. Both in 2021 and 2022 there was a high fishing activity in the Hesselø OWF and along the cable corridor. In 2022 the north and northeastern part of the OWF area, and also the cable corridor had an increase from the year before.

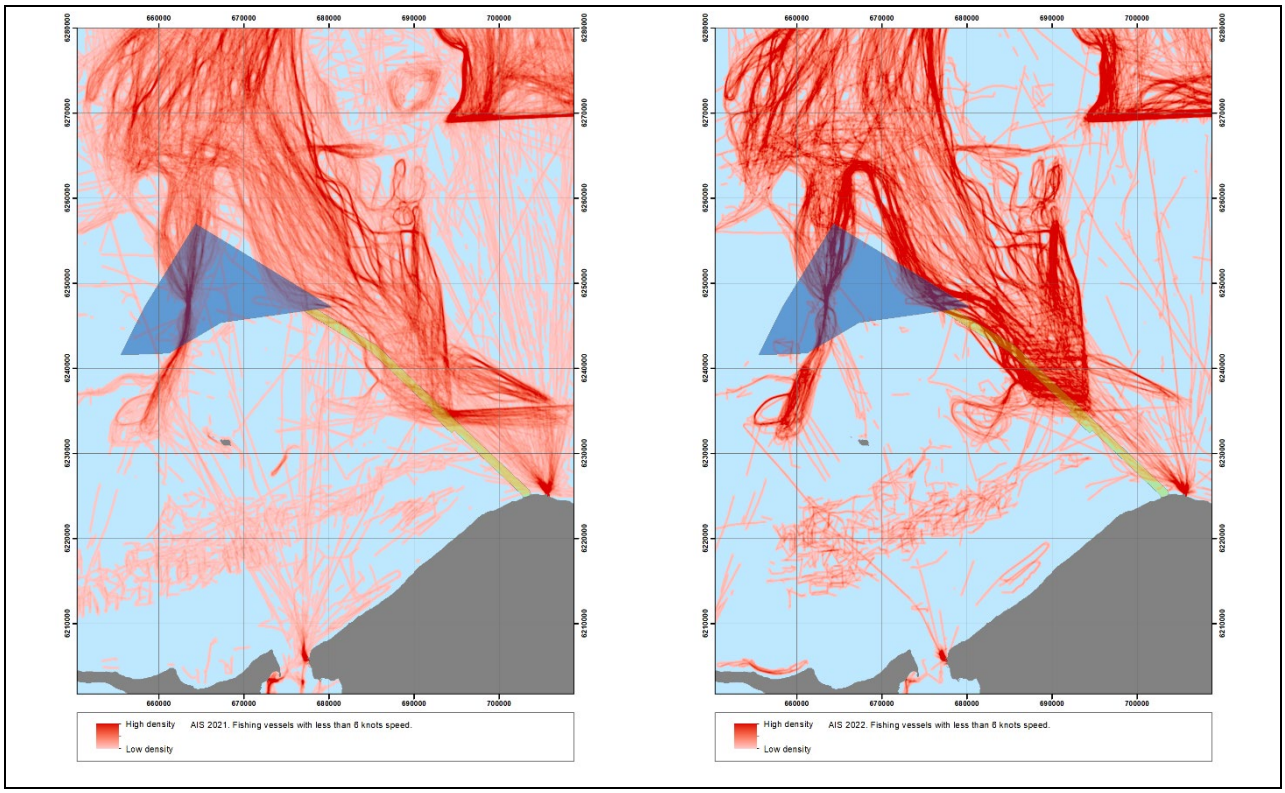


Figure 5-2. AIS tracking data for fishing vessels with less than 6 knots speed in the planned Hesselø OWF area in 2021 and 2022. Source: Danish Maritime Authority, 2024.

5.3 AIS & VMS data

To further provide information on active fishing areas, a combination of AIS and VMS data has been utilized. The figures below (Figure 5-3) show the combination of AIS tracking data and VMS data in 2021 and 2022.

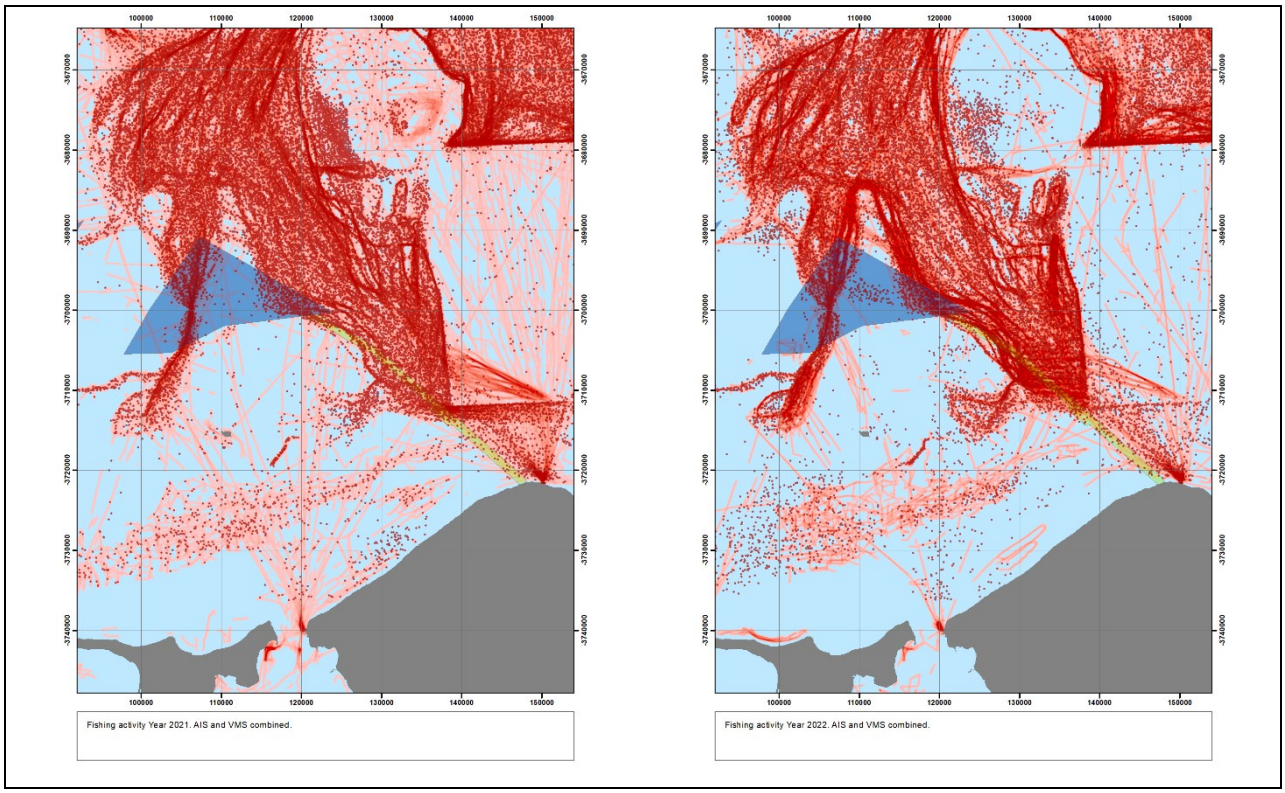


Figure 5-3. Fishing vessels in the planned Hesselø OWF area in 2021 and 2022 by combining AIS and VMS data. Source: Danish Maritime Authority, 2024 & Danish Fisheries Agency, 2023.

5.4 Map plotter data

Figure 5-4 shows the fishers mapping/trawl tracks, where two important trawl areas are particularly noteworthy: the "Kabelrenden" (Cable Trench) through the central part of the OWF area and the "Lysegrundskrogen" (Lysegrunds Hook) in the eastern part of the wind farm area. Figure 5-5 shows trawl tracks from a smaller trawler that fishes intensively in the "Kabelrenden". The significant narrowing of the fishing area is due to poor bottom conditions (stones) on both sides, which make bottom trawling impossible. Trawling generally follows depth contours, and fishing is predominantly conducted in a north-south direction through the area. The primary target species here is Norway lobster, with a smaller bycatch of flatfish species. Unusually this year, there has also been a relatively large presence of haddock in the catches - although mostly below the minimum size (Krog Consult, 2024).

The chosen route for the export cables from the wind farm to the landing point west of Gilleleje will, in the northern half of the route (from about 10 nautical miles from the coast), pass through important trawl areas. Since fishing with bottom-towed gear will be prohibited within 200 meters of the cables, the selected cable route would be destructive to bottom trawl fishing in the area. The fishers, therefore, suggest an alternative cable corridor route further to the west (Figure 5-6). From the fishers (fishers no. 4, 7 & 8) and their organizations, an alternative proposal for the placement of the Hesselø OWF area has been developed, which would significantly interfere less with fisheries than the current proposed location (Figure 5-7). The new proposed location will be in an area between the «Kabelranden» and the "Lysegrundkrogen", north of Natura 2000 area N128, and surrounding the Natura 2000 area N207 (Figure 5-6) (Krog Consult, 2024).

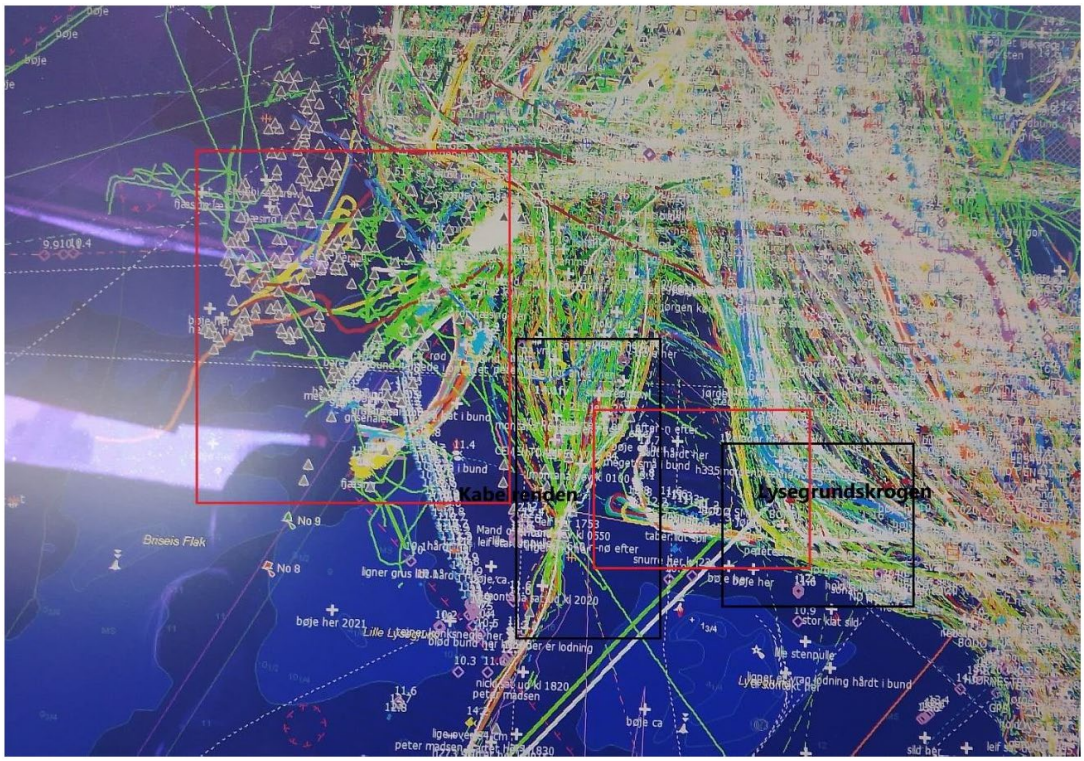


Figure 5-4. Trawl lines in and around Hesselø OWF area. In recent years a experimental fishing for greater weever has been carried out (red lines). The eastern part of these areas lies within the boundaries of the wind farm. Important trawl areas (Kabelrenden and Lysegrundskrog) are indicated in black, both of which lie within the boundary of the offshore wind farm. Source: Fisher no. 9. Krogh Consult, 2024.

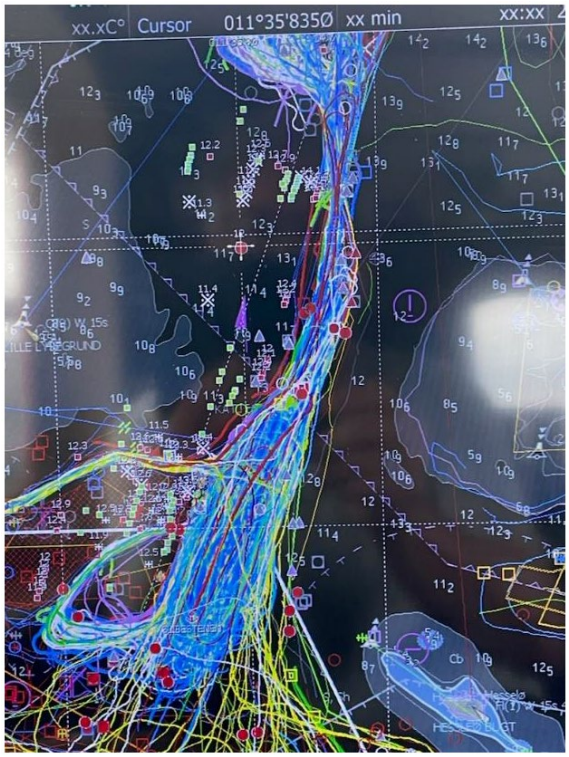


Figure 5-5. North-south trawl lines from smaller trawlers (with a single trawl) through the "Kabelrenden" in the western part of the Hesselø OWF area. Source Fisher no. 17. Krogh Consult, 2024.

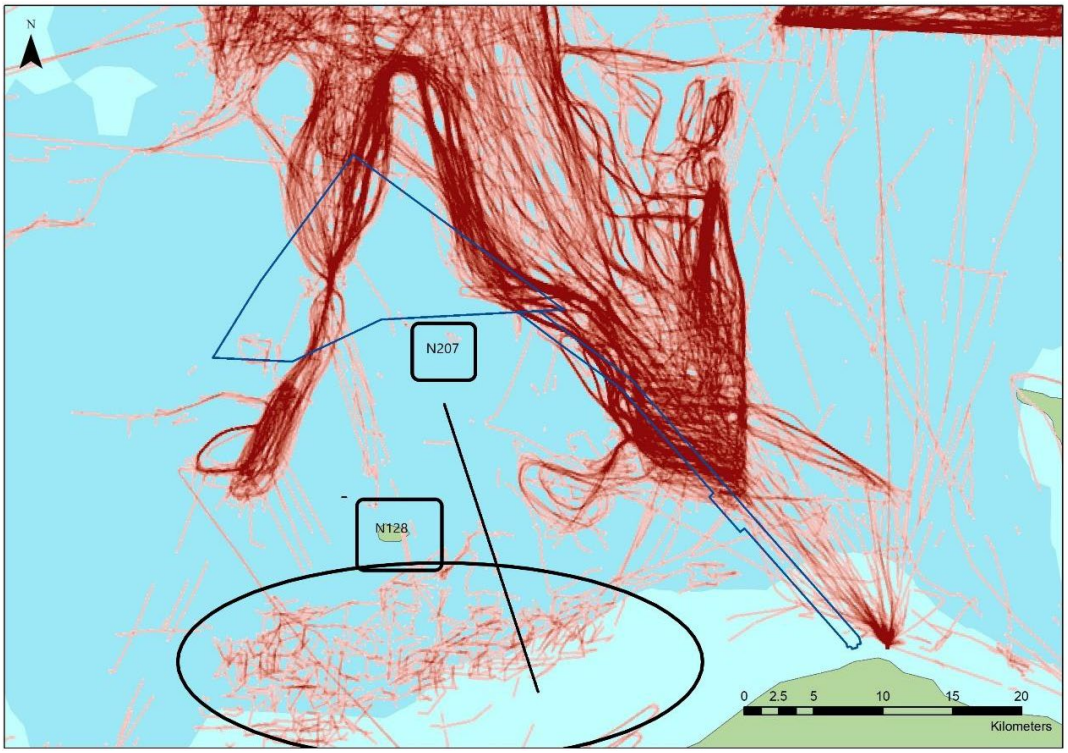


Figure 5-6. AIS - registrations of fishing vessels in the Hesselø area in year 2022, speed <6 knots. The Hesselø OWF area and the export cable corridor is shown in blue. The fishers suggestion to the approximate position of the mid- part of the export cable corridor is marked in black. The Natura-2000 areas, N207 & N128, is indicated. AIS-registrations of gillnet fishing is found inside the ellipse close to shore. Source: Fishers 8 & 9, Krog Consult, 2024.

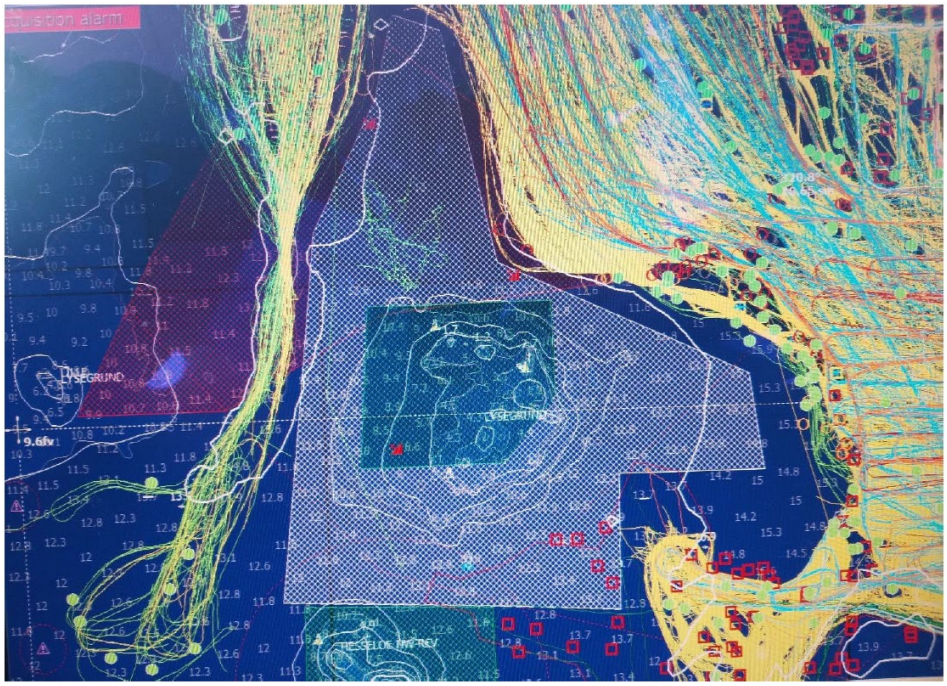


Figure 5-7. The fishers proposal for an alternative location for the Hesselø OWF (white shading). Fisher no. 8. Krogh Consult, 2024.

6 CONCLUSION

The commercial fishery in the Kattegat, including the planned Hesselø OWF area, has undergone substantial changes over the past decade. While the region continues to support a diverse fishery, with valuable species such as flatfish, codfish, Norway lobster, and pelagic species, overall fishing activity with respect to number of fishing vessels has declined over the last decade. The number of active fishing vessels has decreased, and landings of key species like cod and flatfish have declined. Despite these declines, Norway lobster has become increasingly dominant in terms of economic value, particularly in Gilleleje, where it now represents the vast majority of the landings value. The total value of landings to Gilleleje has remained relatively stable over the last 5 years with an average of 36 million DKK. Fishing for Norway lobster in the Kattegat is not only carried out by vessels based on Djursland or in North Zealand, but periodically also by vessels from further ports (Strandby, Hvide Sande etc.), Krog Consult, 2024.

Although other fisheries, such as those for greater weever, have seen some exponential growth with respect to landed weigth, the overall trend points towards a shift to fewer, more specialized fisheries.

The planned Hesselø OWF area and its export cable route overlaps with significant trawling areas, particularly along the proposed export cable route. This has led fishers to suggest relocating the OWF area and proposing an alternative export cable route to reduce interference with their fishing operations (Krog Consult, 2024).

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APPENDIX 1 NOTAT - INDHENTNING AF OPLYSNINGER FRA FISKERE I FORBINDELSE MED FORUNDERSØGELSERNE TIL HAVVINDMØLLEPROJEKTER I KATTEGAT OG ØSTERSØEN

Carsten Krog: ***UDKAST***

NOTAT

Indhentning af oplysninger fra fiskere i forbindelse med forundersøgelserne til havvindmølleprojekter i Kattegat og Østersøen

Juni 2024

DNV Denmark A/S har af Energinet Eltransmission A/S fået til opgave at gennemføre marine miljøundersøgelser i Indre danske Farvande i forbindelse med udbygningen af havvindområderne i Kattegat og Østersøen (*DNV Denmark A/S. Energinet - marine Environmental Studies (Fisheries), project no.10443476)*.

Arbejdet inkluderer baseline beskrivelse/undersøgelse af fisk og fiskeri i de omhandlede områder. Det er af DNV/Energinet besluttet ikke at gennemføre fiskeundersøgelser men alene at beskrive fisk og fiskeri baseret på eksisterende informationer. Det er dog samtidig besluttet, at der skal gennemføres interviews af fiskere med interesser i de relevante farvandsområder. Dette arbejde har DNV Denmark overdraget Krog Consult v./fiskerikonsulent Carsten Krog at gennemføre.

Metode

Indledningsvis er fiskernes hovedorganisation, Danmarks Fiskeriforening DFPO /4/ blevet kontaktet med henblik på dels at informere om det igangværende projekt, og dels at få forslag til fiskere, som det kunne være relevant at kontakte. Herefter er der taget kontakt med de lokale fiskeriforeningsformænd i havnene i Klintholm /5/, Grenå /1/ og Gilleleje /6/ for at aftale møder med fiskerne i de primære landingshavne for fiskeriet i Kattegat - Grenå og Gilleleje. Fiskeriet i Østersøen er gået overordentligt meget tilbage i de senere år, og fiskeriets omfang, karakter og udvikling her er hovedsageligt beskrevet ud fra telefoniske interviews.

Formændene i de nævnte primære havne er anmodet om at indkalde andre relevante fiskere til at de aftalte møder. – Praksis viser, at det sjældent går helt som forventet/aftalt, bl.a. fordi fiskerne er på fiskeri eller andet på dagen. Det er ofte muligt, når man først er på stedet, at finde frem til fiskere og andre, som kan være relevante at interviewe. De der ikke har været hjemme på besøgstidspunktet, og fiskere fra andre havne, er herefter kontaktet telefonisk. Fleksibel planlægning og opfølgning er derfor en forudsætning for at kunne gennemføre processen.

På møderne er fiskerne blevet spurgt ind til deres interesser i de pågældende mølleområder – hvor og hvornår de fisker (evt. dokumenteret med GPS-data), hvilke redskaber de anvender (evt. fotos), fiskearter og mængder, kendskab til gyde- og opvækstområder m.v. Endvidere er den enkelte fisker blevet spurgt ind til deres kendskab til andre fiskere, eventuelt fra andre havne (også udenlandske), som også er aktive i det pågældende område.

Navnene på de interviewede fiskere og andre fremgår ikke af nærværende notat men er angivet ved et nummer, som refererer til en deltagerliste, som ikke er offentligt tilgængelig.

Udkast til notat har været sendt til centrale fiskere til kommentering.

Kattegat mølleområdet

Der er blevet afholdt et møde/besigtigelse i Grenå den 1. maj 2024 med deltagelse af formanden for Grenå Fiskeriforening /1/ og en trawlfisker fra Grenå /2/ samt en mangeårig, tidligere formand for Bønnerup Fiskeriforening /3/. Efterfølgende er der taget telefonisk kontakt med 4 andre fiskere (/12/, /14/,/15/, /16/).

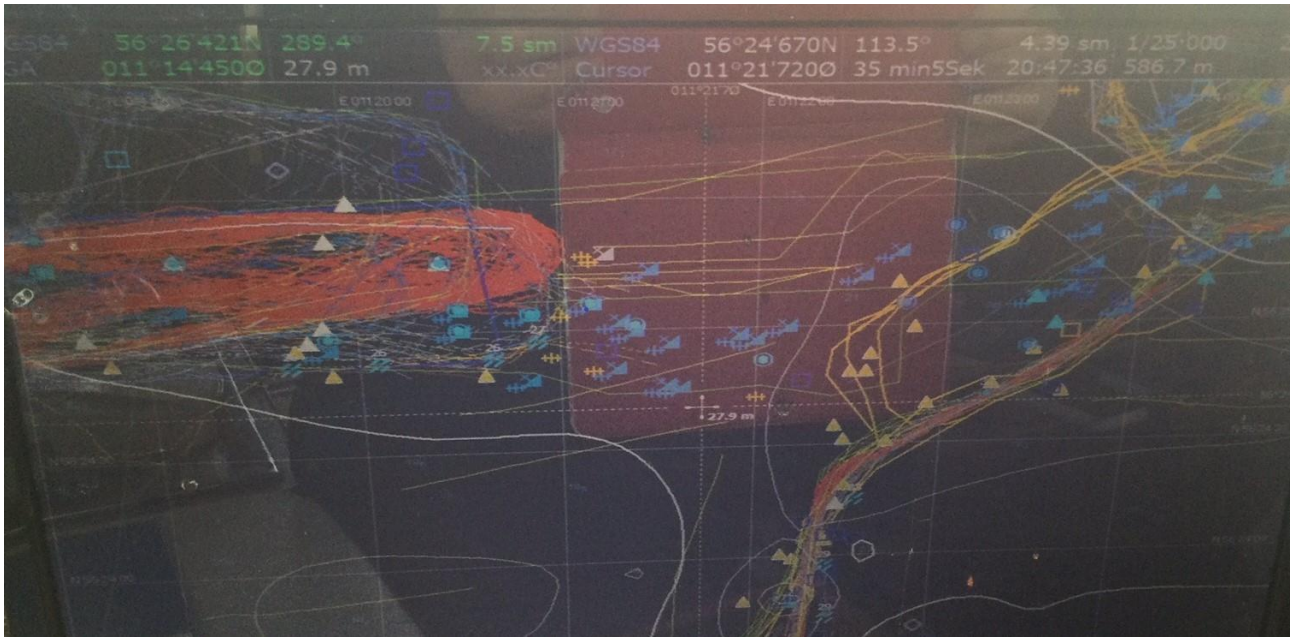
Generelt er fiskeriet i Kattegat gået overordentligt meget tilbage igennem de sidste 20 år, det gælder især for fangsterne af fisk som er reduceret fra omkring 40.000 tons i begyndelsen af 2000-tallet til nu kun ca. 1500 tons. En væsentlig del af forklaringen herpå er, at rettigheden til at lande industrifiskearterne (især brisling) er solgt til fartøjer fra andre, fjerntliggende havne, og at disse arter derfor fanges/landes i Skagerrak/Nordsøen i stedet. Fiskerne i Grenå, og eventuelle udefrakommende fartøjer her, lander deres konsumfisk til Grenå Fiskeauktion mens fisk der landes i Bønnerup overvejende sendes til Strandby Fiskeauktion.

De vigtigste konsum-fiskearter er nu fladfiskearterne tunge, slethvarre, pighvarre og rødspætte, mens landingerne af torsk de seneste år har været på mindre en 1000 kg (Grenå Fiskeauktion, Fiskeristyrelsen). Fangsterne af jomfruhummer i Kattegat er derimod, modsat situationen for fangsten af fisk , gået markant frem fra omkring 1300 tons i begyndelsen af 2000-tallet til nu omkring 1800 tons. Eftersom jomfruhummer er en højværdi-art, har den samlede værdi af alle landinger fra Kattegat kun udvist en relativt begrænset nedgang fra omkring 220 mio. kr i begyndelsen af 2000-tallet til nu omkring 150 mio. kr (alle landingsoplysninger fremgår af BILAG 2A).

Denne udvikling i fiskeriet blev diskuteret med fiskerne. Konsekvensen har naturligvis været, at især fiskeriformer, specielt garnfiskeriet, som ikke har jomfruhummer som målart er gået markant tilbage. I Bønnerup og Grenå er der således nu kun en håndfuld garnfartøjer tilbage, som kan betegnes som fuldtids kommercielle – nogle af disse fisker endvidere periodisk i fjernere farvande (Skagerrak, Nordsøen) for at kunne opretholde den nødvendige indtjening. Der er fortsat et betydeligt antal enmands joller med fiskerinummer udrustet til garnfiskeri i både Grenå og Bønnerup – de pågældende fiskere har en beskeden aktivitet og er overvejende registreret som bierhvervsfiskere, eller er erhvervsfiskere med alternativ beskæftigelse, og oppebærer en stor del af deres samlede indtægt fra arbejde i land eller fra pension.

De vigtigste fiskearter for garnfiskeriet har i de senere år været arter af fladfisk (pighvarre, slethvarre, tunge, rødspætte) – i visse år har også fangster af stenbider (”kulso”) været af væsentlig betydning.

Der foregår nu kun meget lidt fiskeri med garn i mølleområdet /1/, 3/, /14/, der er dog enkelte garnfartøjer som fisker fladfisk, og som i sommer- efterårsperioden desuden driver et fiskeri med såkaldte krabbegarn (aflagte, stormaskede stenbider-eller pighvarregarn) efter taskekrabber (Se fig. 1). Tidligere da torskebestanden/-kvoten var meget højere udgjorde mølleområdet en attraktiv, kystnær fiskeplads for mindre garnfartøjer – også fra andre havne og selv fra fjerne havne som eksempelvis Hvide Sande.



Figur 1. Slæbestreger samt garnsætninger fra et mindre garn/trawlfartøj. Garnsætningerne er vist med rette, gule streger især centralt i området (vest for Torskerenden, se nedenfor) /14/.

Trawlfiskeriet er ikke gået lige så meget tilbage som garnfiskeriet, eftersom det har været muligt at oppebærer den nødvendige indtjening ved at fokusere på jomfruhummer som den primære målart - i værdi repræsenterende ca. 90% af den samlede værdi af landingerne. Den resterende værdi af landingerne hidrører fra bifangst af diverse konsumarter (fladfisk, taskekrabber). Endelig skal bemærkes, at der i de seneste 3 år har været gennemført et forsøgmæssigt fiskeri efter fjæsing med bundtrawl, som kan fanges med mindre maskestørrelse (60 mm), end den der ellers er tilladt til konsumfiskeri. Forsøgsfiskeriet har været begrænset til 3 fartøjer). Dette og tidligere forsøg (Krog, 2005) har dokumenteret, at bestanden af fjæsing er meget stor, og at den i det tidlige forår kan fanges med minimal bifangst af andre arter. Endvidere har afsætningen været god, dog meget afhængigt af fiskenes størrelse (helst > 25 cm). De primære fiskeområder for forsøgsfiskeriet efter fjæsing fremgår af kortet (fig. 7) i det følgende afsnit om Hesselø mølleparken. Ingen af disse områder ligger inden for afgrænsningen af Kattegat mølleparken.

Fiskeriet efter jomfruhummer i Kattegat gennemføres ikke alene af fartøjer hjemmehørende på Djursland eller i Nordsjælland men periodisk også af fartøjer fra fjernere havne (Strandby, Hvide Sande m.fl). For ca. 5 og 10 trawlere i henholdsvis Bønnerup og Grenå har fangst af jomfruhummer i en stor del af året en afgørende betydning for deres økonomi. I opgørelsen indgår også enkelte fartøjer, som er indregistreret i andre lokale havne (Anholt (1) og Ebeltoft (2)).

Jomfruhummer fanges overvejende i bundtrawl som er rigget som 2-trawl med en såkaldt klump, eller evt en rulle i midten, hvor de 2 trawl er koblet sammen, trawlene spiles ved brug af 2 skovle af varierende størrelse (afhængigt af fartøjets størrelse/maskinkraft) – se figur 2. For at kunne fange jomfruhummerne er det nødvendigt, at trawlet følger bunden meget nøje, hvorfor det er monteret med enten en kæderub/såkaldt ”hængebly” eller med en rub med gummiskiver (ofte 6 tommer i diameter). Førstnævnte type af rub anvendes, hvor havbunden er jævn, og uden sten, mens den anden type anvendes, hvor der i havbunden kan forekomme sten, som kan ødelægge trawlet hvis de ”fanges” heri.

Enkelte mindre trawlere /12/, /14/,15/, fisker med enkelttrawl efter primært fisk, men med jomfruhummer som bifangst. Disse trawl er forsynet med ”bobbins” (trawlkugler) eller skiver, således at de kan anvendes på

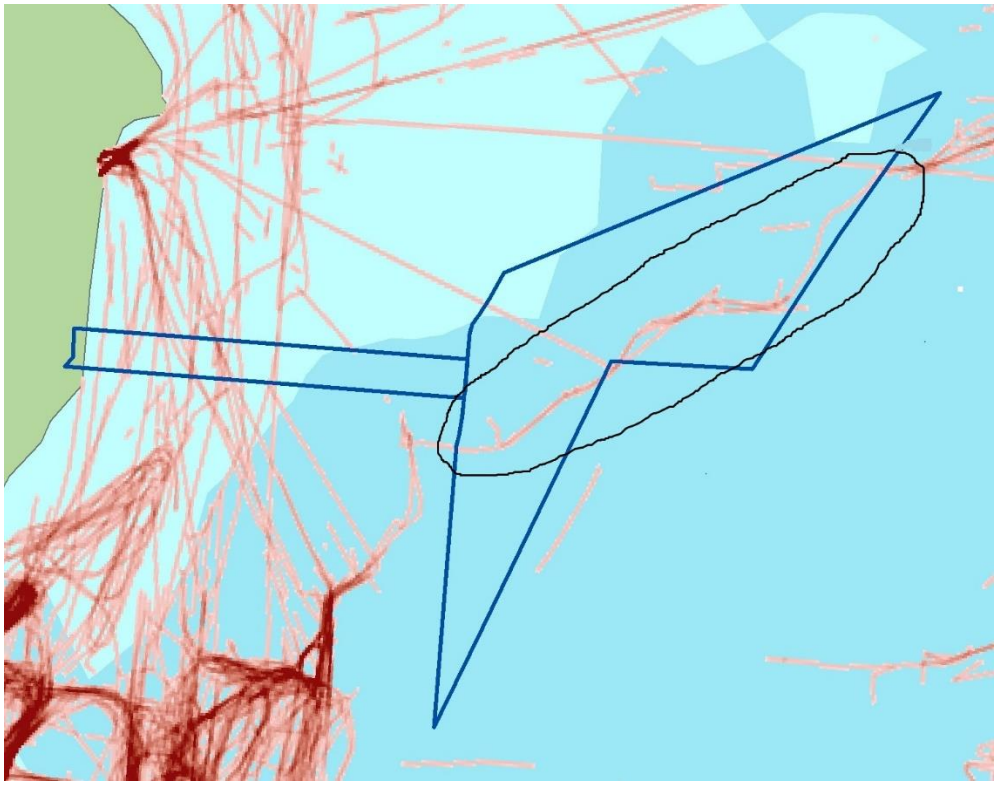
mere ujævn havbund, eventuelt med sten, deres fiskeri foregår derfor overalt i mølleområdet, dog undtaget visse områder med store sten/stenbunker. De primære målarter er fladfiskearter som rødspætter, pighvarre, slethvarre og tunger. Indtil for 15-20 år siden udgjorde torsken også en væsentlig del af fangstværdien.

Fiskeriet efter jomfruhummer foregår om natten eller i skumringen, hvor jomfruhummeren er oppe af deres huler i havbunden for at søge føde. Hvert trawltræk har typisk en varighed på omkring 5 timer svarende til en trawlet strækning på 25-30 km.

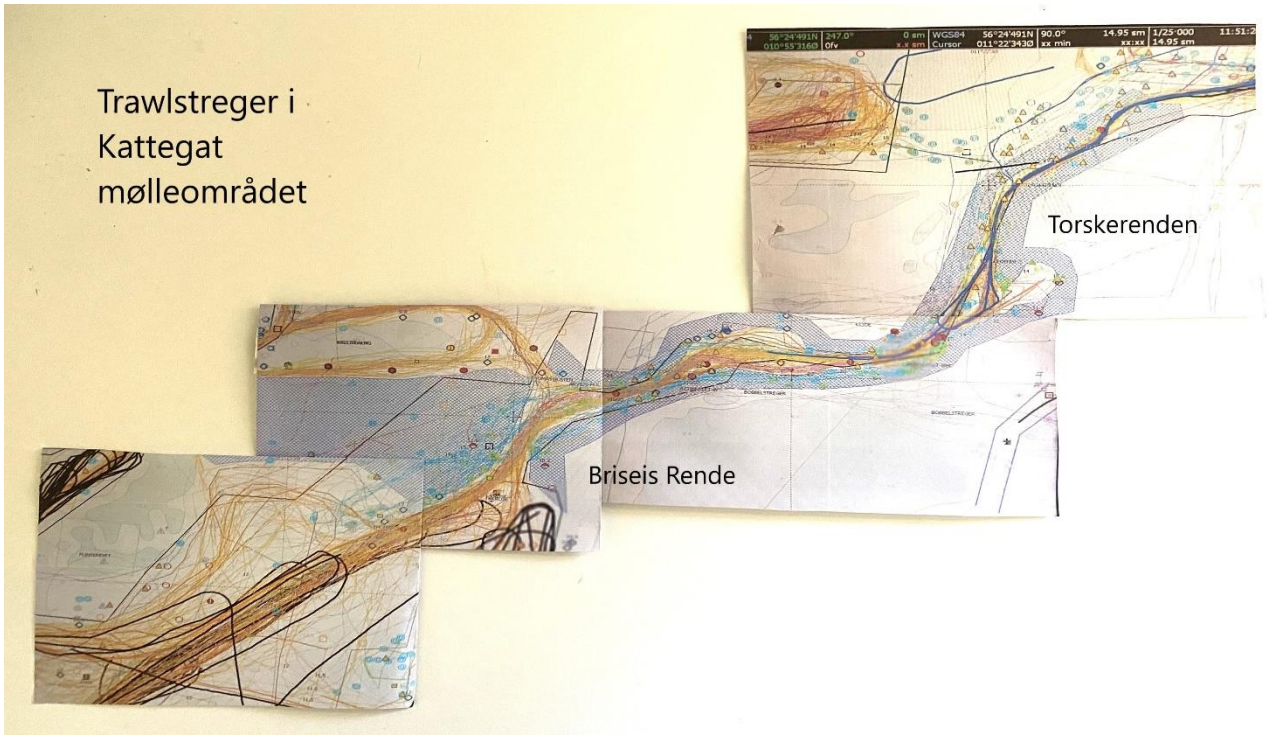
Figur 2. Hummertrawler i Grenå Havn. Bemærk 2 trawltromler, trawlskovle og kædeklump, hvortil de to trawl er forbundet.

Hummertrawlerne fra Djursland fisker naturligvis ikke kun i de helt lokale farvandsområder men fisker også i andre dele af Kattegat, herunder også i det andet mølleområde (nord for Hesselø). Der er et vigtigt, og tydeligt afgrænset trawlspor tværs igennem Kattegat-mølleområdet, som tydeligt fremgår af figur 3. Det skal bemærkes, at denne figur alene bygger på en begrænset mængde VMS-data og på en mangelfuld sortering af data. Samme trawlspor fremgår af Miljøstyrelsens kortlægning i forbindelse med etableringen af Natura 2000 området umiddelbart syd og øst for det nævnte trawlspor - se BILAG 1 (Naturstyrelsen, 2014). Fiskerne /1/ har beredvilligt stillet deres GPS-data over deres fiskeris geografiske udstrækning til rådighed. I figur 4 er fotos heraf sat sammen til en helhed, som dækker hele forløbet igennem Kattegat-mølleområdet. Som det tydeligt fremgår, er fiskeriet efter primært jomfruhummer begrænset til en meget snæver og bugtende rende som strækker sig fra NØ mod SV igennem mølleområdet. Trawlsporet omgives af områder med sten og ujævn bund, hvor der ikke kan anvendes jomfruhummertrawl, der på grund af deres tætte bundkontakt uvægerligt ville hænge fast i bunden her. Den befiskede rende er 30-50 meter dyb og bunden her er relativt blød (mudder, sand). Afstanden igennem området svarer nogenlunde til et trawltræk (20-25 km).

Udenfor den nævnte relativt dybe rende på tværs af mølleområdet fiskes der i begrænset omfang også med trawl (med kugler/skiver) efter fisk - primært fladfisk: rødspætter, pighvarre, slethvarre, tunge) tidligere også efter torsk. Denne type fiskeri drives nu kun af ganske få mindre trawlere, dels pga bestands- og kvotesituationen, dels fordi mange er ophørt med fiskeri, og dels fordi fiskeri efter jomfruhummer udgør et attraktivt alternativ. Disse mindre trawleres positioner/fiskeri fremgår ikke af VMS-registreringen, eftersom fartøjerne er mindre end 12 meter.



<u>Figur 3.</u> VMS-positioner for fiskefartøjer med aktivitet i farvandet øst for Djursland (2022, hastighed< 6 knob). Kattegat-mølleområdet og kabeltraceet til land er markeret med blå streg. (DNV, 2024). Området med sort streg markerer det område, hvorfra der er fremskaffet trawlstreger fra fiskerne (se figur 4). (DNV, 2024).



<u>Figur 4.</u> Trawlspor fra jomfruhummerfiskeri igennem den nordlige del af Kattegat-mølleområdet fra NØ mod SV (se placeringen i fig. 9) /1/. Den blå skravering angiver områder med sten.

Området mellem mølleparken og land, hvor ilandføringskablet skal placeres, er vigtigt for det kystnære fiskeri med garn /14/. Der forventes en effekt på fiskeriet i anlægsperioden, hvor forstyrrelser og uklart vand vil kunne have en midlertidig effekt på fiskenes forekomst/vandring. Tidligere tiders fiskeri med bundgarn på Djurslands østkyst er ophørt for mange år siden, bundgarnsfiskeriet på Djurslands nordkyst forventes ikke at blive berørt af mølleprojektet /16/.

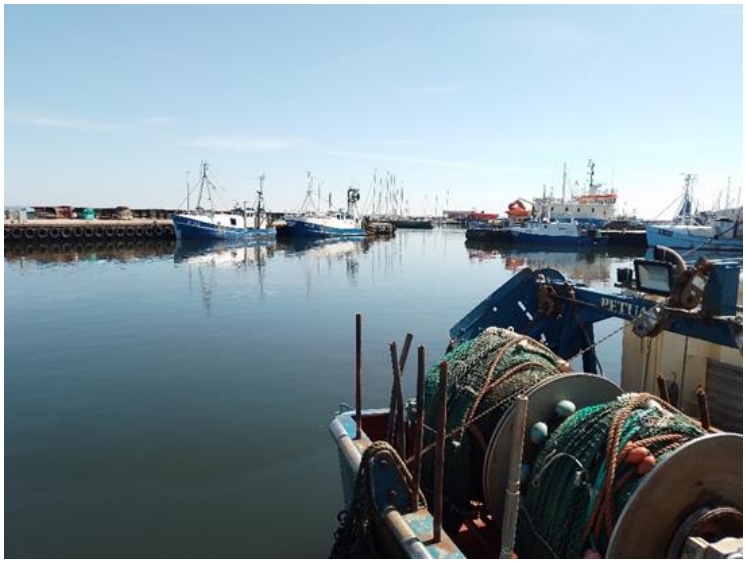
Flere fiskere (/1/, /3/, /14/), udtrykte frygt for, at elektromagnetisk stråling fra kablerne vil kunne have en vedvarende effekt på fisk. Samme bekymring gælder fsa kabler/stråling fra kablerne internt i mølleparken – eventuelt kombineret med vibrationer fra møllefundamenter/driften af møllerne. Den dokumenterede viden om en sådan mulig effekt er meget begrænset, men flere af fiskerne henviste til erfaringer fra Anholt-mølleparken, hvor /12/ eksempelvis gentagne gange uden held, og modsat situationen før parken blev etableret, havde forsøgt at lodde fisk (kun fisk oppe i vandet som sild, brisling, fjæsing) ved gennemsejling af mølleparken på vej mod Anholt. En garnfisker /14/ omtalte fiskeriforsøg inde i mølleparken, hvor der kun blev fanget krabber men ingen fisk. Vedkommendes vurdering er dog, at uanset om der er fisk eller ej, avil det ikke være sikkerhedsmæssigt forsvarligt at fiske med enmands fartøjer inde i mølleparken pga risikoen for at drive ind mod møllefundamenterne.

Generelt var fiskerne uforstående overfor, at man havde valgt den pågældende placering af mølleparken, når der både nord og syd herfor var områder hvor fiskeriet ville blive generet i væsentlig mindre grad. En friholdelse af det intensivt anvendte trawlspor på tværs af mølleområdet og en placering af møllerne henholdsvis nord og syd herfor, eventuelt indenfor afgrænsningen, ville kunne reducere generne for fiskeriet betragteligt.

Hesselø mølleområdet

Der er blevet afholdt et møde/besigtigelse i Gilleje den 7. maj 2024 med deltagelse af auktionsmesteren /7/, Formanden for Gilleleje Fiskeriforening /6/ og 2 trawlfiskere (/8, /9/). Efterfølgende er der taget kontakt med 3 andre fiskere med interesser i Hesselø mølleområdet (/1/, /13/, /17/).

Som beskrevet i afsnittet om Kattegat mølleområdet er fiskeriet generelt gået overordentligt meget tilbage i Kattegat igennem de sidste 20 år, det gælder især for fangsterne af fisk, mens landingerne af jomfruhummer er gået markant frem. Eftersom jomfruhummer er en højværdiart har den samlede værdi af alle landinger af både fisk og skaldyr fra Kattegat kun udvist en relativt begrænset nedgang fra omkring 220 mio. kr i begyndelsen af 2000-tallet til nu omkring150 mio. kr (alle landingsoplysninger fremgår af BILAG 2A).



Figur 5. Hummertrawlere i Gilleleje Havn, maj 2024.

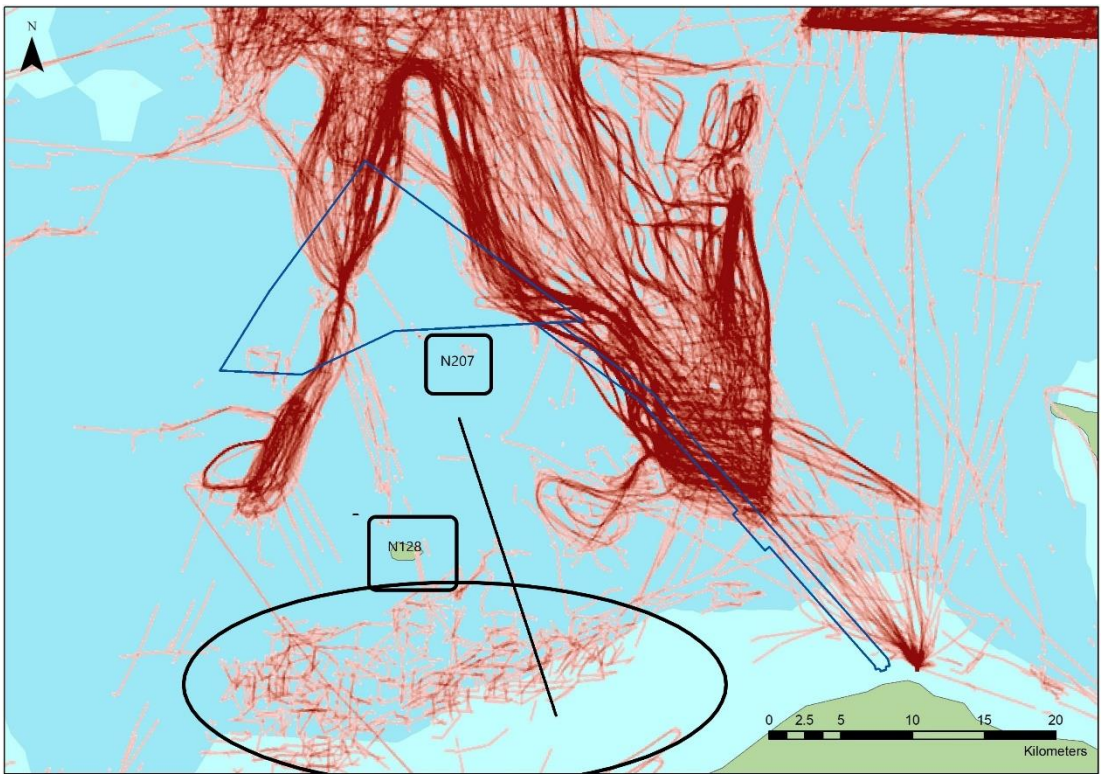
Fiskerne i Gilleleje, og mange udefrakommende fartøjer, lander deres fangster til Gilleleje Fiskeauktion Værdien af landingerne i Gilleleje har udvist mindre dramatiske og negative udsving end i Kattegat generelt, men også her dominerer landingerne af jomfruhummer i stadig stigende grad. I løbet af de sidste 10 år er værdien af jomfruhummerlandingerne næsten fordoblet fra godt 26 mio kr (gennemsnit 2012-2014) til ca. 47 mio kr (gennemsnit 2021-2023). Værdien af landingerne af jomfruhummer udgør nu ca. 85% af den samlede værdi af alle landinger sammenlignet med ca. 75% for 10 år siden (Gilleleje Fiskeauktion AS/Fiskeristyrelsen).

De vigtigste konsum-fiskearter er nu fladfiskearterne tunge, slethvarre, pighvarre og rødspætte. Værdien af landingerne i Gilleleje af disse arter har holdt sig relativt konstant eller endog stigende fsa pighvarre og slethvarre. Landingerne af torsk til Gilleleje auktionen er derimod gået dramatisk tilbage fra at have haft en værdi på mere end 5 mio kr i 2017 til nu (2022-2023) kun godt 100.000 kr.

Denne udvikling i fiskeriet blev diskuteret med fiskerne. Konsekvensen har naturligvis været, at især fiskeriformer, specielt garnfiskeriet, som ikke har jomfruhummer som målart er gået markant tilbage. I Gilleleje – og i de andre havne på Sjællands nordkyst (Hundested og Sj. Odde) - er der således nu kun en håndfuld garnfartøjer tilbage, som kan betegnes som fuldtids kommercielle. Der er fortsat et betydeligt antal enmands joller med fiskerinummer udrustet til garnfiskeri i de nævnte havne – ejerne af disse fartøjer er registreret som bierhvervsfiskere eller erhvervsfiskere med en beskeden aktivitet, og som oppebærer en stor del af deres indtægt fra arbejde i land eller fra pension.

I Gilleleje er der nu 7 hjemmehørende trawlere, men i hummersæsonen er der ofte op til 15 trawlere fra andre dele af landet, som har deres udgangspunkt i Gilleleje havn. I hver af havnene i Hundested og Odden er der 2 hjemmehørende hummertrawlere. Den dominerende fiskeriform er fiskeri med særlige hummertrawl (fig. 5), enkelte af trawlerne driver periodisk også et målrettet fiskeri efter konsumfisk med bobbins-trawl (rub med bobbins/kugler eller skiver), som gør det muligt at fiske på mere ujævn/stenet grund.

De primære fiskeområder fremgår af figur 6, der viser VMS registreringer i 2022 fra alle fiskefartøjer i den sydlige del af Kattegat i og omkring Hesselø-mølleområdet (DNV, 2024). Det skal dog bemærkes, at kun fartøjer >12 meter er omfattet af VMS-registreringen, og at mindre fartøjers fiskeri i området således ikke er omfattet af denne kortlægning (se også BILAG 3). Værdien af de mindre fartøjers fiskeri er imidlertid, set i den store sammenhæng, af minimal betydning (værdien af landingerne fra alle danske fiskefartøjer <12 meter udgør kun 5-10% af den samlede værdi af alle landinger).



Figur 6. VMS-positioner fra fiskefartøjer i Hesselø-området (2022, hastighed <6 knob). Mølleområdet og placeringen af kabeltraceet til land er markeret med blå streg (DNV, 2024). Fiskernes forslag til omtrentlig placering af den midterste del af kabeltraceet er markeret med sort streg /8/, /9/. Den omtrentlige placering af Natura-2000 områderne N207 og N128 er markeret med firkanter. VMS-registreringer af garnfiskeriet er indeholdt i elipsen markeret med sort streg nederst i billedet.

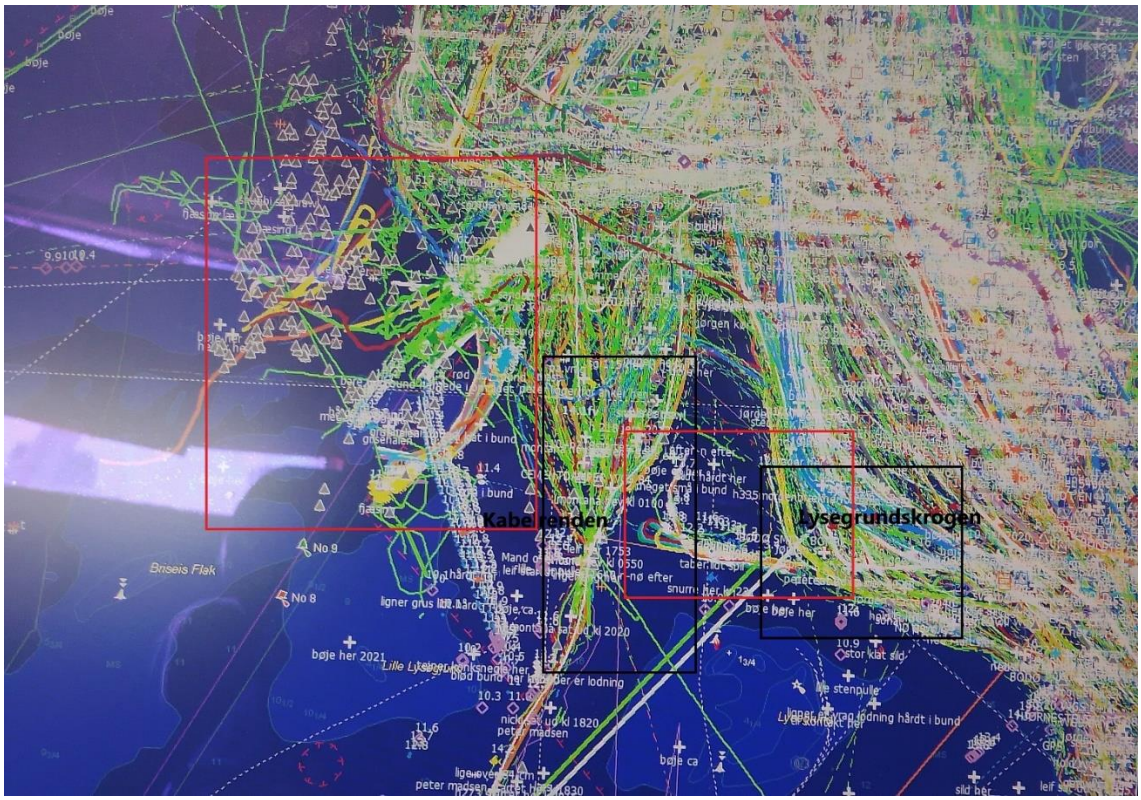
Mølleområdet er, som det fremgår af figur 6, placeret nord for Hesselø, og umiddelbart nord for Lysegrund (Natura-2000 område N207) og som det tydeligt fremgår foregår der inden for afgrænsningen af mølleområdet og af kabelforløbet mod land et intensivt fiskeri med trawl. Flere fiskere har givet adgang til deres GPS-loggere, som understøtter VMS-kortlægningen. I figur 7 ses fiskernes kortlægning/trawlstreger, hvor især skal bemærkes de 2 vigtige trawlområder: "Kabelrenden" igennem den centrale del af mølleområdet og "Lysegrundskrogen" i den østlige del af mølleområdet /9/. I figur 8 er vist trawlstreger fra en mindre trawler /17/, som fisker intensivt i "Kabelrenden". Den markante indsnævring af fiskeområdet skyldes dårlige bundforhold (sten) på begge sider heraf, som umuliggør fiskeri med bundtrawl. Fiskeriet med

trawl følger som regel dybdekurverne, og som det fremgår, fiskes der overvejende nord-syd igennem området. Den primære målart her er jomfruhummer, med en mindre bifangst af fladfiskearter. Som noget specielt i år er der desuden en relativ stor forekomst af kuller i fangsterne – dog overvejende under mindstemålet. Udover hummer-trawlfiskeriet foregår der desuden et mindre trawlfiskeri med "fisketrawl" (rub med kugler/skiver), som gør det muligt at fiske på mere stenet/ujævn grund) uden for de omtalte intensivt befiskede trawlspor.

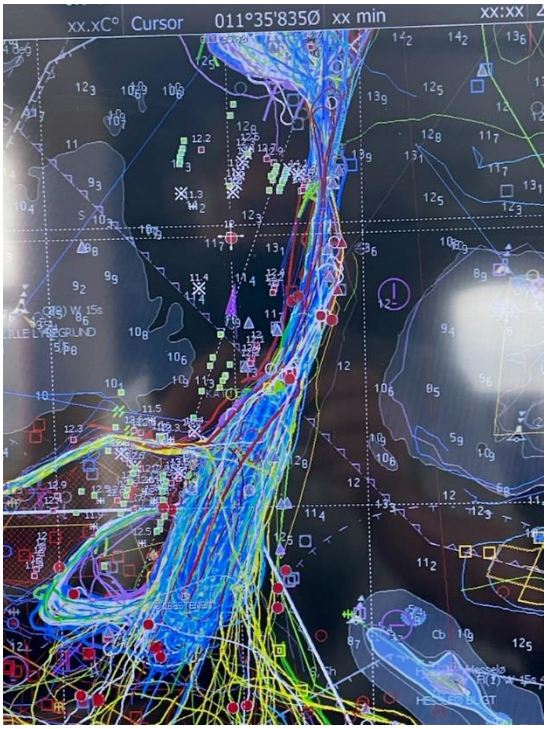
Der er igennem de seneste 4 år gennemført et forsøgsmæssigt fiskeri efter fjæsing med særlige trawl med reduceret maskestørrelse. Fjæsingen forekommer visse steder, især om foråret, i enorme mængder. Som det fremgår af figur 7 vil et par af disse områder blive berørt af mølleprojektet.

Som tidligere nævnt er der kun ganske få aktive garnfartøjer i de nordsjællandske havne, deres fiskeri foregår naturligvis uden for trawlområderne og overvejende mere kystnært /13/. Vigtige arter for dette fiskeri er fladfisk (især tunger om foråret), og stenbider("kulso") i årets første måneder (dette fiskeri er nu på det seneste blevet stærkt reguleret/begrænset). Garnfiskerne ser temmelig mange småtorsk i deres redskaber men kun sjældent torsk over mindstemålet. Garnkutterne i området anvender sjældent mere end 100 garn, som fastholdes med mindre ankre (typisk 3 kg) for hver 10-15. garn /13/.

Den valgte placering af eksportkablerne fra mølleparken og til ilandføringen vest for Gilleleje vil i den nordlige halvdel af forløbet (fra ca. 10 sømil fra kysten) komme til at gå igennem vigtige trawlområder. Eftersom fiskeri med bundslæbende redskaber i udgangspunktet vil være forbudt indenfor 200 meter fra kablerne vil det valgte kabelforløb være ødelæggende for bundtrawlfiskeriet i området. Fiskerne foreslår derfor en andet forløb af kabelkorridoren længere mod vest (se figur 6).

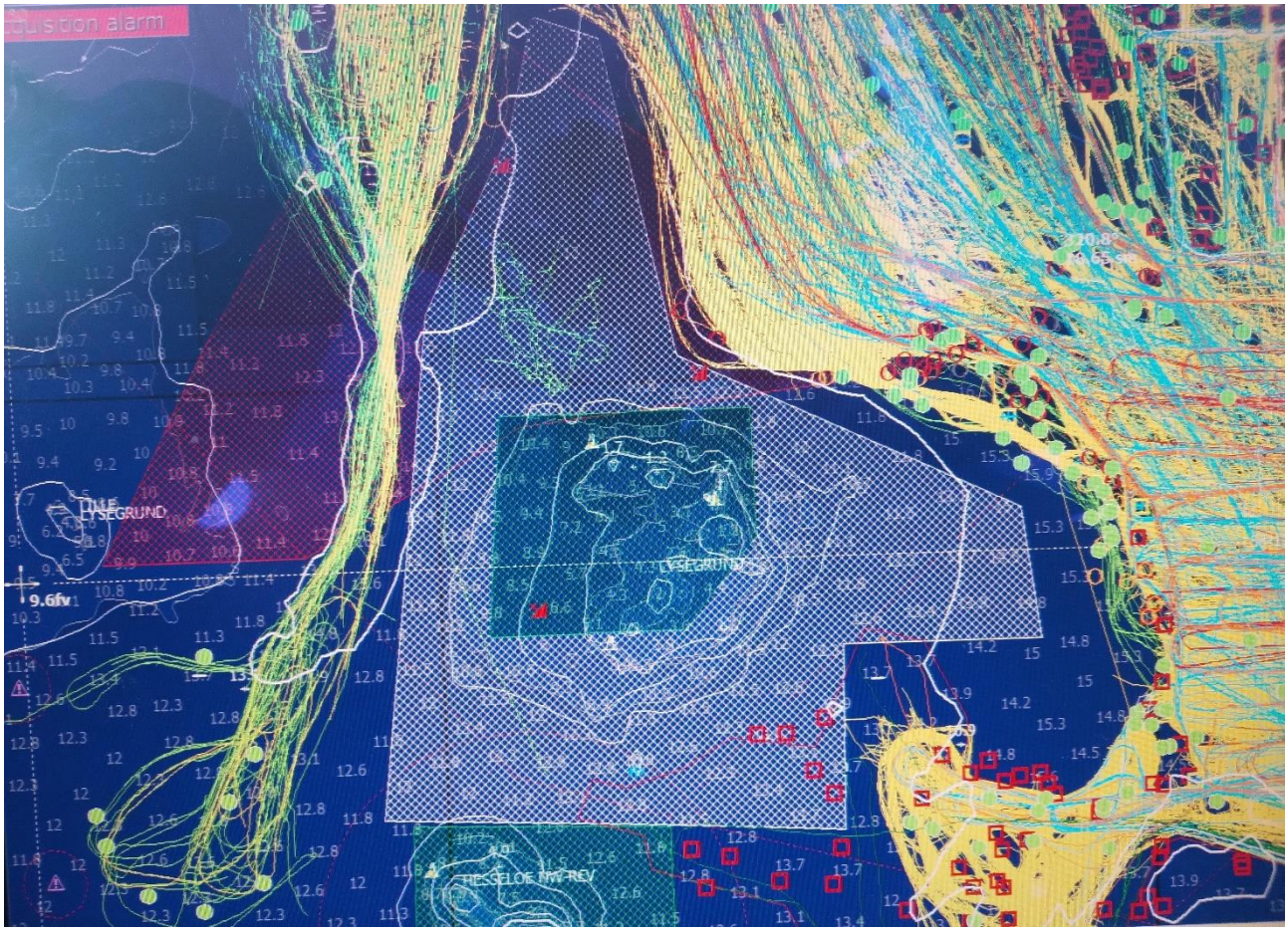


Figur 7. Trawlstreger i og omkring Kattegat-mølleområdet /9/. I områderne angivet med rød streg er der i de seneste år gennemført et forsøgsfiskeri efter fjæsing - det østlige af disse områder ligger inden for afgrænsningen af mølleparken. Med sort streg er angivet vigtige trawlområder (Kabelrenden og Lysegrundskrogen), som begge ligger inden for afgrænsningen af mølleparken.



<u>Figur 8</u>. Nord-syd gående trawlstreger fra mindre trawler (fisker med enkelt trawl) igennem Kabelrenden i den vestlige del af Hesselø mølleområdet /17/.

Fra fiskerne og deres organisations side (/4/, /7/, /8/) er der udarbejdet et alternativt forslag til placering af mølleparken som vil genere fiskeriet væsentligt mindre end det nuværende forslag til placering (Figur 9). Som det fremgår, foreslås møllerne placeret i et område imellem hhv "Kabelrenden" og "Lysegrundskrogen", nord for Hesselø (Natura 2000 område N128) men omkransende Natura 2000 omr. N207 (Lysegrund).



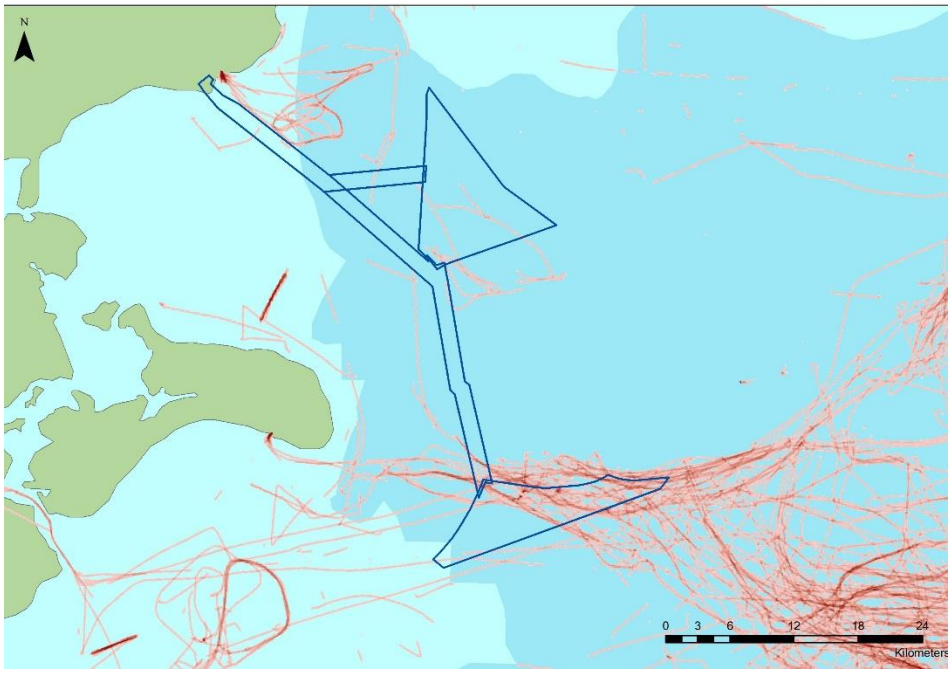
<u>Figur 9</u>. Fiskernes forslag til alternativ placering af Hesselø mølleparken (hvid skravering) /8/.

Kriegers Flak mølleområderne (nord og syd)

De vigtigste fiskere i Kriegers Flak mølleområderne er blevet kontaktet enten telefonisk /10/, /11/ eller ved opmøde /9/. For at overleve økonomisk fisker de alle også i andre farvande end vestlige Østersø/Kriegers Flak.

Fiskeriet i Østersøen, herunder i de nævnte mølleområder, er gået voldsomt tilbage i løbet af det sidste tiår, dette gælder især for så vidt angår landingerne af torsk, som er gået tilbage fra en årlig landingsværdi på 200-380 mio. kr til nu (2022-2023) så lidt som ca. 1-2 mio. kr årligt (se BILAG 2B). Denne udvikling ses også markant i de 2 havne (Rødvig og Klintholm), som tidligere var de vigtigste for fiskeriet i den vestlige Østersø/Krigers Flak – til og med 2017 blev der i disse havne årligt landet fisk til en værdi af 20-30 mio kr, værdien af de samlede landinger var i 2023 på mindre end 1. mio kr. Nedgangen i de samlede landinger af torsk i de 2 havne har været endnu mere dramatisk - til og med 2017 blev der årligt landet torsk til en værdi af 5-10 mio kr for så i 2023 at falde til en værdi på mindre end 10.000 kr. De vigtigste fiskearter for fiskeriet i Østersøen er nu, i nævnte rækkefølge: Brisling (omkring 50% af samlede landingsværdi), sild, tunge, rødspætte, ål og pighvarre.

Det er hensigten at etablere 2 nye vindmølleparker hhv nord og syd for den nuværende Kriegers Flak Vindmøllepark (se figur 10).



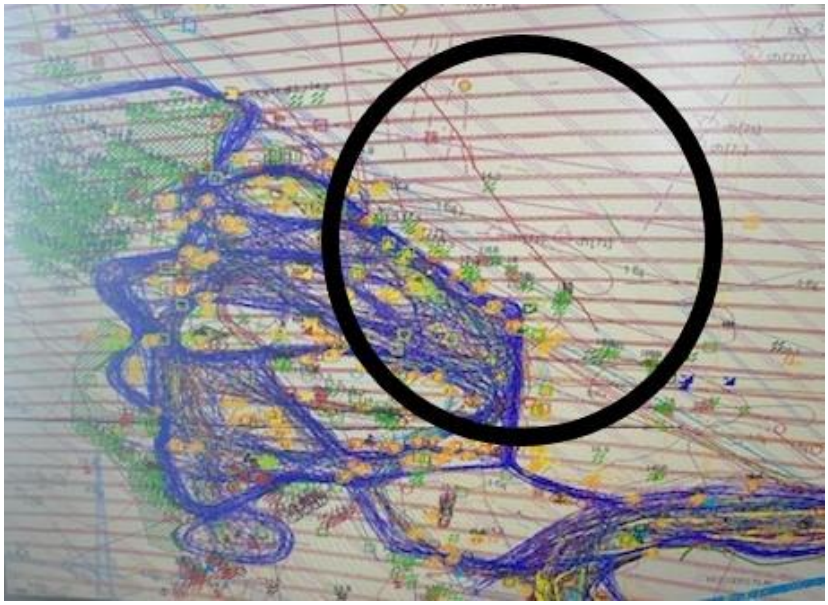
Figur 10. VMS-registreringer i 2022 fra fiskefartøjer der bevæger sig med en hastighed over 6 knob. Endvidere er vist placeringen af de 2 nye vindmølleparker henholdsvis nord og syd for den nuværende Kriegers Flak Vindmøllepark (DNV, 2024).

Fiskeriets omfang og karakter på og omkring Kriegers Flak er tidligere, i forbindelse med Krigers Flak Vindmølle-projektet, blevet beskrevet temmelig detaljeret (Klaustrup & Krog, 2015 og 2021). Eftersom fiskeriet i de senere år, efter 2018, er gået dramatisk tilbage, er oplysningerne i disse redegørelser dog mindre relevante.

I henhold til de nye oplysninger fra fiskerne (/9/, /10/, /11/) er der kun 3 trawlere tilbage, som kan siges at have en væsentlig interesse i farvandet, hvor de nye mølleparker skal etableres. Kriegers Flak-området har set i relation til torskebestandens dårlige tilstand, den gældende restriktive fiskeriregulering, og den relativt

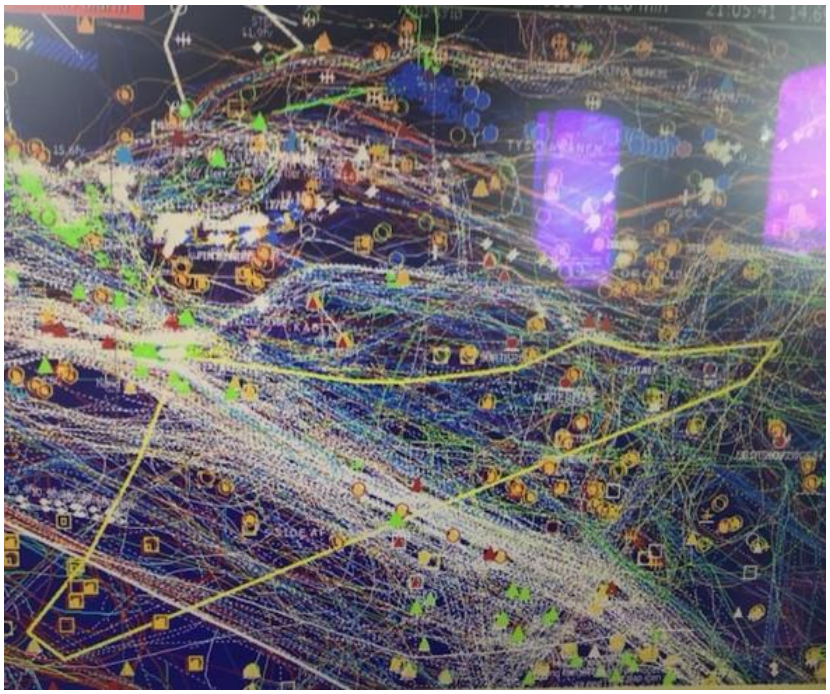
store afstand fra hjemhavnene, kun en meget begrænset eller ingen interesse for de få tilbageblevne garnfiskere i nærområdet.

I Kriegers Flak Nord–området er der som det fremgår af figur - og af Bilag 4 A og B - kun en meget begrænset fiskeriaktivitet, idet det skal bemærkes, at de angivne trawlstreger overvejende er fra før den nævnte dramatiske nedgang i fiskeriet begyndte (før 2018).



Figur 11. Trawlstreger i farvandet nord for den eksisterende møllepark på Kriegers Flak, hvor den nye møllepark, Kriegers Flak Nord tænkes placeret (omtrentlig placering markeret med sort streg) og hvorigennem kablet til land vil komme til at gå igennem/10/.

Fiskeriet i Kriegers Flak Syd-området er mere betydningsfuldt end i den nordlige møllepark, se figur 12 og 13, men også her skal det understreges, at en overvejende del af trawlstregerne er fra før den store nedgang i fiskeriet begyndte. Tidligere udgjorde torsk den primære målart, men i de seneste år har fangsten af fladfisk - primært rødspætte, tunge, pighvarre, slethvarre og skrubbe været de vigtigste arter for trawlfiskeriet i området. I de seneste år er der observeret en stor forekomst af små rødspætter (yngel, fisk under mindstemålet) i området /10/, 11/.



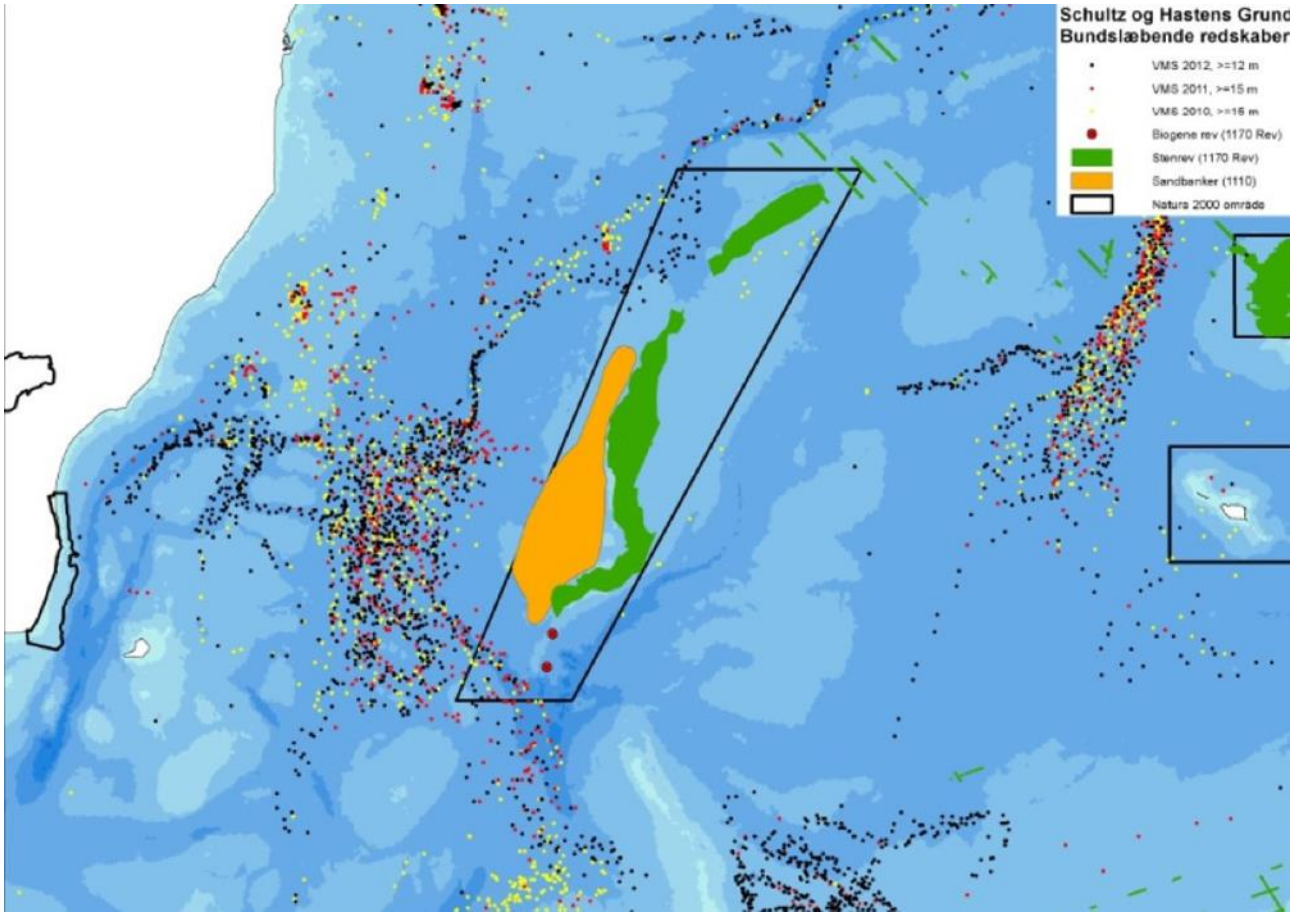
Figur 12. Trawlstreger syd for den eksisterende møllepark på Kriegers Flak med markering (gul streg) af afgrænsningen af den planlagt, nye møllepark)Kriegers Flak Syd) /10/

Figur 13. Trawlstreger fra demersal trawler /9/, der viser fiskerimønsteret i Kriegers Flak området. Med sort streg er markeret den omtrentlige placering af Kriegers Flak Nord mølleparken.

Eksportkablerne fra de 2 nye mølleparker forventes til dels, at blive placeret i de samme kabeltraceer som kablerne fra Kriegers Flak Vindmølleparken. I henhold til gældende lovgivning ("Kabelbekendtgørelsen") vil der, medmindre kabelejerne søger om dispensation fra bekendtgørelsens regler, automatisk blive etableret et forbud mod brug af ankre og bundslæbende redskaber indenfor 200 meters afstand fra kablerne. Eftersom kablerne vil komme til at krydse trawlspor hele vejen ind til ilandføringen ved Rødvig (se BILAG 4 A og B), kan dette have store konsekvenser for trawlfiskeriet, idet det dog skal bemærkes, at denne konsekvens allerede er mærkbar i forbindelse med den nuværende møllepark

BILAG 1

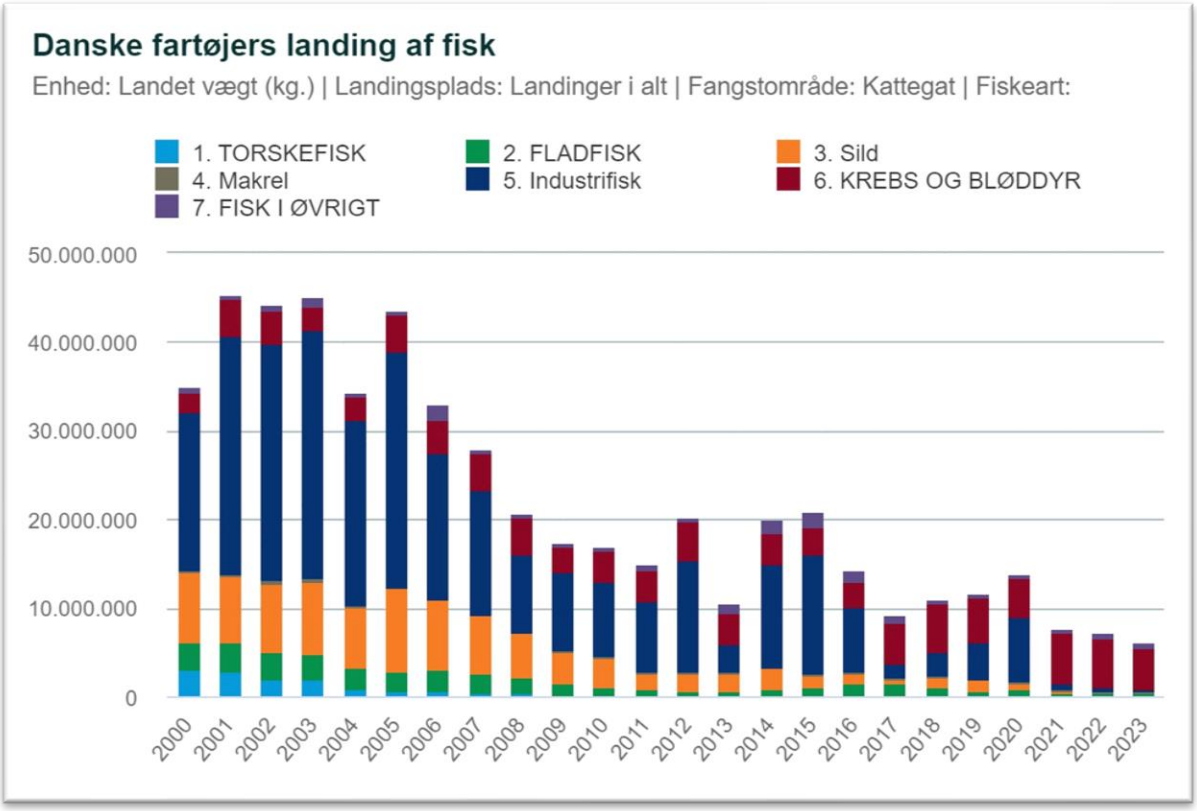
VMS-positioner for fiskefartøjer over 12 meter som fiskede med bundslæbende redskaber og med en hastighed på under 6 knop i perioden 2010-2012. Udarbejdet af DTU Aqua. Natura 2000 omr. Det med sort markerede rektangel angiver afgrænsningen af Natura 2000 område H224 (Naturstyrelsen, 2014). Kattegat-mølleområdet er placeret helt op til afgrænsningen af den nordlige og nordvestlige del af Natura 2000 området.

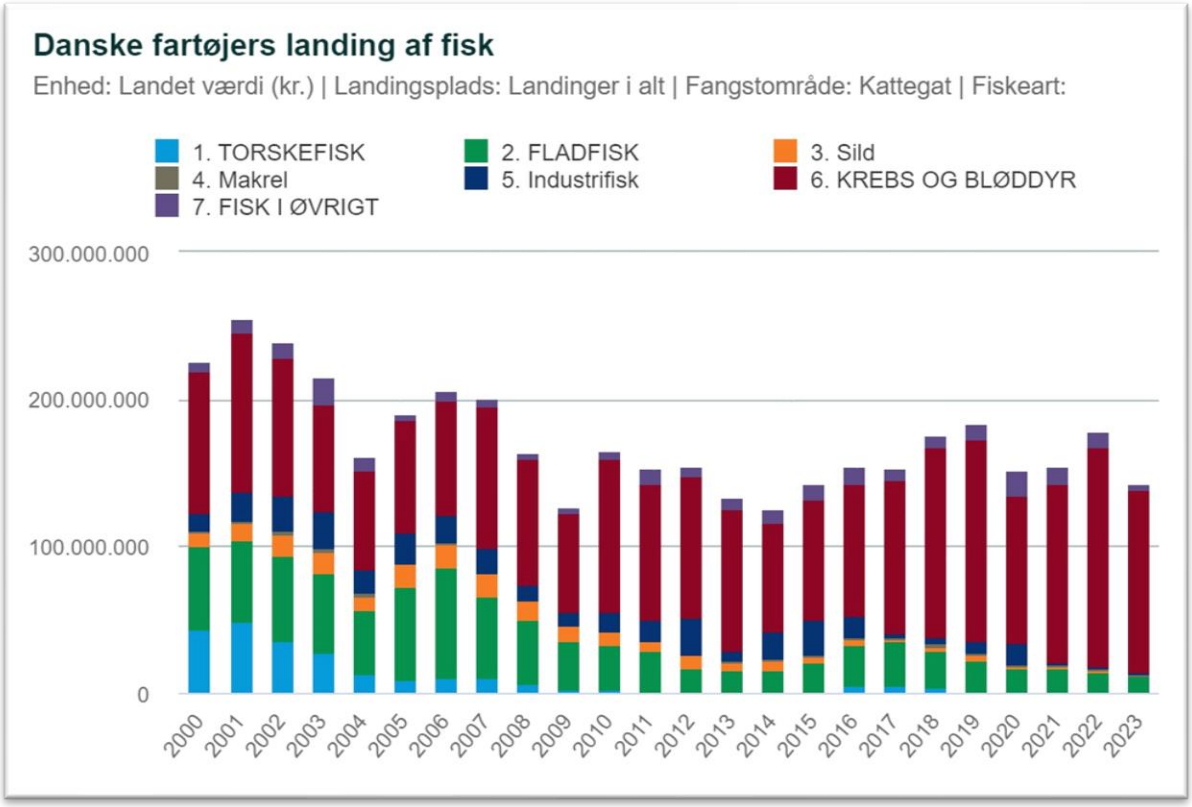


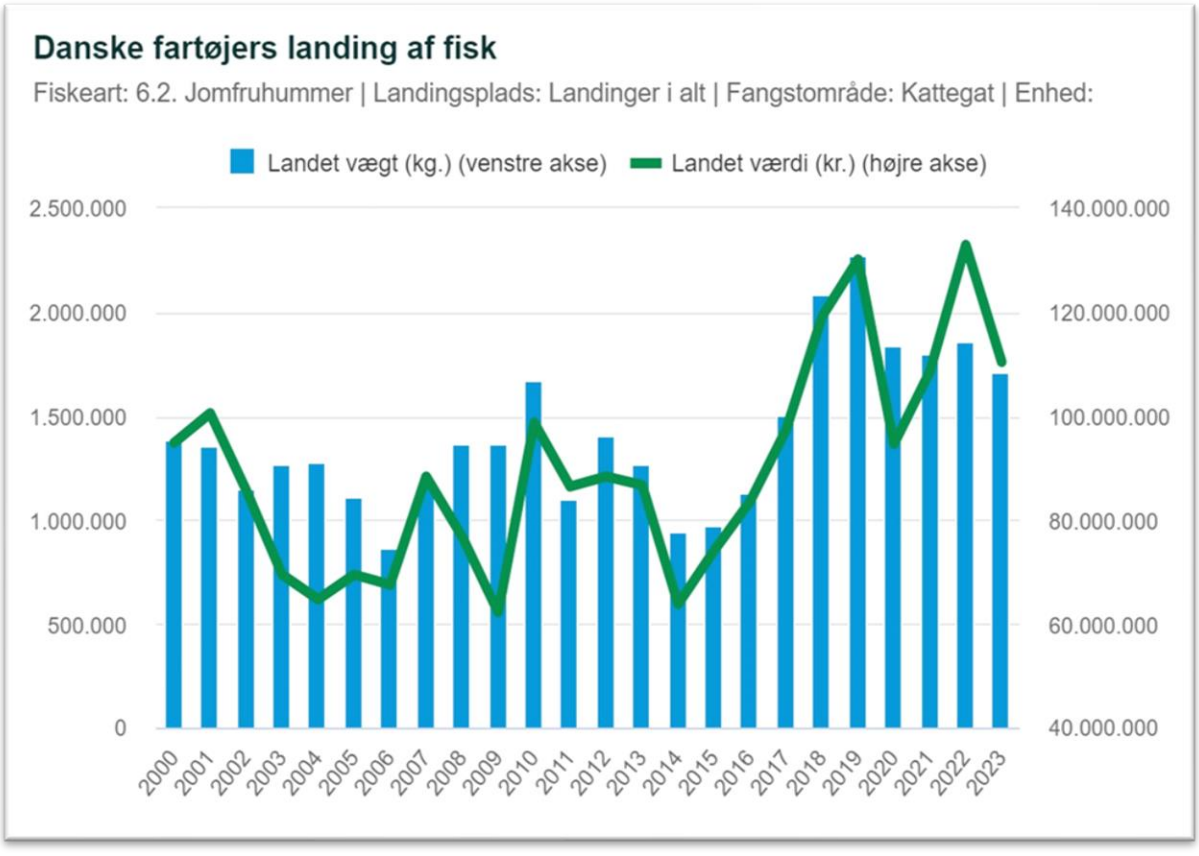
BILAG 2

Landingsstatistik (Danmarks Statistik/Fiskeristyrelsen)

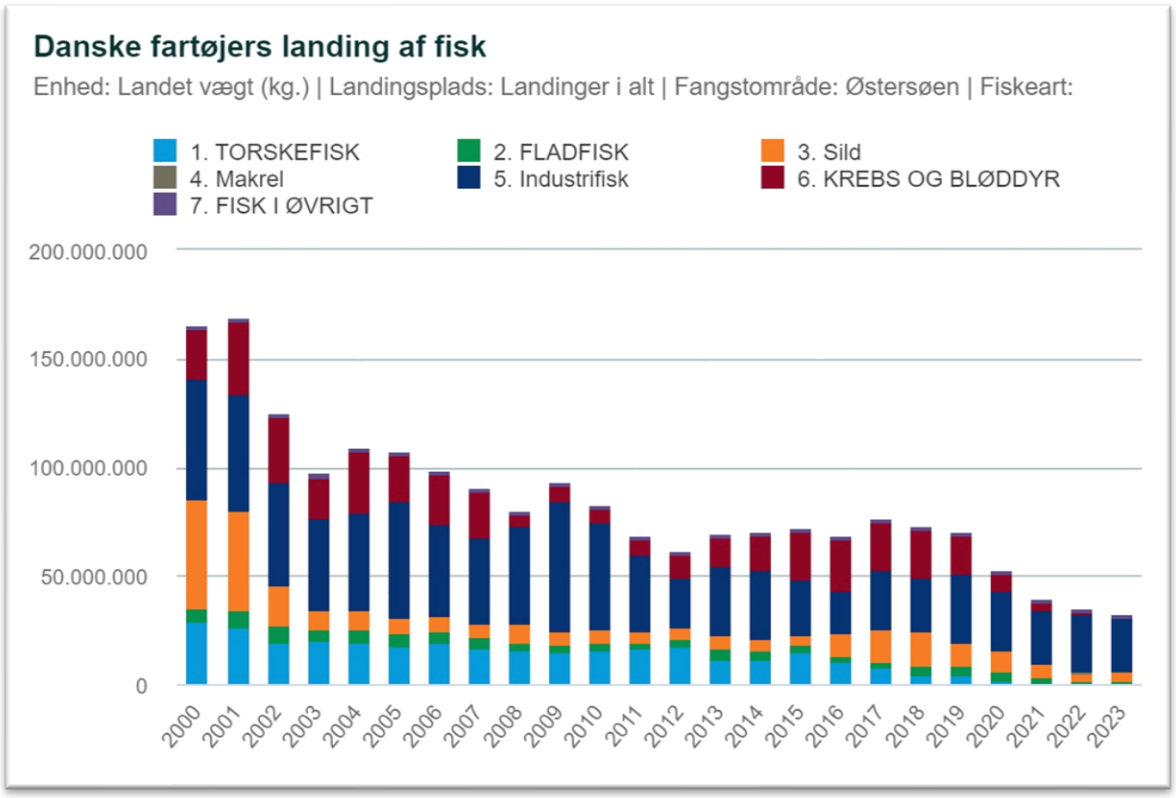
A. Kattegat

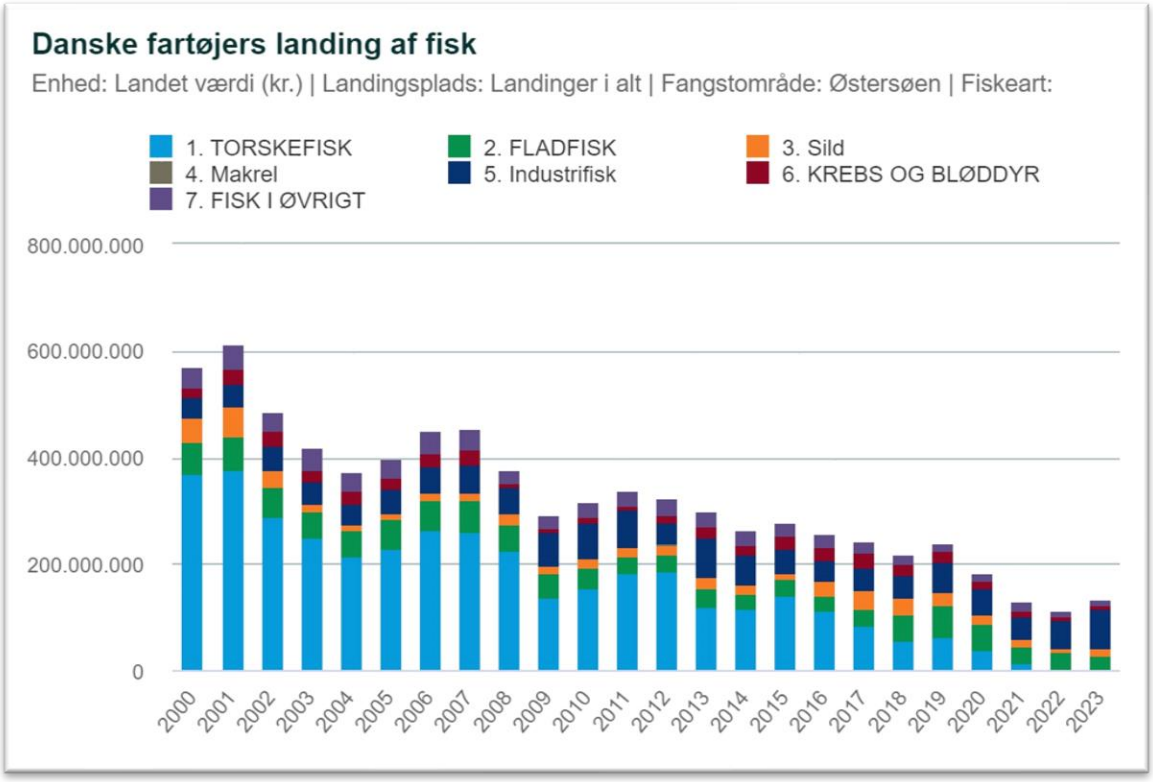



Danske fartøjers landing af fisk
Enhed: Landet værdi (kr.) | Landingsplads: Landinger i alt | Fangstområde: Kattegat | Fiskeart:
1. TORSKEFISK
2. FLADFISK
3. Sild
4. Makrel
5. Industrifisk
6. KREBS OG BLØDDYR
7. FISK I ØVRIGT
300.000.000
200.000.000
100.000.000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023


Danske fartøjers landing af fisk
Fiskeart: 6.2. Jomfruhummer | Landingsplads: Landinger i alt | Fangstområde: Kattegat | Enhed:
Landet vægt (kg.) (venstre akse)
Landet værdi (kr.) (højre akse)
2.500.000
2.000.000
1.500.000
1.000.000
500.000
0
140.000.000
120.000.000
100.000.000
80.000.000
60.000.000
40.000.000
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

B. Østersøen

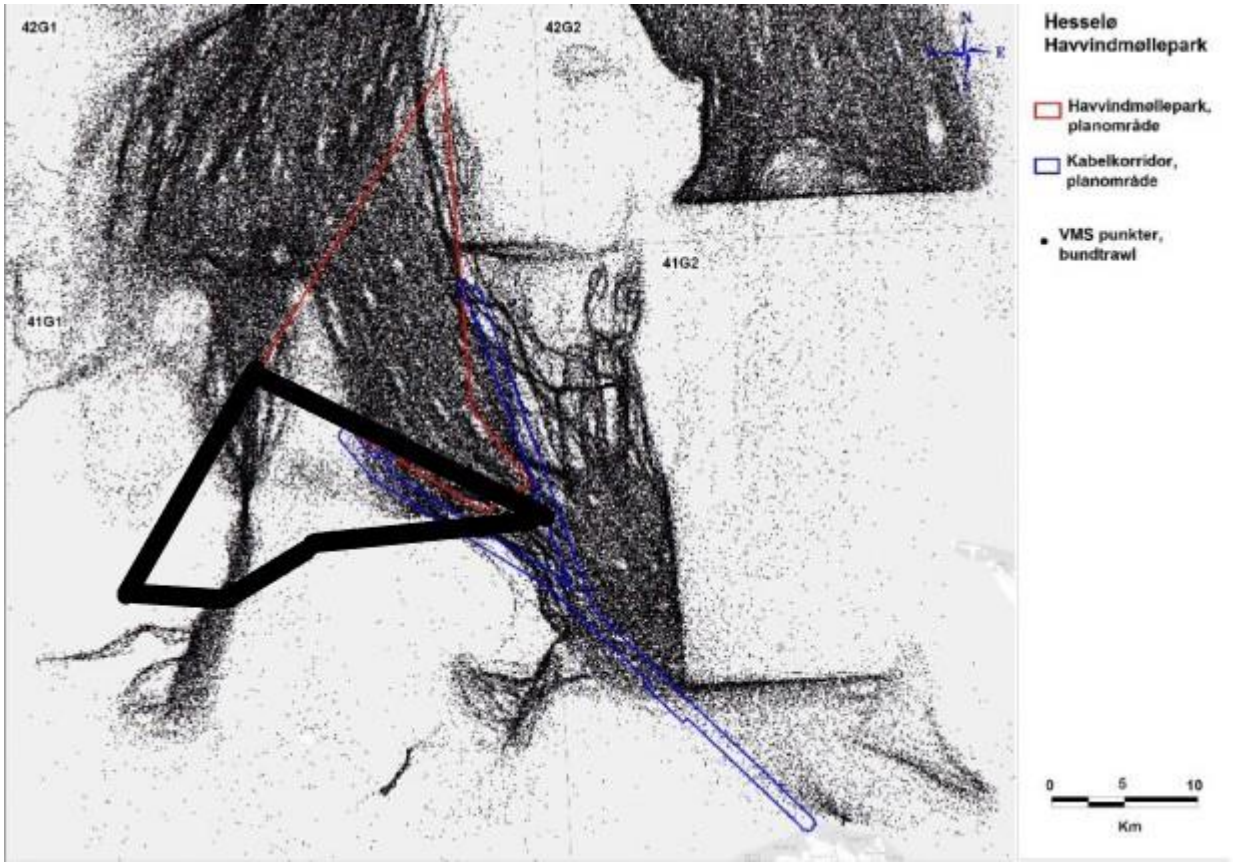

Danske fartøjers landing af fisk
Enhed: Landet vægt (kg.) | Landingsplads: Landinger i alt | Fangstområde: Østersøen | Fiskeart:
1. TORSKEFISK
2. FLADFISK
3. Sild
4. Makrel
5. Industrifisk
6. KREBS OG BLØDDYR
7. FISK I ØVRIGT
200.000.000
150.000.000
100.000.000
50.000.000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023


Danske fartøjers landing af fisk
Enhed: Landet værdi (kr.) | Landingsplads: Landinger i alt | Fangstområde: Østersøen | Fiskeart:
1. TORSKEFISK
2. FLADFISK
3. Sild
4. Makrel
5. Industrifisk
6. KREBS OG BLØDDYR
7. FISK I ØVRIGT
800.000.000
600.000.000
400.000.000
200.000.000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

BILAG 3

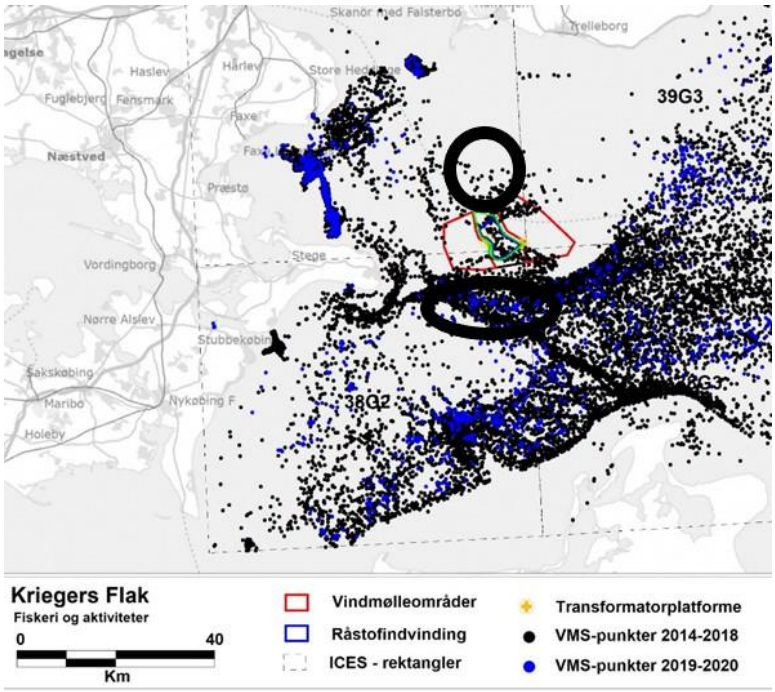
Fiskeri med bundtrawl i og nær planområdet for Hesselø Havvindmøllepark og kabelkorridor (Fra: Niras/Energistyrelsen, 2022. Miljøvurdering af planen for Hesselø Havvindmøllepark – Delrapport 2: Miljø på havet)

Den nye, omtrentlige placering af mølleparken er markeret med sort streg

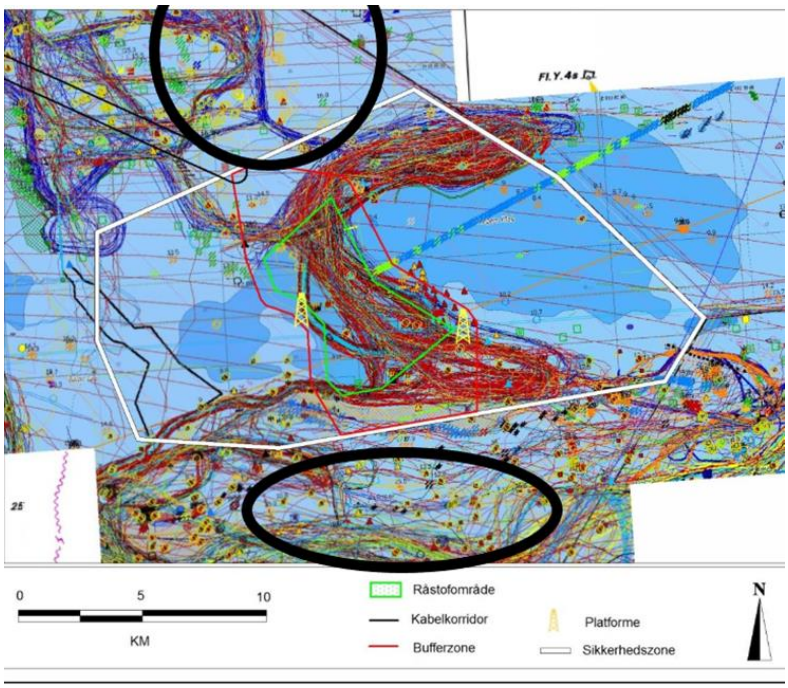


BILAG 4

A. De 8 mest aktive fartøjers fiskeriindsats i 4 ICES-rektangler fordelt på hhv perioden 2014-2018 og perioden 2019-2020 (Fra Klaustrup & Krog, 2021. Fiskeriinteresser ved Kriegers Flak – Overblik over fiskeriets udvikling i perioden 2014-2020).De kommende mølleparkers omtrentlige placering hhv nord og syd for Kriegers Flak Havmøllepark er markeret med sorte cirkler.



B.Trawl-slæbestreger i Kriegers Flak-området /10/. Afgrænsningen af den nuværende møllepark er markeret med den hvide sikkerhedszone. Det med grøn streg markerede område er udlagt til råstofindvinding (sand). Den røde streg markerer afgrænsningen af de 2 del-mølleområde som den eksisterende møllepark består af (Klaustrup og Krog, 2015). Den omtrentlige placering af de 2 nye mølleparker er markeret med sort streg.



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APPENDIX 2 FISHERIES STATISTICS

Table 2a. Landings in tons of commercial species from the Kattegat Sea from 2013-2023 by Danish fishers and vessels > 10 m. Source: Statistics Denmark, 2024.

Sum of landings (tons)											
Species	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Amer. plaice	0,00773	0,02435	0,03172	0,0113	0,00304	0,00508	0,002	0,0893	0,01038	0,0013	0,00578
Angler	0,51341	0,66309	0,89717	1,09683	0,78155	1,53015	2,22086	1,75945	3,0942	2,2862	1,89887
Atlantic bonito	0	0	0,582	1,2875	1,4495	0,0175	0,0355	0,092	0,006	0	0,291
Atlantic cod	48,08357	62,26653	51,03215	157,86801	175,61069	148,91936	54,77008	19,85839	15,88627	12,56153	15,81916
Atlantic halibut	0,22887	0,7689	0,71882	0,53628	0,31983	0,23302	0,21903	0,27991	0,15087	0,08252	0,23225
Atlantic herring	1738,73376	2079,0604	1176,69379	1104,28271	584,08382	1007,79426	1165,42093	519,79525	80,9475	108,15096	78,53694
Atlantic horse mackerel	1,39029	0,61641	2,52806	2,64192	10,46054	1,02752	1,16076	3,82093	1,43756	3,29769	0,19878
Atlantic mackerel	170,42776	104,65603	158,77672	150,9564	120,47045	183,00665	115,22771	184,35383	132,38099	206,18455	196,68176
Atlantic pomfret	0	0	0,0004	0,00391	0,00418	0,10996	0,04601	0,1055	0,13761	0,02637	0,01004
Atlantic salmon	0,004	0,0048	0,0045	0,004	0,0125	0,027	0,008	0,0045	0,003	0	0,0185
Ballan wrasse	0,0014	0,001	0,0063	0,0029	0,0035	0,0042	0,0098	0,0595	0,0089	0,0047	0,0002
Blonde ray	0,002	0	0	0,462	0	0	0	0	0	0,01	1,14681
Blue ling	0,0026	0,001	0	0,00082	0	0,006	0,002	0,001	0,0025	0,00018	0,00021
Blue skate	0	0	0,0003	0,06836	0,0715	0,3495	0,028	0,007	0,297	0	0,002
Brill	44,00336	40,09345	66,57313	88,03004	95,33151	63,7519	57,52887	72,59329	61,9878	34,677	35,75896
Common dab	48,0999	34,87259	51,03948	51,77453	49,00316	49,60378	36,76204	30,44689	22,79228	29,03049	17,50422
Common sole	142,16408	134,32039	93,39014	159,19097	210,69596	154,31274	132,01216	124,16765	111,96227	66,94471	35,4082
Cuckoo ray	1,145	0,2645	0,313	0,37	0,138	0,21952	0,15092	0,52253	0,43239	0,57211	0,39823
Eelpout	0	0	0	0,024	0	0	0	0	0,004	0	0
Eelpouts	0,071	0,121	0,048	0,016	0,047	0	0	0	0,002	0	0
European anchovy	0	0	0	0	0	0	0	0,6429	30,453	24,321	0,06
European conger	0	0	0	0	0	0,001	0	0,0003	0,0172	0,00053	0,0003
European eel	31,217	22,63134	18,20129	22,253	21,02431	25,8001	21,8855	14,4295	15,1859	16,6735	10,87658
European flounder	149,06891	171,33874	62,81485	87,1638	131,10436	147,03109	98,83322	89,33268	64,61291	76,88693	67,9383
European hake	8,85244	8,93687	13,47075	12,82512	8,19172	6,52347	4,91759	5,10476	9,33105	11,65449	12,27476
European perch	1,033	0,099	0,001	0	0	0,0025	0,01	0	0	0,002	0
European pilchard(=Sardine)	0	0	0	0	0	0,109	0	0	1,03	0,328	0,3365
European plaice	215,26014	318,0734	749,90558	925,8015	666,24627	456,55758	310,76781	248,11761	186,61597	133,01624	154,02724
European seabass	0	0	0,0005	0,0075	0,01123	0,01584	0,0064	0	0,0146	0,0564	0,002
European sprat	2970,8	11481,49775	13244,75823	7019,33392	1545,74	2827,84825	3783,6572	7145,17979	570,764	346,13	17,494
European whitefish	0,327	0,039	0	0	0	0	0,004	0	0	0	0
Freshwater bream	0	0,0015	0	0	0	0	0	0,0024	0,0014	0	0
Garfish	13,5638	12,8078	7,05263	8,31457	17,3304	8,4045	54,0787	20,8323	48,2563	77,6234	40,096
Golden redfish	0,01927	0,0074	0,00714	0,00684	0,00636	0,00765	0,00463	0,00542	0,01302	0,00261	0,00389
Greater forkbeard	0	0	0,01	0	0	0,02743	0,00331	0,002	0,00447	0,00437	0,00311
Greater weever	906,25049	1223,38854	1236,69944	1234,70376	698,21017	13,47108	78,08888	136,737	13,73258	349,12333	656,9233
Greenland halibut	0,0073	0,0233	0,0005	0,02107	0	0	0	0	0	0,001	0,0007

Grey gurnard	1,71145	1,5598	2,37296	3,84039	3,4097	3,22617	2,37487	0,77864	0,73587	2,296	0,12341
Haddock	7,56633	15,41348	34,74742	59,81904	28,94282	17,80321	3,97433	4,33774	2,53446	1,14423	9,45989
John dory	0	0,0004	0,0022	0,0026	0,0005	0,0028	0,0016	0,0057	0,01521	0,00293	0,00224
Lemon sole	15,39934	8,75073	13,28863	20,21012	23,85501	18,88526	13,61313	13,67831	10,00311	5,40835	6,51385
Ling	1,49735	1,13611	2,16044	3,05144	1,3599	1,19488	1,63308	2,20025	2,62683	2,26198	1,58981
Lumpfish	51,94214	245,19164	321,77126	101,81869	46,32734	114,4265	63,3674	159,63925	39,35774	23,72698	2,88075
Mediterranean scaldfish	0	0,009	0	0,0003	0,007	0	0,001	0,001	0	0	0,015
Megrim	0	0	0,00097	0,0018	0,001	0	0,00008	0	0	0	0
Mullets	2,06496	1,569	1,255	0,1711	0,34	0,036	0,0168	0,0145	0,052	0	0
Northern pike	0,0474	0,012	0,062	0,189	0	0	0	0,042	0	0	0,075
Picked dogfish	0	0	0,002	0	0	0,011	0,0085	0,012	0,005	0,0065	58,01437
Pike-perch	0,032	0,002	0	0,011	0	0,007	0,028	0	0	0	0
Pollack	2,59474	5,75378	5,74155	3,8619	5,08909	1,43816	0,46986	0,22016	0,24401	0,35705	0,2605
Rainbow trout	0,246	0,01	0	0,034	0	0,005	0,001	0,005	0	0,01	0
Roundnose grenadier	0,002	0,00033	0,01562	0,00197	0,0015	0,002	0	0	0,00048	0	0
Sailray	0	0	0	0	0	0	0	0	0,25469	0,0665	0,00184
Saithe(=Pollock)	1,24411	0,83084	1,93633	4,06383	2,13955	3,42446	1,41185	0,58896	0,22616	0,24138	0,24815
Sandeels(=Sandlances)	106,385	76,7	231,73	118,03686	0	25	103,91	176,663	132,687	42,14	125,558
Sea trout	0,0611	0,1008	0,1671	0,08157	0,0944	0,0363	0,2165	0,0311	0,02466	0,01423	0,0094
Shorthorn sculpin	0	0	0,0048	0,0032	0,001	0	0	0,01	0	0	0
Small-spotted catshark	0,0048	0,0173	0,0113	0,01595	0,0354	0,0324	0,0194	0,0258	0,0149	0,0119	0,0174
Surmullet	0	0,0002	0,00284	0,00321	0,0026	0,016	0,0316	0,07455	0,10551	0,03015	0,02656
Thornback ray	0,0384	0,0982	0,23316	0,48185	0,2443	0,2205	0	0	0	0,1801	3,1447
Tope shark	0,00831	0	0,011	0,0115	0,011	0	0	0	0,009	0,01106	0,0309
Tub gurnard	0,56204	0,28324	1,20246	1,19288	0,58565	0,50068	0,17044	1,98277	3,94836	2,5111	2,60713
Turbot	19,48372	21,16131	25,51253	30,99559	37,19011	33,3091	19,65661	22,00578	26,65508	20,26805	16,49194
Tusk(=Cusk)	0,006	0	0	0,00047	0,00164	0,00146	0,00027	0,004	0,0013	0	0,00151
Twaite shad	0	0	0,001	0,0005	0,001	0,00121	0,001	0	0,0012	0	0,0148
Whiting	3,82183	5,607	9,16329	15,07316	12,49271	3,86733	1,67812	159,97524	11,94749	4,8999	3,33808
Witch flounder	13,64835	11,49578	16,46215	23,05374	29,70847	23,66075	16,49225	11,86236	9,07581	6,94671	6,07025
Wolffishes(=Catfishes)	2,44114	1,30286	1,84507	1,59755	1,57026	1,06012	0,72035	0,59251	0,63465	0,47243	0,37157

Table 2b. Landings in value (DKK) of commercial species from the Kattegat Sea from 2013-2023 by Danish fishers and vessels > 10 m. Source: Statistics Denmark, 2024.

Sum of Landings Value (DKK)											
Species	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Amer. plaice	8	9,15	17,37	26,38					2,16		3,14
Angler	17275,88	22893,73	32294,73	31022,62	23447,37	48880,82	75869,6	52543,53	113813,64	90690,35	68910,9
Atlantic cod	948726,35	1250809,26	1192241,39	3523019,61	3950338,62	2994678,97	1188643,71	474869,53	321790,02	287807,96	304196,95
Atlantic halibut	12665,01	34537,25	42749,27	34737,22	14367,56	17537,65	13062,68	14706,09	9378,6	3928,08	14488,64
Atlantic herring	3391725,22	5657522,8	2778572,26	4158859,64	1930681,08	3032045,04	3675790,83	1236665,06	176550,02	502274,01	400407,83

Atlantic horse mackerel	6309,7	2686,38	8048,13	7118,17	26600,67	3896,72	3991,79	7345,99	4377,99	9831,62	287,93
Atlantic mackerel	993567,33	1170657,38	1125272,92	1133048,18	1033334,86	1458182,94	1148944,33	1347893,55	1203747,53	1695540,6	1386472,17
Atlantic pomfret				33,99	29,63	4377,87	1666,78	374,2	8257,1	991,15	449,01
Ballan wrasse	7,16			3,4	6,25	32,75	62,11	846,69	31,84	29,54	
Blue skate				114,61	578,5	4475,5					
Brill	1498962,69	1370681,51	2076077,79	2975021	3774695,53	3050455,75	2302635,44	2492450,26	3141944,39	2353149,37	2194994,36
Common dab	176441,02	125243,47	289301,51	295527,74	356092,17	371651,37	274828,42	170952,09	162097,67	282576,29	177940,27
Common sole	9449320,89	8862853,32	7355178,57	11674895,06	14413537,7	11561079,44	11053350,15	8099377,99	8747617,46	6866434,28	3637626,52
Cuckoo ray	21486	4260	4950	5317	2217	3074	77,75	2813,62	445,79	1496,64	627,38
European eel	1402130,12	731453	437438,79	603943,2	709703	675497	476112	293204	455133	632943	227081
European flounder	372835,68	417404,59	171910	322440,42	353939,32	470214,3	339693,21	287484,7	191407,18	302329,07	334499,25
European hake	92397,04	96912,31	164745,54	164440,76	120301,56	94330,45	95864,41	57190,29	132147,42	215804,24	275370,85
European plaice	1516174,09	2323036,26	7304360,8	10036823,93	7909982,11	6757658,56	4551015,36	3044102,33	2301999,1	2291083,88	2610272,59
European seabass				155,5	156,95	648,11	270,57		577,75		
European sprat	6426335,5	17928783,87	23298943,13	13363629,55		4837528,65	2274339,2	13847813,76	1290226,84	802501,5	
Garfish	24078	1221,5	33617,23	8090,03	16920,47	13849,42	8576,72	48442,61	13980,04	19397,1	4495,15
Golden redfish	158,84	71,7	49,78	76,61	69,6	130,23	75,32	80,51	184,18	36,35	41,4
Greater forkbeard						42,62	7,01		13,03	7,29	
Greater weever	2165839,04	2221042,46	2255565,12	2619297,02	1283823,66	168593,54	279848,96	465687,15	146219,5	931927,13	1830047,18
Greenland halibut	109,7	606		1035							
Grey gurnard	8705,14	8435,7	13346,76	32479,77	30512,83	48653,38	23197,17	7606,61	7617,85	7834,45	1085,75
Haddock	49422,71	148887,22	351140,94	622896,07	355551,85	198702,87	45755,32	12326,58	8358,08	9201,88	24573,11
John dory			56,35	45,36		50,55	17,01	217,5	430,28	18	13,88
Lemon sole	279668,11	171021,97	330949,86	466231,97	641221,68	471004,79	276837,09	244933,78	225917,74	131036,32	154708,72
Ling	18485,45	14269,25	29413,07	33447,32	16252,88	15771,58	24672,89	27287,43	34517,36	36440,55	26329,1
Lumpfish(=Lumpsucker)	2615945,54	5099391,55	6500005,59	7111996,6	4759904,71	5809518,44	7162967,83	15128232,88	8810297,17	7732124,87	525076,16
Mullets	64892,03	61169,25	50972,15	4573,5	15706,64	1520					
Pollack	68160,8	146074,04	158041,1	114569,07	141412,11	27973,39	12328,81	3980,02	5110,52	10542,31	7193,3
Saithe(=Pollock)	18310,76	8246,23	23033,09	59338,67	24914,59	41563,91	15602,35	4909,93	2664,26	3575,94	3302,86
Sea trout	190,5		1666,5	398,5		828,96			1346,03		
Small-spotted catshark	34,97	42,67	45,36	44,93	219,09	257,05	188,87	140,7	28,64	42,37	30,66
Surmullet			37,11	47,79	34,85	294,55	463,27	1384,76	2798,74	1086,98	524,84
Thornback ray	199,01	880,03	1272,08	2428,13	1791,79	2417,46				865,62	17103,82
Tub gurnard	3150,28	1591,33	5298,37	6589,83	2898,68	1767,53	807,71	14623,95	32018,77	23260,32	25712,02
Turbot	955867,1	1172198,62	1423947,87	1669264,84	2099829,71	2175966,85	1385964,48	1375278,8	1970139,63	1817387,73	1473170
Whiting	17802,33	23320,45	35563,95	70492,45	78023,51	22771,33	11069,41	319011,68	27641,01	14061,61	17510,32
Witch flounder	95213,53	107033,2	192603,31	266762,66	345889,13	326172,07	257997,58	167848,4	140328,59	133330,74	97081,08
Wolffishes(=Catfishes)	65423,57	31099,98	44114,13	39402,68	36796,44	24508,9	17314,83	14360,41	16612,69	12233,48	9481,68

Table 2c. Sum of landings (tons) for the different species in Kattegat, 2013-2023. Source: Statistics Denmark, 2024.

Sum of Landings (tons)											
Species	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Amer. Plaice	0	0	0	0	0	0,003	0	0	0,009	0,001	0,003
Angler	0,0038	0,0065	0,002	0,0075	0,0105	0,03349	0,0965	0,0698	0,0785	0,043	0,0355
Atlantic cod	3,0025	4,7158	6,102	13,4827	12,7643	9,3915	3,5732	1,4918	1,5577	0,8712	0,8219
Atlantic halibut	0,0204	0,1651	0,1	0,0735	0,0312	0,0148	0,028	0,037	0,0095	0,004	0,0123
Atlantic herring	672,338	0	0	0	0	47,42	0	22,081	38,426	15,7	5,976
Atlantic mackerel	0,106	0,0215	0,1065	0,081	0,0778	0,0405	0,7179	0,1093	0,406	0,9094	0,4712
Blue skate	0	0	0	0	0,0365	0,0395	0,006	0,002	0,019	0	0,002
Brill	9,431	7,9355	11,34028	15,78715	18,2405	11,97518	10,6712	9,9475	9,4789	4,732	4,6809
Common dab	7,5909	3,886	4,1447	5,79407	8,0491	8,13502	3,6748	2,3734	1,7978	3,9583	0,9666
Common sole	27,9519	24,4353	11,39586	26,80154	37,5535	31,51761	21,0501	12,9323	16,2665	7,6485	5,3983
Cuckoo ray	0,126	0,0145	0,011	0,005	0,001	0,003	0	0	0	0,0615	0
European anchovy	0	0	0	0	0	0	0	0,033	27,171	24,023	0
European eel	0,1335	0,102	0,211	0,115	0	0	0,001	0	0	0	0
European flounder	9,8298	11,3779	9,5158	6,7815	11,447	14,408	8,2453	4,3375	3,8169	5,1743	2,759
European hake	0,1651	0,5378	0,33	0,28803	0,1518	0,0585	0,0879	0,1736	0,2689	0,1762	0,1769
European perch	0	0	0	0	0	0,0025	0,01	0	0	0	0
European plaice	42,5227	43,2153	54,8792	115,79601	108,1607	80,65477	65,9869	44,85521	34,3769	18,1566	17,3528
European seabass	0	0	0	0	0,0005	0	0,001	0	0,004	0	0
European sprat	1030,91	655,71788	853,22754	2313,63133	6,36	16,44	550,53	414,252	504,723	258,242	16,908
Garfish	0	0	0	0	0,0005	0	0	0,066	0,229	0	0
Greater weever	891,0213	1135,194	1203,567	1222,3935	687,966	1,9075	68,9073	60,0315	2,7892	339,1977	648,69
Grey gurnard	0,0564	0,0851	0,1392	0,4191	0,2879	0,1697	0,165	0,1015	0,387	2,1411	0,0674
Haddock	0,7155	1,7316	4,525	20,17527	2,3405	0,8889	0,676	0,0806	1,407	0,0185	0,2916
Lemon sole	2,711	1,4591	2,50906	3,25065	3,9756	2,50393	2,5068	2,2137	1,216	0,5592	0,5153
Ling	0,17	0,01	0,23	0,497	0,12	0,13496	0,105	0,2385	0,2545	0,281	0,114
Lumpfish(=Lumpsucker)	0,984	6,3315	6,4459	1,8503	0,4764	4,19197	0,4115	0,4339	0,1685	0,0155	0,0406
Mullets	0,028	0,0075	0,0015	0	0,003	0	0	0	0,002	0	0
Picked dogfish	0	0	0	0	0	0,004	0,007	0,009	0	0	0,223
Pollack	0,018	0,015	0,039	0,062	0,065	0,11281	0,0335	0,013	0,017	0,012	0,002
Saithe(=Pollock)	0,002	0,0555	0,2928	0,1195	0,0835	0,363	0,026	0,008	0,001	0	0,0035
Sandeels(=Sandlances)	20	0	196,2	113,11704	0	0	103,91	155,921	132,687	42,14	125,558
Sea trout	0,0005	0	0	0	0,002	0,001	0,001	0,002	0,003	0	0
Tub gurnard	0	0	0	0	0	0,012	0,0258	0,0033	0,0449	0,1285	0,0883
Turbot	4,5985	4,7175	7,6147	5,93349	8,2258	6,19117	4,2268	3,333	4,151	2,2402	2,497
Whiting	0,001	0,0286	0,0558	0,04628	0,333	0,034	0,01	1,757	4,331	1,682	0,1755
Witch flounder	2,2047	1,5406	2,18877	2,57561	2,9527	1,73993	1,6878	1,1468	0,6795	0,4967	0,2482
Wolffishes(=Catfishes)	0,171	0,047	0,0975	0,044	0,093	0,07529	0,0933	0,0775	0,046	0,019	0,004

Figure 2d. Sum of values (DKK) for the different fish species in Kattegat Sea, 2013-2023. Source: Statistics Denmark, 2024.

Sum of Landings Value (DKK)											
Species	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Angler	110	215		230	277,5	746,81	2818,5	1694,1	2787,5	1470	922,5
Atlantic cod	54402,4	73013,53	110604,11	242431,72	258192,73	168632,3	79798,25	31687,16	35294,8	18697,9	12548,42
Atlantic halibut	608,7	7124,75	5539	4417	1504,15	502,5	1441	2580	760	215	826,5
Atlantic herring								39576,94	81690,59	33437,39	20625,85
Atlantic mackerel	1530	241	1193	884	1073,81	570	10111,72	1760,51	1360,95	2472,29	2315,11
Brill	311619,13	282080,07	394849,54	526314,28	683340,47	561275,32	379592,37	310891,77	441076,01	278831,05	253420,27
Common dab	27423,43	12904,1	16167,75	27059,72	49180,39	53922,54	20731,37	10437,97	7504,79	15133,99	5030,17
Common sole	1746341,66	1524098,61	886732,6	1747504,61	2280236,38	2276600,21	1667167,02	847962,91	1099757,19	673496,94	528674,11
European flounder	24267,82	29850,87	24403,4	19075,15	30967,79	45665,96	26262,24	15794,75	13518,62	14597,04	11957,05
European hake	1392,94	3873,6	3117,75	2663,05	2008,3	725	1367,22	2813,07	3929,5	3069,15	2750,95
European plaice	266604,51	276939,02	379685,5	1124804,79	1089017,02	948971,8	864206,67	463388,37	341736,16	250552,93	246976,49
European sprat	2077011	982025,11	1572087,15	4705389,53				732259,59	1290226,84	595181,5	
Greater weever	1943205,99	1910104,85	2021045,08	2452656,69	1146056,15	23069,49	139979,9	129718,45	31056,62	785931,15	1728783,99
Grey gurnard	647,76	865,6	1322,55	4427,3	2893,1	1693,66	1877,83	1255,57	4414,64	6159,92	798,9
Haddock	5756	13641,88	35475,1	207399,47	25768,76	8918,05	8577,65	1117,6	3743,7	222,5	1141,3
Lemon sole	43851,12	28120,09	53456,7	71381,62	95473,73	56719,56	49257,46	36440,5	28164,29	13683,14	10701,2
Ling	1756,5	92	2568	4913	1315,5	1634,57	1438,17	3452,5	4127	4673	1819
Lumpfish	124040,88	176686	220159,1	267969,35	79067	245419,77	72504,65	6522,76	10143	607	7232,5
Pollack	295	154	527	1092	1020	2317,53	611		390	275	
Saithe(=Pollock)		389	2624,15	1133	1053	3596	254	100			
Tub gurnard						242	292,45		477,05	1345,1	943
Turbot	229972,86	260274,09	443228,96	324930,49	461936,36	399603,86	267103,46	189559,05	263276,5	194261,08	210464,86
Whiting		161,6	369,15	344	1110,47	191	80	3214,49	9346,6	3780,93	538,49
Witch flounder	11548,69	11113,95	18508,74	21513,09	24052,97	17135,12	18664,21	13150,39	7600,43	4794,27	2485,83
Wolffishes(=Catfishes)	3523,5	975	2096,5	956	2351	1769,14	1965,1	1908	1186		

APPENDIX 3 LANDINGS MADE BY FOREIGN VESSELS

In addition to Danish fisheries activity, foreign vessels also conduct fishery in the Kattegat Sea. Landings (tons) of foreign and Danish vessels in the period 2013-2023 are presented in Figure 3. Landings information from these vessels have been obtained from Statistics Denmark, 2024.

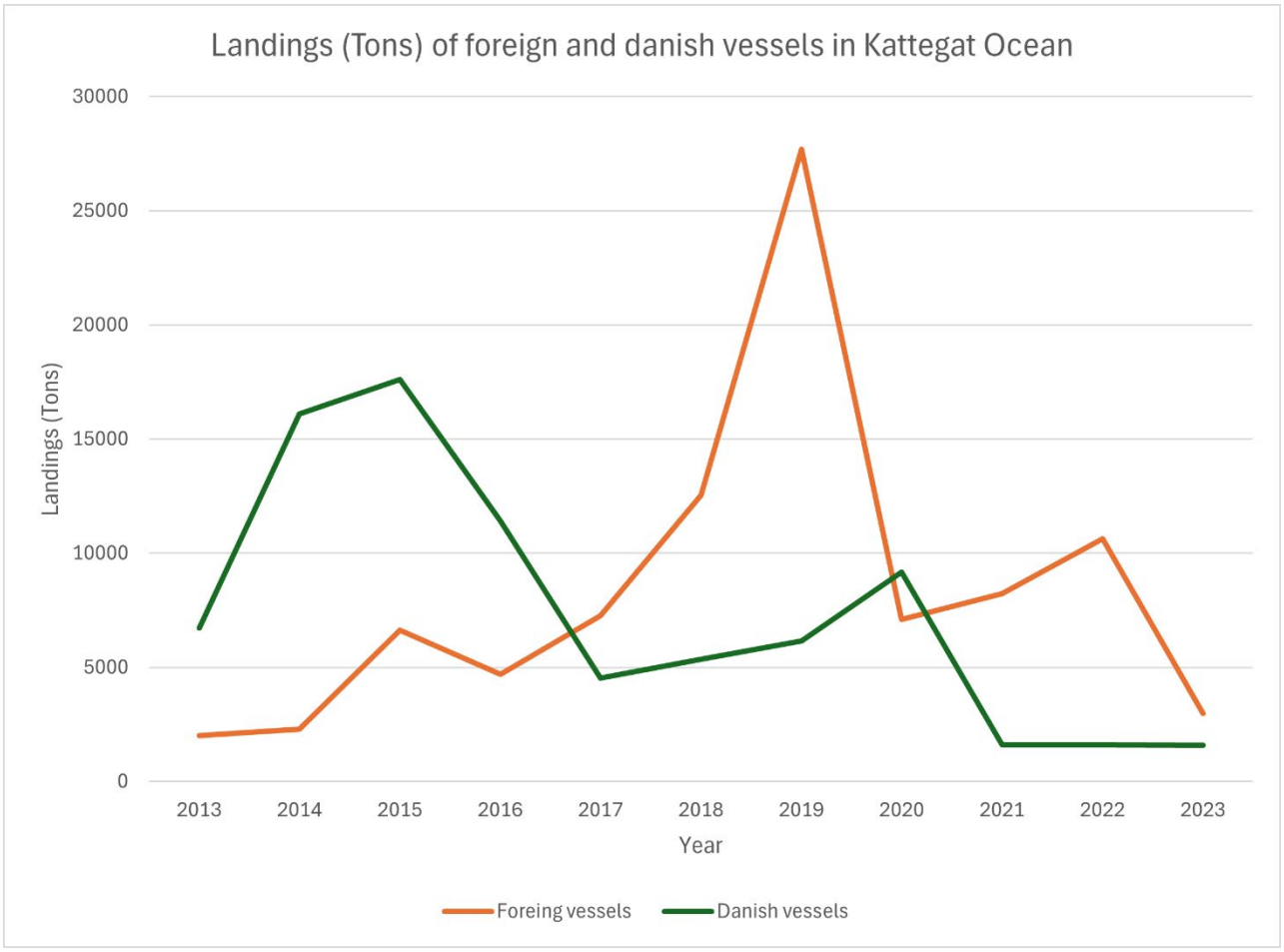

Figure 3. Landings in weight (tons) of Danish and foreign vessels in the Kattegat Sea in the period 2013-2023. Source: Statistics Denmark, 2024.

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DNV is the independent expert in risk management and assurance, operating in more than 100 countries. Through its broad experience and deep expertise DNV advances safety and sustainable performance, sets industry benchmarks, and inspires and invents solutions.

Whether assessing a new ship design, optimizing the performance of a wind farm, analyzing sensor data from a gas pipeline or certifying a food company's supply chain, DNV enables its customers and their stakeholders to make critical decisions with confidence.

Driven by its purpose, to safeguard life, property, and the environment, DNV helps tackle the challenges and global transformations facing its customers and the world today and is a trusted voice for many of the world's most successful and forward-thinking companies.