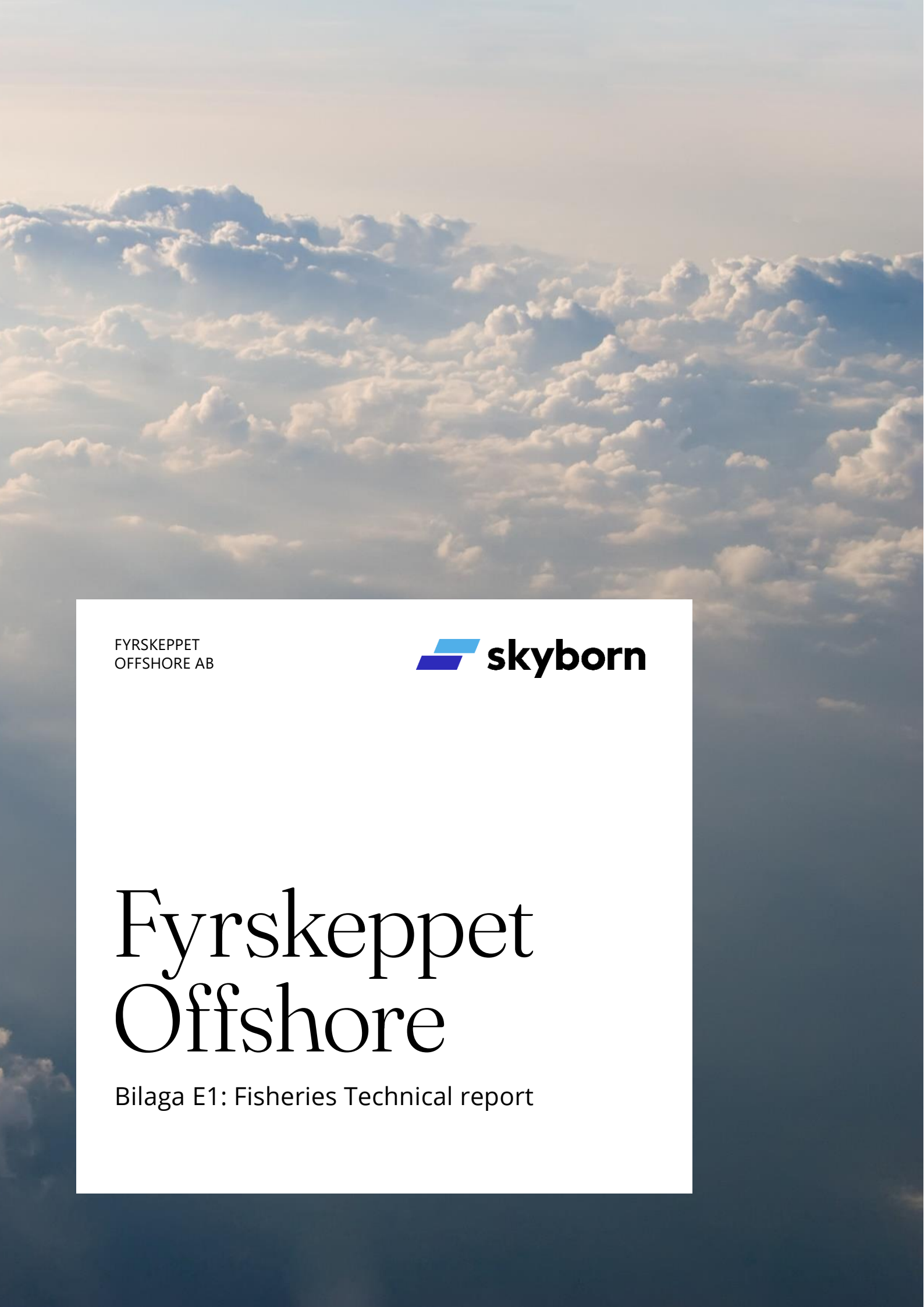

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Bilaga E1: Fisheries Technical report

Fyrskeppet Offshore Wind Farm

Fisheries
Technical report

Fyrskeppet Offshore AB

Date: 08 June 2023

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1 Contents

2 Summary

This technical report presents baseline information on the commercial fisheries in the area of the Southeastern Bothnian Sea where installation of Fyrskeppet Offshore Wind Farm is planned. Data and information on the local fisheries over a 10-year period (2012-2021) were acquired from the Swedish Agency for Marine and Water Management (Swam) (Havs- och vattenmyndigheten, 2022) and the Finnish Centre for Economic Development (NTM-centralerna, 2022). Baseline commercial fishery information based on gear use (bottom trawl, pelagic trawls, gillnets and other gear) and target species were used to make an assessment of the importance of the Fyrskeppet OWF project area to the commercial fisheries.

The Fyrskeppet OWF project area is located in two ICES rectangles 51G8 and 50G8, thus the fishery statistics in these areas are presented and represent the fisheries in the region of the Fyrskeppet OWF project area. Only Sweden and Finland undertake commercial fisheries in ICES rectangles 51G8 and 50G8.

From 2012-2021, Swedish and Finnish commercial vessels primarily used pelagic trawls, particularly since 2018 when Swedish bottom trawlers no longer fished in the region. The Swedish and Finnish fisheries in the region almost exclusively landed herring, which accounted for more than 97 % of the total landings by weight and value in the two ICES rectangles 51G8 and 50G8 that includes Fyrskeppet OWF project area. Only a very small fraction of the landings in the regional area (ICES rectangles 51G8 and 50G8) were taken by gillnets, which accounted for approx. 0.04 % of the landings by weight and 0.06 % of the landings by value. These fisheries typically targeted cod, bream, trout, pike, perch and whitefishes near the coast and thus were not observed to be fishing near the Fyrskeppet OWF project area. All landings in the Finnish fisheries in the regional area (ICES 50G8 and 51G8) containing the Fyrskeppet OWF project area were caught by trawlers, ie. there were no Finnish fisheries using passive gear such as gillnets etc

When comparing the Swedish and Finnish fisheries, data showed the largest proportion of total landings in the region (ICES rectangles 50G8 and 51G8) was accounted for by Finnish vessels which accounted for approximately 64 % of landings, while Swedish vessels accounted for the remaining 36 % of the landings.

The distribution and effort of the Swedish and Finnish commercial fisheries based on Vessel Monitoring System (VMS) data over a 10-year period (2012-2021) show there are some common intensively fished areas in ICES 51G8 and 50G8 and near the Fyrskeppet OWF project area, but only very little fishery within the project area. Similarly, only 2.1 % of the combined fishing effort by the Swedish and Finnish fisheries in the region (ICES 51G8 and 50G8) was undertaken within the Fyrskeppet OWF project area. Thus, despite the Fyrskeppet OWF project area being in a region where a considerable amount of Swedish and Finnish commercial fisheries are undertaken, the low fishing effort within the Fyrskeppet OWF project area by both of these countries, indicates the Fyrskeppet OWF project area is of low importance to the commercial fisheries.

Based on 3.1 % of the Swedish fishing effort in ICES 51G8 and 0.5 % of the fishing effort in 50G8 were within the Fyrskeppet OWF project area, estimated landings and value of landings within the Fyrskeppet OWF project area from 2012-2021 amounted to approximately 798 tons and approximately 4.6 million SEK. For the Finnish fisheries 4.6 % and 0.6 % of the total effort in ICES 51G8 and 50G8 were within the section of the Fyrskeppet OWF project area, which resulted in estimated landings and value of landings within the Fyrskeppet OWF project area of 3,148 tons and 17.4 million SEK during the 10-year period 2012-2021. Because herring is both landed as an industrial fish and for consume, the price per kilo of herring used to calculate the value of the landings in this report was an average between these prices. However, because the greatest majority of herring caught in ICES rectangles 51G8 and 50G8 may have been

landed as an industrial fish, the estimated value of the landings of herring in the fisheries are potentially overestimated.

Fish caught by the Swedish fisheries in ICES 51G8 and ICES 50G8, which include the Fyrskeppet OWF project area were landed at 16 different ports with the port of Norrsundet located on the Swedish coast west of the project area being the most important and accounting for 86 % of the landings. Swedish vessels fishing in the ICES rectangles (ICES 50G8 and 51G8) that include the Fyrskeppet OWF project area came from 21 different ports from around Sweden. Of these, 57 % of the landed value of the Swedish fisheries (232 million SEK) in ICES 50G8 and ICES 51G8 from the period 2012-2021 was accounted for by vessels originating from ports along the western Swedish Kattegat coast (mainly ports around Göteborg), while the remaining 43 % (173 million SEK) of the landings was accounted for by vessels originating from ports along the eastern Swedish Bothnian Sea coast. The Swedish fisheries in ICES 51G8 and 50G8 are undertaken by a relatively small number of vessels with trends over the last 10-years (2012-2021) moving towards larger and fewer vessels fishing in the near region around the project area.

3 Introduction and aim

Fyrskeppet Offshore AB is seeking the rights to establish an offshore wind farm (OWF) northeast of Gävle in the Bothnian Sea. The 488 km^2 project area is located 50 km from the coastline in the Swedish EEZ and in an area assigned to energy production in the "Havsplan för Bottniska viken" (Havs- och vattenmyndigheten, 2019). The offshore wind farm will contribute to the Swedish aim of reducing greenhouse gas emissions by 85 % (from the 1990-level) by 2045, which in part is expected to be accomplished by increasing offshore wind energy production by 100 TWh by the year 2040. The Fyrskeppet Offshore Wind Farm is estimated to yield a yearly production of 8-11 TWh and have an installed capacity of 2,800 MW (WPD Fyrskeppet Samrådsunderlag, 2022).

The Fyrskeppet OWF project area is shown in Figure 3-1. The Fyrskeppet OWF project area is bordering, but not overlapping, the Finngrunden-Östra Banken Natura 2000 area on its southwestern border.

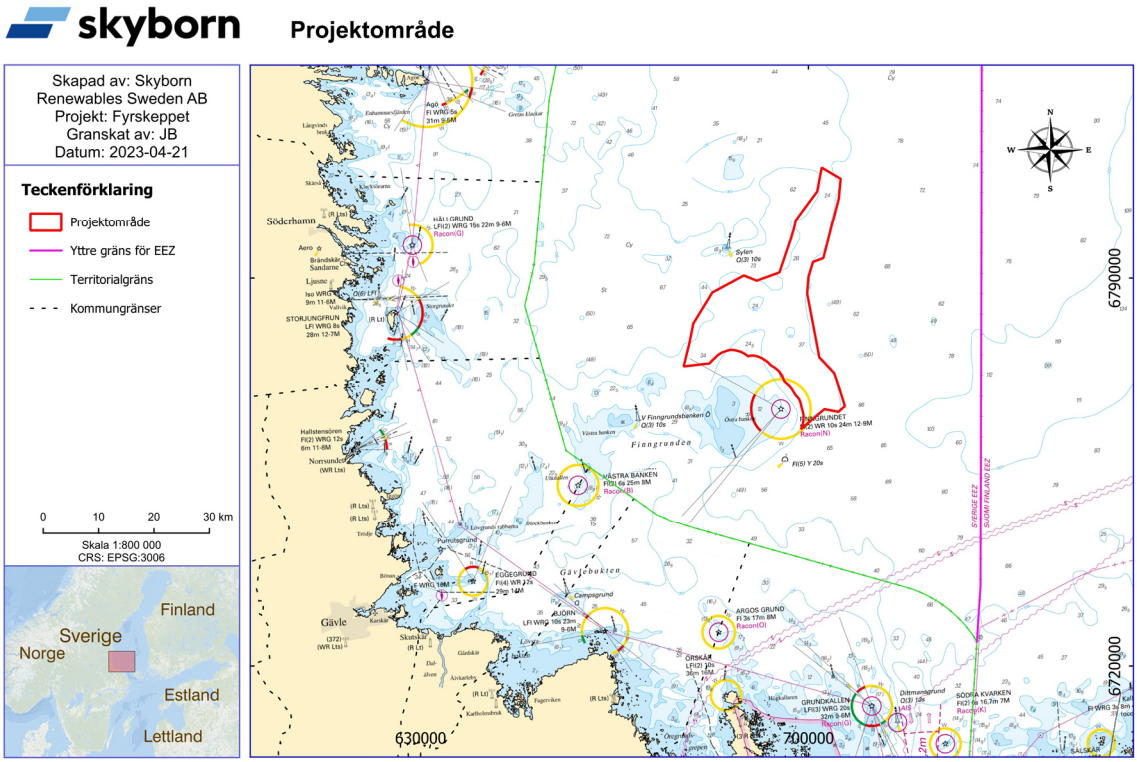


Figure 3-1: The Fyrskeppet Offshore Wind Farm project area.

The Fyrskeppet Offshore Wind Farm (OWF) project was assessed to have an environmental impact, and an environmental impact assessment report (EIA) was thus required. The elements of an EIA were determined by the Consultation document (Fyrskeppet Offshore AB, 2022) and responses from the associated public hearing. In this process, it was decided to include an assessment of Fyrskeppets OWF's potential impact on the commercial fisheries in the EIA.

3.1 Aim

The aim of this technical report is to describe the commercial fisheries in the regional and local area of the Eastern Bothnian Sea in relation to the Fyrskeppet OWF project area. The first section of the report presents the methods used to obtain and analyse commercial fishery data, and give a description of the Fyrskeppet OWF project area. In the second section, a description of the existing (baseline) conditions of the commercial fisheries in, and around the Fyrskeppet OWF project area, are outlined. Based on this data, the importance of the Fyrskeppet OWF project area to the commercial fisheries is briefly assessed.

4 Methods

4.1 Commercial fisheries

This section gives an overview of the origin of Swedish and Finnish fishery data and information used to describe the commercial fisheries in the region of the Fyrskeppet Offshore Wind Farm project area.

The extent and characteristics of the commercial fisheries are described by using official fisheries statistics (landing, fleet statistics and VMS (Vessel Monitoring System) data over a 10-year period (2012-2021) obtained from the Swedish Agency for Marine and Water Management (Havs- och vattenmyndigheten, 2022). Similarly, Finnish fishery statistics (landings and VMS (Vessel Monitoring System) for the same period were also acquired from the Finnish Fisheries Agency (NTM-centralerna, 2022).

4.1.1 Official fisheries statistics – logbook data

In Swedish waters, all commercial fishing vessels are required to register their catches. For statistical analysis, the international Council for the Exploration of the Sea (ICES, u.d.) have standardized the division of sea areas, including the Swedish waters, into international fishery zones, so-called ICES-rectangles of approximately 30x30 nautical miles (56x56 km) and larger sub-divisions. Within these fishery zones and depending on the length of the fishing vessel, catch data is collated. In the regional area of the Baltic, including the Bothnian Sea and Bothnian Bay, various national and international fishery regulations, requirements and quotas also apply.

In the Bothnian Sea, where the Fyrskeppet OWF project area is located, fishing vessels equal to or larger than 8 meters (≥8 meters) are required to register their catches in logbooks at the ICES rectangle level. Vessels less than eight meters (<8 meters) are only required to register catches in so-called "local water (coastal) declarations" where catches are only attributable to ICES subareas, in this case the Bothnian Sea. There is, however, relatively few active fishing vessels less than 8 meters in the regional area of the Fyrskeppet OWF project area and in general their contribution to the total landings in the Swedish fisheries only comprise a very small part of landings e.g. Swedish vessels less than 12 meters account for less than 0.5 % of total landings in Sweden (SLU Aqua, 2021).

The value of the landings was calculated for each year (2012 through 2021) by multiplying the quantity of the landed fish with the average price per kilo of that fish species for the respective year from relevant fish auction data for the fisheries in the Bothnian Sea region received from the Swedish Agency for Marine and Water Management (Havs- och vattenmyndigheten, 2022). Because herring is both landed for consume and as an industrial fish, the price per kilo of herring used to calculate the value of the landings in this report was an average between these prices for each year. However, because the greatest majority of herring caught in the fisheries around Fyrskeppet OWF project area might have been landed as an industrial fish, which on average was approximately 66 % of less value than the price per kilo for herring used in this report (Havs- och vattenmyndigheten, 2022), the estimated value of the landings of herring in the fisheries and thus the value of the landings in general are potentially overestimated. The potential overestimation of fishery value, is noted as a potential bias in relevant tables and figures in the report.

The entire project area for Fyrskeppet OWF is located in parts of ICES rectangles 51G8 and 50G8, see Figure 4-1. The proposed Fyrskeppet OWF project area is approximately 487 km², which is relatively small in relation to the total area of ICES rectangle 51G8 (2,991 km²) and ICES rectangle 50G8 (3.038 km²) (ICES, u.d.).

Ninety-five percent or 463 km² of the Fyrskeppet OWF project area is located in ICES rectangle 51G8, which amounts to approximately 15.5 % of the total area of this ICES rectangle. Five percent or 24 km² of the southern section of the

Fyrskeppet OWF project area is located in ICES rectangle 50G8. Thus, the southern section of Fyrskeppet OWF project area that lies within ICES rectangle 50G8, makes up only 0.8 % of the total area of this ICES rectangle..

As the Fyrskeppet OWF project area only makes up a relatively small area of the ICES rectangles, the fishery data from ICES rectangles 51G8 and 50G8 are primarily used to give an overall understanding of the amount and characteristics of the commercial fisheries in the region around and containing the Fyrskeppet OWF project area.

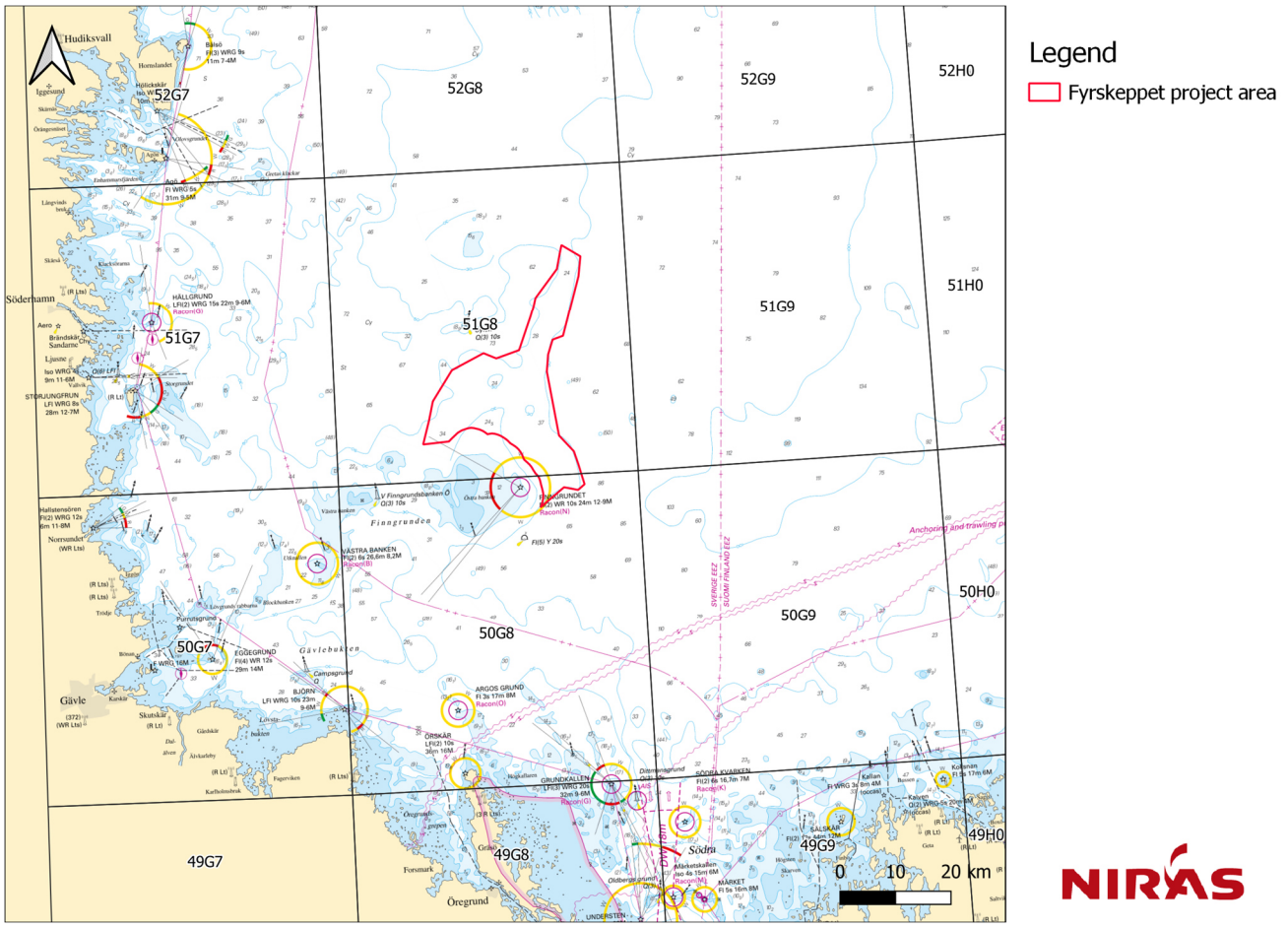


Figure 4-1: Map of the southwestern Bothnian Sea outlining the ICES rectangles (black borders) and the proposed Fyrskeppet Offshore Wind Farm (OWF) project area (red borders).

4.1.2 Determining the distribution of the fisheries – VMS data

Commercial fishing vessels with lengths equal to or above 12 meters are required to have a satellite-based global positioning Vessel Monitoring System (VMS) onboard to register their location at sea approximately every 1-2 hours. By using knowledge and assumptions of the normal range of speed at which fishing vessels are moving when undertaking their fisheries with different types of gear, these speed ranges were used to select the VMS points in the Swedish fisheries that indicated fishing vessels while actively fishing. The speeds in which fishing vessels were assumed to be undertaking their fisheries according to the primary gear types (bottom trawls, pelagic trawls and gillnets) are given in Table 4-1.

Fishing gear (groups)	Vessel speed (knots)
Bottom trawl	0,1 – 4 knots
Pelagic trawl	0,1 – 4 knots
Gillnets and other stationary gear	0,1 – 3 knots

Table 4-1: Vessel speeds while actively fishing according to the primary gear types.

Fishing gear (groups)	Vessel speed (knots)
Bottom trawl	0,1 – 4 knots
Pelagic trawl	0,1 – 4 knots
Gillnets and other stationary gear	0,1 – 3 knots

Both bottom and pelagic trawling vessels were assumed to be fishing (towing a trawl in the water) when their speed was between 0,1-4 knots. Vessels using gillnets and other stationary gear were also assumed to be fishing (setting and retrieving gear) when their speed was 0,1-3 knots. Vessel speed was not given for the Finnish VMS data, and therefore all the VMS points were used as a proxy for their fishing distribution, despite some of the VMS data points possibly representing steaming to and from fishing areas. VMS data points from fishing vessels actively fishing were then used as a proxy to map the Swedish and Finnish distribution of the fisheries in the regional area and within the Fyrskeppet OWF project area.

Because VMS data only includes vessels equal to or larger than 12 meters, it is not possible to specifically determine the distribution of the small fishing vessels, which are primarily represented in the gillnet and other passive gear fisheries. However, because the majority of the Fyrskeppet OWF project area is a considerable distance offshore, and the predominant fisheries are undertaken by trawlers, which are generally larger than 12 meters, the VMS data is assumed to represent the distribution of a large majority of the fishing fleet. Furthermore, the fisheries with smaller vessels in the offshore area west of the Fyrskeppet OWF project area (and thus closer to the coast) were considered irrelevant in magnitude according to information on the coastal fisheries by the Swedish Univ. of Agricultural Sciences - SLU Aqua (SLU Aqua, 2021), and thus these fisheries were also considered irrelevant with respect to the Fyrskeppet OWF project area.

4.1.3 Assessing the relative importance of the Fyrskeppet OWF project area to the commercial fisheries

The relative importance of Fyrskeppet OWF project area to the Swedish and Finnish commercial fisheries in the region was assessed by using VMS data showing the distribution of the fisheries in relation to the Fyrskeppet OWF project area. For the Swedish fisheries more comprehensive data allowed this to be done according to the primary gear types (bottom trawls, pelagic trawls and gillnets).

Similarly, the number of VMS points representing the effort of the Swedish and Finnish fisheries was used to calculate the ratio of fishing effort within the Fyrskeppet OWF project area in comparison to the fishing effort in the two primary ICES fishing areas (ICES rectangles 50G8 and 51G8) that contain the project area. Furthermore, the ratio of fishing effort within the project area in comparison to the two primary ICES fishing areas was used to make an area-based comparison of fishing effort within the Fyrskeppet OWF project area.

Finally, the percentage of Swedish and Finnish VMS points within the Fyrskeppet OWF project area was used to indicate the ratio of fishing effort within the Fyrskeppet OWF project area from 2012-2021 and calculate the landings

and value of landings within the Fyrskeppet OWF project area from the landings data of the fisheries in ICES 51G8 and ICES 50G8.

5 Baseline description of the commercial fisheries

The Bothnian Sea is a brackish (low-salinity) waterbody located in the least saline part of the Baltic Sea. It has a particular mix of hydrographical conditions due to the large freshwater runoff from its catchment area and the limited exchange with saline waters flowing from the North Sea into the Baltic Sea (HELCOM, 2018). The brackish waters of the Bothnian Sea imposes physiological stress on both marine and freshwater organisms. Low salinities of 6-7 PSU in the Baltic Sea limits the majority of typical northern marine fish species from inhabiting this part of the Baltic, though some examples of genetic adaptation and diversification exist, such as where populations of herring and Atlantic cod have adapted better to a life in brackish waters (Johannesson & André, 2006). Simultaneously, a number of fish species typically associated with freshwater habits (perch, pike, bream etc.) can also inhabit slightly saline areas of the Bothnian Sea, especially in the coastal areas and archipelagos (Appelberg, 2012).

The commercial fish community in the Bothnian Sea is dominated by the pelagic species herring and to a lesser extent sprat. There are also a number of other commercial species inhabiting the sea, such as Atlantic cod, flounder, whitefish, pike, perch, smelt, Atlantic salmon, stickleback and European eel etc., but these have little importance for most of the offshore commercial fisheries, either due to low abundance or their preference for near-coastal environments where they are targeted by other sectors of the fisheries (gillnets, traps, pound nets etc) (Naturvårdsverket, 2012).

The southwestern Bothnian Sea, where the Fyrskeppet OWF project area is located, has, some of the highest densities of herring in the Baltic Sea, especially during the winter. Thus, it is an important fishing area, particularly for large (>24 meter) commercial trawlers from Sweden and Finland (SLU Aqua, 2021) that target this species.

5.1 Fishing Methods

In the Bothnian Sea, there are a number of different types of commercial fisheries that are being undertaken with a variety of fishing gear. Trawling is considered an "active gear method" where the gear is actively pulled along the bottom or through the water. Active gear types are efficient independent of the activity of the target species. "Passive gear types" such as gillnets, pots and fyke nets are stationary gear that are often utilized in or near the coastal areas. Because passive gears are stationary and dependent on the movement of the target species to be captured, this gear is more efficient when fish are more active.

Trawl fisheries in and near the Fyrskeppet OWF project area can be divided into: a) pelagic trawls and b) bottom trawls. Characteristic for the fisheries with trawls are the use of heavy "trawl doors" that spread the arms of the trawl to open up a net and create a large swept area (

Figure 5-1). The trawl doors can either be fished along the bottom (in bottom trawls) or in the water column or midwater (in pelagic trawls). The trawl fisheries have hauls that can last for several hours, typically having the shortest hauls during the summer months (3-4 hours) and the longest hauls during the winter (8 hours), thus hauls are typically undertaken over long distances.

Pelagic trawls are traditionally used to target large schools of pelagic fish e.g. herring and sprat in the open water column, while bottom trawls often target benthic or semi-benthic species such as different cod and flatfishes. In the

Bothnian Sea however, both pelagic and so-called bottom trawls (which includes a trawl called "bottom herring trawl") are exclusively used to catch the pelagic fish herring and sprat (typically bycatch) at different depths in the pelagic (Fishsource, 2023) (ICES, 1988).

Herring and sprat are moderate to low price-range commercial species compared to e.g. consume species such as cod, trout, perch, salmon and whitefish that are sold at higher prices per kg and are typically targeted with passive gear such as gillnets. However, because of the comparatively large landings of the pelagic species herring and sprat by trawlers in this region, the landings by weight and the value of landings of these species, particularly herring generally dominate the commercial fisheries in the region. This is also observed in the ICES rectangles s 50G8 and 51G8 where the Fyrskeppet OWF is located, as landings from the trawl fisheries, were almost exclusively made up of herring and sprat, and thus make up the majority of the total landings.

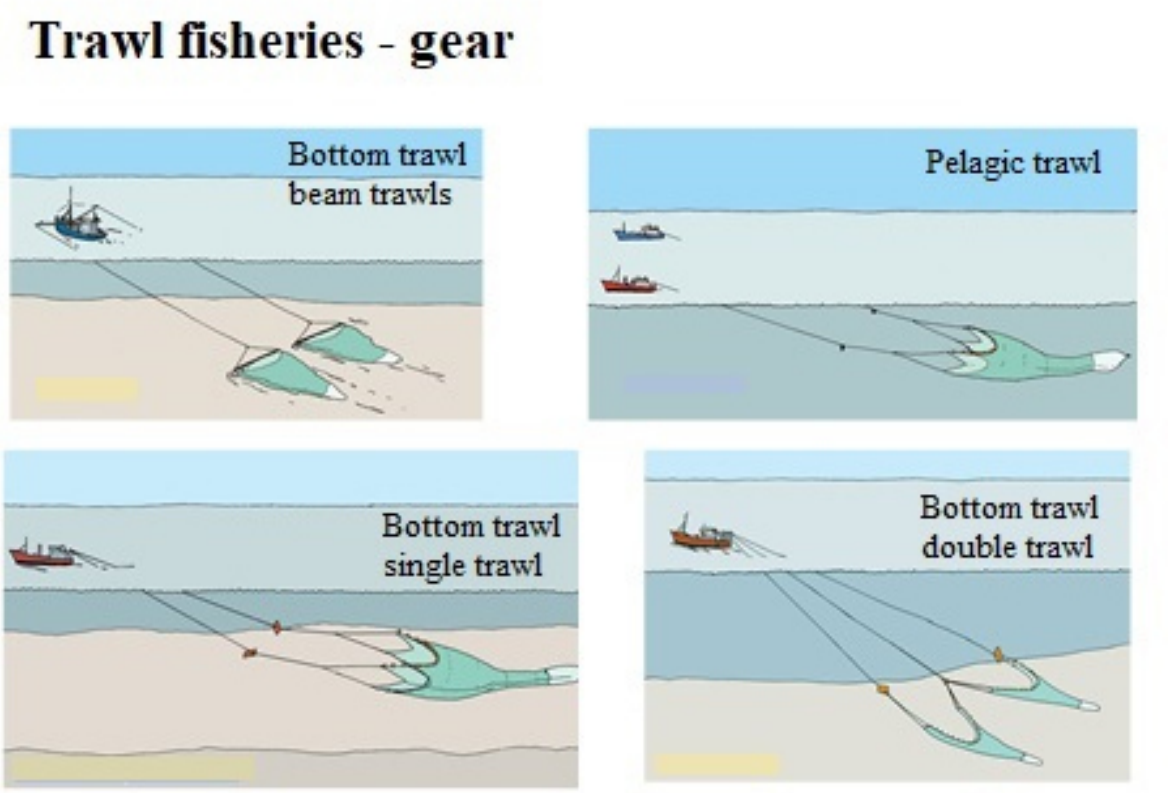


Figure 5-1: Different forms of trawl fishing gear (Drawing by: Niels Knudsen, Fisheries and maritime museum, Esbjerg, DK)

Gillnet fisheries are undertaken with passive (stationary) gear made up of "panels" of interlaced nets that are often linked together in sets of 10-20, and typically fished along the bottom, where they are anchored at each end (Figure 5-2). Gillnets can, however, also be fished midwater or along the surface to target pelagic species. Gillnets are fished with a variety of mesh sizes depending on which commercial species are targeted and the fishes body shape or form. In this part of the Bothnian Sea, gillnets are primarily used in the coastal area to target e.g. cod, trout, perch, pike, whitefish, zander, but also herring when nearshore. Vessels participating in the gillnet fisheries are usually smaller than trawlers, and generally set and retrieve their gear within a time frame of 12-36 hours.

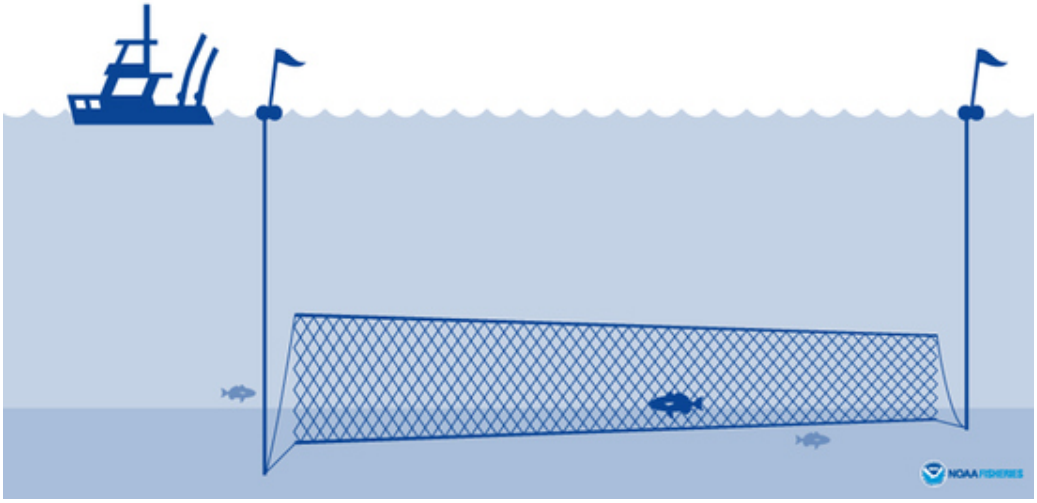


Figure 5-2: Illustration of a bottom gillnet (www.noaa.gov).

Other gears (pots, traps and fyke nets) used in the area are stationary gears involving a variety of gear types that include enclosed nets (fyke nets and traps) and pots targeting a variety of species and functioning by fish typically being retained and/or entering the gear voluntarily and being hampered from escaping. These gears are used to catch a variety of valuable commercial species such as trout, salmon, perch, migrating silver eel and whitefish.

5.2 Swedish landings statistics

The development of the total landings by weight (tons) and value (1,000 SEK) of the most important commercial species in the two ICES rectangles (50G8 and 51G8) that include the Fyrskeppet OWF project area is presented in Figure 5-3.

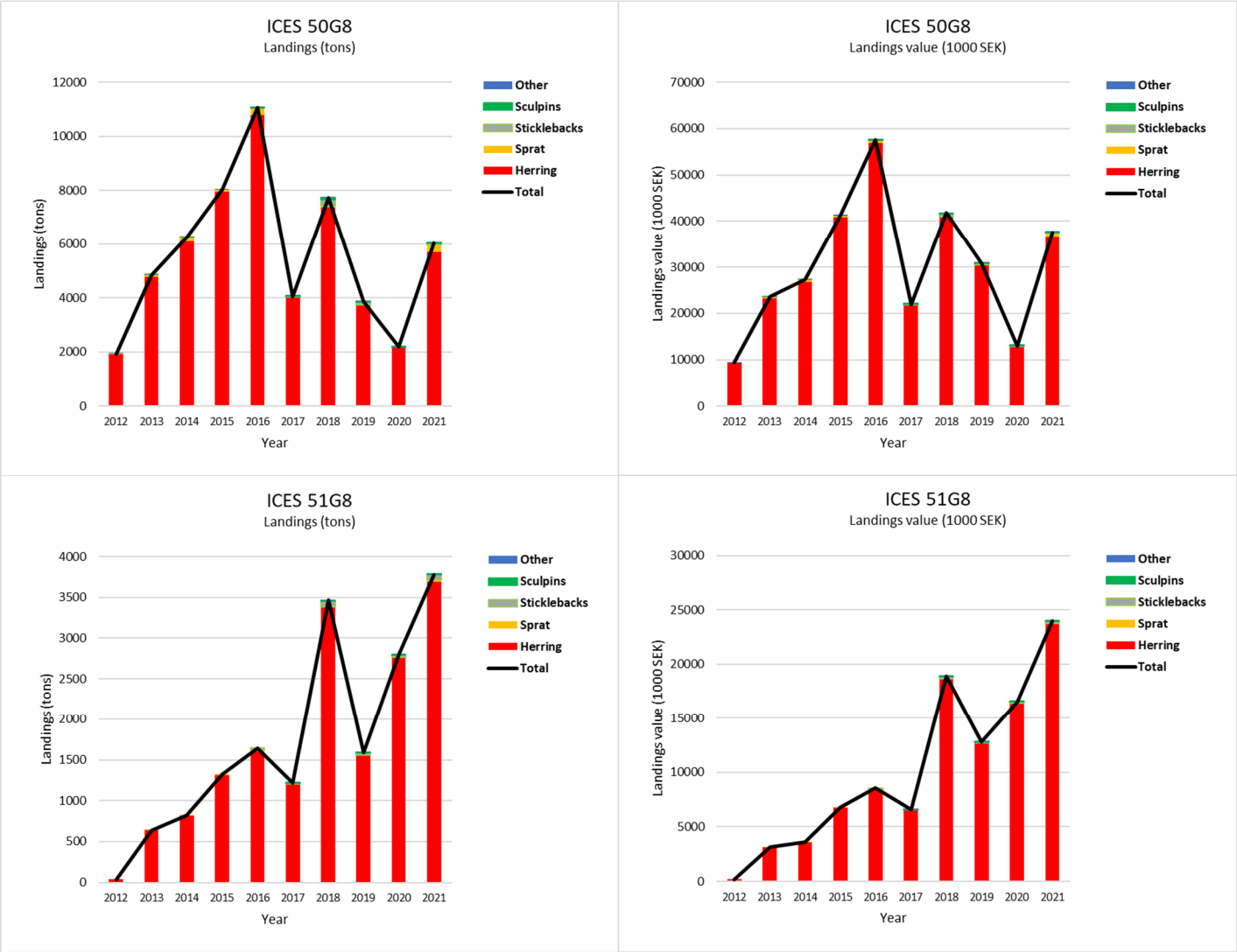


Figure 5-3: The development of the landings and the value of the landings in relation to the most important commercial species in a 10-year period (2012-2021) in the ICES rectangles 50G8 and 51G8) where parts of the Fyrskeppet OWF project area is located. Data from SwAM 2022. Estimated landing values are based on an annual average price per kg of herring used both as an industrial fish and for consume, if herring were only used as an industrial fish the estimated landing values would be overestimated.

Combined, the total landings by weight and value of landings in the two ICES rectangles 50G8 and 51G8 have increased considerably during the period 2012-2016. Hereafter, landings in weight and value have fluctuated considerably from year to year, slightly decreasing in ICES 50G8, while continuing to increase in ICES 51G8 during the period 2017-2021. During the entire 10-year period (2012-2021) total landings per year fluctuated between 1,944-11,059 tons in ICES 50G8 and between 37-3,780 tons in ICES 51G8. During the same period, total values per year have fluctuated between 9-58 million SEK in 50G8 and 0-24 million SEK in 51G8 (see *Figure 5-3: The development of the landings and the value of the landings in relation to the most important commercial species in a 10-year period (2012-2021) in the ICES rectangles 50G8 and 51G8) where parts of the Fyrskeppet OWF project area is located. Data from SwAM 2022.*Figure 5-3).

Herring is by far the most important catch in the region (includes both ICES rectangles), both in terms of landed weight and estimated value (97.5 % of total landed weight and 98.7 % of total landed value). Sprat accounted for 1.4 % of the total landed weight and 0.7 % of total landed value. Thus, together the landings of herring and sprat

accounted for a total of 98.9 % of landed weight and 99.4 % of landed value during the 10-year period 2012-2021. As a consequence, fluctuations in the weight and value of the total landings in the area are mainly attributed to the variable landings and market prices of herring, and to a lesser extent sprat.

Herring and sprat are used for industrial fisheries products, and for some herring also human consumption, and therefore these commercial species have a low to moderate price-range (3-8 SEK/kg during the 10-year period). If herring, which make up more than 97 % of the landings in this region, was only used in the industrial fisheries, they would have a price per kilo range between 1,2-3 SEK/kg, which is approximately 66 % less value per kilo. This suggests that the estimates of the value of the landings could be overestimated and thus, this potential difference is noted in several of the calculations and figures for comparison reasons. The third and fourth most abundant species in the landings (sticklebacks and sculpins) that are used entirely for industrial products, had market prices of 2-3 SEK/kg during the 10-year period. Sticklebacks and sculpins made up approximately 1.07 % of the total landed weight (between 0.0 – 3.4 % of the annual weight) in the area (ICES 50G8 and 51G8) during the 10-year period 2012-2021.

Other species that have higher value for human consumption such as cod, European eel, trout, perch, salmon and whitefish etc. are sold at considerably higher prices per kilo (e.g. 25-38 SEK/kg for whitefish and 65-97 SEK/kg for European eel during the 10-year period). High-value target species are, however, almost absent from landings in the ICES rectangles that contain Fyrskeppet OWF project area (<0.04 % of total landed weight) and therefore have very little overall impact on the total landed values in the region of the Fyrskeppet OWF project area.

The average annual landings by weight and value of the most important commercial fish species from both ICES rectangles (ICES 50G8 and 51G8) that includes the Fyrskeppet OWF project area is given in Table 5-1. If herring in the landings was only used as an industrial fish, than the estimated value of the landings for this target species would be approximately 66 % less in value (Havs- och vattenmyndigheten, 2022).

Table 5-1: The average annual landings by weight (tons) and value (SEK) of the most important commercial fish species in each of the ICES rectangles (50G8 and 51G8) containing sections of the Fyrskeppet OWF project area during the 10-year period (2012-2021). Data from SwAM 2022 (Havs- och vattenmyndigheten, 2022). The estimate for herring is based on an annual average price per kg of herring used both as an industrial fish and for consume, if herring were only used as an industrial fish the estimated value of herring would be overestimated by approximately 66 %.*

ICES rectangles	50G8		51G8	
Species	tons	1000 SEK	tons	1000 SEK
Herring	5,453	29,993*	1,697	10,001*
Sprat	96	257	10	26
Sticklebacks	43	118	23	59
Sculpins	10	27	2	6
Perch	0.3	10	0.006	0,2
Pike	0.1	3	0.002	0.03
Whitefishes	0.2	5	0.001	0.05
Trout	0.2	8	0	0
Cod	0.1	2	0.053	0.7
Sandeels	0.1	0	0	0
Bream	0.1	0	0.001	0.01
Salmon	0.1	3	0	0
Flounder	0.02	0.1	0	0
Other	0.1	1	0	0

Total	5,604	30,426	1,732	10,094

As shown in Table 5, herring is by far the most dominant commercial species in the Swedish landings in both ICES rectangles 50G8 and 51G8 with average annual landings of 5,453 tons in 50G8 and 1,697 tons in 51G8, during the 10-year period 2012-2021. The average annual landings of other species including sprat (106 tons), sticklebacks (66 tons) and sculpins (12 tons) made up most of the remaining parts of the landings, followed by comparatively low landings of a number of other species (Table 5-1).

The importance of the region around Fyrskeppet OWF project area for the Swedish fisheries for herring was determined by comparing the total landings of herring within ICES rectangles 50G8 and 51G8 from 2020 and 2021 with the total landings of herring from the entire Gulf of Bothnia in the same period. The total landings of herring in the Gulf of Bothnia in 2020 and 2021 amounted to 72,956 and 71,924 tons, respectively, while the landings of herring in the Swedish fisheries from ICES 50G8 and 51G8 combined was 4,937 tons in 2020 and 9,398 tons and 2021. This amounted to the Swedish fisheries in these 2 ICES rectangles accounted for approximately 6.8 % and 13.1 % of the total landings in the Gulf of Bothnia (ICES, 2022).

5.2.1 Landings and value by gear type

The amount (tons) and value (1000 SEK) of the landings from both ICES rectangles (50G8 and 51G8) according to the primary fishing gear are shown in Figure 5-4. From 2012-2021, the overall importance of trawlers (both bottom and pelagic) to the commercial fisheries is illustrated by trawlers accounting for more than 99.9 % of the total landings by weight and value in both ICES rectangles that include sections of the Fyrskeppet OWF project area.

In total, the combined landings from both ICES rectangles 50G8 and 51G8 showed pelagic trawlers accounted for 87.5 % of landings by weight and 88.6 % by value, while bottom trawlers targeting the same species (see Table 5-2) accounted for 12.4 % of landings by weight and 11.3 % by value. From 2012-2018, the distribution between landings made with both trawl types were stable in ICES 50G8 and 51G8 (Figure 5-4). However, from 2018 and onwards, there were no more registered landings by Swedish bottom trawlers in the region of Fyrskeppet OWF (ICES 50G8 and 51G8)(Figure 5-4).

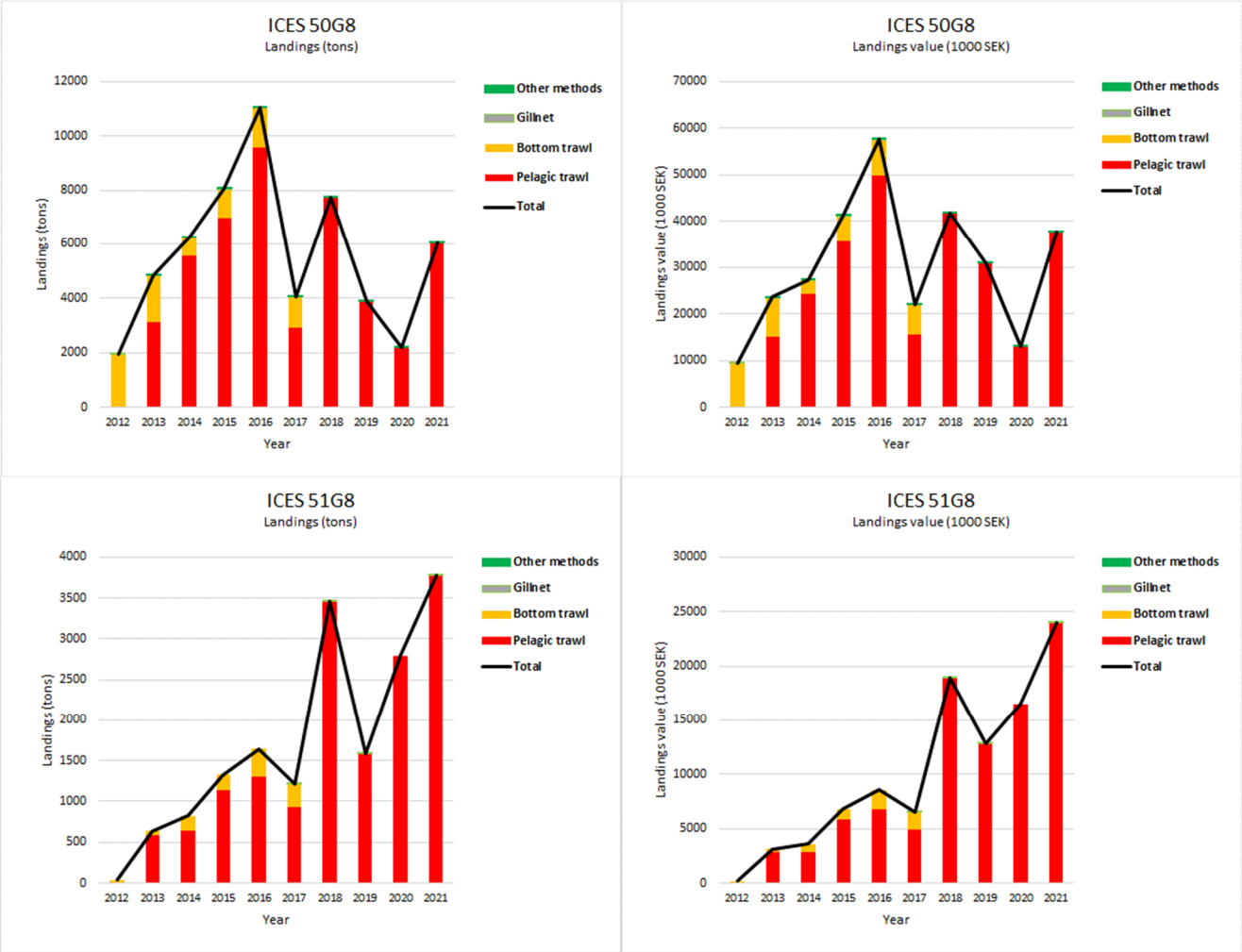


Figure 5-4: The development of the landings and the value of the landings in relation to the gear types over a 10-year period (2012-2021) in both ICES rectangles (ICES 50G8 and 51G8) where the Fyrskeppet OWF project area is located. Data from SwAM 2022 (Havs- och vattenmyndigheten, 2022). *Estimated landing values are based on an annual average price per kg of herring used both as an industrial fish and for consume, if herring were only used as an industrial fish the estimated landing values shown in the figure would be overestimated.*

Gillnet landings in rectangle 51G8 amounted to a combined total of 0.6 ton and in rectangle 50G8 a combined total of 28 tons during the 10-year period between 2012-2021. Combined, gillnet landings thus accounted for less than 0.04 % of the landings by weight in both rectangles. Although, species targeted in gillnet fisheries are typically sold at a higher price, the gillnet fisheries only accounted for 0.06 % of the landings value from both rectangles combined.

The combined landings over the 10-year period for other stationary gear types (traps, fykenets, pots etc.) amounted to a total of 9 tons in ICES 50G8, while there were no registered landings by "other" stationary gear in ICES 51G8 rectangle. Thus, other fishing methods in the region around the Fyrskeppet OWF project area accounted for less than 0.01 % of the landings.

Table 5-2: Total landings (tons) and value of landings (SEK) of commercial species according to gear type in ICES 50G8 and 51G8 during the 10-year period 2012-2021. Blank cells means no catch, while zeros means catches below 0,5 tons or landed values below 500 SEK. Data from SwAM 2022

(Havs- och vattenmyndigheten, 2022).* *Total value estimates are based on an annual average price per kg of herring used both as an industrial fish and for consume, if herring were only used as an industrial fish the estimated values for herring would be overestimated by approximately 66 %.*

50G8 - Total landings (tons) of species by gear type (2012-2021)

	Pelagic trawl	Bottom trawl	Gillnets	Other gear
Herring*	46,586	7,922	23	3
Sprat	833	127		
Sticklebacks	429			
Sculpins	105			
Perch			2	1
Pike			1	1
Whitefishes			1	1
Trout			0.03	1,7
Cod		0.004	1,3	0,001
Sandeels	1.1			
Salmon			0.001	0,8
Flounder	0.2			
Bream			0.38	0,5
Other	0.3		0.1	0.3
Total	47954	8049	28	9

50G8 - Total value (1.000 SEK) of species by gear type (2012-2021)

	Pelagic trawl	Bottom trawl	Gillnets	Other gear
Herring	260,028*	39,766*	121	15
Sprat	2,205	365		
Sticklebacks	1,175			
Sculpins	270			
Perch			72	27
Pike			13	14
Whitefishes			17	31
Trout			1	80
Cod		0.05	17	0.02
Sandeels	2.4			
Salmon			0.03	272
Flounder	1.4			
Bream			2.6	1.9
Other				4
Total	263682	40131	244	201

51G8 - Total landings (tons) of species by gear type (2012-2021)

	Pelagic trawl	Bottom trawl	Gillnets	Other gear
Herring	15,893	1,079		
Sprat	94	4		
Sticklebacks	226			
Sculpins	24			
Perch			0,06	
Pike			0,02	
Whitefishes			0,01	
	Cod		0,5	
Bream			0,007	
Total	16236	1083	1	

51G8 - Total value (1.000 SEK) of species by gear type (2012-2021)

	Pelagic trawl	Bottom trawl	Gillnets	Other gear
Herring	94,491*	5,521*		
Sprat	247	12		
Sticklebacks	593			
Sculpins	63			
Perch			2.0	
Pike			0.3	
Whitefishes			0.5	
Whitefishes			7.1	
Bream			0.1	
Total	95393	5533	10	0

5.2.2 Seasonal landings

General trends in the seasonal fluctuations of landings in both ICES rectangles (50G8 and 51G8) containing parts of the Fyrskeppet OWF project area are driven by the large landings of herring (Figure 5-5). This led to landings being relatively high in the early part of the year, low in late spring and summer months, and increasing once again during the autumn (Figure 5-5). Specifically, for each ICES rectangle, in 51G8, catches were very low from May to August, while being more evenly distributed from October through April. In ICES rectangle 50G8, some of the largest overall landings occurred during May and June, while landings from July to October were low. The periods of low landings in of herring the fisheries during the summer and early autumn months and comparatively good landings the remaining

parts of the year in both ICES rectangles is likely attributed to the availability of numerous sub-populations of both spring and autumn spawning herring in the Bothnian Sea, and from herring migrating to and from feeding grounds to spawning areas (SLU Aqua, 2021; Jørgensen et al, 2005).

Economically, fluctuations in the total value of the landings strongly followed the seasonal trends in the large catches of especially herring (Figure 5-5).

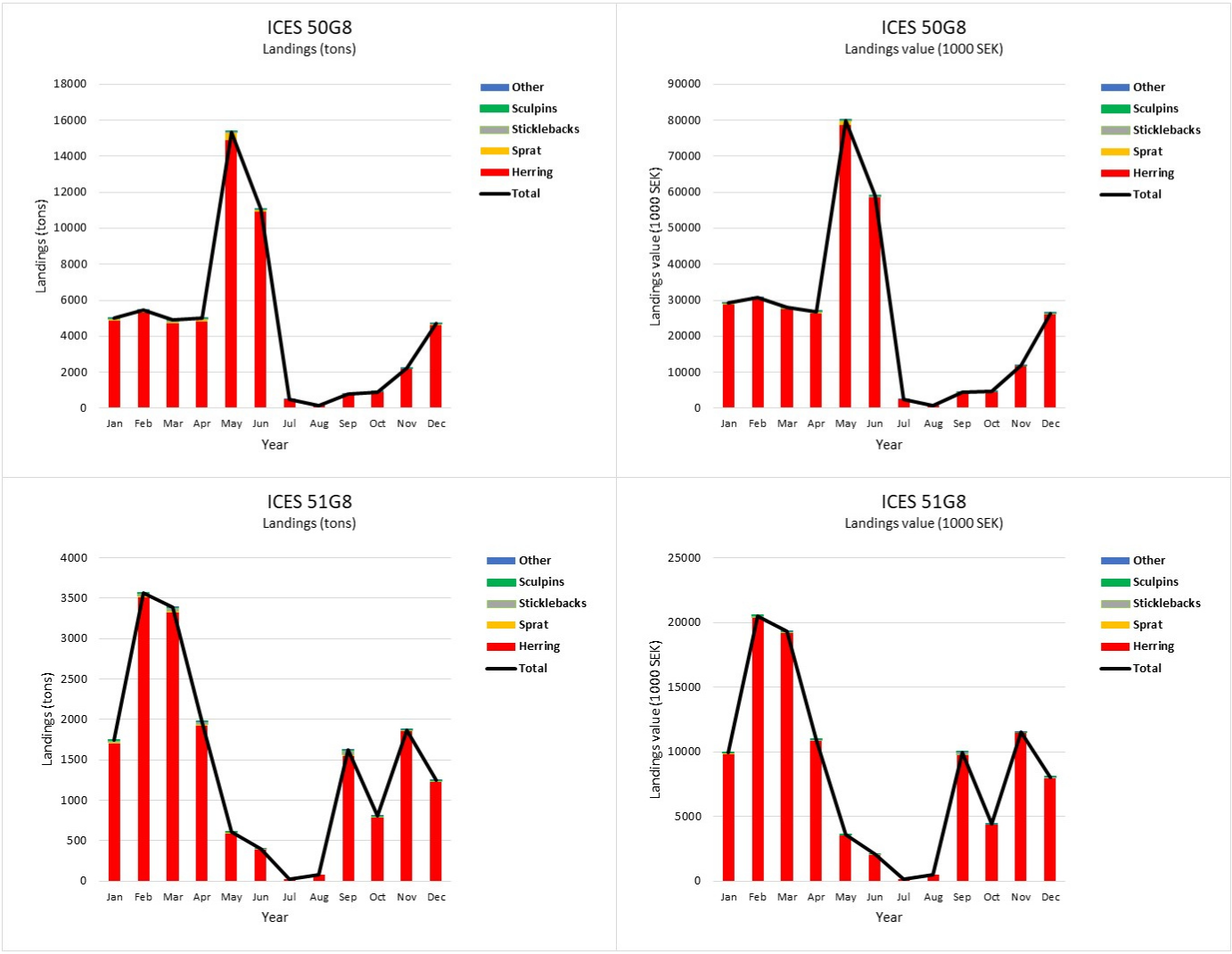


Figure 5-5: Monthly landings (tons) and value (1000 SEK) of landings for the most important commercial species in the ICES rectangles 50G8 and 51G8. Data derived from logbooks for the period 2012-2021 (Havs- och vattenmyndigheten, 2022). *Estimated landing values are based on an annual average price per kg of herring used both as an industrial fish and for consume, if herring were only used as an industrial fish the estimated landing values shown in the figure would be overestimated.*

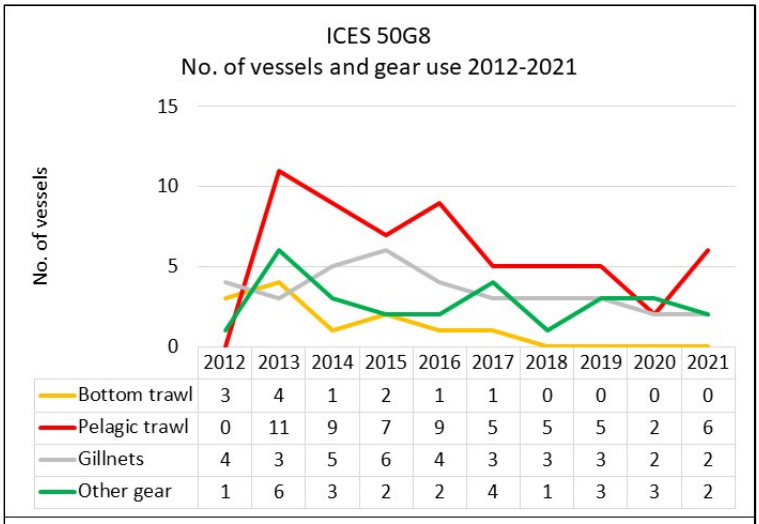
5.2.3 Fleet statistics and fishing effort

During the 10-year period from 2012-2021, the total number of commercial vessels equal to or larger than 8 meters that have fished (registered landings) in both ICES rectangles that include the Fyrskeppet OWF project area has decreased (Figure 5-6). This decrease can be attributed to both a steady decline in the number of pelagic trawlers

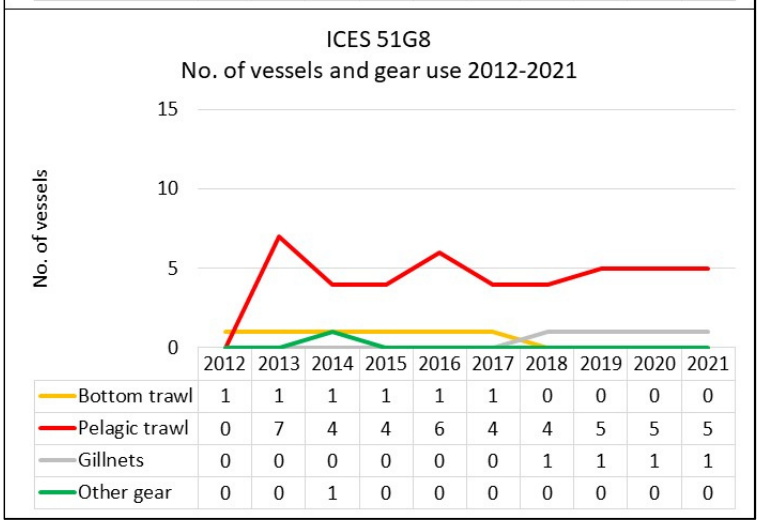
from 18 vessels in 2013 to 7-11 vessels in the past three years (2019-2021), and a slight downward trend in the number of vessels using gillnets and other gear types (traps and pots). The decrease in the number of pelagic trawlers corresponded to an upward increase in the length of fishing vessels in the area (SLU Aqua, 2021).

The number of bottom trawlers fishing in the two rectangles decreased from 5 vessels in 2013 to 0 vessels from the year 2018 and onwards. This also aligns with no reported landings from bottom trawlers as of 2018 and onwards (Figure 5-4).

Only a few fishing vessels (0-2 vessels during the 10-year period) used gillnets or other gear types in ICES 51G8, while 4-9 vessels used gillnets or other gear types in ICES 50G8 (Figure 5-6). Gillnets and other fishing methods are mainly confined to near coastal areas, and the difference between the numbers of vessels fishing in the two rectangles is probably due to the presence of a coastal zone in the southern part of ICES 50G8, while ICES rectangle 51G8 is entirely offshore (see Figure 4-1).



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Bottom trawl	3	4	1	2	1	1	0	0	0	0
Pelagic trawl	0	11	9	7	9	5	5	5	2	6
Gillnets	4	3	5	6	4	3	3	3	2	2
Other gear	1	6	3	2	2	4	1	3	3	2



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Bottom trawl	1	1	1	1	1	1	0	0	0	0
Pelagic trawl	0	7	4	4	6	4	4	5	5	5
Gillnets	0	0	0	0	0	0	1	1	1	1
Other gear	0	0	1	0	0	0	0	0	0	0

Figure 5-6: The development of the number of fishing vessels that recorded landings in the ICES rectangles 50G8 and 51G8 according to their primary gear use (bottom trawl, pelagic trawl, gillnets and other gear (pots, fyke nets, hook and lines) from 2012-2021. Data from SwAM (Havs- och vattenmyndigheten, 2022).

5.2.4 Small fishing vessels <8 meter

The majority of fishing vessels less than 8 meters do not register their catches in logbooks and therefore not part of the landing statistics presented in the data at the ICES rectangle level. The actual number of vessels fishing in the ICES rectangles are, however, reported. A total of two vessels less than 8 meters have reported fishing in the offshore ICES rectangle 51G8 during the entire 10-year period (2012-2021), while between 1-4 vessels less than 8 meters have reported fishing in the same rectangle 51G8 during this time. The amount and values of the landings from vessels less than 8 meters was low (10 tons and 152 thousand SEK) compared to the overall landings from larger vessels in both ICES rectangles.

5.2.5 Number of fishing trips (fishing effort)

Although a fishing trip can represent from one to several days of fishing for different vessels, the number of fishing trips in an area can be used as a proxy for the amount of effort used for the different fisheries in ICES rectangles 50G8 and 51G8.

The number of fishing trips registered for bottom trawls in years 2012-2017 has fluctuated between 14-32 trips per year in ICES 50G8 and between 3-11 trips per year in 51G8 (Table 5-3). As of 2018, there has been no Swedish bottom trawl vessels fishing in the region around Fyrskeppet OWF project area. For pelagic trawls, there has been an upward trend in the combined number of fishing trips from both ICES rectangles. This is based on an increase from between 0-52 fishing trips in the years 2012-2014 to 35-68 trips in the years 2019-2021 in ICES 50G8, and from 0-22 trips in the years 2012-2014 to 53-69 trips in the years 2019-2021 in ICES 51G8. The increasing trend in pelagic trawling effort together with a decrease in the number of pelagic vessels in recent years (Figure 5-6) suggest that the average number of fishing trips undertaken by pelagic fishing vessels has increased during the later years.

Table 5-3: Development of the number of registered fishing trips undertaken by fishing vessels larger than 8 meters according to gear during the 10-year period 2012-2021. Data from SwAM 2022 (Havs- och vattenmyndigheten, 2022).

ICES rectangle		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
50G8	Bottom trawl	21	32	16	24	20	14				
	Pelagic trawl		31	52	33	71	38	87	68	35	66
	Gillnets	10	26	22	23	17	17	13	14	7	3
	Other gear		12	12	12	13	10	6	9	5	1
51G8	Bottom trawl	3	7	10	10	11	10				
	Pelagic trawl		13	22	19	35	26	57	68	69	53
	Gillnets						3	3	1		6
	Other gear										

During the period 2012-2021, the number of fishing trips by vessels using gillnets has been between 1-6 trips per year in the offshore ICES 51G8 and between 3-26 trips in ICES 50G8. There have been no fishing trips with "other gear" types in ICES 51G8 and only between 1-13 trips a year with "other gear" (fykenets, traps and pots) in ICES 50G8.

5.3 The distribution of the commercial fisheries in the Fyrskeppet OWF project area

As a proxy for the distribution of the commercial fisheries according to gear types (pelagic trawls, bottom trawls and gillnets), VMS data indicating where vessels equal to or larger than 12 meters were actively fishing was used to make distribution maps. To show the distribution of the fisheries in a wide regional area that included the Fyrskeppet OWF project area, the VMS data from six ICES rectangles (50G7, 51G7, 50G8, 51G8, 50G9 and 51G9) was used to map the relevant fisheries. These maps and data for each fishery according to gear type are presented in the following sections.

5.3.1 Bottom trawls

Since 2017, bottom trawling has been absent from the regional area around the Fyrskeppet OWF project area. Before this, the majority of fisheries with bottom trawls in the years 2012-2017 have occurred in relatively confined areas to the south and west of the project area, and in all cases outside the Fyrskeppet OWF project area (Figure 5-7). Similarly, there are large regional areas within the six ICES rectangles including the Fyrskeppet OWF and surrounding areas that were not fished by bottom trawlers.

Bottom trawl catches in the area mainly consisted of herring, which is rather atypical for bottom trawls in an international context (NOAA Fisheries, 2023) but not unusual in the northern Baltic Sea (Fishsource, 2023); (ICES, 1988). Information from the Swedish fishery authorities suggested that the bottom trawlers used in the regional waters around the project area are called "bottom herring trawls" which are trawls designed to catch herring and thus fish in pelagic. The fishing areas where bottom trawls were used (Figure 5-7) have considerable overlap with the areas of pelagic trawling (Figure 5-8) which is understandable as trawlers registered as using bottom trawl in this region also primarily target and catch herring. As mentioned in section 5.2.3, there have been no registered landings from vessels using bottom trawls in the region (ICES 50G8 and 51G8) around Fyrskeppet OWF project area since 2017.

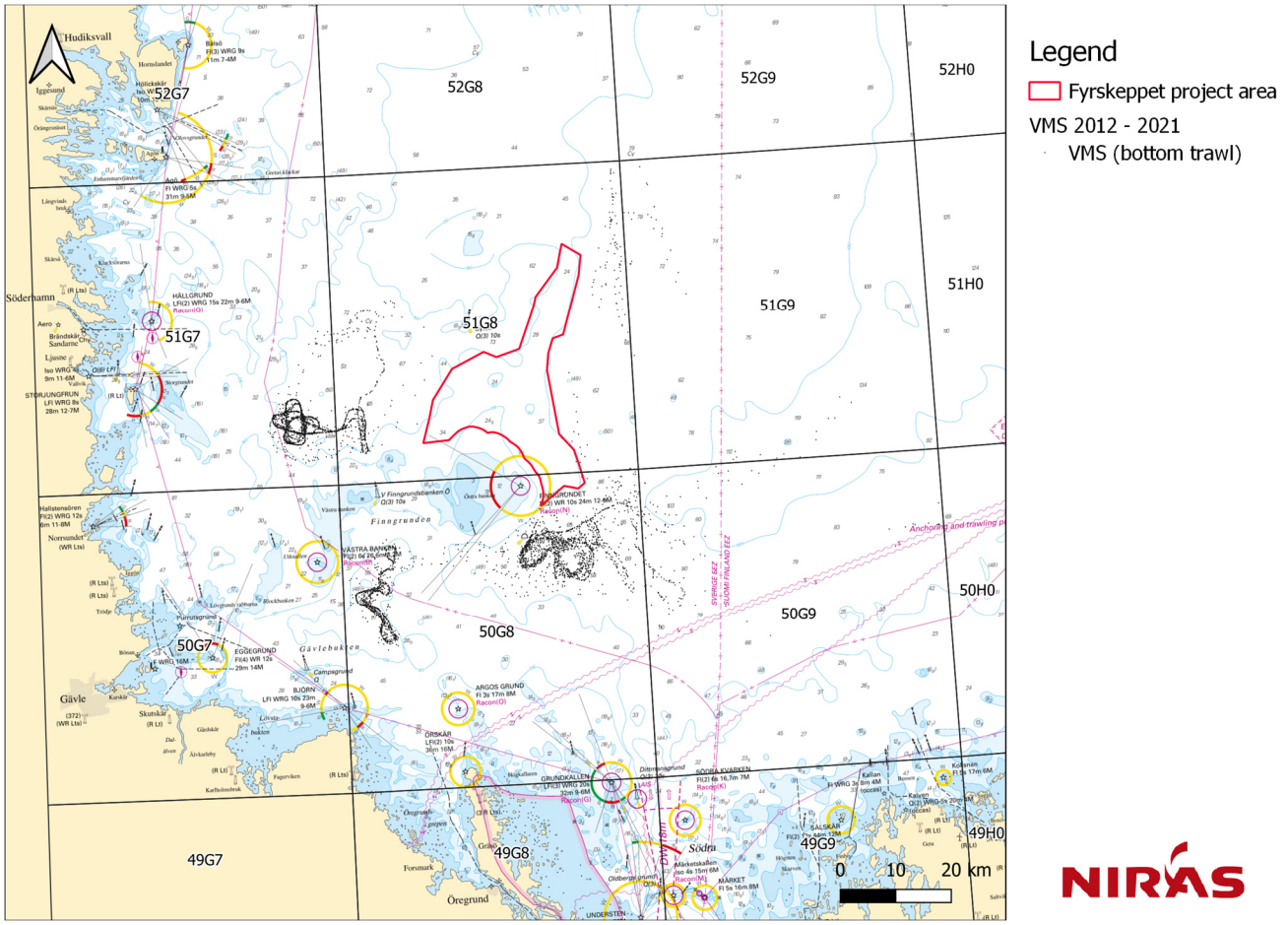


Figure 5-7: The distribution of the bottom trawling activity in the six ICES rectangles (50G7, 51G7, 50G8, 51G8, 50G9 and 51G9) in the southwestern part of the Bothnian Sea and in relation to the Fyrskeppet OWF project area (red borders). Vessels using bottom trawls have not fished in the regional area since 2017. Data derived from VMS data over a 10-year period (2012-2021). Data from SwAM (Havs- och vattenmyndigheten, 2022).

5.3.2 Pelagic trawls

The distribution of the fishery with pelagic trawls is spread throughout the Bothnian Sea, though with particular intensity in the southern areas (SLU Aqua, 2021). Although pelagic trawling is widely distributed in the southern Bothnian Sea, some areas are more intensively fished than others (Figure 5-8). VMS data indicates, however, that the pelagic trawlers seldom fish in the Fyrskeppet OWF project area compared to the surrounding areas (Figure 5-8). The pelagic trawl fishery is particularly intense in an area of approximately 25x25 km² just south and southeast of the Fyrskeppet OWF project area. Similarly, areas west and northeast of the project area are also intensively fished. Contrary to this, the Natura 2000-area Finngrunden-Östra Banken located at the southwestern border of the Fyrskeppet OWF project area is not used as fishing grounds by trawlers (Figure 3-1).

Pelagic trawlers primarily target herring and sprat and account for a considerable proportion of the landings of herring caught in the ICES rectangles (51G8 and 50G8) that include the Fyrskeppet OWF, as described in section 5.2.

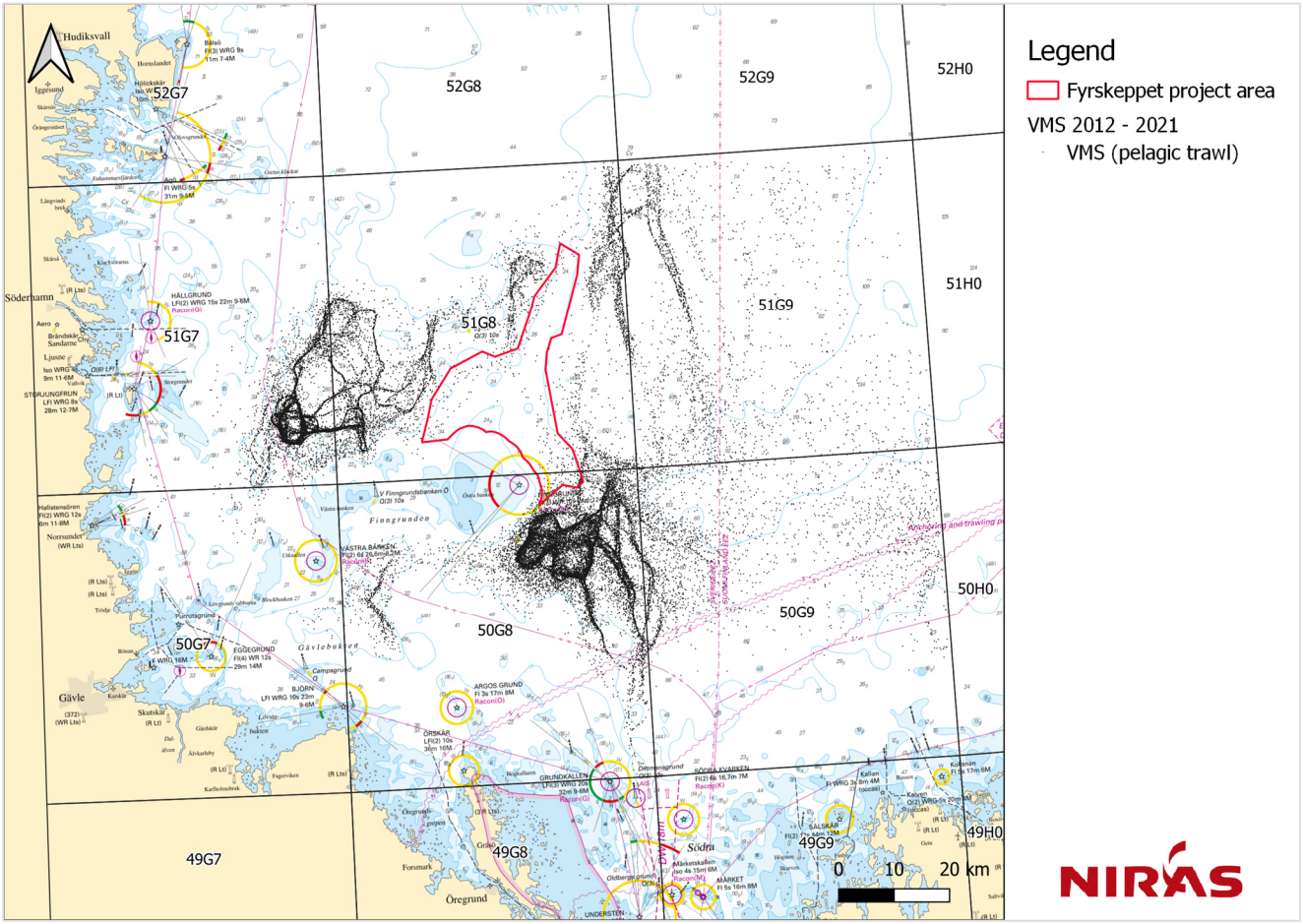


Figure 5-8: The distribution of the pelagic trawling activity by Swedish trawlers in the 6 ICES rectangles (50G7, 51G7, 50G8, 51G8, 50G9 and 51G9) in the south-western Bothnian Sea and in relation to the Fyrskeppet OWF project area (red borders). Data derived from VMS data over a 10-year period (2012-2021) from SwAM, 2021 (Havs- och vattenmyndigheten, 2022).

5.3.3 Gillnets

The distribution of the gillnet fisheries in the southwestern Bothnian Sea based on VMS data of large gillnet vessels (≥12 meters in length) during the period 2012-2021 is shown in Figure 5-9. Results indicate that there was no gillnet fishery registered from these vessels in the near region around the project area, and that gillnet fishing activity was primarily undertaken south of the Fyrskeppet OWF project area in the near-coastal areas of ICES 50G7 and 50G8. There is no distribution data for small gillnet vessels (<12 meters) because vessels of this length are not required to have VMS equipment onboard. However, it is anticipated that the distribution of the gillnet fisheries with small vessels is also most likely near the coast, where these fisheries tend to allocate effort targeting a variety of high value commercial species such as cod, trout, perch, pike and whitefishes, as well as herring during spawning runs for consume (see Table 5-2).

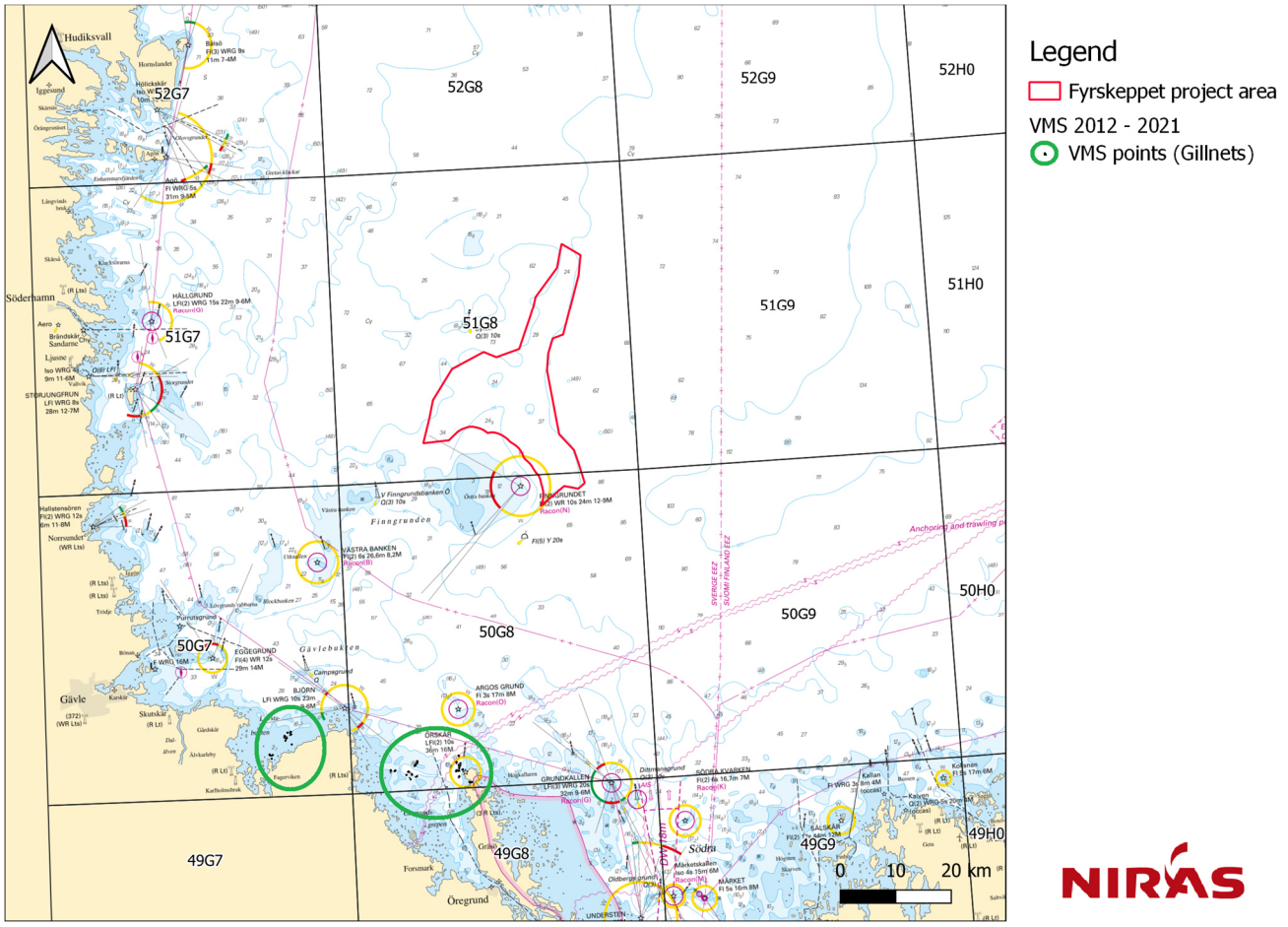


Figure 5-9: The distribution of the gillnet fishery (in green circles) from VMS data for the six ICES rectangles (50G7, 51G7, 50G8, 51G8, 50G9 and 51G9) in the southwestern Bothnian Sea and in relation to the Fyrskeppet OWF project area (red borders). Data derived from VMS data over a 10-year period (2012-2021) from SwAM (Havs- och vattenmyndigheten, 2022).

5.3.4 Other gear (pots, fyke nets, lines etc.)

The distribution of the local fisheries with other gear, was almost exclusively done in near-coastal areas from vessels less than 12 meters in length. The fisheries with "other gear" which according to logbook data primarily includes fisheries with fykenets, traps, and pots target a variety of commercial species such as Atlantic salmon, European eel, whitefish and trout.

In general, the fisheries with these different types of passive gear along the coast has been sporadic and decreasing during the period 2012-2021.

5.4 Fishery statistics of landing and basis (home) ports from fisheries in and near the Fyrskeppet OWF project area

Landing ports

For the two ICES rectangles (50G8 and 51G8) containing parts of the Fyrskeppet OWF project area, catches from these 2 ICES rectangles have been landed in 16 different ports over the past 10-years (2012-2021) with the eight most

important landing ports given in Table 5-4. During this period the port of Norrsundet to the west of ICES rectangles 51G8 and 50G8 and Fyrskeppet OWF project area was by far the most important landing port by vessels fishing in ICES 50G8 and ICES 51G8 throughout most of the period (Västervik was the most important port for landings from ICES 51G8 in 2013 and 2014, however, this port eventually closed). During the period 2012-2021, total landings in the port of Norrsundet amounted to 63,135 tons and 349.5 million SEK in value, which was 86 % of both the landings by weight and value from ICES 50G8 and ICES 51G8.

Other important landing ports for fish caught in ICES 50G8 and 51G8 by Swedish vessels during the period 2012-2021 were Skagen in Denmark (7 % of total landings in tons and value) and Västervik (4 % of total landings in tons and value).

Table 5-4: Ports where the fisheries (catch) in ICES 50G8 and 51G8 were landed according to weight (tons) and value (SEK) during the period 2012-2021. Data from SwAM 2022 (Havs- och vattenmyndigheten, 2022). ** Estimated landings values in ports are based on an annual average price per kg of herring used both as an industrial fish and for consume, if herring were only used as an industrial fish the estimated value would be overestimated.*

ICES 50G8 – Landings (tons) in ports

Landings port	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Norrsundet	1,941	2,931	4,702	7,536	10,269	3,702	7,338	3,873	2,196	2,746
Skagen		817	92	501	559	121				1,986
Västervik		1,095	1,105		225	98				
Grenaa			351			111				635
Ventspils										654
Neksø							219			
Västergarn							177			
Gudinge	4	8	5	5	3	2	4	4	2	2
Other ports	0	3	0	5	3	21	0	0		
Total	1,946	4,854	6,255	8,047	11,059	4,054	7,738	3,877	2,198	6,023

ICES 50G8 – Landings value (1000 SEK) in ports *

Landings port	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Norrsundet	9,364	14,237	20,483	38,514	53,441	20,042	39,566	30,875	12,998	17,487
Skagen		3,937	405	2.579	2,914	656				11,854
Västervik		5,315	4,822		1,169	532				
Grenaa			1,544			576				4,069
Ventspils										4,150
Neksø							1.180			
Västergarn							980			
Gudinge	41	66	54	45	36	28	84	79	36	46
Other ports	1	16	1	44	21	120	3	1		
Total	9,407	23,570	27,309	41,182	57,581	21,953	41,812	30,955	13,034	37,606

ICES 51G8 – Landings (tons) in ports

Landings port	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Norrsundet	37	547	823	1,273	1,620	1,128	3,465	1,590	2,688	2,730
Skagen		29		54	24				73	732
Västervik		1,095	1,105		225	98				

ICES 51G8 – Landings (tons) in ports										
Landings port	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Grenaa			351			111				635
Ventspils									36	295
Neksø										
Västergarn										
Gudinge										
Other ports			0			80				
Total	37	1.672	2.279	1.327	1.868	1.417	3.465	1.590	2.797	4.392

ICES 51G8 – Landings value (1000 SEK) in ports *										
Landings port	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Norrsundet	179	2,668	3,613	6,508	8,420	6,085	18,880	12,776	15,885	17,455
Skagen		139		277	121				430	4,481
Västervik		305								
Grenaa						46				147
Ventspils									214	1,874
Neksø										
Västergarn										
Gudinge										
Other ports			0			427	3	1	1	3
Total	179	3,112	3,613	6,785	8,541	6,558	18,884	12,777	16,530	23,959

Basis ports – home ports

The vessels that fished in ICES rectangles 50G8 and 51G8 (that contained parts of the Fyrskeppet OWF project area) during the 10-year period 2012-2021 came from 21 different ports from around Sweden. The vast majority (95 % in tons and value) of landings (predominantly herring and sprat) from the region around the project area (ICES 50G8 and 51G8) were taken by trawlers from the following five ports; Hönö (27 % in tons and 24 % in value), Öregrund (21 % in tons and 22 % in value), Engesberg (19 % in tons and 19.7 % in value), Fotö (15.6 % in tons and 16 % in value) and Fiskebäck (14.4 % in tons and 13.5 % in value). Of the five main ports, Hönö, Fotö and Fiskebäck are located on the southwest coast of Sweden (outside Göteborg), while Engesberg and Öregrund are located along the Bothnian Sea coast, west and south of Fyrskeppet OWF project area.

Of the 405 million SEK accounted for by vessels fishing in rectangles 50G8 and 51G8 over the 10-year period from 2012-2021, 57 % of the value (232 million SEK) landed from these rectangles was accounted for by vessels originating from ports along the western Swedish coast in the Kattegat and 43 % (173 million SEK) was accounted for by vessels originating from ports along the eastern Swedish coast of the Bothnian Sea.

A number of vessels from other ports close to the ICES rectangles 50G8 and 51G8 (e.g. Gudinge, Karlholmsbruk and Ljusne), generally targeted consume species perch, salmon, trout and whitefish, which were mainly caught by using gillnets. Vessels from these ports accounted for only 0,02% of total landings in tons and 0,04 % of total landings in value from the two ICES rectangles.

Table 5-5 lists the total landings (tons) and value of landings (1000 SEK) of the top 8 ports where vessels registering landings from ICES 50G8 and 51G8 had their home port, during the period 2012-2021.

Table 5-5: The top 8 Home ports (Basis ports) of the Swedish vessels that registered landings from ICES 50G8 and 50G9, according to weight (tons) and value (1000 SEK) during the period 2012-2021. Data from SwAM (Havs- och vattenmyndigheten, 2022). ** Estimated landings values according to home ports are based on an annual average price per kg of herring used both as an industrial fish and for consume, if herring were only used as an industrial fish the estimated landings value would be overestimated.*

ICES 50G8 - Landings in tons according to home ports of vessels

Home port	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Hönö		632	2,525	2,343	2,490	1,209	4,737	937		
Engesberg	1.888	1,592	699	1,027	1,465	1.149		1.257	951	732
Fiskebäck		542	1,339	3,010	2,709					2,273
Fotö		1,095	336	1,474	1,323	339	1,666	467		1,870
Öregrund		312	665	33	1,940	877	1,157	1,213	1,244	1,102
Donsö					477	477				45
Göteborg		321	495	112						
Stora Dyrön-Nordhamnen	4	8	5	5	3	2	4	4	2	2
Other ports	58	362	196	48	6	2	178	4	2	2
Total	1,950	4,862	6,260	8,051	10,414	4,056	7,742	3,881	2,200	6,025

ICES 50G8 - Landings value (1000 SEK) according to home ports of vessels *

Home port	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Hönö		3,074	10,998	11,947	13,054	6,535	25,311	7,242		
Engesberg	9,110	7,718	3,041	5,199	7,707	6,245		10,021	5,636	4,681
Fiskebäck		2,594	5,837	15,450	13,923					13,648
Fotö		5,315	1,469	7,562	6,913	1,801	9,126	3,800		11,946
Öregrund		1,521	2,894	175	10,021	4,748	6,329	9,813	7,362	7,012
Donsö					2,507	2,594				272
Göteborg		1,563	2,178	574						
Stora Dyrön-Nordhamnen					3,404					
Other ports	297	1,784	891	276	52	29	1,046	80	36	46
Total	9,407	23,570	27,309	41,182	57,581	21,953	41,812	30,955	13,034	37,606

ICES 51G8 - Landings in tons according to home ports of vessels

Home port	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Hönö		436	467	765	848	395	342	166		
Engesberg	37	50	178	190	335	293		635	751	823
Fiskebäck		58		105	181					238
Fotö		63		267	82	49	6	113	744	1,439
Öregrund		31	68		198	480	3,117	675	1,275	741
Donsö										538
Göteborg										
Stora Dyrön-Nordhamnen										
Other ports		2	109			0	0	0	27	
Total	37	639	823	1,327	1,643	1,217	3,466	1,590	2,797	3,780

ICES 51G8 - Landings value (1000 SEK) according to home ports of vessels *

Home port	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Hönö		2,125	2,054	3,912	4,463	2,139	1,872	1,309		
Engesberg	179	242	784	970	1,765	1,592		5,141	4,446	5,262
Fiskebäck		280		538	921					1,457
Fotö		305		1,365	428	256	33	880	4,394	9,221
Öregrund		151	295		963	2,568	16975	5,447	7,528	4,715
Donsö										3,305
Göteborg										
Stora Dyrön-Nordhamnen										
Other ports		10	480			3	3	1	161	
Total	179	3.112	3614	6785	8541	6558	18.884	12777	16530	23959

5.5 Distribution of the Finnish fisheries in the planned project area and region

An overview of the distribution of Finnish commercial fisheries in the region, and landings data for Finland are presented, and in some instances compared to the Swedish fisheries in the following section.

Similar to the Swedish vessels, the movement of the Finnish commercial fishery vessels equal to or larger than 12 meters are also monitored by VMS (Vessel Monitoring System) equipment. This data was obtained from Finnish fishery authorities for four relevant ICES rectangles; 50G8, 51G8, 50G9 and 51G9 over a 10-year period (2012-2021). Although vessel speed to help determine when vessels are fishing and when they are steaming to and from fishing areas was not included in the VMS data, this data was still used to map the distribution of the Finnish fisheries in the regional area that includes and surrounds the Fyrskeppet OWF project area (Figure 5-10).

Results indicated that the distribution of the Finnish fisheries is broadly spread throughout the region and Finnish vessels allocated their fishing effort in areas just east and south of the Fyrskeppet OWF project area, in ICES 50G8, as well as in a fishing area just north of Fyrskeppet OWF project area in ICES 51G8 (Figure 5-10). Within the Fyrskeppet OWF project area, the distribution of the Finnish fisheries was considerably spread throughout the project area, and with considerably less effort than the primary fishing areas both north and south of the project area (Figure 5-10).

The distribution of the Finnish commercial vessels was also prominant to the east of Fyrskeppet OWF project area in the ICES rectangles 50G9 and 51G9 (Figure 5-10). In these two rectangles Finnish fishing vessels accounted for 90,6 % of the total landings in tons and 90,0 % in total value over the 10-year period, 2012-2021.

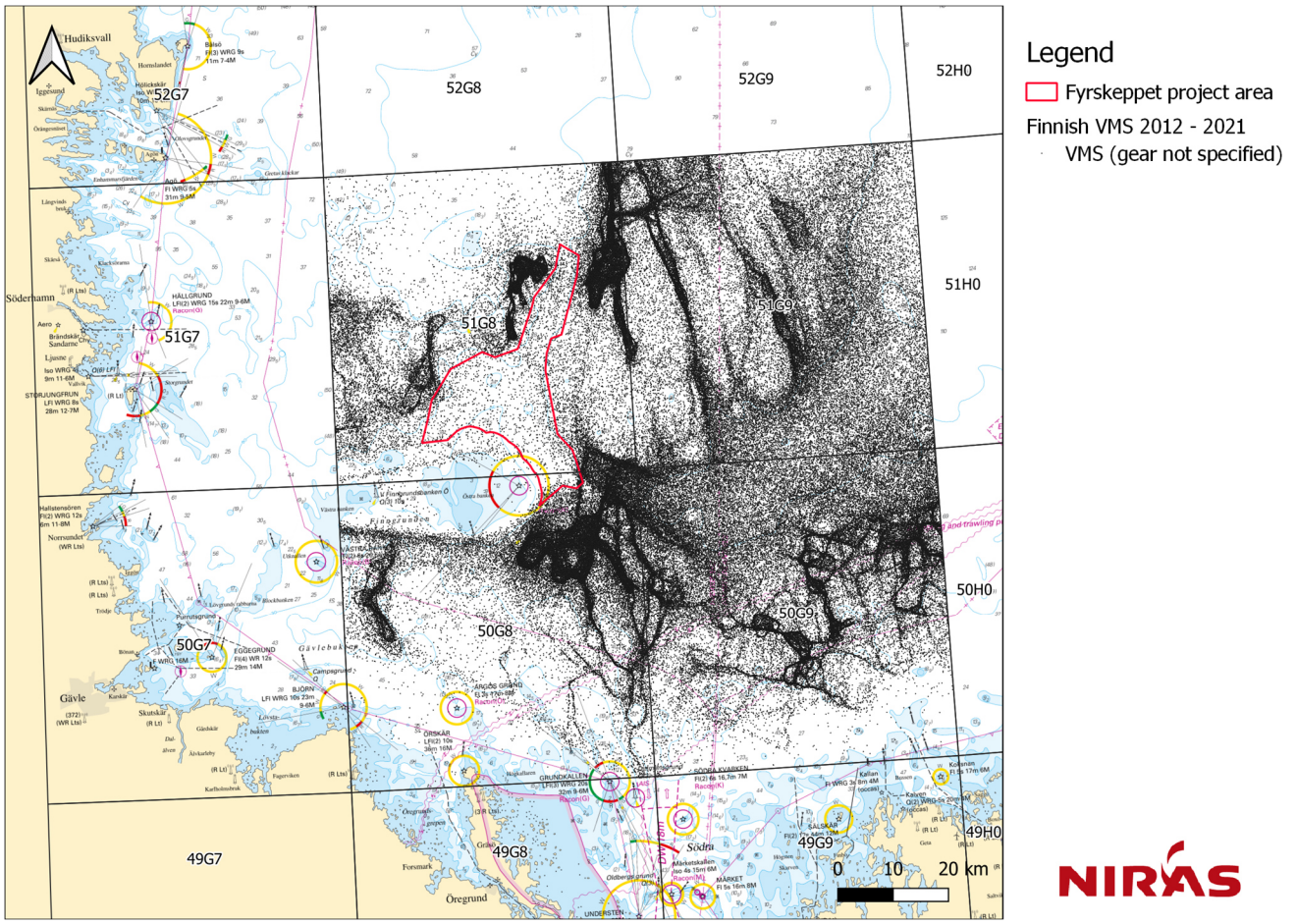


Figure 5-10: The distribution of Finnish fishing vessels (all gear types – primarily bottom and pelagic trawls) in the 4 ICES rectangles (50G8, 51G8, 50G9 and 51G9) in the southern Bothnian Sea and in relation to the Fyrskeppet OWF project area. Data derived from the Finnish Fisheries Agency (NTM-centralerna, 2022).

Comparisons between the distribution of both the Swedish and Finnish fisheries In the ICES rectangles 50G8 and 51G8 that contain the Fyrskeppet OWF project area, indicated an overall preference for both of these nations to focus their fishing effort in a number of common areas just outside the project boundaries of the Fyrskeppet OWF project area. In general, the Fyrskeppet OWF project area was used only marginally as a fishing area, and primarily by Finnish vessels (Figure 5-11).

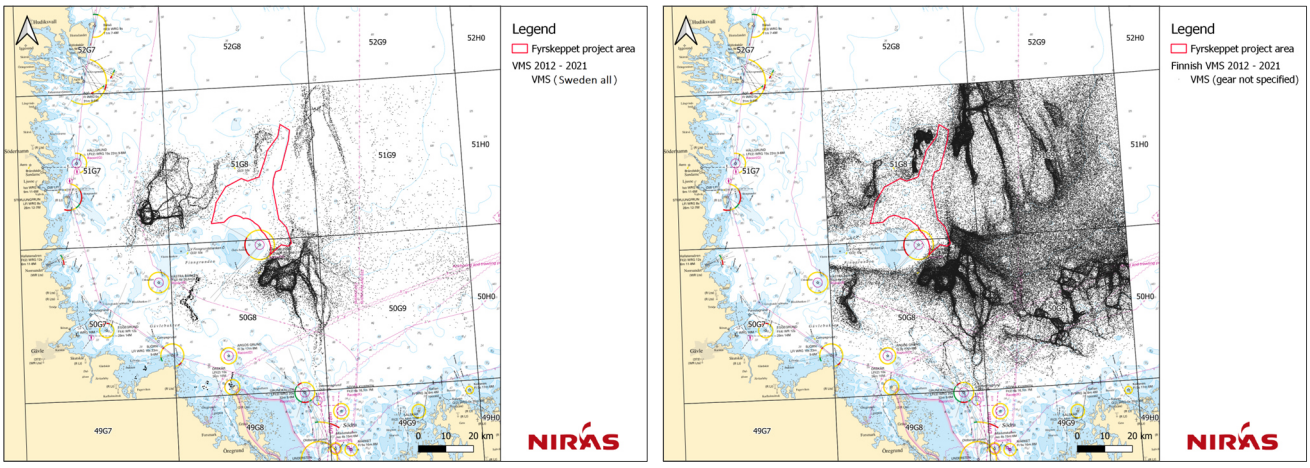


Figure 5-11: Comparisons between the distribution of the Swedish fisheries (all gear types) in 6 ICES rectangles (50G7, 51G7, 50G8, 51G8, 50G9 and 51G9) on the left map, and the Finnish fisheries (all gear types) in 4 ICES rectangles (50G8, 51G8, 50G9 and 51G9) on the right map, in relation to the Fyrskeppet OWF project area Data derived from VMS data from SwAM (Havs- och vattenmyndigheten, 2022) *and Finnish Fisheries Agency* (NTM-centralerna, 2022).

5.5.1 Finnish landings statistics

The total Finnish landings in the regional area the Fyrskeppet OWF project area is located (ICES rectangles 50G8 and 51G8), fluctuated between a combined total of 10,280 - 20,692 tons per year during the 10-year period from 2012-2021 (Figure 5-12). During this period, average annual landings from the Finnish fisheries were slightly higher in ICES 50G8 (avg. of 7,452 tons) that contains the smaller southern section of Fyrskeppet OWF project area than in ICES 51G8 (avg. of 5,978 tons) that contains the northern and largest section of the Fyrskeppet OWF project area (see Figure 4-1).

Figure 5-12: Finnish landings of different fish species over a 10-year period (2012-2021) in the two ICES rectangles (50G8 and 51G8) that contain parts of the Fyrskeppet OWF project area. Data from Finnish Fisheries Agency (NTM-centralerna, 2022). *Estimated landing values are based on an annual average price per kg of herring used both as an industrial fish and for consume, if herring were only used as an industrial fish the estimated value would be approximately 66 % less than shown*.

All landings in the Finnish fisheries in the regional area (ICES 50G8 and 51G8) containing the Fyrskeppet OWF project area were caught by vessels using gear listed as either pelagic or bottom trawls, ie. there were no fisheries using passive gear such as gillnets etc. (Table 5-6). The lack of Finnish fisheries using passive gear in the region, probably reflects that gear such as gillnets are often utilized by small vessels in coastal areas, and because of the location of Fyrskeppet OWF project area, the major part of the Finnish fleet that use passive gears would probably be allocating their effort and fisheries nearer the Finnish coastal areas of the Bothnian Sea.

Species composition of the catches from the Finnish fleet using trawls and fishing in the regional area was similar to the Swedish fleet, with herring and some sprat being the main target species. In rectangles 50G8 and 51G8, the landings of herring accounted for 97.7% by weight and 98.9 % by value during the 10-year period from 2012-2021. During this period, landings of sprat accounted for 2.27 % of the weight and 1.09 % of the landed value from Finnish vessels. Thus, together, sprat and herring account for 99.99 % of the landings by weight and value from Finnish vessels in 50G8 and 51G8 (Table 5-6).

There were very few other fish species registered in the landings by the Finnish fisheries in the region. These were primarily stickelbacks and sculpins (38 tons combined), but also a few cod (193 kg), smelt (1 kg) and unspecified fish (565 kg) were also landed by the Finnish fisheries from ICES 50G8 and ICES 51G8 during the 10-year period 2012-2021 (Table 5-6). These landings only amounted to 0,03 % by weight (38.2 tons) and 0.02% by value (113,600 SEK) of the total landings (Table 5-6).

Table 5-6. Finnish landings (tons) and value of landings (SEK) of commercial species according to gear types in ICES 50G8 and 51G8 during the 10-year period 2012-2021. Blank cells means no catch. Data from the Finnish Fisheries Agency 2022 (NTM-centralerna, 2022). ** Total value estimates are based on an annual average price per kg of herring used both as an industrial fish and for consume, if herring were only used as an industrial fish the estimated values for herring would be overestimated by approximately 66 % of the value given.*

50G8 – Total Finnish landings (tons) of species by gear type (2012-2021)	Pelagic trawl	Bottom trawl	Gillnets	Other gear
Herring	44,164	27,916		
Sprat	1,180	1,256		
Sticklebacks	7.2			
Sculpins		0.5		
Other	0.5			
Total	**45,352**	**29,172**		

50G8 – Total value (1000 SEK) of species by gear type (2012-2021)	Pelagic trawl	Bottom trawl	Gillnets	Other gear
Herring	239,968*	153,249*		
Sprat	3,068	3,366		
Sticklebacks	21			
Sculpins		1.5		
Other	1.4			
Total	**243,058**	**156,615**		

51G8 – Total Finnish landings (tons) of species by gear type (2012-2021)	Pelagic trawl	Bottom trawl	Gillnets	Other gear
Herring	22.726	36.410		
Sprat	295	324		
Sticklebacks	2.3	4.4		
Sculpins	2.1	21		
Other	0.1	0.1		
Total	**23,025**	**36,759**		

51G8 – Total value (1000 SEK) of species by gear type (2012-2021)	Pelagic trawl	Bottom trawl	Gillnets	Other gear
Herring	120,833*	208,473*		
Sprat	752	822		
Sticklebacks	6,5	12		
Sculpins	6,3	62		
Other	1,3	0,3		
Total	**121,598**	**209,370**		

5.5.2 Seasonal distribution of the Finnish landings

Trends in the monthly landings from the Finnish fleet indicated their fisheries generally occurred during the same time of the season as the Swedish fisheries (see Figure 5-5), with low landings from May-August in ICES 51G8 and low landings from July-August in ICES 50G8 (Figure 5-13). During the rest of the year the overall landings from Finnish fisheries in the region are relatively stable, with a slightly greater amount of landings from the southern region containing the southern section of Fyrskeppet OWF project area (ICES 50G8) than from the northern region containing the majority of the Fyrskeppet OWF project area (ICES 51G8). The comparable fishing seasons between the two nations reflects the similarity in the primary target species (herring) and the seasonal availability of this commercial species in the region.

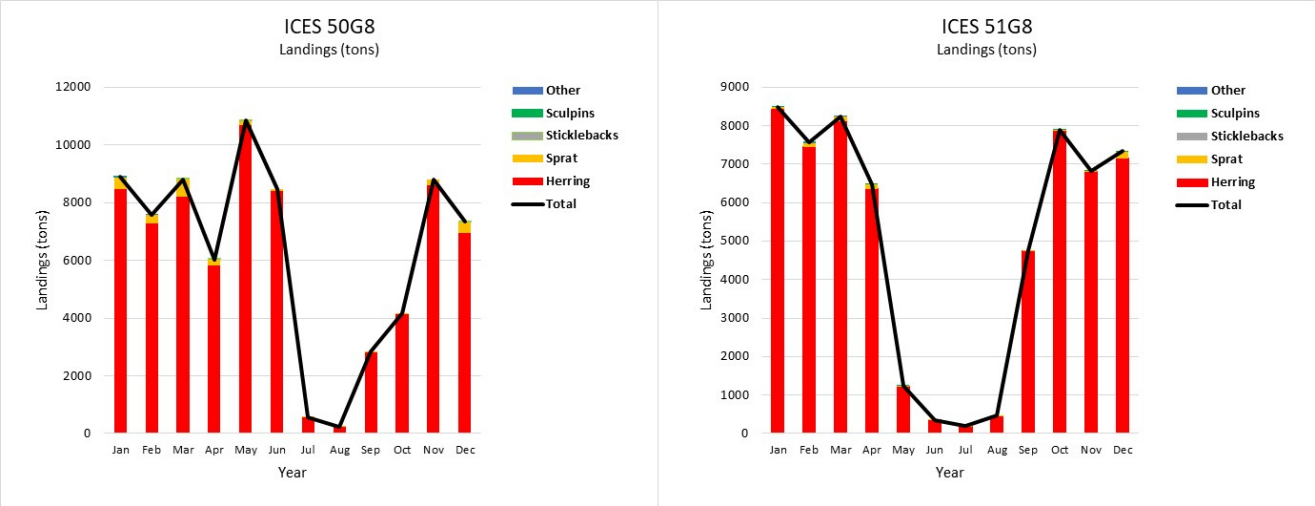


Figure 5-13: Monthly landings (tons) from the Finnish fisheries in the ICES rectangles 50G8 and 51G8. Data derived from logbooks for the period 2012-2021 from Finnish Fisheries Agency (NTM-centralerna, 2022).

5.6 Comparisons between Swedish and Finnish fisheries; annual landings and seasonal variation

The yearly variation in Swedish and Finnish landings in the two ICES rectangles (50G8 and 51G8) containing parts of the Fyrskeppet OWF project area during the 10-year period from 2012-2021 are presented in Figure 5-14. In total, the combined landings and estimated value of landings from the Swedish and Finnish fisheries from rectangles 50G8 and 51G8 from 2012-2021 amounted to approximately 207,676 tons and 1,136 million SEK in value. Please note that value estimates are based on an annual average price per kg of herring used both as an industrial fish and for consume, if herring were only used as an industrial fish the estimated value of landings would be overestimated by approximately 66 %.

During the 10-year period 2012-2021, landings by Finnish vessels accounted for 64.7 % of the total landings by weight (134,309 tons) and 64.3 % of the total landings value (730 million SEK) in the two ICES rectangles (50G8 and 51G8). In comparison, landings by Swedish fishing vessels accounted for the remaining 35.3 % of the landings by weight (73.4 tons), which amounted to 406 million SEK in value.

ICES rectangle 51G8

In ICES rectangle 51G8 where the majority of the Fyrskeppet OWF project area is located, the Finnish landings were 59,785 tons from 2012-2021 and ranged between 3,707-6,682 tons per year. Comparatively, the Swedish landings totaled 17,320 tons and ranged between 37-3,780 tons per year during the same time period. During the period from 2012, the Swedish landings showed an upgoing trend, both in terms of increasing landings by weight and value, but also with an increasing proportion of yearly catches in the ICES rectangle 51G8 compared to the Finnish landings (Figure 5-14). This was illustrated by the Swedish proportion of landings by weight and value increasing from 0.6 % to 16.5 % in the years 2012-2014, and from 24 % to 40 % in the years 2019-2021.

Mean annual Finnish landings in ICES 51G8 during the 10-year period from 2012-2021 was 5.978 tons and approx. 31 million SEK (range: 18-64 million SEK). In comparison, mean annual Swedish landings in ICES 51G8 during the same 10-year period was 1,700 tons and approx. 10 million SEK (range: 0.2 – 24.0 million SEK).

ICES rectangle 50G8

In the southern area of the Fyrskeppet OWF project area (ICES 50G8), the total Finnish landings from 2012-2021 was 74,524 tons (between 5,517-10,943 tons per year) and the total landings by value was 399 million SEK (between 32-56 million SEK per year)(Figure 5-14). In comparison, during the same 10-year period the Swedish landings by weight totaled 56,051 tons (between 1,946-11,200 tons per year) and by value totaled 304 million SEK (between 9.4-58 million SEK per year).

Mean annual Finnish landings in ICES 50G8 over the entire 10-year period was 7.500 tons and approx. 40 million SEK. During the same period the mean annual Swedish landings in ICES 50G8 was 5.600 tons and approx. 30.4 million SEK. Because the Finnish landings were comparatively stable, the variations in the total landings (both Finnish and Swedish) in ICES 50G8 from 2012-2021 was primarily driven by the variations in the Swedish landings. The proportion of Swedish landings to Finnish landings increased from 21-57 % from 2012-2016 and then were variable (29-54 %) from 2017-2021 (Figure 5-14).

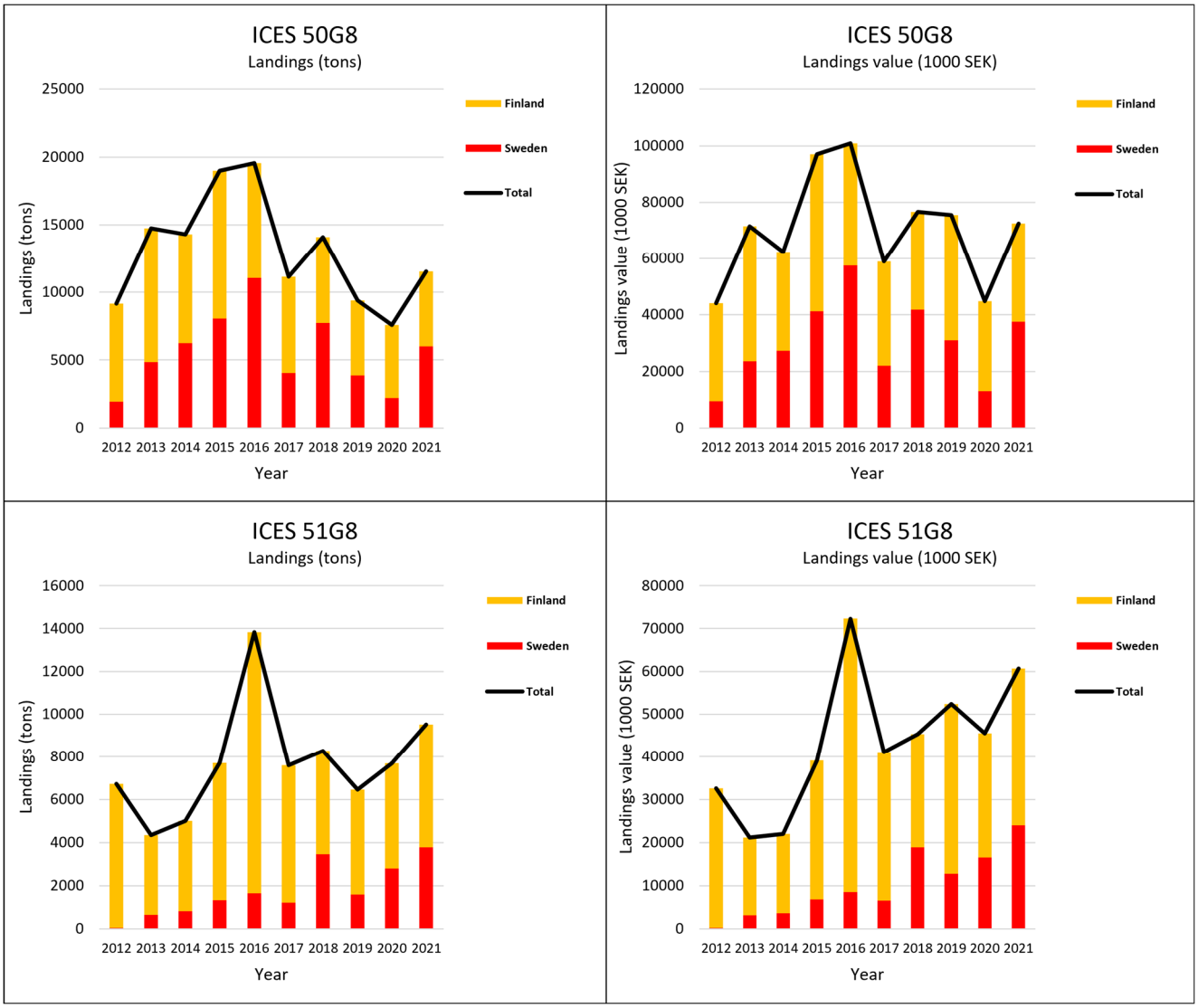


Figure 5-14. The development of the Swedish and Finnish landings over a 10-year period (2012-2021) in the two ICES rectangles (50G8 and 51G8) that contain parts of the Fyrskeppet OWF project area. Data from SwAM (Havs- och vattenmyndigheten, 2022) *and Finnish Fisheries Agency* (NTM-centralerna, 2022). *Estimated landing values are based on an annual average price per kg of herring used both as an industrial fish and for consume, if herring were only used as an industrial fish the estimated landing values would be overestimated by approximately 66 %.*

Comparisons between the landings by the Swedish and Finnish fisheries in the Fyrskeppet OWF project area region according to gear, where trawling with bottom and pelagic trawls are by far the most dominant, indicated that bottom trawls were utilized much more by the Finnish fishing fleet than the Swedish fishing fleet (see Table 5-2 and Table 5-6). In the Swedish fisheries bottom trawlers accounted for approx. 16.8 % of the landings in 50G8 and approx. 6.7 % of the landings in ICES 51G8. In comparison, Finnish bottom trawlers accounted for 39 % of the landings in 50G8 and 61 % of the landings in 51G8 during the 10-year period from 2012-2021.

6 Estimating the importance of the Fyrskeppet OWF project area for the commercial fisheries

The importance of the Fyrskeppet OWF project area for Swedish commercial fisheries is assessed by comparing the distribution of commercial fisheries within the Fyrskeppet OWF project area to the distribution of the fisheries outside the project area using VMS data during the 10-year period (2012-2021)(se section 5.3). Similarly, the ratio of fishing effort within the Fyrskeppet OWF project area is compared to the fishing effort in the two primary ICES fishing areas (ICES rectangles 50G8 and 51G8) that contain the project area. Finally, the ratio of fishing effort within the project area in comparison to the two primary ICES fishing areas was used to make an area-based comparison of fishing effort within the Fyrskeppet OWF project area.

To indicate the magnitude of the fisheries within the Fyrskeppet OWF project area, the total landings and value of the landings within the project area was estimated by using the percentage of fishery effort within the Fyrskeppet OWF project area in relation to the fishery effort in the regional area (ICES 50G8 and 51G8).

6.1 Distribution and relative effort of the commercial fisheries within the Fyrskeppet OWF project and regional area

The Swedish and Finnish fisheries in the region of the Fyrskeppet OWF project area were almost exclusively undertaken by trawlers (only pelagic trawlers since 2017) and included a significant amount of effort by these fisheries throughout the surrounding regional area of the Fyrskeppet OWF project area and in the southern Bothnian Sea (ICES, 2022). VMS data showing the distribution of the fisheries in the regional area (ICES 51G8 and ICES 50G8) containing the Fyrskeppet OWF project area during the years 2012-2021, indicated that the Fyrskeppet OWF project area had only little importance for the Swedish (Figure 5-7 and Figure 5-8) and Finnish (Figure 5-10) fisheries, as the distribution of the fisheries and fishing effort was primarily located outside the Fyrskeppet OWF project area (see Figure 5-11 for combined Swedish and Finnish VMS data for the region).

The number of VMS points representing Swedish and Finnish fishing effort from 2012-2021 in the most relevant ICES rectangles (51G8 and 50G8) in the region of Fyrskeppet OWF project area, and effort within the Fyrskeppet OWF project area are given in Table 6-1.

During the period 2012-2021, approx. 2.1 % of the total fishing effort by the Swedish and Finnish fisheries in the region (ICES 51G8 and 50G8) was estimated to have been observed within the Fyrskeppet OWF project area.

Swedish fisheries effort alone, indicated only approx. 1.2 % of the Swedish fishing effort (represented by 398 VMS points) was undertaken in the Fyrskeppet OWF project area (Table 6-1). Similarly, for the Finnish fisheries, approx. 2.4% of the fishing effort in the region (ICES 51G8 and 50G8) was observed in Fyrskeppet OWF project area (Table 6-1).

Table 6-1: The number of Swedish and Finnish VMS points representing the effort of the fisheries with different gear methods (Swedish only) in the region of the Fyrskeppet OWF project area (ICES rectangles 50G8 and 51G8) and within the Fyrskeppet OWF project area. As of 2017, bottom trawls have not been used in the region by the Swedish fisheries SwAM (Havs- och vattenmyndigheten, 2022) *and Finnish Fisheries Agency* (NTM-centralerna, 2022).

Sweden	ICES 51G8	ICES 50G8	Total		Project area (51G8)	Project area (50G8)	Project area Total
Gillnet	0	41	41		0	0	0
Bottom trawl	566	2755	3,321		4 (0.7 %)	2 (0.04 %)	6
Pelagic trawl	7014	16468	23,482		212 (3 %)	102 (0.6 %)	314
(unknown gear)	1704	4453	6,157		60 (3.5 %)	8 (0.2 %)	68
VMS total (all gear) (All gear)	9284	23717	33,001		286 (3.1 %)	112 (0.5 %)	398 (1.2 %)
Finland	51G8	50G8	Total		Project area (51G8)	Project area (50G8)	Project area Total
VMS total (unknown gear)	45796	52125	97,921		2097 (4.6 %)	287 (0.6 %)	2,384 (2.4 %)

The entire project area for Fyrskeppet OWF is located in parts of ICES rectangles 51G8 and 50G8, see Figure 4-1. Swedish and Finnish fishing effort within Fyrskeppet OWF project area compared to the total area of the two ICES rectangles (51G8 and 50G8) containing the project area, indicate that the Fyrskeppet OWF project area was of relatively little importance to the commercial fisheries in the region. For the Swedish fisheries, this is based on only 3.1 % and 0.5 % of the total effort (measured as the number of VMS points) by Swedish fishing vessels are observed within the section of the project area in the two rectangles ICES 51G8 and 50G8, in comparison to the project area making up 15.5 % and 0.8 % of ICES rectangles 58G1 and 58G0, respectively. Similarly, only 4.6 % and 0.6% of the total effort by the Finnish commercial fishing vessels are undertaken in the Fyrskeppet OWF project area in comparison to the project area making up 15.5 % and 0.8 % of ICES rectangles 58G1 and 58G0.

Based on the percentage of effort for the Swedish and Finnish fisheries within the Fyrskeppet OWF project area in each ICES rectangle (58G1 and 58G0) the total landings and value of the landings within the Fyrskeppet OWF project area during the 10-year period 2012-2021 was estimated. For the Swedish fisheries, 3.1 % of the fishing effort in ICES 51G8 and 0.5 % of the fishing effort in 50G8 were within the section of the Fyrskeppet OWF project area, which resulted in estimated landings and value of landings of approximately 798 tons and approximately 4.6 million SEK within the Fyrskeppet OWF project area, from 2012-2021. For the Finnish fisheries 4.6 % and 0.6 % of the total effort in ICES 51G8 and 50G8 were within the section of the Fyrskeppet OWF project area, which resulted in estimated landings and value of landings within the Fyrskeppet OWF project area of 3,148 tons and 17.4 million SEK during the 10-year period 2012-2021.

6.2 Pelagic trawls

Pelagic trawlers in both the Swedish and Finnish fisheries accounted for the greatest majority of landings by weight and value in the regional area (ICES 50G8 and ICES 51G8) around the Fyrskeppet OWF project area during the period 2012-2021 (see Table 5-2). Within the Fyrskeppet OWF project area, the low intensity of the fishing effort was undertaken almost exclusively by pelagic trawlers (98 %). However, as already mentioned, the prominent fishing areas for the pelagic fisheries were located outside the boundaries of the Fyrskeppet OWF project area, and fishing effort by pelagic trawlers within the Fyrskeppet OWF project area was very limited compared to the extensive pelagic fisheries in the regional area (ICES rectangles 50G8 and 51G8) In conclusion, the Fyrskeppet OWF project area is assessed to be of low importance for pelagic trawl fisheries in the region.

6.3 Bottom trawls

Although Swedish and Finnish fishery data register the use of bottom trawlers in the ICES rectangles 50G8 and 51G8, these vessels almost exclusively targeted and landed the pelagic species herring and sprat. Maps showing the distribution of the bottom trawl fisheries in the Swedish fisheries, indicate that this fishery was very seldom undertaken in the Fyrskeppet OWF project area (Figure 5-7). This is also supported by only 6 VMS points have been registered in the Fyrskeppet OWF project area and all before 2018 (see section 5.3.1, Table 6-1). In conclusion, the Fyrskeppet OWF project area is assessed to be of low importance to vessels that using bottom trawling gear.

6.4 Gillnet fisheries

Gillnet fisheries have very little commercial value (<0,06 % of total landed value) in the ICES rectangles (50G8 and 51G8) that include the Fyrskeppet OWF project area compared to the trawl fisheries. Results from VMS data indicated that there was no effort from gillnet fisheries within the Fyrskeppet OWF project area and that the distribution of the gillnet fishery from vessels equal to or larger than 12 meters is primarily in near-coastal areas (there are only a total of 41 VMS points in rectangle 50G8 and none in 51G8)(Figure 5-9). This is also most likely the case for smaller vessels (< 12 meters in length) that do not use VMS data equipment. The Fyrskeppet OWF project area is therefore assessed to be of no importance for gillnet fisheries.

6.5 Other gear (fyke nets, hook and lines and conical pots etc.)

There are no VMS records of these types of fisheries in the Fyrskeppet OWF project area, and the landings taken with these gear types account for <0.001 % of the total landed value from ICES rectangles 50G8 and 51G8. The Fyrskeppet OWF project area is therefore assessed to be of no or very little importance for fisheries with these gear types.

6.6 Importance of the Fyrskeppet OWF project area to the local fishery landing and home ports

The port of Norrsundet located on the Swedish coast to the west of the Fyrskeppet OWF project area is the most important landing port for Swedish vessels fishing in the ICES rectangles 50G8 and 51G8 that contain the project area. This is illustrated by 86 % of Swedish landings from the ICES rectangles 50G8 and 51G8 (in both tons and value) during the period 2012-2021 were landed in Norrsundet. Similarly, fishing vessels that have registered landings from the ICES rectangles 50G8 and 51G8 come from a large number of ports (Hönö, Engesberg, Fotö, Öregrund, Fiskebäck etc.). However, because there is no significant fishing effort or landings that come from the Fyrskeppet OWF project area, the project area has no importance to the landing ports or home ports of vessel fishing in the region.

7 Conclusion

The southwestern Bothnian Sea is an important area for the commercial fisheries, particularly for trawlers which almost exclusively targeted the pelagic species herring and sprat. These species have, over time, become gradually more important for the commercial fishery in the Baltic Sea (ICES, 2022).

The Fyrskeppet OWF project area is located in the southwestern Bothnian Sea and thus this area is potentially important for commercial fisheries. The Fyrskeppet OWF project area is located in two ICES rectangles with proportionally large landings and where herring accounted for more than 97 % of the landings in terms of both value and weight. Pelagic trawling is the most important gear type used, particularly since 2018 when Swedish bottom trawlers no longer fished in the region. Only a very small fraction of the landings in the regional area are taken by gillnets and these fisheries are predominantly undertaken near the coast. Seasonally, landings occur throughout the year, however only in very low amounts during the summer months. Catches from the region have been landed in 16 different ports, with the most important landing port being Norrsundet, which is located on the Swedish coast to the west of the Fyrskeppet OWF project area. Similarly, vessels from 21 different ports fished in the regional area around the Fyrskeppet OWF project area from 2012-2021. The majority of these vessels originate from distant ports on the Swedish west coast, while other vessels are from local Bothnian Sea ports. Fisheries in the area are undertaken by a relatively small number of vessels with trends over the last 10-years (2012-2021) moving towards larger and fewer vessels fishing in the near region around the project area.

The regional area that includes Fyrskeppet OWF project area is also utilized by Finnish fishing vessels (pelagic and bottom trawlers), that account for 64 % of the total landings in rectangles 50G8 and 51G8. The Finnish fleet allocates more fishing effort in the regional area, and has a higher proportion of landings by trawlers registering the use of bottom trawls than Swedish vessels, however, the distribution of effort, fishing seasons and target species (primarily herring) in the Finnish fisheries are similar to the Swedish fisheries.

The distribution and effort of the commercial fisheries suggests there are some intensively fished areas near the Fyrskeppet OWF project area, however fishing effort is primarily located outside the project area. Some pelagic trawl fishing, primarily from Finland, occurs within the Fyrskeppet OWF project area, but fishing effort within the project area is considerably less than what is observed in the 2 ICES rectangles (ICES 58G1 and 58G0) that make up the regional area around the Fyrskeppet OWF project area. Thus, despite the Fyrskeppet OWF project area being in an area of considerable fishing effort and landings from the Swedish and Finnish commercial fisheries, the relatively low fishing effort within the project area by both of these countries, indicates the Fyrskeppet OWF project area is of low importance to the commercial fisheries in the region.

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