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BioConsult SH

# Interconnector NeuConnect – Fishery study

**REPORT**

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|---|---|
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# 1 INTRODUCTION

NeuConnect is planning a new interconnector from the United Kingdom (UK) to Germany (Figure 1). This project is the development of a high voltage direct current (HVDC) electricity transmission interconnector between the Isle of Grain, Kent, mainland UK, and Hooksiel, Germany. It is routed through UK territorial waters (TW) and the exclusive economic zone (EEZ), the Dutch EEZ and the German TW and EEZ. Large infrastructure projects, like the HVDC-cable NeuConnect, will affect fishery during construction and operation phases. The fishery baseline study has been designed to provide the essential information on fleet and landing statistics on the trans-regional and regional level as well as an overview of the fishery in the near field of the alignment.

The present baseline report presents the official fishery and economic data available for the North Sea.

# 2 BACKGROUND AND OBEJECTIONS

NeuConnect Ltd. plans to connect the German and British energy markets with a high voltage cable. The NeuConnect project is a proposed 1,400 MW High Voltage Direct Current (HVDC) interconnector linking Germany and the United Kingdom. The interconnector will comprise HVDC submarine cables of approx. 680 km between Germany and the UK, with a section passing through Netherlands territorial waters (Figure 1). The interconnector will be designed to transmit electrical power in both directions across the Southern North Sea, UK territorial waters, through the Dutch EEZ and into German territorial waters and EEZ to link the electricity transmission systems in the UK and Germany.

A preliminary route has been proposed. It is subject to ongoing discussions with relevant stakeholders in each of the countries. A pair of cables will be buried in the seabed, typically to a depth of 2 to 3 meters.

The objective of this report is to provide comprehensive information about the fishery in the North Sea and the Dutch EEZ, the recent development of the landings, the distribution and the effort (measured as number of fished hours) of the fishery.

More specifically, the information from the collected data is essential for the assessment of which sections of the commercial fishery (e.g. fishing fleet and gear type) is most likely to be affected directly and indirectly by temporary and permanent impacts on fishery by the interconnector.

This baseline report summarizes the information of commercial fishery in the North Sea. It covers both trans-regional and regional data over the last 3 years (2014-2016). It was prepared to provide a solid foundation and refer-

ence for predicting and assessing possible changes to the fishery in relation to impacts caused by construction and operation of the interconnector.


Figure 1: Overview of the planned HVDC submarine cable between Germany and the UK with the section of the Netherlands EEZ (red line = cable route; dashed green line = EEZ borders; dotted blue line = territorial borders).

## 3 METHODOLOGY

The fishery in the North Sea is divided by international fishery zones where national and international fishery regulations, requirements and quotas apply. These zones (ICES subdivisions and ICES rectangles (approx. 30 x 30 nautical miles) are used as boundaries for the presentation of the official commercial fishery data. Table 1 and Figure 3 give an overview of the ICES rectangles that build the baseline for the presentation of fishery data. All references to near field and regional areas refer to data within these ICES rectangles.

The legal framework for using fishery data is based upon:

- Commission Decision of 18 December 2009 adopting a Multiannual Community Programme for the collection, management and use of data in the fisheries sector for the period 2011-2013 (2010/93/EU).
- Commission Implementing Decision of 13 August 2013 extending the programme as set out in Commission Decision 2010/93/EU to the period 2014-2016.
- Gentlemen agreement reached between DG Mare and the Member States about the evaluation of the fishing effort regimes.

Based on a request of the Commission to the STECF 'Working Group on Fishery-dependent Information' biologic data were compiled. They contain information about fishery regulated through fishing effort management schemes. The tables were prepared by processing and analyzing data from the fishing effort management schemes related to recovery and management plans in the following areas: the Baltic Sea, the North Sea, the Iberian Peninsula, the Western Channel and the Bay of Biscay, the western waters, the deep sea fishery and also fishery located in the Celtic Sea. Data are submitted by national authorities.

This baseline report gives a summary of the commercial fishery in the North Sea on a trans-regional and regional level over the last 3 available years (2014-2016).

For the description of the international fishery the eco-region “Greater North Sea” has been used as the investigation area (see Figure 1). This eco-region is covering the most important fishery areas in the North Sea. The national fishery of the Netherlands has been evaluated using ICES-rectangles for the Dutch EEZ (Figure 2 and Table 1).

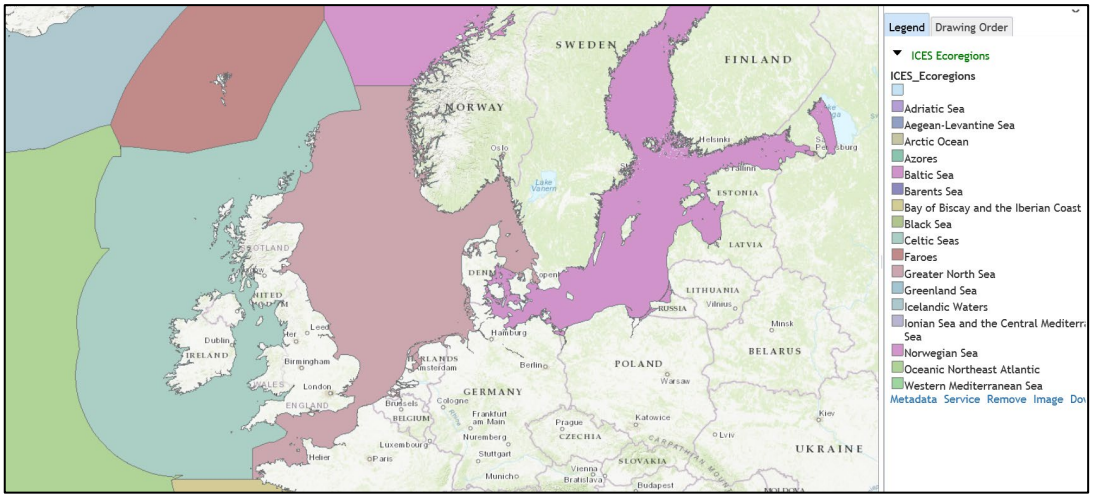


Figure 2: Overview on the several ecoregions in the North Sea. (data source: http://gis.ices.dk/sf/index.html?widget=visa&assessmentKey=9425).

## 3.1 Data sources

The current status of fishing was described based on activities, landing and effort data for the planned cable route as evaluated by the following authorities and institutions:

- ICES (International Council for the Exploration of the Sea),
- STECF 'Working Group on Fishery-dependent Information'.

The considered period shall cover at least the last three years in order to illustrate the development of the national and international fishery. The landing

data from the ICES and the STCW statistics provide information on existing fishery and the main target species. The ICES rectangles affected by the project have been analyzed in detail.

A map of the North Sea including the outlines of the ICES rectangles is shown in Figure 3. Table 1 gives an overview of ICES rectangles evaluated for the description of the fishery in the Dutch EEZ. The red lined squares show the rectangles, which will be affected directly by the projected cable route (34F3; 35F3; 35F4; 36F4; 36F5; 37F5; 37F6). These ICES-rectangles have been evaluated in detail to assess the impairment of the affected fishery or the commercially exploited fish species.

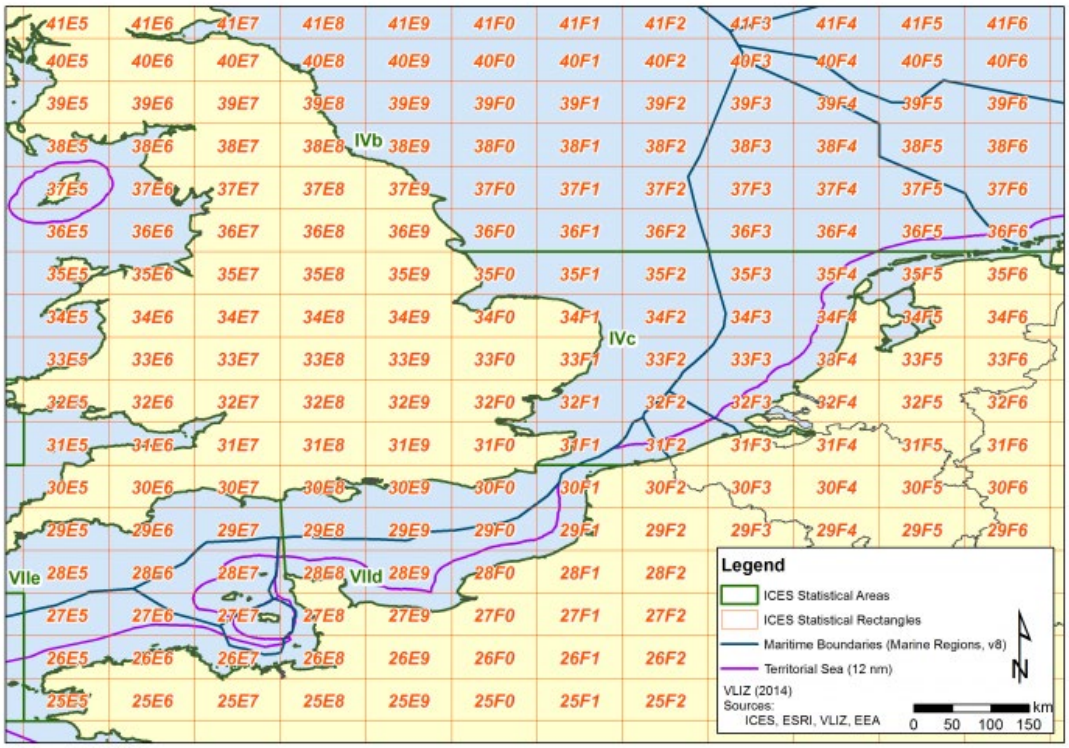
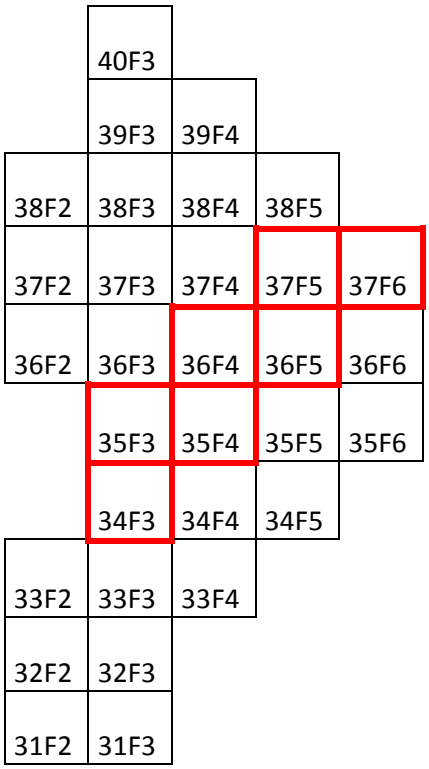



Figure 3: Overview of number and count of the ICES-rectangles within the Dutch EEZ. (data source: http://www.marineregions.org/maps.php?album=3753&pic=107478#photogallery).

It is important to note, that both the Dutch and European authorities are bound by laws that protect personal rights. These strongly limit what data and information they can make available. This resulted in numerous limitations of presenting more detailed data at the individual/vessel level in this baseline report. All official data were anonomised or they were of a character that did not divulge a fishing vessel or personal identity. Thus, data was generally received in a format that allowed only an overview of the fisheries with respect to data protection.

Table 1: Overview of the used ICES-rectangles which build the baseline for the assessment of the regional fisheries. (red lined squares = by the project directly affected rectangles).




# 4 RESULTS

## 4.1 Trans-regional fishery in the North Sea

The following chapter presents the analysis of the fishery activities on the trans-national level. The analyzed data cover the eco-region of the Greater North Sea and parts of the Celtic Seas (compare with Figure 2).

In the following, supra-regional and international fishery are presented on the basis of effort data. Effort data are available for the years 2014 to 2016. The distribution of the target fish species was recorded on the basis of catch data from ICES (International Council for the Exploration of the Sea). Data for the years after 2017 were not available. However, the evaluated data can be transferred to these years, as the various national fleet's fish generally on traditional target species in adjacent fishing areas.

### 4.1.1 Effort

Hereafter, the international fishery from the ecoregion "Greater North Sea" and parts of the "Celtic Seas" for the most important countries were analyzed (observation period 2006-2010).

In the recent years, the fishing activities in the area under consideration are mainly dominated by the nations Scotland accounting for 43% (15.166.867 t)

and England accounting for 20% (7.040.082 t). France, Northern Ireland and Denmark showed a significantly lower average of 6%-7% of the fished hours. All other countries reach a maximum of 4% of the total effort (see Figure 4 and Table 2).

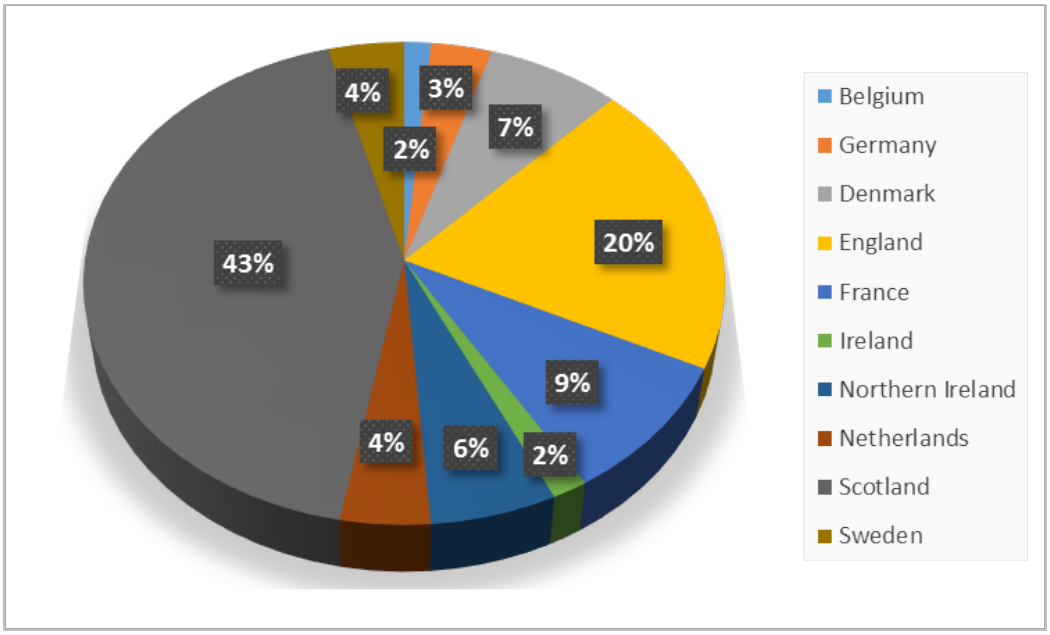


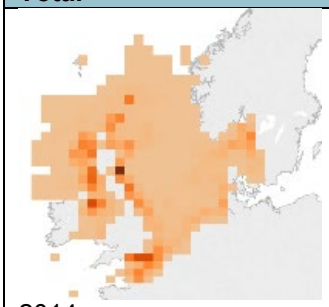
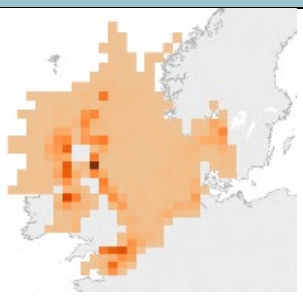
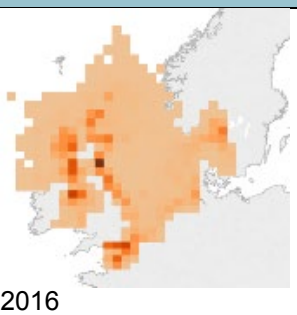

Figure 4: Overview of the percentage distribution of international fishery in the area under consideration.

Table 2: Overview of the effort (in fished hours) for the international fishery in the area under consideration.

| Country | 2014 | 2015 | 2016 | Total |
|---|---|---|---|---|
| Belgium | 180.985,00 | 170.080,00 | 170.052,00 | 521.117,00 |
| Germany | 382.446,00 | 399.712,00 | 411.943,00 | 1.194.101,00 |
| Denmark | 933.527,00 | 829.839,00 | 857.771,00 | 2.621.137,00 |
| England | 2.388.371,00 | 2.279.637,00 | 2.372.074,00 | 7.040.082,00 |
| France | 1.104.692,00 | 1.057.802,00 | 1.074.678,00 | 3.237.172,00 |
| Ireland | 182.226,00 | 186.451,00 | 209.911,00 | 578.588,00 |
| Northern Ireland | 718.162,00 | 675.605,00 | 679.978,00 | 2.073.745,00 |
| Netherlands | 497.233,00 | 478.123,00 | 489.321,00 | 1.464.677,00 |
| Scotland | 4.929.965,00 | 5.235.348,00 | 5.001.554,00 | 15.166.867,00 |
| Sweden | 476.096,00 | 495.646,00 | 515.198,00 | 1.486.940,00 |

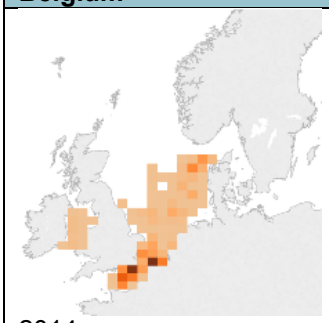
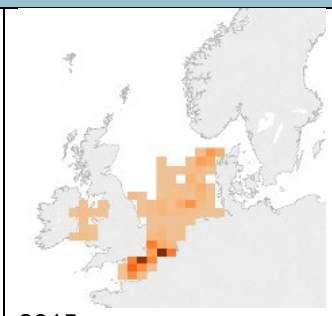
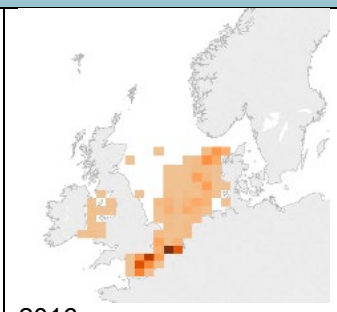
The main fishing areas for international fishery is located in the coastal areas of the neighboring countries. In particular, the English Channel and the coastal areas of Great Britain, Holland and Germany show the highest fishing activities (Table 3).

Table 3: Distribution of the Total fishing effort (in fished hours) in the area under consideration.

| Total | | |
|---|---|---|
|  2014 |  2015 |  2016 |

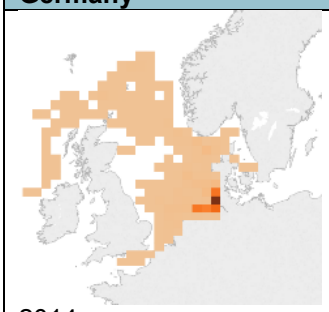
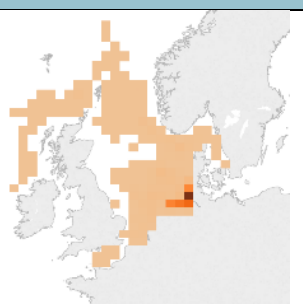
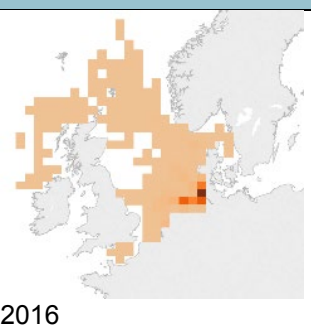
The Belgian fishery is concentrated in the southern North Sea. The English Channel and the Belgian territorial waters show the highest fishing effort (521.117 hours fished). Compared to the other nations, Belgian fisheries are of minor importance (Table 4).

Table 4: Distribution of the Belgium fishing effort (in fished hours) in the area under consideration.

| Belgium | | |
|---|---|---|
|  2014 |  2015 |  2016 |

The German fishery has their main fishing area within the German Bight. The most important fishing areas with the highest amount of fished hours are located in the coastal area of the territorial waters of Germany (Table 5). Compared to the other fishery nations, German fishery is of medium importance in the North Sea (1.194.101 hours fished).

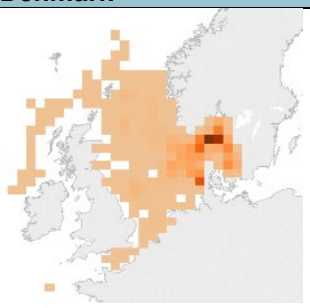
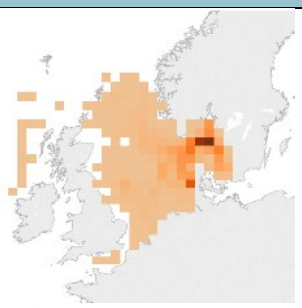
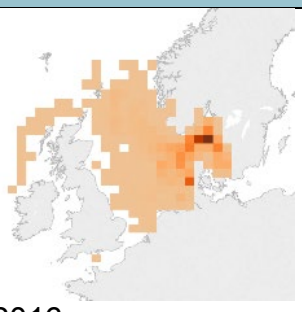
Table 5: Distribution of the German fishing effort (in fished hours) in the area under consideration.

| Germany | | |
|---|---|---|
|  2014 |  2015 |  2016 |

The Danish fishery is distributed over the entire North Sea. The coastal waters of Denmark and the sea areas of the Kattegat and Skagerrak show the

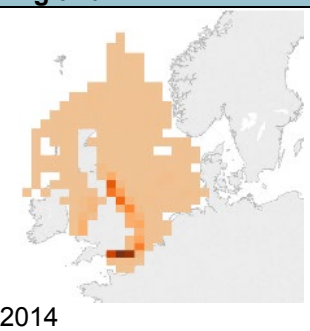
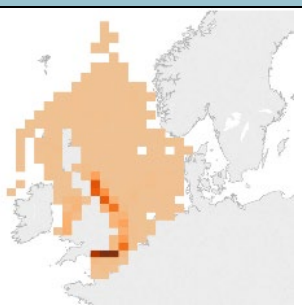
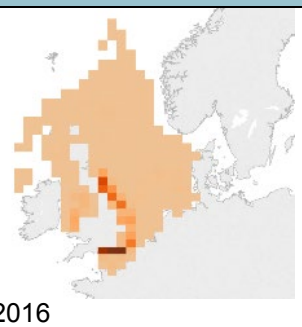
highest fishing effort in recent years (2.621.137 hours fished). Compared to the other fishery nations, Danish fishery are of medium importance in the North Sea (Table 6).

Table 6: Distribution of the Danish fishing effort (in fished hours) in the area under consideration.

| Denmark | | |
|---|---|---|
|  2014 |  2015 |  2016 |

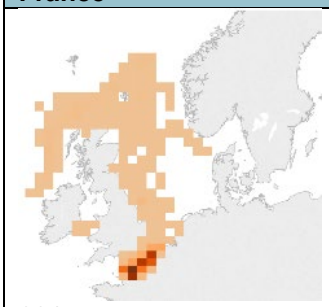
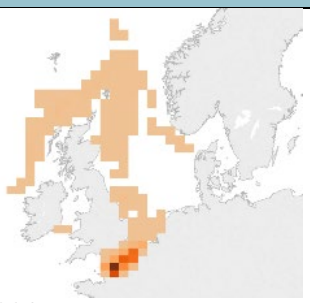
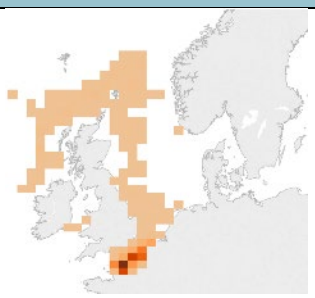
The English fishery extends to the whole North Sea. The areas of England's western coastal waters and the English Channel show the highest fishing intensity (7.040.082 hours fished). Differences in the distribution of fishery has not been observed in the last years. The English fishery is one of the two most important fisheries in the North Sea and has a high importance (Table 7 and Table 2).

Table 7: Distribution of the English fishing effort (in fished hours) in the area under consideration.

| England | | |
|---|---|---|
|  2014 |  2015 |  2016 |

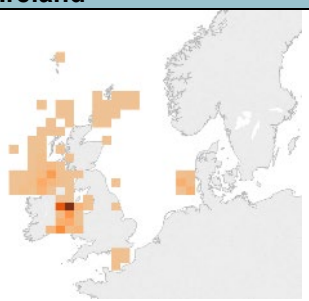
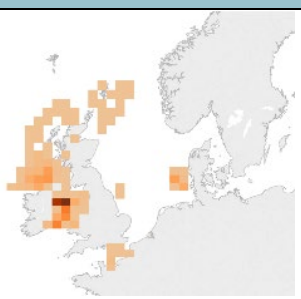
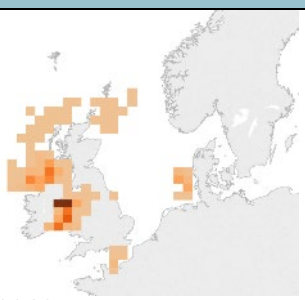
French fishery is particularly concentrated in the English Channel. In addition, the English coastal areas have a certain importance for French fishery. Compared to the other fishery nations, French fishery is of medium importance in the North Sea (3.237.172 hours fished).

Table 8: Distribution of the France fishing effort (in fished hours) in the area under consideration.

| France | | |
|---|---|---|
|  2014 |  2015 |  2016 |

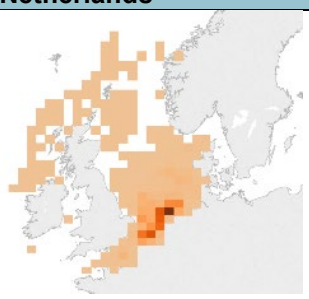
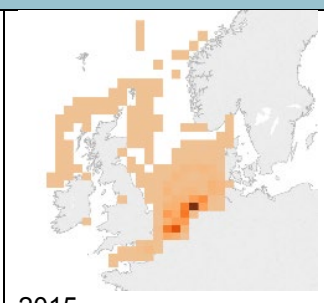
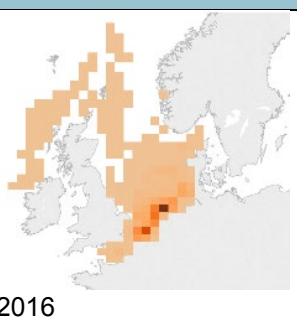
The Irish fishery is mainly concentrated in the Celtic Sea, where it has the highest number of fishing hours (578.588 hours fished). Irish fishery is of minor importance (Table 9).

Table 9: Distribution of the Irish fishing effort (in fished hours) in the area under consideration.

| Ireland | | |
|---|---|---|
|  2014 |  2015 |  2016 |

The southern North Sea and the English Channel are of major importance for Dutch fishery. The territorial waters of the Netherlands in particular show the highest fishing effort in the years under consideration (1.464.677 hours fished). Compared to international fishery, the Dutch fishery is of medium importance (Table 10 and Table 2).

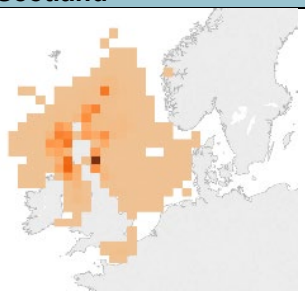
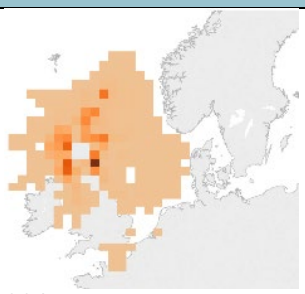
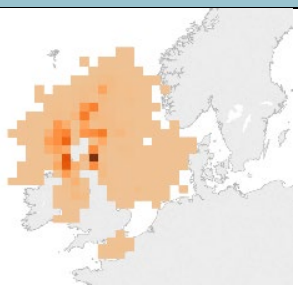
Table 10: Distribution on the Dutch fishing effort (in fished hours) in the area under consideration.

| Netherlands | | |
|---|---|---|
|  2014 |  2015 |  2016 |

Scottish fishery are concentrated in particular in the northern and central North Sea. The southern coastal areas have less fishing activities. The Scottish fishery dominate the international fishery. With 15,166,867 hours fished,

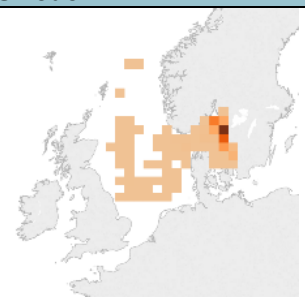
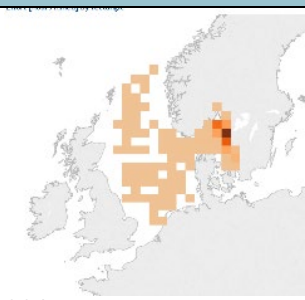
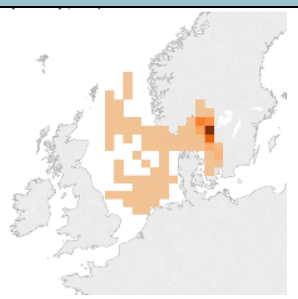
they represent more than 40% of the total North Sea fishery. Scottish fishery are the most important in the North Sea compared to international fishery (Table 11).

Table 11: Distribution of the Scottish fishing effort (in fished hours) in the area under consideration.

| Scotland | | |
|---|---|---|
|  2014 |  2015 |  2016 |

With 1,486,940 hours fished, the Swedish fishery shows a medium fishing intensity. It concentrates in particular on the waters of the Kattegat and Skagerrak. Compared with international fishery, Swedish fishery is insignificant in the North Sea (Table 12).

Table 12: Distribution of the Swedish fishing effort (in fished hours) in the area under consideration.

| Sweden | | |
|---|---|---|
|  2014 |  2015 |  2016 |

### 4.1.2 Landings

Fishery landings are mainly dominated by the species groups of fish and crustaceans. Both groups represent 94% of all landings from the North Sea (Figure 5). Crabs and shrimps are summarized to one group with together 6% of the total landings in the last decade. This group is characterized by the most important crab and shrimp species like Common shrimp and European lobster (compare with Table 13). About 88% of the total landings are composed by fish species. The most important commercial fish species in the last decade in the North Sea are Herring, Mackerel, Sandeel, Sprat, Blue Whiting, Plaice, Horsemackerel, Saithe, Haddock and Cod. The pelagical fish species Herring (23%), Mackerel (19%) and Sprat (15%) as well as Sandeel (12%) dominated the landings in the North Sea and the adjacent waters (Figure 5; Figure 6 and Table 13).

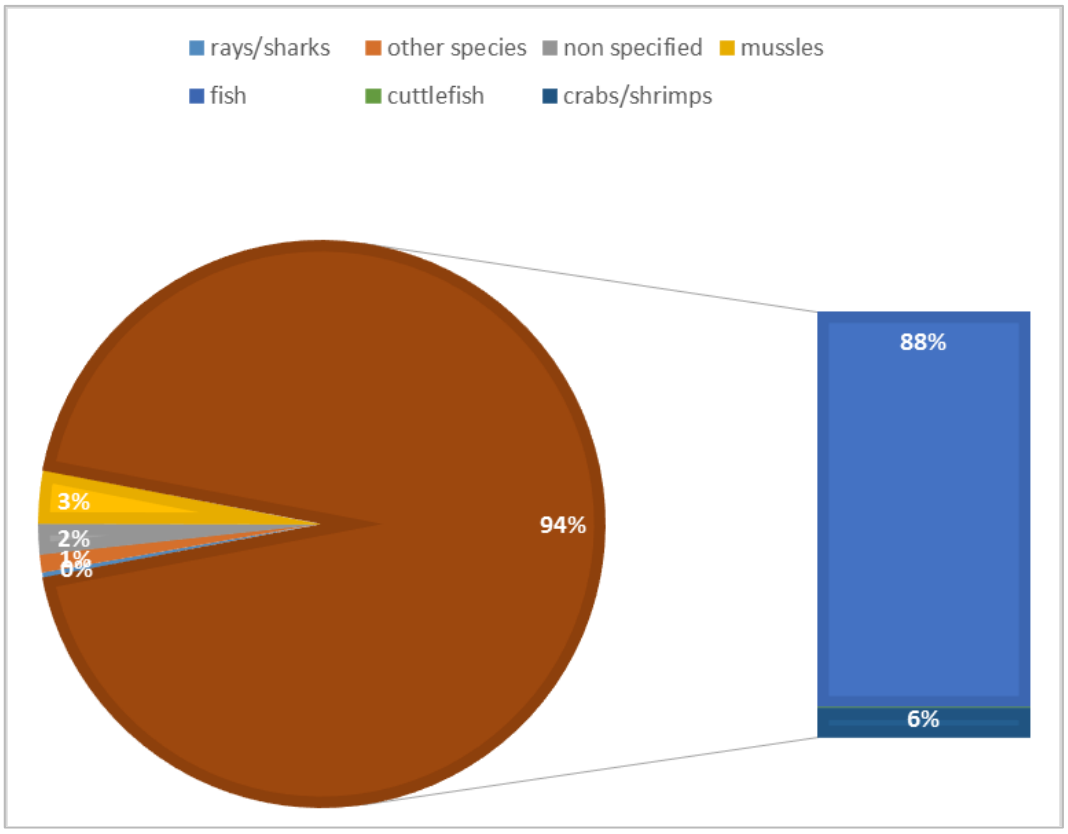



Figure 5: Overview of the percentage distribution of the target fishery species groups in the area under consideration.

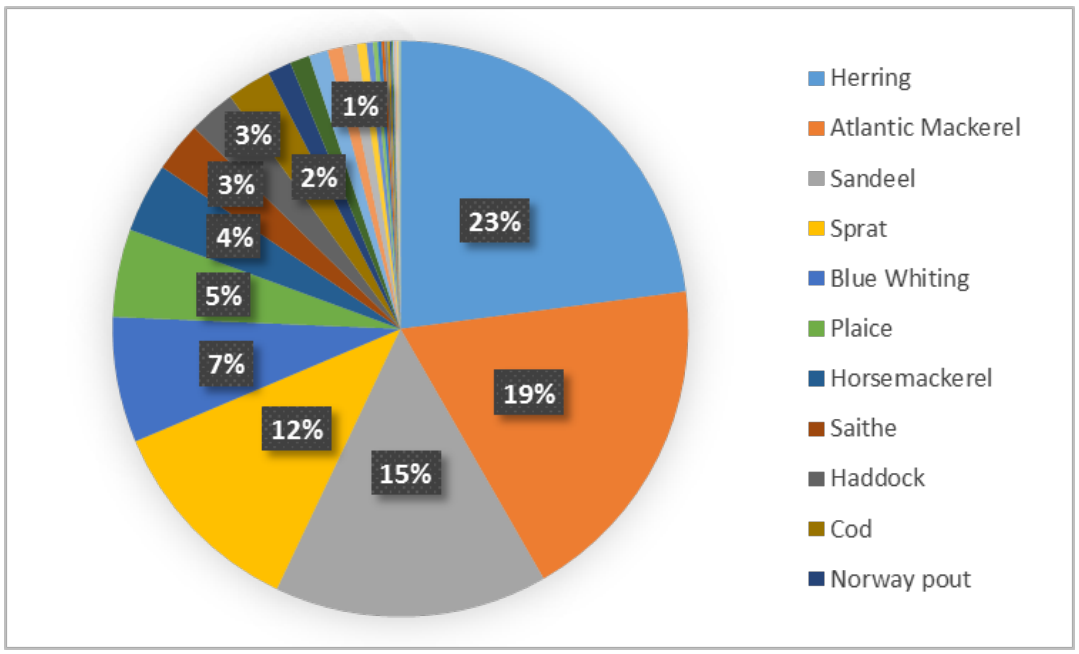



Figure 6: Overview of the percentage distribution of the target fish species in the area under consideration.

Table 13: Distribution of landings (in t) for the main target fishery species / species groups in the area under consideration.

| Landings in t | Species/species group | Commercial type |
|---|---|---|
| 4.645.646,30 | Herring | fish |
| 3.808.001,20 | Atlantic Mackerel | fish |
| 3.111.445,40 | Sandeel | fish |
| 2.340.465,40 | Sprat | fish |
| 1.429.489,30 | Blue Whiting | fish |
| 999.335,00 | Plaice | fish |
| 789.806,80 | Horsemackerel | fish |
| 618.500,90 | Norway lobster | crabs/shrimps |
| 569.465,00 | Saithe | fish |
| 532.984,70 | Haddock | fish |
| 502.498,70 | Cod | fish |
| 423.898,40 | Great Atlantic scallop | mussles |
| 387.598,30 | Common shrimps | crabs/shrimps |
| 357.336,00 | Edible crab | crabs/shrimps |
| 270.463,20 | Norway pout | fish |
| 224.900,50 | Common sole | fish |
| 219.910,80 | Blue mussel | mussles |
| 216.916,80 | Whiting | fish |
| 171.274,90 | Hake | fish |
| 165.250,80 | Anglerfishes | fish |
| 106.073,20 | Dab | fish |
| 72.724,00 | Ling | fish |
| 61.051,90 | Northern prawn | crabs/shrimps |
| 60.013,30 | Rays | rays/sharks |
| 53.486,50 | Lemon sole | fish |
| 46.786,60 | Queen scallop | mussles |
| 44.080,90 | Turbot | fish |
| 34.257,40 | Megrim | fish |
| 34.137,60 | Flounder | fish |
| 26.364,30 | Common cuttlefish | cuttlefish |
| 24.121,00 | Greater silver smelt | fish |
| 23.970,90 | squid | cuttlefish |
| 23.174,20 | European lobster | crabs/shrimps |
| 17.569,70 | Picked dogfish | fish |
| 17.462,60 | Black scabbard-fish | fish |
| 17.417,20 | Tub gurnard | fish |
| 16.452,90 | Blue ling | fish |
| 16.194,80 | European anchovy | fish |
| 15.950,20 | cat-shark | rays/sharks |
| 15.423,40 | European seabass | fish |
| 11.168,90 | Velvet swim crab | crabs/shrimps |
| 10.163,50 | Grenadier | fish |
| 9.558,80 | Surmullet | fish |
| *235.675,30* | *other species** | *other species** |
| *397.555,90* | *non specified** | *non specified** |

Over the last 10 years, varying landings have occurred for the main commercial fish species. The catches of the pelagic species (herring, mackerel, and sprat) increased continuously between 2003 and 2005. Subsequently, land-

ings for all three species decreased significantly. From 2011 catches recovered again and have remained relatively stable at values above 350,000 t (mackerel and herring). Since 2013, landings of sprat have also recovered and recorded the highest landings in 2015, within the entire time period. In contrast, the landings of sandeel showed relatively stable catches between 180,000 t and 330,000 t in the period until 2011. The last years show a decreasing trend for the sprat landings in the North Sea.

All other fish species showed very constant catches over the entire period under consideration. The landings were clearly below the quantities of the main target species (<100,000 t). However, these fish species are rather insignificant for fishing in the North Sea as a whole, they may well be of particular importance locally for the various national fishery.

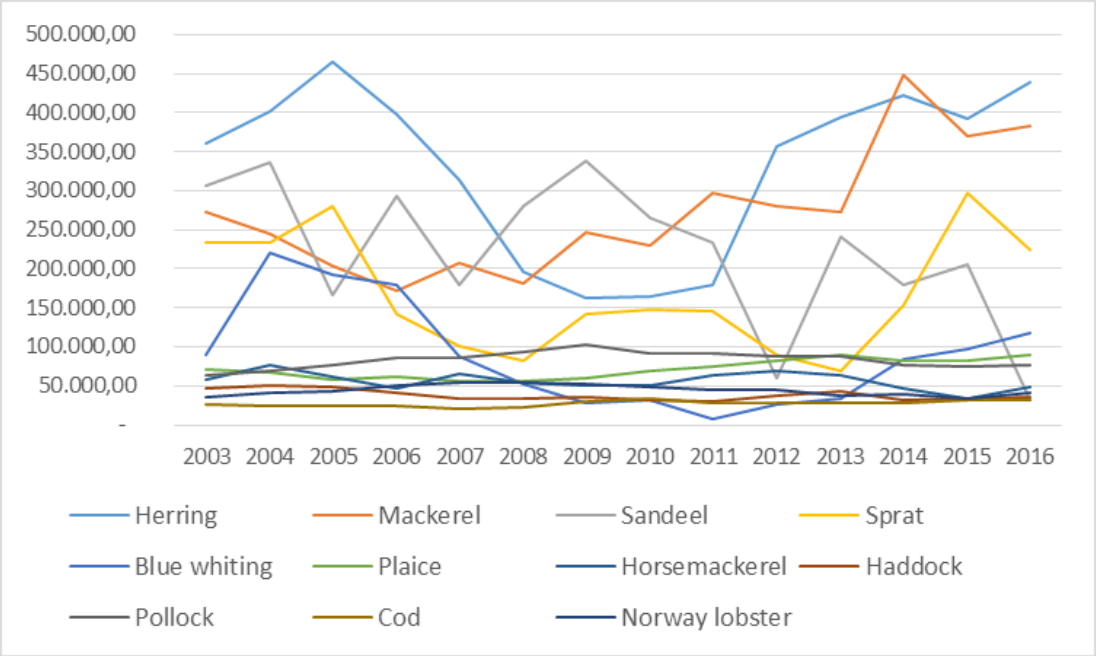



Figure 7: Overview of the development of landing of target fish species in the area under consideration in the last decade.

## 4.2 Regional fishery in the Dutch EEZ

The following chapter presents the analysis of the fishery activities on the national level. The analyzed data covers the Dutch EEZ and the territorial waters of the Netherlands (compare with chapter 3).

### 4.2.1 Effort

Within the Dutch EEZ, the Dutch fishery dominates in all years under consideration. The effort was consistently above 370,000 hours. This corresponds to more than 50% of the total fishing effort in the Dutch EEZ. In addition, German fishery also accounted for a maximum of 16% of the analyzed fishing effort (> 73,000 hours fished). The fishery nations Belgium, Denmark,

England and France had a low importance within the Dutch EEZ with a portion between 5% and 10% (Figure 8 and Table 14).

Table 14: Distribution of the total effort (in hours fished) for the international fishery in the Dutch EEZ in the recent years.

| Country | Total effort in hours | | | Total |
|---|---|---|---|---|
| | 2014 | 2015 | 2016 | |
| Belgium (BEL) | 61.986 | 58.874 | 63.060 | 183.920 |
| Germany (DEU) | 73.578 | 79.893 | 107.749 | 261.220 |
| Denmark (DNK) | 35.478 | 44.590 | 24.889 | 104.957 |
| England (ENG) | 52.718 | 51.534 | 49.815 | 154.067 |
| France (FRA) | 37.213 | 35.219 | 47.077 | 119.509 |
| Lithuania (LTU) | 20 | - | - | 20 |
| Northern Ireland (NIR) | 216 | 64 | 36 | 316 |
| Netherlands (NLD) | 396.827 | 371.524 | 369.383 | 1.137.734 |
| Scotland (SCO) | 10.345 | 12.849 | 22.071 | 45.265 |
| Sweden (SWE) | 258 | 601 | 909 | 1.768 |

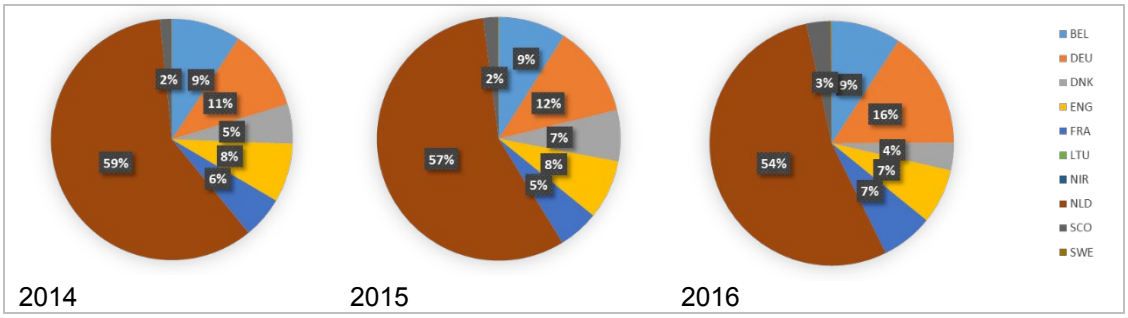
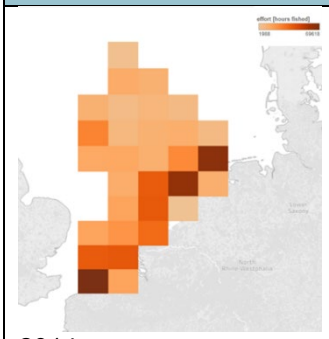
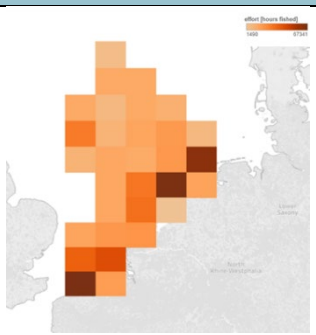
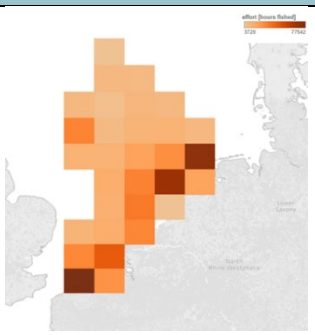



Figure 8: Overview of the proportion of fishing effort in the Dutch EEZ in the recent years.

A closer look at the distribution of fishing effort shows that the most important fishing grounds lie along the coastal areas of the Dutch EEZ. In contrast, the ICES rectangles which are affected by the cable project show a medium fishery effort compared to the ICES rectangles along the coast. On the other hand, the rectangles of the northern Dutch EEZ reveal a lower fishery effort.

Table 15: Overview of the distribution of fishing effort in the Dutch EEZ in the recent years.

| Total | | |
|---|---|---|
|  |  |  |
| 2014 | 2015 | 2016 |

In the next stage, the analysis of fishing effort shall be carried out separately categorized by fishing gears. The analysis will only evaluate fishing gears that have had an effort of more than 500 hours during the period under consideration.

## BEAM TRAWL

The beam trawl fishery is mainly characterized by the Dutch fishery. More than 68% (945.528 h) of the total effort is allocated to Dutch fishery. Belgium and Germany, with 10% and 15% respectively, also show significant shares of fishing effort. Their effort of less than 215,000 hours is substantially lower than the Dutch effort. All other nations are not important for beam trawl fishery in the Dutch EEZ (Table 16 and Figure 9).

Table 16: Distribution of the effort (in hours fished) for the international beam trawl fishery in the Dutch EEZ in the recent years.

| Effort in hours for beam trawl | | | | |
|---|---|---|---|---|
| **Country** | **2014** | **2015** | **2016** | **Total** |
| Belgium (BEL) | 45.005 | 48.449 | 48.800 | 142.254 |
| Germany (DEU) | 59.504 | 61.175 | 92.048 | 212.727 |
| Denmark (DNK) | - | - | - | - |
| England (ENG) | 28.246 | 25.875 | 22.766 | 76.887 |
| France (FRA) | 1.011 | 2.370 | 2.357 | 5.738 |
| Lithuania (LTU) | - | - | - | - |
| Northern Ireland (NIR) | - | - | - | - |
| Netherlands (NLD) | 325.874 | 306.909 | 312.745 | 945.528 |
| Scotland (SCO) | 1.469 | 2.663 | 1.648 | 5.780 |
| Sweden (SWE) | - | - | - | - |

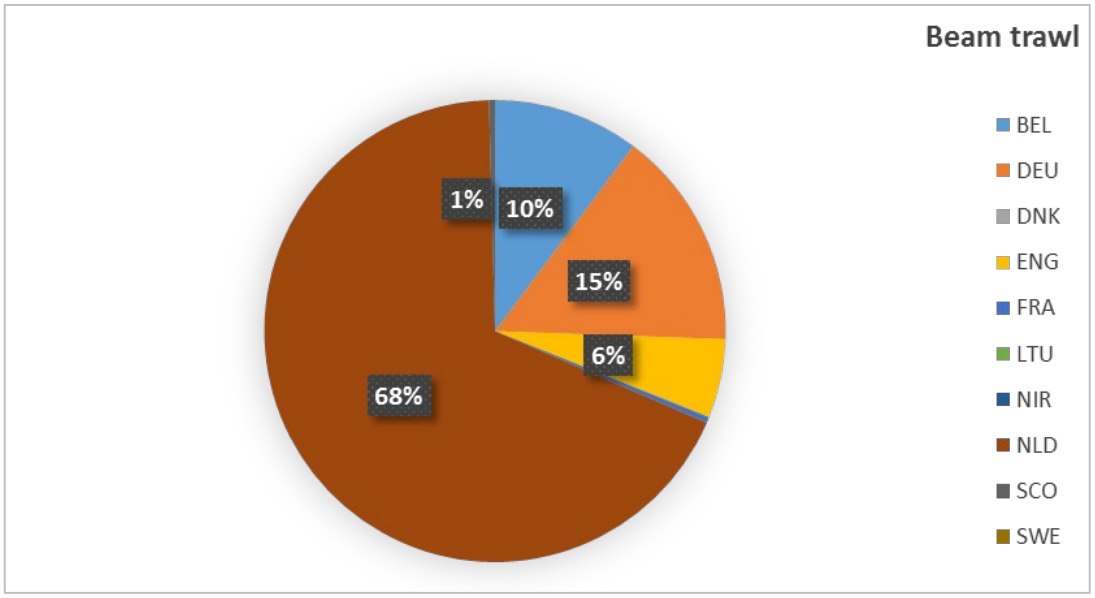



Figure 9: Overview of the distribution of effort for the international beam trawl fishery in the Dutch EEZ in the recent years.

## DEMERSAL SEINE

The fishery with demersal seiners is of minor importance compared to the total effort of all fishing gears. Dutch fishery reach about 50% of the effort. Denmark shows an effort share of 25%. The remaining proportions of maximum 10% are distributed between Belgium, England and France (Figure 10 and Table 17).

Table 17: Distribution of the effort (in hours fished) for the international demersal seine fishery in the Dutch EEZ in the recent years.

| Effort in hours for Demersal Seine | | | | |
|---|---|---|---|---|
| **Country** | **2014** | **2015** | **2016** | **Total** |
| Belgium (BEL) | 948 | 565 | 811 | 2.324 |
| Germany (DEU) | - | - | - | - |
| Denmark (DNK) | 4.440 | 3.636 | 1.640 | 9.716 |
| England (ENG) | 2.575 | 1.098 | 186 | 3.859 |
| France (FRA) | 608 | 817 | 2.643 | 4.068 |
| Lithuania (LTU) | - | - | - | - |
| Northern Ireland (NIR) | - | - | - | - |
| Netherlands (NLD) | 6.730 | 6.086 | 6.219 | 19.035 |
| Scotland (SCO) | - | - | - | - |
| Sweden (SWE) | - | - | - | - |

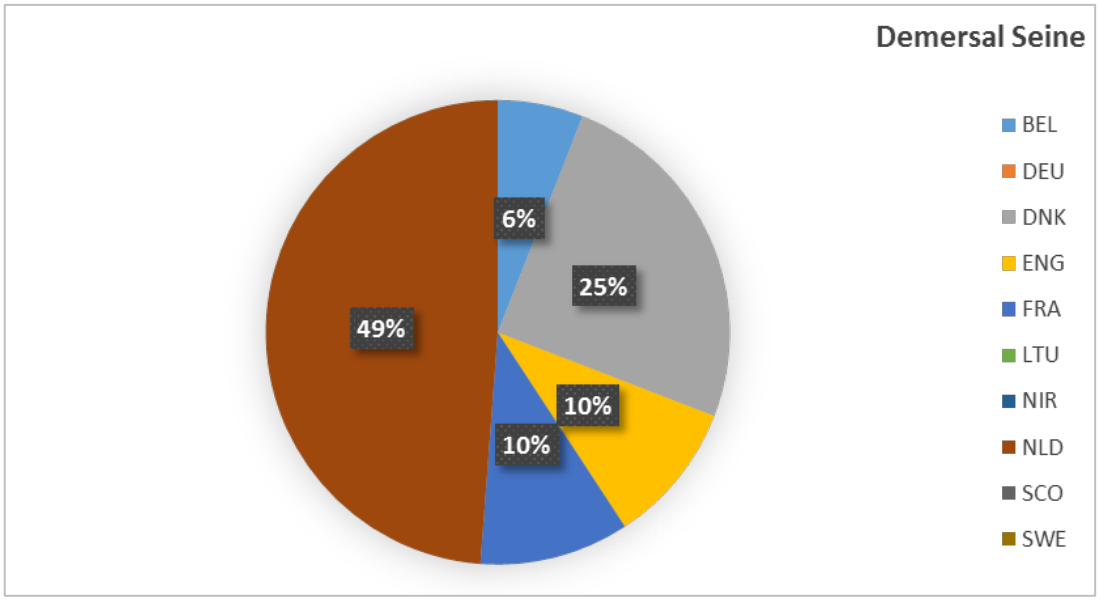



Figure 10: Overview of the distribution of effort for the international demersal seiner fishery in the Dutch EEZ in the recent years.

## DREDGE

Fishery with dredges are insignificant in relation to the total effort of all fishing gears. Dutch fishery is responsible for about 95% of the effort. The remaining shares of a maximum of 4% are distributed between Germany, England, France and Scotland (Table 18 and Figure 11).

Table 18: Distribution of the effort (in hours fished) for the international dredge fishery in the Dutch EEZ in the recent years.

| Effort in hours for Dredge | | | | |
|---|---|---|---|---|
| **Country** | **2014** | **2015** | **2016** | **Total** |
| Belgium (BEL) | - | - | - | - |
| Germany (DEU) | 64 | 64 | 71 | 199 |
| Denmark (DNK) | - | - | - | - |
| England (ENG) | - | 48 | 29 | 77 |
| France (FRA) | 853 | 19 | - | 872 |
| Lithuania (LTU) | - | - | - | - |
| Northern Ireland (NIR) | - | - | - | - |
| Netherlands (NLD) | 6.380 | 7.780 | 7.416 | 21.576 |
| Scotland (SCO) | - | - | 29 | 29 |
| Sweden (SWE) | - | - | - | - |

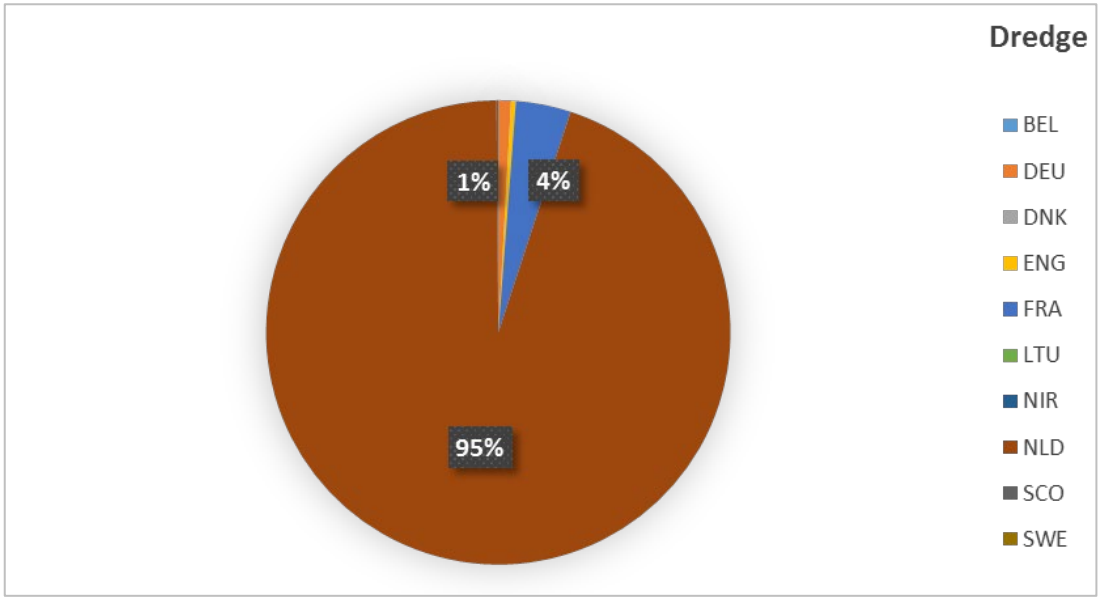



Figure 11: Overview of the distribution of effort for the international dredge fishery in the Dutch EEZ in the recent years.

## GILL NET

The Dutch fishery has a significant position in the set net fishery with a proportion of 53%. The Dutch fishery invested an effort of approx. 41,000 hours in the set net fishery. Germany and Denmark achieved significantly lower

ratios, with 13% and 22% respectively. All other nations showed insignificant efforts for fishery by gill net and are negligible (Figure 12 and Table 19).

Table 19: Distribution of the effort (in hours fished) for the international gill net fishery in the Dutch EEZ in the recent years.

| Effort in hours for Gill net | | | | |
|---|---|---|---|---|
| **Country** | **2014** | **2015** | **2016** | **Total** |
| Belgium (BEL) | 1.139 | 918 | 1.143 | 3.200 |
| Germany (DEU) | 4.401 | 3.385 | 2.371 | 10.157 |
| Denmark (DNK) | 3.625 | 9.270 | 3.625 | 16.520 |
| England (ENG) | 3.191 | 1.276 | 1.242 | 5.709 |
| France (FRA) | 15 | 17 | 50 | 82 |
| Lithuania (LTU) | - | - | - | - |
| Northern Ireland (NIR) | - | - | - | - |
| Netherlands (NLD) | 19.696 | 11.225 | 9.678 | 40.599 |
| Scotland (SCO) | - | - | - | - |
| Sweden (SWE) | - | - | - | - |

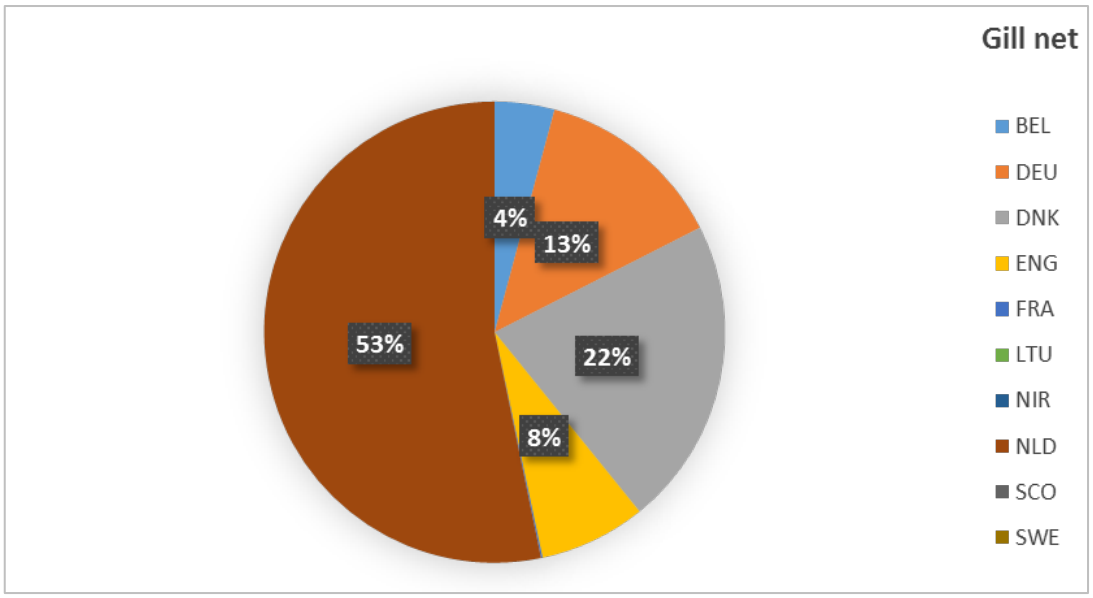



Figure 12: Overview of the distribution of effort for the international gill net fishery in the Dutch EEZ in the recent years.

## OTTER TRAWL

The otter trawl fishery is one of the most important fishery within the Dutch EEZ besides the beam trawl fishery. The overall effort is dominated by the Netherlands, with a share of 27% (Table 20 and Figure 13. However, other nations also have relatively high effort shares (10% to 18%).

Table 20: Distribution of the effort (in hours fished) for the international Otter trawl fishery in the Dutch EEZ in the recent years.

| Effort in hours for Otter trawl | | | | |
|---|---|---|---|---|
| **Country** | **2014** | **2015** | **2016** | **Total** |
| Belgium (BEL) | 11.328 | 12.062 | 11.603 | 34.993 |
| Germany (DEU) | 9.112 | 14.775 | 13.007 | 36.894 |
| Denmark (DNK) | 8.315 | 13.701 | 5.883 | 27.899 |
| England (ENG) | 16.394 | 16.301 | 19.493 | 52.188 |
| France (FRA) | 6.431 | 4.536 | 7.713 | 18.680 |
| Lithuania (LTU) | 20 | - | - | 20 |
| Northern Ireland (NIR) | 216 | - | 36 | 252 |
| Netherlands (NLD) | 26.912 | 29.557 | 22.322 | 78.791 |
| Scotland (SCO) | 8.876 | 10.186 | 20.394 | 39.456 |
| Sweden (SWE) | 94 | 163 | - | 257 |

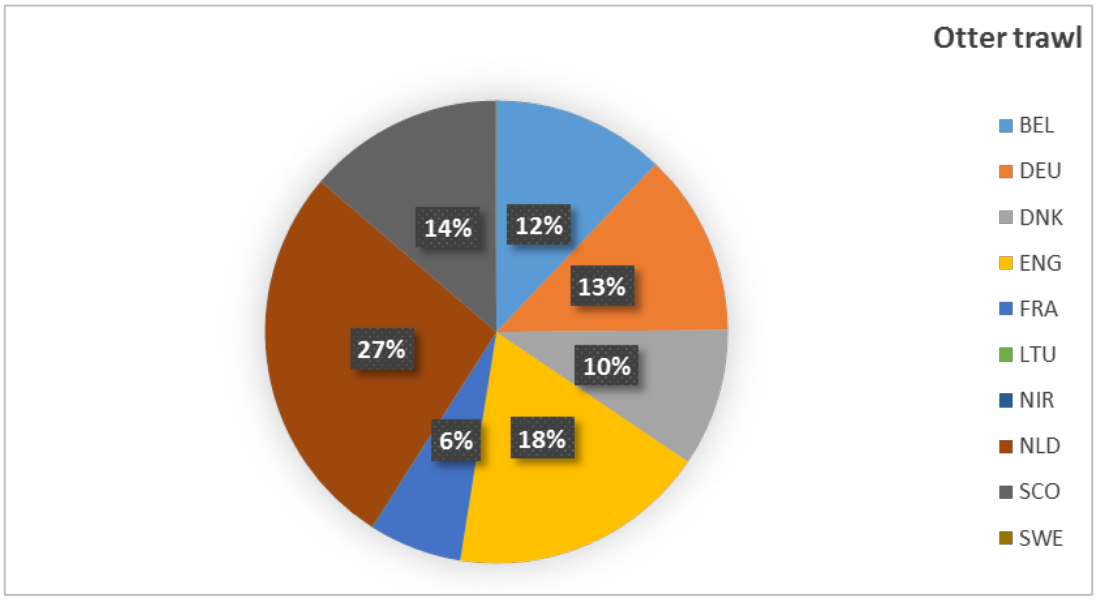



Figure 13: Overview of the distribution of effort for the international otter trawl fishery in the Dutch EEZ in the recent years.

## PELAGIC TRAWL

The pelagic trawl fishery is determined by the Danish fishery. Their contribution to the total effort was about 80% in the years considered. The Dutch fishery only accounts for 4% of the effort. Only the fishing nations Sweden and France still show remarkable shares of 3% and 4% respectively. All other nations are of no importance for pelagic fishery (Figure 14 and Table 21).

Table 21: Distribution of the effort (in hours fished) for the international pelagic trawl fishery in the Dutch EEZ in the recent years.

| Effort in hours for Pelagic trawl | | | | |
|---|---|---|---|---|
| **Country** | **2014** | **2015** | **2016** | **Total** |
| Belgium (BEL) | - | - | - | - |
| Germany (DEU) | 169 | 166 | 252 | 587 |
| Denmark (DNK) | 13.693 | 17.863 | 13.693 | 45.249 |
| England (ENG) | 160 | 53 | 112 | 325 |
| France (FRA) | 1.578 | 962 | 1.481 | 4.021 |
| Lithuania (LTU) | - | - | - | - |
| Northern Ireland (NIR) | - | - | - | - |
| Netherlands (NLD) | 732 | 401 | 1.002 | 2.135 |
| Scotland (SCO) | - | - | - | - |
| Sweden (SWE) | 164 | 438 | 909 | 1.511 |

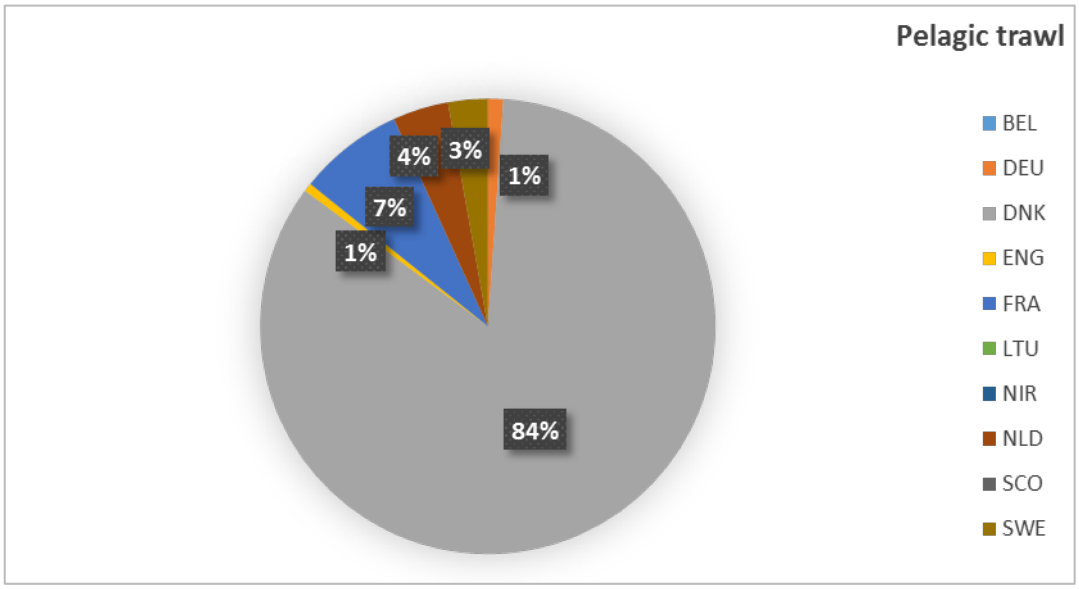



Figure 14: Overview of the distribution of effort for the international pelagic trawl fishery in the Dutch EEZ in the recent years.

## POTS

The pot or trap fishery is carried out by few nations in the Dutch EEZ. With more than 60% of the total effort, the Dutch fishery dominates this kind of fishery method. After all, English trap fishery still has a significant share of 30%. The remaining nations show only insignificant or no effort contributions (Table 22 and Figure 15).

Table 22: Distribution of the effort (in hours fished) for the international Pot fishery in the Dutch EEZ in the recent years.

| Effort in hours for Pots | | | | |
|---|---|---|---|---|
| **Country** | **2014** | **2015** | **2016** | **Total** |
| Belgium (BEL) | - | - | - | - |
| Germany (DEU) | 328 | 328 | - | 656 |
| Denmark (DNK) | - | - | - | - |
| England (ENG) | 1.252 | 5.779 | 5.675 | 12.706 |
| France (FRA) | 158 | 195 | 1.742 | 2.095 |
| Lithuania (LTU) | - | - | - | - |
| Northern Ireland (NIR) | - | - | - | - |
| Netherlands (NLD) | 10.007 | 8.604 | 8.837 | 27.448 |
| Scotland (SCO) | - | - | - | - |
| Sweden (SWE) | - | - | - | - |

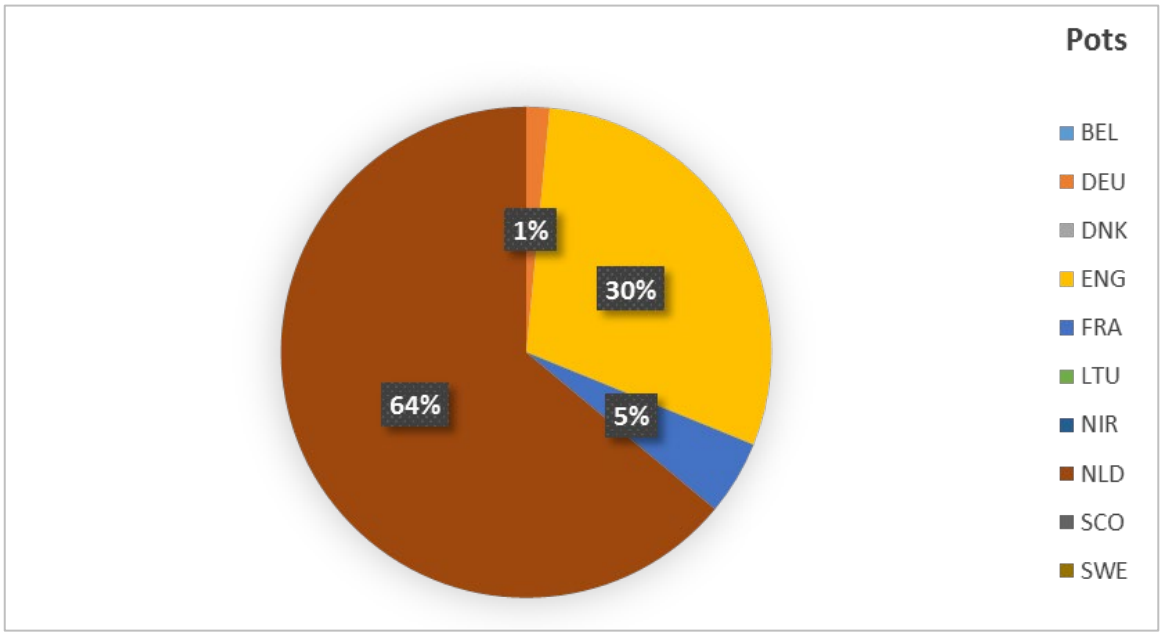



Figure 15: Overview of the distribution of effort for the international pot fishery in the Dutch EEZ in the recent years.

## TRAMMEL NET

The trammel net fishery is also carried out by few nations in the Dutch EEZ. With more than 95% of the total effort, the French fishery dominates this method. Dutch fishing accounts for only 3% of the total effort. The remaining fishing nations show only insignificant or no effort percentages (Figure 16 and Table 23).

Table 23: Distribution of the effort (in hours fished) for the international Trammel net fishery in the Dutch EEZ in the recent years.

| Effort in hours for Trammel net | | | | |
|---|---|---|---|---|
| **Country** | **2014** | **2015** | **2016** | **Total** |
| Belgium (BEL) | 122 | 324 | 703 | 1.149 |
| Germany (DEU) | - | - | - | - |
| Denmark (DNK) | 504 | 120 | 48 | 672 |
| England (ENG) | - | - | 24 | 24 |
| France (FRA) | 25.711 | 25.887 | 30.306 | 81.904 |
| Lithuania (LTU) | - | - | - | - |
| Northern Ireland (NIR) | - | - | - | - |
| Netherlands (NLD) | 496 | 962 | 720 | 2.178 |
| Scotland (SCO) | - | - | - | - |
| Sweden (SWE) | - | - | - | - |

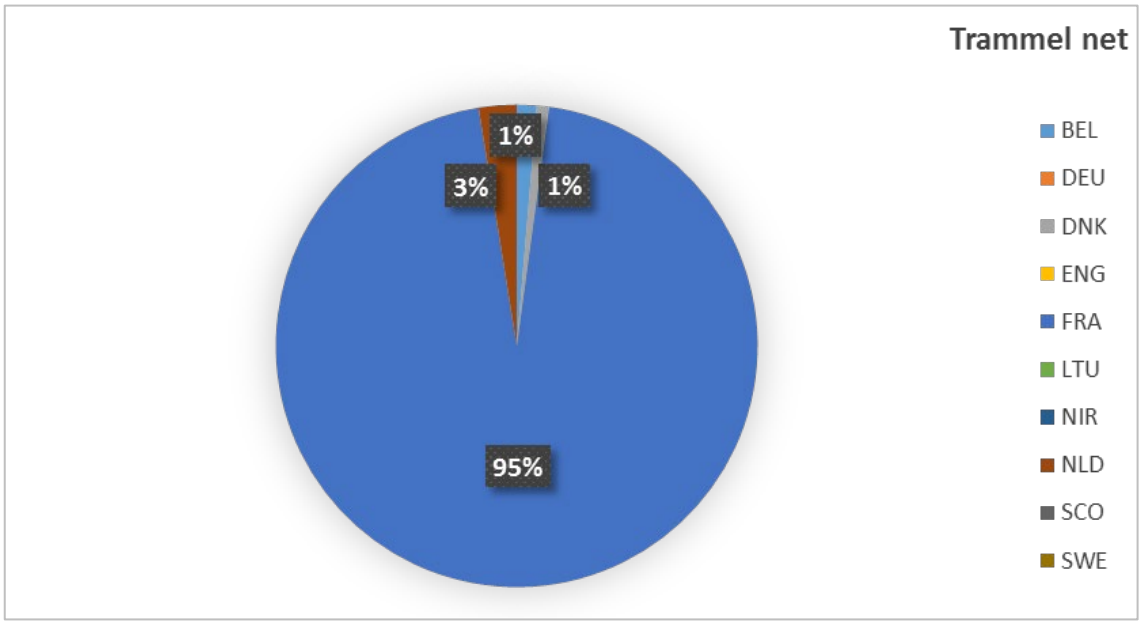



Figure 16: Overview of the distribution of effort for the international trammel net fishery in the Dutch EEZ in the recent years.

Overall, the beam trawl and otter trawl fishery dominates the fishery within the Dutch EEZ. In addition, gill net fishery is also important in the area under consideration. These types of fishery are generally dominated by the Dutch fishery.

### 4.2.2 Landings

The following chapter focuses exclusively on the Dutch fishery. The presented landing data of the most important commercial fish species were analyzed separately according to the different fishing gears. Only those fishing gears

have been analyzed where Dutch fishery have played a dominant role (compare chapter 4.2.1).

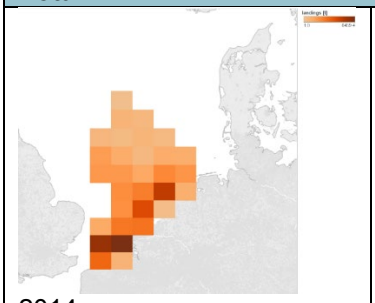
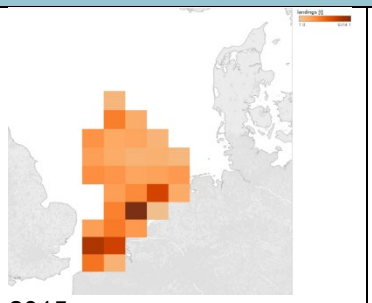
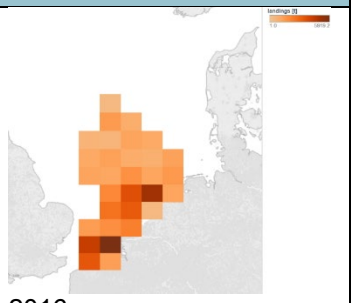
Table 24: Overview on landings per ICES-rectangle (in t) from the recent years for the Dutch fishery in the EEZ (colored ICES rectangles affected by the project).

| ICES-rectangle | year | | | Total |
|---|---|---|---|---|
| | 2014 | 2015 | 2016 | |
| 31F2 | 3.188,10 | 2.727,70 | 3.389,80 | 9.305,60 |
| 31F3 | 709,70 | 734,30 | 1.343,90 | 2.787,90 |
| 32F2 | 5.726,30 | 5.077,40 | 4.281,70 | 15.085,40 |
| 32F3 | 6.459,40 | 4.407,90 | 5.919,20 | 16.786,50 |
| 33F2 | 1.079,20 | 1.437,30 | 1.411,40 | 3.927,90 |
| 33F3 | 2.710,60 | 2.549,60 | 1.805,70 | 7.065,90 |
| 33F4 | 2.831,00 | 1.618,30 | 2.230,60 | 6.679,90 |
| 34F3 | 1.960,90 | 2.362,90 | 2.617,40 | 6.941,20 |
| 34F4 | 4.126,80 | 6.314,10 | 3.297,80 | 13.738,70 |
| 34F5 | 272,70 | 145,80 | 413,40 | 831,90 |
| 35F3 | 2.011,20 | 1.451,70 | 2.022,60 | 5.485,50 |
| 35F4 | 2.512,20 | 2.051,60 | 3.645,00 | 8.208,80 |
| 35F5 | 4.801,30 | 4.287,70 | 5.046,70 | 14.135,70 |
| 35F6 | 880,30 | 1.009,30 | 1.187,10 | 3.076,70 |
| 36F2 | 1.686,80 | 1.924,20 | 1.217,00 | 4.828,00 |
| 36F3 | 1.706,70 | 1.737,10 | 1.106,00 | 4.549,80 |
| 36F4 | 1.161,40 | 1.237,70 | 1.755,90 | 4.155,00 |
| 36F5 | 2.196,20 | 1.356,60 | 1.159,30 | 4.712,10 |
| 36F6 | 1.804,80 | 1.586,10 | 1.521,10 | 4.912,00 |
| 37F2 | 1.547,80 | 1.449,40 | 1.038,00 | 4.035,20 |
| 37F3 | 1.003,00 | 1.042,90 | 1.304,40 | 3.350,30 |
| 37F4 | 492,00 | 718,60 | 912,50 | 2.123,10 |
| 37F5 | 1.001,30 | 805,80 | 803,60 | 2.610,70 |
| 37F6 | 955,70 | 538,80 | 1.251,60 | 2.746,10 |
| 38F2 | 564,50 | 1.815,50 | 618,00 | 2.998,00 |
| 38F3 | 413,80 | 1.131,90 | 580,10 | 2.125,80 |
| 38F4 | 629,00 | 1.240,90 | 1.215,20 | 3.085,10 |
| 38F5 | 452,40 | 667,90 | 1.032,30 | 2.152,60 |
| 39F3 | 679,10 | 2.450,60 | 1.453,60 | 4.583,30 |
| 39F4 | 528,70 | 963,10 | 894,70 | 2.386,50 |
| 40F3 | 204,00 | 561,60 | 404,10 | 1.169,70 |

The total landings from the individual ICES rectangles of the recent years remained relatively constant. The maximum variation in landings was about 50% - 70% between the considered years (40F3; 38F4; 39F3; 37F4; 37F6; 34F5). The main ICES rectangles with the highest landings are near the coast (31F2; 32F2; 32F3; 34F4; 35F5). The landings from these rectangles

reached more than 10.000 t in the considered years (Table 24). The rectangles affected by the project showed significantly lower landings overall and ranged between 2,610 t and 8,208 t. However, a gradient can be seen which shows that the importance of ICES rectangles decreases from north-east to south-west (Table 25). Overall the southwestern rectangles show a high importance for the Dutch fishery (34F3; 35F3; 35F4). The north-eastern rectangles are of medium importance (36F4; 36F5; 37F5; 37F6).

Table 25: Distribution of Dutch landings in the EEZ in the recent years.

| Total | | |
|---|---|---|
|  |  |  |
| 2014 | 2015 | 2016 |

## BEAM TRAWL

Within the beam trawl fishery the landings are dominated by common shrimps (total 42.992 t and 35%) and flatfish (Table 26 and Figure 17). Concerning flatfish, plaice and common sole dominates the landings with a proportion of 34% (42.239 t) and 19% (19.447 t).

Table 26: Overview on landings (in t) from the recent years for the Dutch beam trawl fishery in the EEZ.

| Species | 2014 | 2015 | 2016 | Total |
|---|---|---|---|---|
| Common shrimps | 17.106,60 | 13.164,30 | 12.721,50 | 42.992,40 |
| Common dab | 1.569,70 | 1.256,00 | 1.321,50 | 4.147,20 |
| Gurnard | 719,70 | 881,60 | 1.167,20 | 2.768,50 |
| European plaice | 13.566,90 | 14.812,80 | 13.859,30 | 42.239,00 |
| Common sole | 6.704,60 | 5.858,30 | 6.884,10 | 19.447,00 |
| Turbot | 933,50 | 933,90 | 1.157,70 | 3.025,10 |
| Others | 3.110,80 | 3.222,50 | 3.443,40 | 9.776,70 |

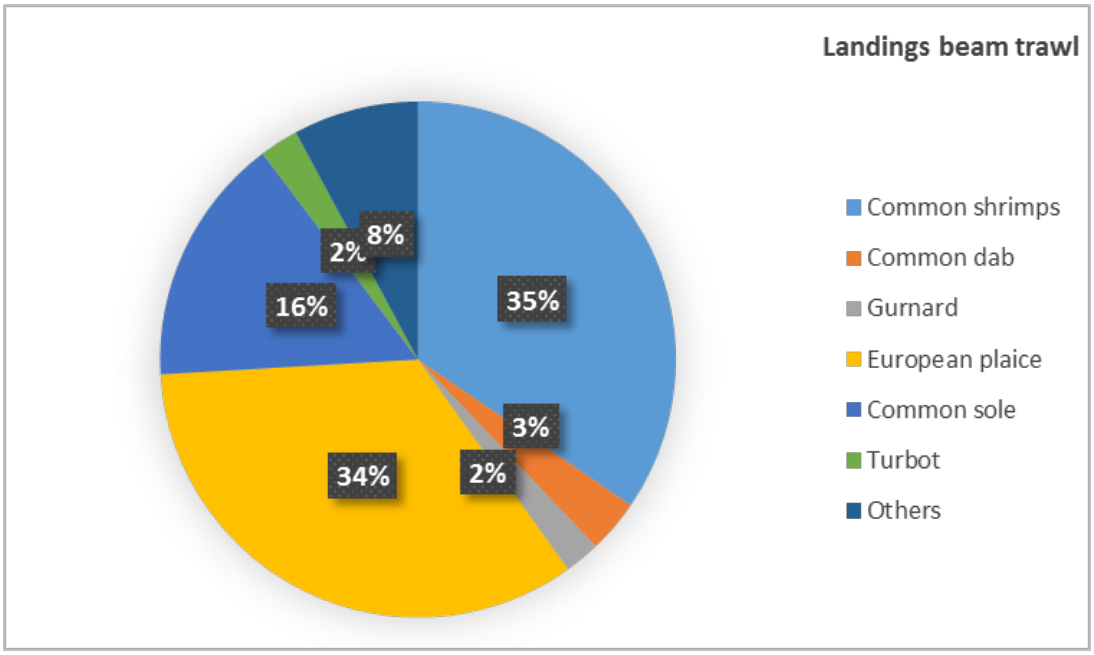
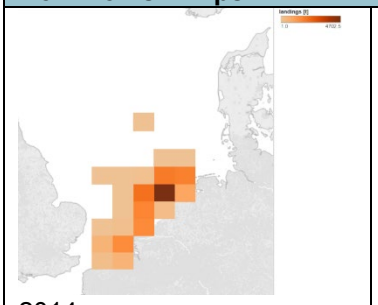
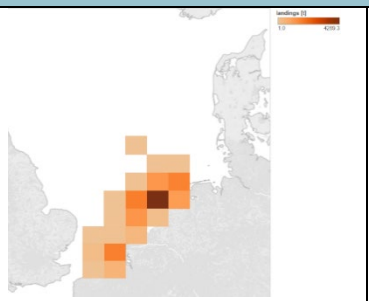
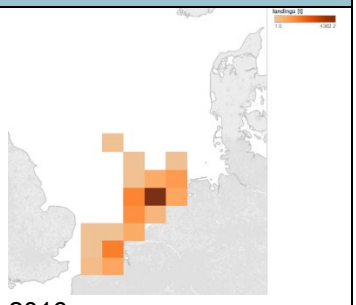



Figure 17: Overview on the most important commercial fish species for the Dutch beam trawl fishery in the EEZ.

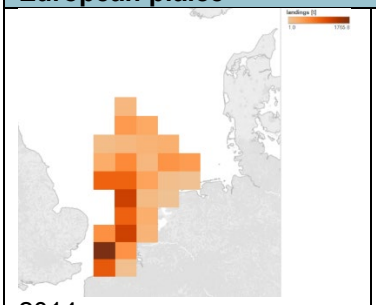
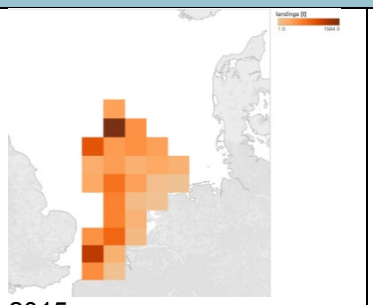
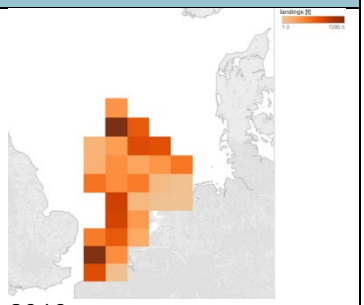
The main fishing grounds for common shrimps are located within the ICES rectangles on the coast. In contrast, the offshore rectangles are rarely fished. The rectangles 35F4, 36F5 and 37F6, which represent the cable route, are intensively used for common shrimp fishery (Table 27).

Table 27: Overview on the most important fishery areas for Common shrimps in the recent years within Dutch EEZ (landings in t).

| Common shrimps | | |
|---|---|---|
|  |  |  |
| 2014 | 2015 | 2016 |

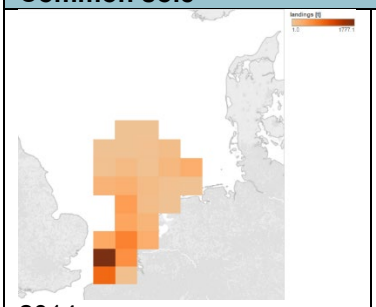
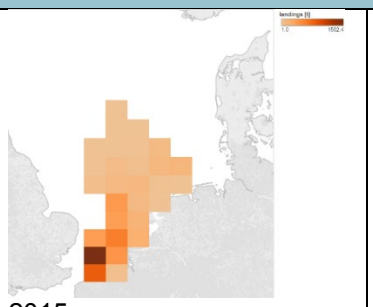
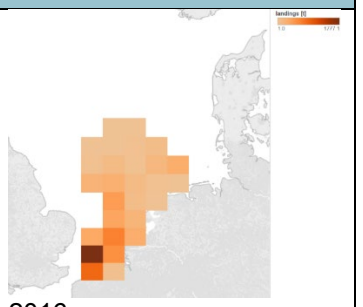
The fishing grounds of plaice are concentrated in the offshore areas of the Dutch EEZ. From the rectangles on the coast fewer landings are detected. Along the entire cable route an intensive fishing on plaice takes place (Table 28).

Table 28: Overview on the most important fishery areas for European plaice in the recent years within Dutch EEZ (landings in t).

| European plaice | | |
|---|---|---|
|  |  |  |
| 2014 | 2015 | 2016 |

The highest landings of sole have been recorded for the southern ICES rectangles at the entrance to the English Channel. Here the main fishing areas are located within the Dutch EEZ. Overall, the sole fishery is conducted throughout the entire EEZ. In the ICES rectangles affected by the project a fishing of medium intensity is carried out (Table 29).

Table 29: Overview on the most important fishery areas for Common sole in the recent years within Dutch EEZ (landings in t).

| Common sole | | |
|---|---|---|
|  |  |  |
| 2014 | 2015 | 2016 |

## DREDGE

The landings with the Dredge are determined by the mussel fishery. The Pod razor shell accounts for 98% or 9,841 t of the landings (Table 30 and Figure 18).

Table 30: Overview on landings (in t) from the recent years for the Dutch Dredge fishery in the EEZ.

| Species | 2014 | 2015 | 2016 | Total |
|---|---|---|---|---|
| Pod razor shell | 4.583,30 | 5.257,70 | 5.789,20 | 9.841,00 |
| Solen razor clams | 182,70 | 20,00 | 0,50 | 202,70 |
| Ostrich egg sponge | - | 20,00 | 0,50 | 20,00 |

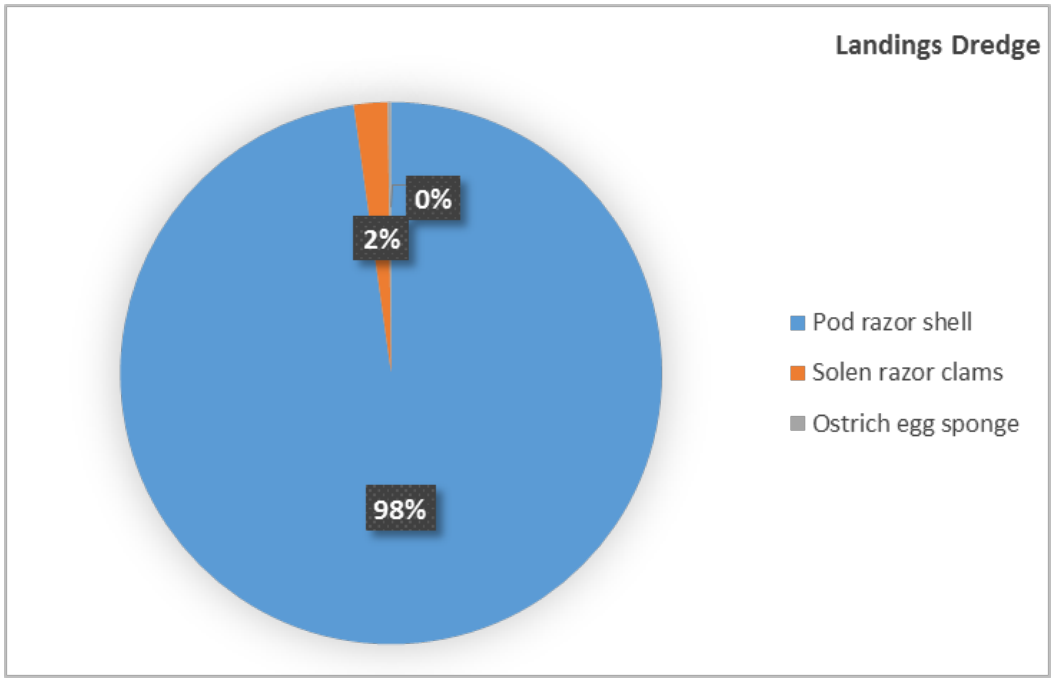
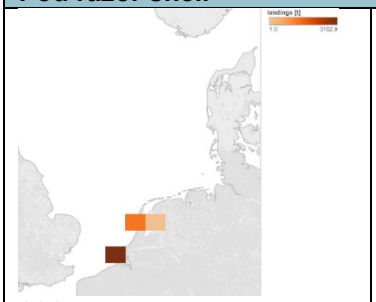
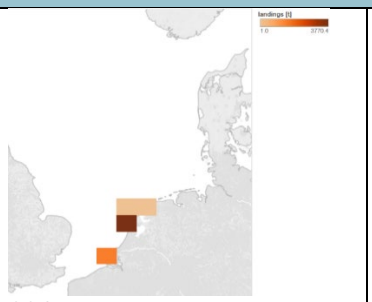
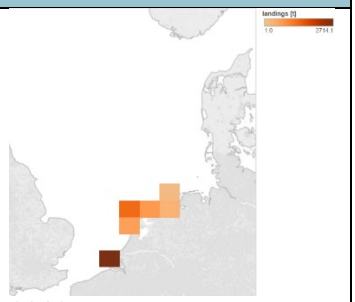



Figure 18: Overview on the most important commercial fish species for the Dutch dredge fishery in the EEZ.

The main fishery of the commercial species Pod razor Shell is located near the coast. There is no fishery in the offshore rectangles on this species. The planned cable route crosses the ICES rectangle 35F4. This rectangle is part of the main fishing areas. Here, an intensive mussel fishery takes place (Table 31).

Table 31: Overview on the most important fishery areas for Pod razor shell in the recent years within Dutch EEZ (landings in t).

| Pod razor shell | | |
|---|---|---|
|  |  |  |
| 2014 | 2015 | 2016 |

## GILL NET

The bottom-set net fishery is particularly characterized by the landings of sole with 60% share of landings (348 t). Other flatfish species such as Dab (12%) and Flounder (3%), or Seabass (5%) and Grey mullet (5%) are also important for fishing with gill nets (Table 32 and Figure 19).

Table 32: Overview on landings (in t) from the recent years for the Dutch Gill net fishery in the EEZ.

| Species | 2014 | 2015 | 2016 | Total |
|---|---|---|---|---|
| European seabass | 9,40 | 9,70 | 8,30 | 27,40 |
| Atlantic cod | 5,00 | 3,80 | 3,10 | 11,90 |
| Common dab | 24,40 | 21,80 | 21,40 | 67,60 |
| European flounder | 8,00 | 5,30 | 3,60 | 16,90 |
| Grey mullet | 13,30 | 8,80 | 8,70 | 30,80 |
| Pacific oyster | 0,00 | 0,90 | 33,90 | 34,80 |
| Common sole | 174,60 | 100,50 | 73,60 | 348,70 |
| Others | 12,70 | 16,30 | 10,80 | 39,80 |

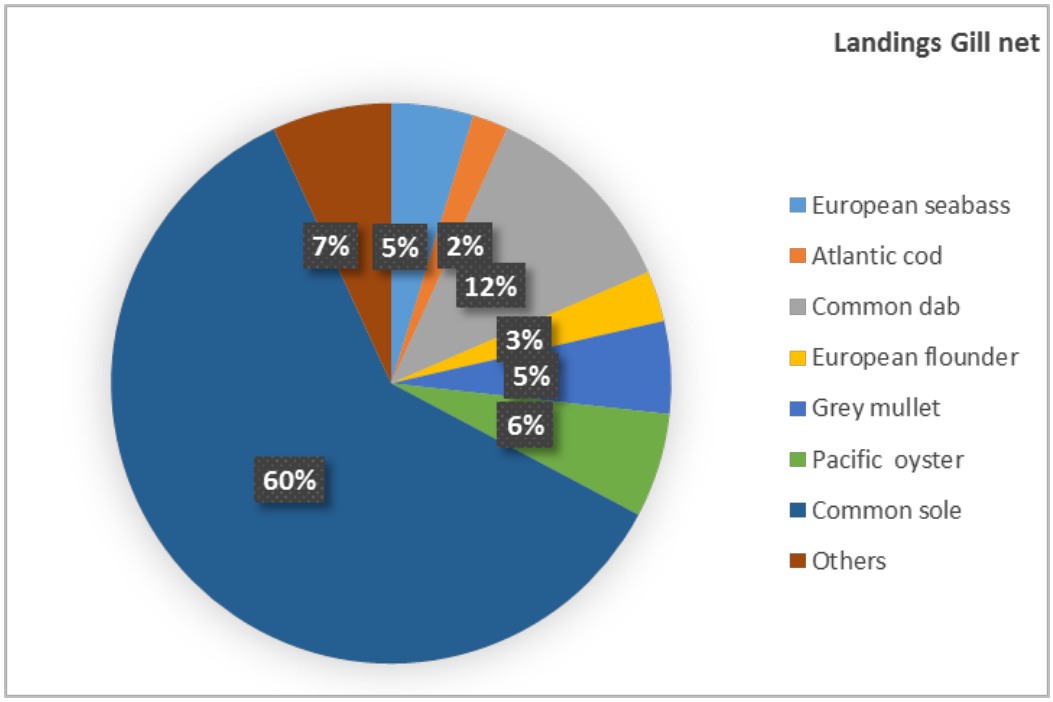
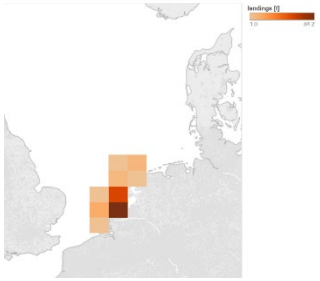
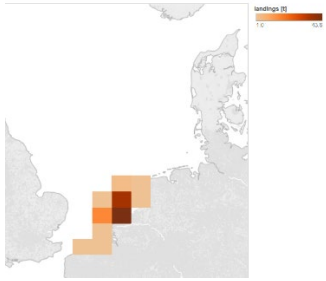
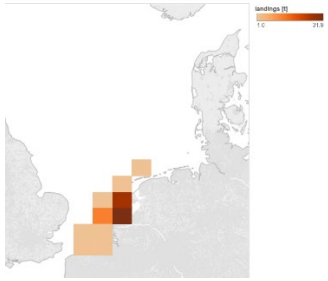



Figure 19: Overview on the most important commercial fish species for the Dutch gill net fishery in the EEZ.

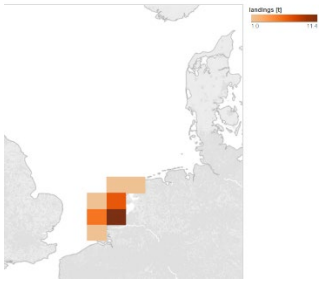
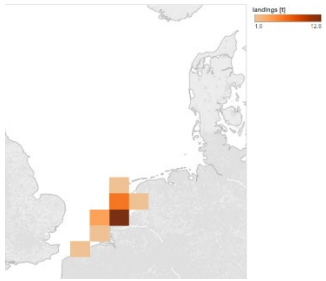
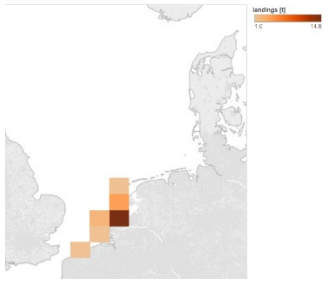
The exercise of sole fishery takes place exclusively in the coastal waters. The marine areas around the offshore islands are of particular importance. Along the cable route, the ICES rectangles 34F3 and 35F4 are exercised by a sole fishery of medium intensity (Table 33).

Table 33: Overview on the most important fishery areas for Common sole in the recent years within Dutch EEZ (landings in t).

| Common sole | | |
|---|---|---|
|  2014 |  2015 |  2016 |

As in the case of sole, the most important fishing areas for the dab are located in the coastal waters. In the area of the route alignment, the ICES rectangle 35F4 contains a low intensity of dab fishery (Table 34).

Table 34: Overview on the most important fishery areas for Common dab in the recent years within Dutch EEZ (landings in t).

| Common dab | | |
|---|---|---|
|  2014 |  2015 |  2016 |

## OTTER TRAWL

The catches from the Otter Trawl fishery are determined with 48% and approx. 80 t by Common shrimps. In addition, the landings from the plaice fishery are also significant with 38% and 50 t (Table 35 and Figure 20).

Table 35: Overview on landings (in t) from the recent years for the Dutch otter trawl fishery in the EEZ.

| Species | 2014 | 2015 | 2016 | Total |
|---|---|---|---|---|
| Common shrimps | 80,10 | 0,00 | 0,20 | 80,30 |
| Norway lobster | 0,00 | 0,10 | 15,90 | 16,00 |
| European plaice | 0,00 | 41,20 | 9,50 | 50,70 |
| Others | 2,70 | 10,10 | 7,40 | 20,20 |

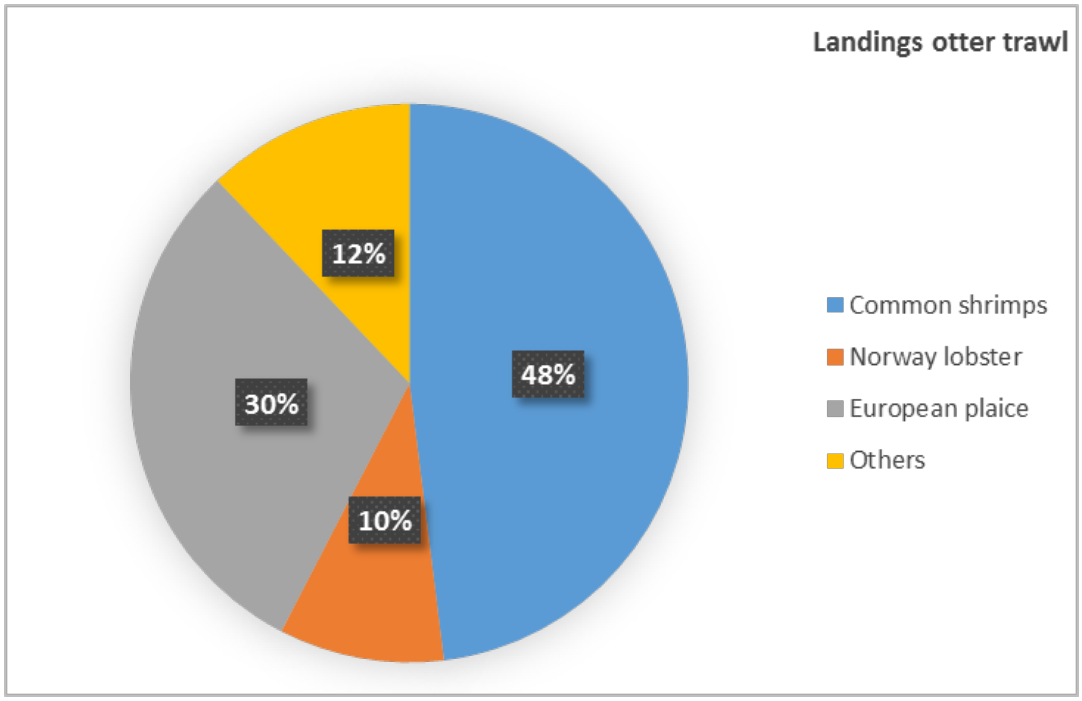
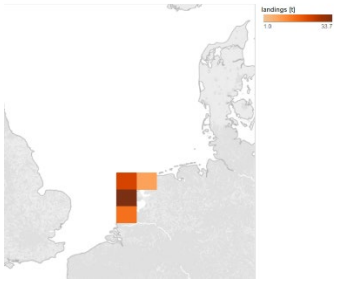
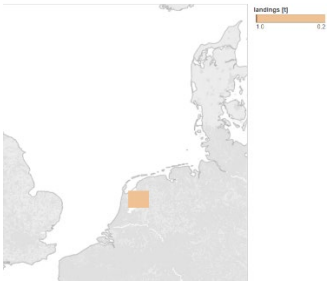



Figure 20: Overview on the most important commercial fish species for the Dutch otter trawl fishery in the EEZ.

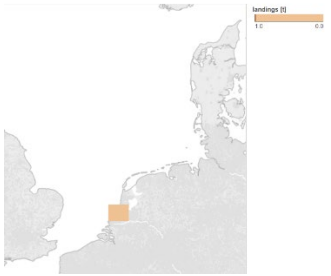
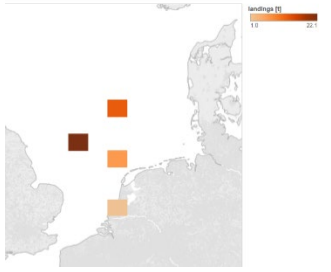
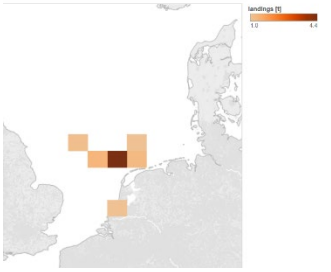
The catches of shrimps were very irregular in the years considered. Nevertheless, this species dominated the percentage of catches. Only in 2014 the rectangle 34F3 was as part of the cable route characterized by a fishery of medium intensity on Common shrimps (Table 36).

Table 36: Overview on the most important fishery areas for Common shrimps in the recent years within Dutch EEZ.

| **Common shrimps** | | |
|---|---|---|
|  2014 | No landings 2015 |  2016 |

The catches of plaice were also very irregular. Specific fishing areas cannot be mapped. Nevertheless, in 2015 and 2016, this species showed medium catch intensities in the area of the route alignment (Table 37).

Table 37: Overview on the most important fishery areas for European plaice in the recent years within Dutch EEZ.

| European plaice | | |
|---|---|---|
|  2014 |  2015 |  2016 |

## POTS

Trap fishing is particularly characterized by the crab species Edible crab and Lobster (Table 38 and Figure 21). Both species are responsible for about 70% of all landings (>100 t).

Table 38: Overview on landings (in t) from the recent years for the Dutch pot fishery in the EEZ.

| Species | 2014 | 2015 | 2016 | Total |
|---|---|---|---|---|
| Edible crab | 23,60 | 10,40 | 20,50 | 54,50 |
| European lobster | 10,40 | 19,50 | 18,80 | 48,70 |
| European plaice | 0,00 | 23,10 | 0,00 | 23,10 |
| Others | 3,60 | 11,10 | 8,70 | 23,40 |

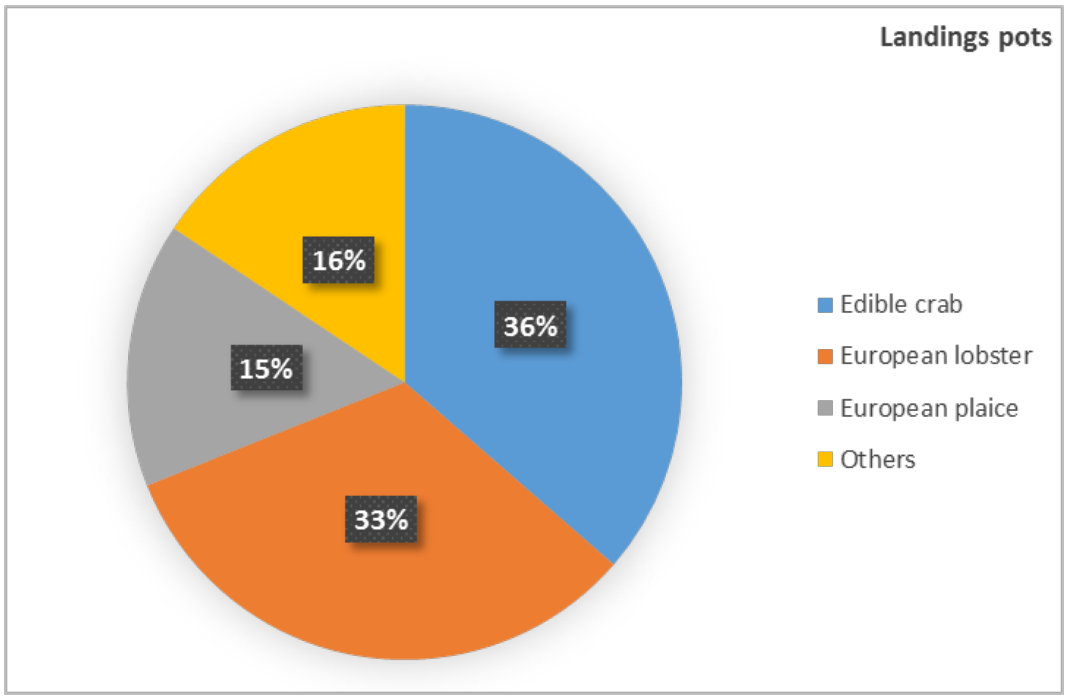
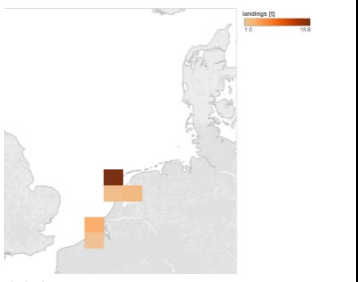
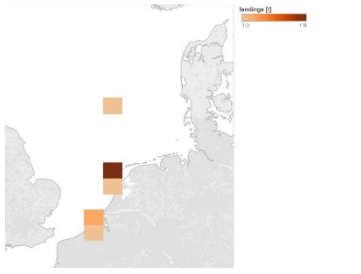
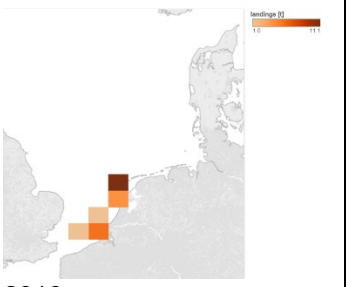



Figure 21: Overview on the most important commercial fish species for the Dutch pot fishery in the EEZ.

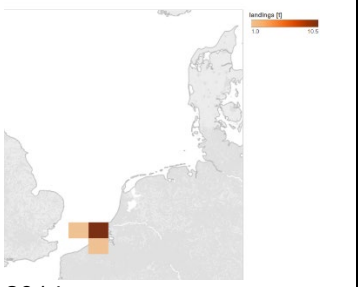
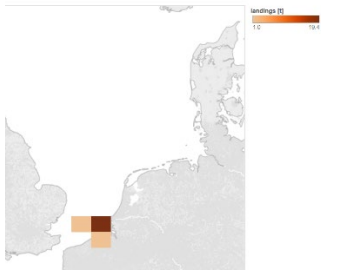
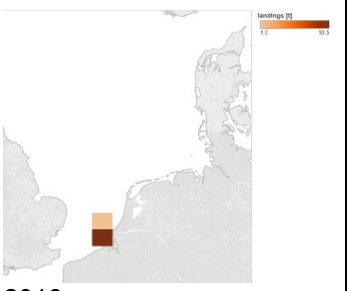
The main fishing areas for the edible crab are close to the Dutch coast. The ICES rectangles 34F3 and 35F3 show an importance for the pot fishery on the edible crab in the affected area of the planned project (Table 39).

Table 39: Overview on the most important fishery areas for Edible crab in the recent years within Dutch EEZ.

| Edible crab | | |
|---|---|---|
|  2014 |  2015 |  2016 |

The highest landings for the European lobster were recorded in the southern part of the Dutch coast. There is no significant fishing area along the planned cable route (Table 40).

Table 40: Overview on the most important fishery areas for European lobster in the recent years within Dutch EEZ.

| European lobster | | |
|---|---|---|
|  2014 |  2015 |  2016 |

## 4.3 Competition to other spatial uses

In the following chapter the Dutch fishery is analyzed in comparison to the other stakeholders which use the Dutch EEZ in a socio-economic manner.

In general, the economic growth has declined significantly since 2008, more significantly and longer than in the surrounding countries, the OECD and the EU on average. This is mainly due to sluggish domestic demand (STECF, 2015).

Table 41 contains an overview of the development of the socio-economic importance in terms of production value, added value and employment for the period 2005-2011 for sectors in the Dutch part of the North Sea as well as land-based sectors that have a direct relationship with the sea. The table

shows that oil and gas extraction, ports and shipping are of great economic importance to the Netherlands.

The total added value of the use of the Dutch part of the North Sea (including its coastal zone and seaports) amounted to over 23 billion euros in 2011. That is a decrease of more than 3.5 billion euros compared to 2008. The added value of the activities in the North Sea in 2011 amounted to an approximate total of 5.4 billion euros. That is a decrease of over 2.5 billion euros compared to 2008. The decrease is largely due to the financial and economic crisis. Oil and gas extraction has the highest added value of all designated uses in the Dutch part of the North Sea (over 4.7 billion euros in 2011). Although the production of oil and gas fell between 2005 and 2011, the production value and added value did not. The rise in oil prices in 2008 offset the decrease in production volume. Employment in this sector remained fairly stable between 2005 and 2011. The shipping industry is also of great economic importance to the Netherlands; however, the industry's added value dropped significantly between 2008 and 2010. The prices for shipping services have been under pressure since 2009, as has the volume of the activity (less volume to be transported). There was, after all, less international trade as a result of the economic crisis. In 2011 the added value of the shipping sector came to 616 million euros.
Sand extraction, fishery and wind energy are of relatively little economic significance compared to oil and gas extraction and shipping. Sand is extracted for coastal defence purposes and for infrastructure and/or land reclamation projects. The economic crisis has had no apparent impact on the demand for sand for coastal defence purposes; however, the demand for fill sand has dropped, as projects have been delayed or postponed as a consequence of the economic crisis. The Dutch fishing industry is highly regulated by the European Common Fishery Policy (CFP). Sole, plaice, herring and mackerel are of particular importance to Dutch fishermen. The added value of the commercial fishery sector has decreased compared to 2005 (STECF, 2015). This is partly due to higher fuel prices, social pressure to fish sustainably and competition from cheaper, imported fish. Wind energy has increased slightly in economic importance in recent years. This sector is expected to grow rapidly in the coming years (Table 41).

The total added value of directly sea-related land-based economic activities amounted to approximately 17.8 billion euros in 2011. This is a decrease of approximately 1 billion euros compared to 2008. The economic importance rose again after 2010. Of all land-based activities directly related to the North Sea, the seaports are of major economic interest. Just over half the added value of seaport-based activities is generated in the port of Rotterdam. Moreover, the Dutch seaports are hubs for international goods flows and a seat for industry and services.

The economic importance of other activities in the coastal zone, such as tourism and recreation (Vuik & Van Rossum, 2011), has also declined in recent years. There were fewer international tourists, and hotels, restaurants and

cafés saw a drop in sales. The economic crisis did not impact the number of beach visits or the recreational fishing industry. Many economic activities are more directly dependent on the North Sea, particularly inland shipping and other transport activities, but also the fish processing industry, the trade in ship components, and so on.

Table 41: Economic importance of the Dutch part of the North Sea (2005-2027). Employment x 1,000 FTE, production value and added value x 1,000,000 €.

| | 2005 | 2008 | 2010 | 2011 | 2015 | 2021 | 2027 |
|---|---|---|---|---|---|---|---|
| Shipping | | | | | | | |
| Employment | 8.0 | 7.7 | 8.7 | 8.6 | 5.5 | 5.0-5.4 | 4.6-5.4 |
| Production value | 4913 | 4876 | 3885 | 3885 | 3134 | 3098-3604 | 3002-4048 |
| Added value | 1337 | 1211 | 727 | 616 | 602 | 595-693 | 577-778 |
| Fishery | | | | | | | |
| Employment | 0.61 | 0.56 | 0.54 | 0.52 | 0.4 | 0.4 | 0.3-0.4 |
| Production value | 100.4 | 105.7 | 93.4 | 90.3 | 100 | 85-93 | 75-85 |
| Added value | 41.5 | 32.5 | 26.3 | 23.0 | 23 | 19-22 | 17-21 |
| Oil and gas extraction | | | | | | | |
| Employment | 2.5 | 2.9 | 2.3 | 2.7 | 2.5 | 2.1-2.2 | 1.5-1.8 |
| Production value | 5673 | 8477 | 5389 | 6004 | 5409 | 4483-4694 | 3186-3857 |
| Added value | 4196 | 6834 | 4099 | 4748 | 4277 | 3546-3711 | 2519-3050 |
| Sand extraction | | | | | | | |
| Employment | TBD | TBD | TBD | TBD | 0.2 | 0.2 | 0.2-0.6 |
| Production value | TBD | TBD | TBD | TBD | 133 | 91 | 91-314 |
| Added value | TBD | TBD | TBD | TBD | 31 | 21 | 21-72 |
| Wind energy | | | | | | | |
| Employment | - | 0.1 | 0.1 | 0.2 | 0.5 | 1.5 | 2.2 |
| Production value | - | 54 | 55 | 66 | 254 | 779 | 1146 |
| Added value | - | 31 | 29 | 35 | 76 | 233 | 343 |
| Total sea-based | | | | | | | |
| Employment | 11 | 11 | 12 | 12 | - | - | - |
| Production value | 10686 | 13512 | 9423 | 10046 | - | - | - |
| Added value | 5575 | 8109 | 4882 | 5422 | - | - | - |
| Seaports | | | | | | | |
| Employment | 118 | 126 | 118 | 120 | - | - | - |
| Production value | 63199 | 85761 | 82592 | 95904 | - | - | - |
| Added value | 15857 | 17305 | 15017 | 16436 | - | - | - |
| Coastal zone | | | | | | | |
| Employment | 32 | 35 | 34 | 34 | - | - | - |
| Production value | 2537 | 2946 | 2755 | 2745 | - | - | - |
| Added value | 1318 | 1451 | 1367 | 1350 | - | - | - |
| Total land-based | | | | | | | |
| Employment | 150 | 161 | 151 | 154 | - | - | - |
| Production value | 65736 | 88707 | 85348 | 98649 | - | - | - |
| Added value | 17175 | 18756 | 16384 | 17786 | - | - | - |
| Total sea- and land-based | | | | | | | |
| Employment | 161 | 172 | 163 | 166 | - | - | - |
| Production value | 76422 | 102219 | 94770 | 108695 | - | - | - |
| Added value | 22749 | 26865 | 21266 | 23208 | - | - | - |

Ecorys has made an estimate of the expected socio-economic developments between 2015 and 2027 and looked ahead to 2050 based on the latest information on the national socio-economic developments and on the basis of four long-term scenarios drawn up by the Netherlands Bureau for Economic Policy Analysis (CPB) (Ecorys, 2013). Between 2012 and 2027 the economy is expected to grow by 11% to 36%. Productivity linked to technological improvements will contribute the most to that expected growth. By 2027 employment in the Netherlands will have changed by -5% to +4% compared to 2012.

The oil and gas sector will be of less socio-economic importance in the future. Expectations are that most extractions will cease between 2020 and 2050 as fields become depleted, whereas much is expected of offshore wind energy in the coming years. The Energy Agreement stipulates that by 2023 4,450 MW of offshore wind energy will be operational (DHR, 2014) (by way of comparison: off-shore operational capacity in 2012 was 228 MW). Furthermore, several Dutch companies are actively developing and testing other forms of 'Ocean Energy', such as tidal power, wave power and osmotic energy. These kinds of energy production could be economically viable in the long term. The importance of the shipping sector can both rise and fall between 2012 and 2027. This uncertainty has to do with the large margin in the expected development of the transshipment of goods in the Dutch seaports. It is assumed that the transshipment of goods in Dutch seaports will keep pace with the global transit. The port of Rotterdam expects to transship 575 to 740 million tons per year by 2030. Especially the transshipment of containers is expected to increase substantially as a result of Maasvlakte 2 (50 to 200% growth up to the year 2040). In the coming years shipping will also need to adapt to measures aimed at reducing operational pollution, such as more stringent limits on emissions (such as nitrogen and sulphur oxides) from ships. The transport and the use of alternative fuels such as LNG and biofuel will increase.
The economic importance of sand extraction depends on the demand for sand for coastal sand replenishments and for infrastructure projects. The Delta Decision on Sand (Delta, 2014) proposes an annual coastal sand replenishment of 12 million $m^3$ for the coming years so as to maintain the basic coastline and to conduct additional research into the necessity of letting the coastal foundation rise as well. A required increase of up to 25 million $m^3$ per year of sea sand as fill sand is also taken into account. Meanwhile, technical developments have enabled the extraction of sand from deeper lying beds.

# 5 DISCUSSION

## 5.1 Trans-regional importance

For the North Sea as a whole, Dutch fishery represent only a small proportion (4%) of the total effort. Scottish, English and French fishery had the highest proportions of the total effort. The main fishing areas for international fishery are located in the coastal areas of the neighboring countries. In particular, the

English Channel and the coastal areas of Great Britain, Holland and Germany show the highest fishing activities.
The area along the route alignment in the Dutch EEZ is characterized by Dutch fishery in particular. The Belgian and German fishery also exhibit high fishery intensities.

The pelagic fish species herring, mackerel and sprat represent the main target species of commercial fishery in the North Sea. These species collectively account for more than 50% of the analyzed landings. Flatfishes, such as plaice, as well as lobster and shrimps are further important target species in the coastal areas of the North Sea. The temporal variations of the landings are related to the dependency on the stock situation and thus on the quotation. All commercial fish stocks are subject to strict control by the European Union and are monitored through a targeted fish stock management. The establishment of total allowable catches (TACs) for all commercially exploited fish stocks in the North Sea is a key tool in this context.

The analysis of the effort data for the ICES rectangles 34F3, 35F3, 35F4, 36F4, 36F5, 37F5, 37F6 which are concerned by the project, showed a high importance for the Dutch fishery. Overall, a high importance can be identified for the coastal areas for the flatfish fishery and the fishery on shrimps for trans-regional fishery in the North Sea.

## 5.2 Local and regional importance

The fishing effort in the Dutch EEZ is mainly dominated by the Dutch fishery. Overall considered through the years, the Dutch fishery showed with more than 50% the highest percentage of the total effort (>1,000,000 hours fished). The analysis confirms the importance of the EEZ for the Belgian and German fishery. The most important fishing grounds are located along the coastal areas of the Dutch EEZ. The ICES rectangles, which are affected by the cable project, show a medium fishery effort compared to the ICES rectangles along the coast. On the other hand, the rectangles of the northern Dutch EEZ reveal a lower fishery effort in all.

The Dutch EEZ is dominated by ground-hitting fishery. The beam trawl fishery plays an outstanding role (>900,000 hours fished). Furthermore, the fishery with Dredge, Gill net, otter trawl and traps are also of a high importance for the Dutch fishery within the EEZ. However, this fishery represent only a small proportion of the total effort when compared to beam trawl fishery. When looking at the landings from these fishing techniques, it can be seen that flatfishes, shrimps and lobsters are mainly constituting the catches. Within the flatfish fishery, the fishery on plaice is particularly significant. However, dab and sole also form an important part of the commercially exploited target fish species in the Dutch EEZ. The flatfish fishery does not show any specific fishing areas but was evenly distributed over the entire EEZ over the years under consideration. For the shrimps and lobster species, the coastal areas represent an important fishing area. The coastal areas play a major role in

regional fishery. The fishing areas in the coastal areas result in a lower investment in both time and technical effort (e.g. fuel, etc.) while maintaining good catch levels.

The rectangles affected by the project showed lower landings than the rectangles on the coast. However, a gradient can be seen which shows that the importance of ICES rectangles decreases from north-east to south-west. Overall the southwestern rectangles show a high importance for the Dutch fishery (34F3; 35F3; 35F4). The north-eastern rectangles are of medium importance (36F4; 36F5; 37F5; 37F6).

For local and regional fishery, in summary a high importance of flatfish and shrimp fishery in coastal areas can be derived. Overall, the results in the area of the project show a medium importance for Dutch fishery.

## 5.3 Competition to other spatial uses

In addition to internal competition on fish as a resource, there are also other stakeholder groups that are competing for the use of the space available. In many places the territorial claims already overlap. In the meantime, the use of the sea is becoming increasingly space-intensive including: Maritime transport, trade, coastal industries, offshore facilities, conventional and alternative energy generation, nature conservation areas, aquaculture, marine research and tourism all compete with fishery (Kafemann & Ehrich 2007). The problem here is that fishing is a dynamic process and therefore it is difficult to define its boundaries in connection with the national spatial planning in the Dutch EEZ and territorial waters (Ehrich et al. 2006). By developing new fishing strategies and techniques, it would be possible to protect and reinforce the Dutch fishery and used fish stocks (Ehrich et al. 2006). However, it should be kept in mind that Dutch fishery only have limited alternatives.

The future of the Dutch fishing industry is highly uncertain due to the many changes awaiting the sector (Table 41). A further decline in the sector's economic importance should be taken into consideration. The fishing industry is currently transitioning to a high sustainability level. The sector faces huge challenges to become more sustainable, especially with regard to reducing discards and developing new techniques such as pulse and sumwing fishing, which will continue to supplant traditional beam trawling in the coming years (Kuhlman & Van Oostenbrugge, 2014). Furthermore, the development of the main fish stocks in the North Sea will influence the importance of the sector in the future. Climate change figures in this respect as well. The warming of the North Sea is shifting populations to the north, causing some species to migrate away (cod, plaice) and others to potentially increase in number (mullet, sea bass). Market developments also affect the sector's economic significance. The vast majority of the fish caught in Dutch waters is exported to countries within the EU. Competition from farmed fish has increased sharply in recent years. In addition, the use of space especially by wind farms and protected areas in the North Sea is increasing substantially. That might lead

to displacement effects on the fishery at the traditional and available fishing grounds (AEI, 2012)

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