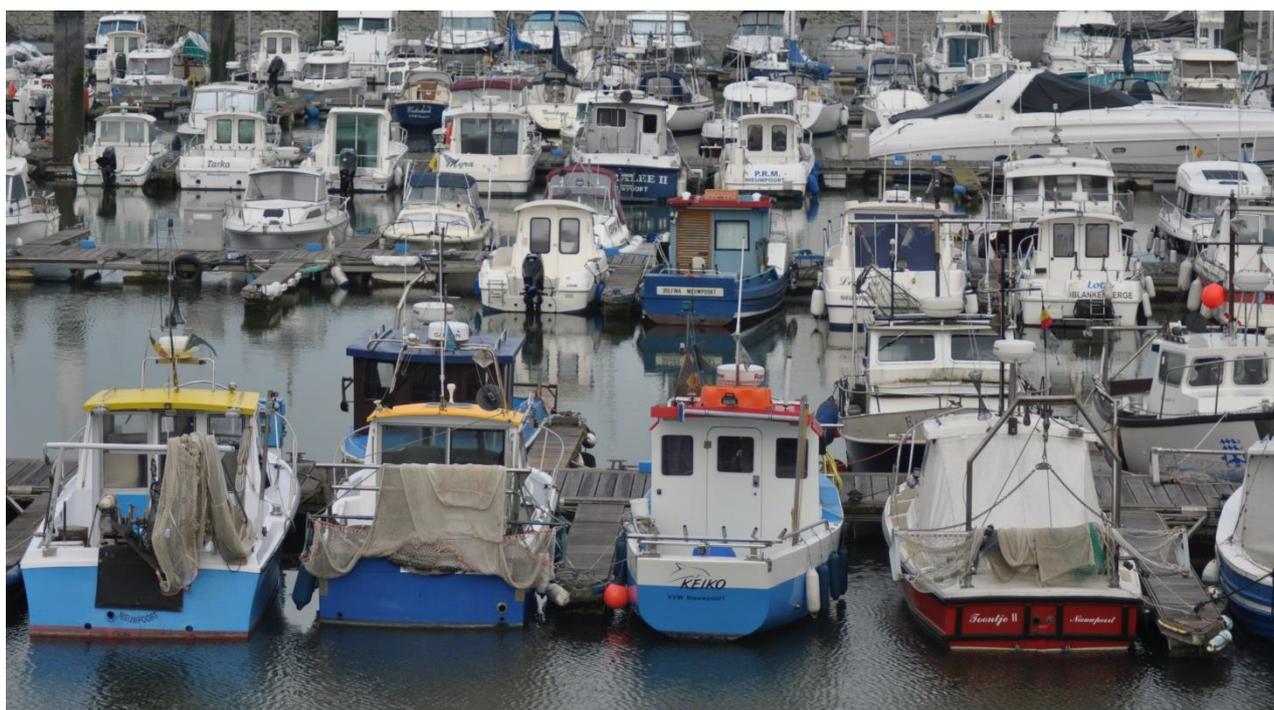


Recreational sea fishing in Belgium:
Monitoring the capacity, intensity and density at sea (*first results*)



Flanders Marine Institute (VLIZ)

Beleidsinformerende nota

Introduction Note

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The content of the BINs is always based on current scientific insights and reflects objective information and data concerning the requested topic. VLIZ relies as much as possible on the expertise of coastal and marine scientists within the network of marine research groups in Belgium, and Flanders in particular, but also consults international experts if need be.

BINs reflect the impartial and objective position of VLIZ and are strongly motivated by the basic principles of sustainability and an ecosystem based approach, as endorsed by the European Integrated Maritime Policy and the best principles of coastal zone management.

More information about the core business, principles and boundary conditions of the VLIZ:

http://www.vliz.be/EN/About_VLIZ/VLIZ_Mission

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CONTENT OF THE REPORT

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RECREATIONAL SEA FISHING IN BELGIUM: CAPACITY, INTENSITY AND DENSITY AT SEA (*FIRST RESULTS*)

1. Research Question

The size and impact on the marine ecosystem of the Belgian recreational fisheries sector are still unknown. However, a better insight into the spatial use, scope and catches can greatly contribute to the marine spatial planning process (including with regard to marine protected areas). In addition, the European Commission obliges Member States to collect data concerning recreational fisheries so as to further develop the fisheries policy. The Marine Strategy Framework Directive, in turn, obliges every European Member State to establish a marine strategy aimed at the protection, conservation and restoration of the marine environment with an eye to achieving good environmental status by 2020 with a special focus on the sustainable use of marine waters. Within the scope of these obligations, Belgium has to present a programme of measures in 2015 which will include the monitoring of recreational fisheries. The GIFS project (2012-2014) (Interreg IVa 2 Seas; *Geography of Inshore Fisheries and Sustainability*) and the LIVIS project (2015) (European Fisheries Fund – Axis 4; *Low-impact Fishing*), the first results of which will be presented in this report, provide an important impetus for complying with the above obligations by systematically mapping the size and activities of the recreational fishing fleet.

2. Scope and definitions

2.1 Scope

The following results are based on monitoring activities conducted by VLIZ in the period from April 2014 to April 2015. This PIB is only aimed at the monitoring of recreational fishing vessels. The purpose of the observations was to gain insight into the size of the recreational fishing fleet (capacity), the number of movements of recreational fishing vessels (intensity) as well as the geographic location of fishing spots in the Belgian part of the North Sea (density). Shore angling, whether or not in combination with other beach fishing techniques (and in the intertidal zone), is considered to contribute significantly to the total recreational catches, but is not part of this specific study. The assessment of catches requires further research and is not discussed here as a result.

2.2 Definitions

Recreational fisheries: the capture of living marine resources for non-commercial purposes, i.e. for personal consumption. This can include various fishing techniques such as angling, the use of towed gear, gathering by hand, passive fishing methods (nets, pots, longlines), etc. Within the context of this publication, the focus is on recreational fisheries using vessels.

Recreational fishing vessels: vessels visibly equipped to fish at sea for recreational purposes, including charter vessels. This excludes any vessel with an identification number which refers to a commercial activity, including identification numbers referring to a foreign home port such as in case of professional hand liners sailing under the Dutch flag. Recreational vessels include boats equipped for angling at sea and for towing fishing gear (beam trawl or otter trawl). Yachts and sailing ships which are not visibly equipped to carry out fishing activities but may be sporadically used for angling at sea are not included in this monitoring.

Recreational beam trawlers: vessels of 8 metres or less in overall length which do not have a fishing licence for commercial sea fishing and are equipped with 1 beam trawl whose beam is maximum 3 metres long. These dimensions are legally defined at the national level (Royal Decree (RD) of 14 August 1989). In the Netherlands, for instance, the maximum length of the beam is only 1.5 m (Regulation of 19 September 2008).

Recreational otter trawlers: vessels which do not have a fishing licence for commercial sea fishing and are equipped with 1 otter trawl whose headline, including slings and cables, is maximum 4.5 m long. These dimensions are legally defined at the national level (RD of 14 August 1989). In the Netherlands, for instance, the maximum length of the headline is only 2.25 m; in addition, a maximum otter board height of 70 cm has been imposed (Regulation of 19 September 2008).

Capacity: the number of equipped recreational fishing vessels based at one of the 4 Belgian coastal marinas (Nieuwpoort, Ostend, Blankenberge and Zeebrugge) supplemented by Belgian vessels observed during intensity monitoring (e.g. vessels transported by means of a trailer) and observations at sea.

Intensity: the number of observed inbound and outbound movements of recreational fishing vessels at the 4 Belgian coastal marinas as observed during the harbour monitoring. These monitoring data are subsequently used to calculate the number of fishing trips on an annual basis.

Density: the relative concentration of recreational fishing vessels in the Belgian part of the North Sea. This includes on-the-spot observations linked to a 1x1 km² grid (vessels per grid cell) and standardised according to the monitoring effort (i.e. number of passages of the research vessel per grid cell), resulting in the possibility that a recreational vessel is observed in case of a single passage through a specific grid cell (see 4.3. *Methodology – Positioning at sea* and 7. *Density of recreational fishing vessels in the Belgian part of the North Sea*).

Trailer vessels: recreational vessels which are launched directly from trailers via a trailer ramp and are consequently not moored at one of the coastal marinas.

3. Introduction

3.1 European context

The Common Fisheries Policy (CFP; Regulation (EU) N° 1380/2013) pursues environmentally, economically and socially sustainable fisheries within the European Union (EU). In addition, the CFP stimulates small-scale fisheries, requiring Member States to give preferential access for small-scale, artisanal and coastal fishermen, since traditional fishing activities are crucial to the social and economic development of certain coastal communities. Furthermore, the CFP should contribute to a fair standard of living for those who depend on fishing activities, bearing in mind coastal fisheries and socio-economic aspects.

The CFP recognises that recreational fisheries can have a significant impact on fish stocks, and stipulates that Member States should ensure that these fisheries are conducted in a manner that is compatible with its objectives. The European fisheries policy is based on scientific data gathered by EU Member States within the scope of the Data Collection Framework (DCF) (Council Regulation (EC) N° 199/2008; Commission Regulation (EC) N° 665/2008; Commission Decision 2010/93/EU) which is currently being revised by the European Commission (EU multi-annual programme; EU-MAP). The collection of data on recreational fisheries is also imposed within this framework. Mapping and monitoring the activities of this sector will contribute to the support of the CFP as well as to the implementation of the Marine Strategy Framework Directive (2008/56/EC), the Habitats Directive (92/43/EEC) and the Maritime Spatial Planning Directive (2014/89/EU). The allocation of marine protected areas (Natura 2000) for the protection of stocks and habitats requires detailed information on all spatial activities, including recreational fisheries.

Recent international studies have shown that for some species, recreational sea fishing represents a significant share of total catches in certain regions (see *inter alia* ICES 2014). This is for example the case for sea bass, for which the combined recreational catch (fish retained on board, excluding discards) in France, the Netherlands, Belgium and Britain is estimated at 1,400-1,500 tonnes, which corresponds to 25% of total catches. The recreational catch of cod in the western Baltic Sea also represented approximately 25% of the total biomass removal from this population in 2010 (ICES 2010; 2011; 2012; 2013; Sparrevohn and Storr-Paulsen, 2012; Strehlow *et al.* 2012).

3.2 National context

In Belgium, recreational fishing is not subject to reporting obligations, which has resulted in an underestimation of total catches, fishing mortality and the environmental impact. So far, only limited research has been conducted on the extent and impact of recreational sea fishing at the national level. Recreational cod catches were initially estimated at 100 to 200 tonnes annually (ILVO, 2007). A wider inventory of recreational fisheries was carried out by Van Den Steen (2010) and has served as a basis for the annual DCF survey (ILVO). The results of the annual DCF survey aimed at recreational fisheries provide insight into the target species and individual socio-economic situations of the respondents; however, extrapolation to the entire sector is impossible because the actual size of the sector is unknown. Contrary to the monitoring results presented in this publication, no on-site surveys have been carried out so far within the scope of the DCF, so that both initiatives can be considered complementary. The recreational shrimp

and flatfish catches were estimated in Lescauwae *et al.* (2013). However, the magnitude of the total recreational fishing sector has not yet been mapped.

In addition to mapping the extent and the efforts of recreational sea fishing from vessels (see 2. *Scope and definitions*), the LIVIS project is also aimed at investigating a potential transition from recreational fisheries and the large-scale fisheries segment to a small-scale commercial fisheries segment in Belgium, cf. one of the objectives of the CFP (stimulating coastal fisheries) and De Snijder *et al.* (2014) (*Vistraject*).

4. Methodology

4.1 Capacity measurements

The size of the recreational fishing fleet was mapped by means of observations in the 4 coastal marinas (Nieuwpoort, Ostend, Blankenberge and Zeebrugge) (Figure 1). In addition to the marinas, potential berths outside the marinas were also monitored where this was deemed necessary. Each marina was visited several times in order to create a complete list of the recreational fishing vessels. The vessels were inventoried in the period of March – July 2014. Where necessary, access to the landing stages was granted by the yacht club in question. These on-site observations made it possible to map every boat equipped for recreational fishing. The records are kept in a non-public database. Recreational fishing vessels added to the list later on were observed during intensity measurements (see 2.2 *Intensity measurements*) or during observations at sea (see 2.3 *Positioning at sea*).



Figure 1: Image of the 4 coastal marinas (Nieuwpoort, Ostend, Blankenberge and Zeebrugge). The yellow areas represent the marina, the red areas indicate areas outside the marinas that have also been mapped (satellite images from 2009)

Whenever possible, the following information was collected for each vessel:

- Observation date
- Location
- Name
- Registration number
- Brand
- Fishing gear (fishing rod, beam trawl, otter trawl, combination of angling and fishing with towed gear) with further specifications depending on the equipment type:
 - Number of rod holders
 - Type of otter trawl (wood, metal, metal with profile)
 - Boiler and sieve possibly on board
- Dimensions
- Power
- Comments

Based on data from the website www.vissersvaartuigen.nl/vaartuigen/, 2 of the boats identified in 2014 have been deleted from the list of recreational fishing vessels in 2015 as they have recently obtained a Dutch license for professional pole-and-line vessels and are therefore no longer covered by the definition of recreational fishing vessels.

4.2 Intensity measurements

Intensity measurements are the result of 12-hour continuous observations in the marinas (from 5 am to 5 pm). Such continuous observations make it possible to calculate the number of inbound and outbound movements as well as the time spent at sea for a large number of observed vessels. The measurements have been conducted on weekdays, weekends and public holidays as well as under different weather conditions so as to gain an insight into the accompanying variations in the number of active vessels (Table 1). However, the current observations are limited and have to be continued over the next few years in order to provide a representative image of the real intensity. Consequently, these first results need to be regarded as preliminary.

Table 1: Overview of the number of ship movements (inbound and outbound movements) by recreational vessels during harbour observation days. Inbound and outbound movements by one and the same ship are interpreted together as 1 movement, so that the figures below give an indication of the number of active recreational fishing vessels on a given day.

Date	Nieuwpoort	Ostend	Blankenberge	Zeebrugge	Number of vessels	Wind (bft)
20/05/2014	22	16	22	17	77	3-4
14/06/2014		8			8	4
15/06/2014			0		0	5
8/07/2014	13	5	7	7	32	2-3
21/07/2014		0			0	4-5
26/07/2014	20				20	4
27/07/2014				5	5	3
2/10/2014	26	11	30	13	80	1-2
20/10/2014		1			1	4-5
30/10/2014		16			16	3
21/01/2015	30				30	2-3

The following elements have been registered during the on-site observations:

- Date
- Location
- Name (link to data in the capacity database)
- Time of inbound and outbound movements
- Coming from a trailer or berth in harbour
- Number of persons on board
- Number of fishing rods on board
- Meteorological and oceanographic conditions

4.3 Positioning at sea

Positioning of recreational fishing vessels at sea is carried out from the research vessel 'Simon Stevin'. So far, 24 observation days have taken place, 21 of which have been selected for the presentation of the interim results. Three trips took place in winds of ≥ 5 Beaufort and resulted in zero observations. Since all observations (intensity measurements and positioning) and the interviews indicate 4 Beaufort as the maximum permissible wind force, no trips will take place in the future in case of a higher wind force, which justifies not taking into account these 3 cruises. The observation days at sea took place between May 2014 and April 2015 (Table 2).

Table 2: Overview of the observation days with the research vessel 'Simon Stevin'

Days at sea	Date	Observations	Wind force (Bft)
1	26/05/2014	2	4
2	2/06/2014	52	2
3	3/06/2014	36	3
	17/06/2014	0	5-6
4	19/06/2014	13	3
5	16/07/2014	30	2
6	17/07/2014	71	2
7	18/07/2014	11	3
8	23/07/2014	6	4
9	24/07/2014	10	4
10	19/09/2014	19	1
	22/09/2014	0	6
11	29/10/2014	0	3
12	31/10/2014	15	3-4
13	24/11/2014	5	2-3
	26/02/2015	0	5
14	9/03/2015	7	1-2
15	10/03/2015	6	2-3
16	11/03/2015	8	3
17	23/03/2015	31	3
18	24/03/2015	1	3
19	8/04/2015	6	1-2
20 ¹	9/04/2015	20	2-3
21 ¹	10/04/2015	6	2-3

¹ Route data not yet processed

Positioning takes place by registering the time, distance and angle with respect to the direction of RV Simon Stevin at the moment of the observation. These parameters are subsequently linked to the route data of RV Simon Stevin (time, coordinates, direction with respect to the north), which makes the calculation of the final coordinates possible (Figure 2).

During the observations, a distinction is made between sea anglers on the one hand and boats making use of towed gear on the other; in addition, it is recorded whether the vessel in question is actively fishing or is in transit. Whenever possible, the number of fishing rods and the number of persons on board the vessel are registered as well.

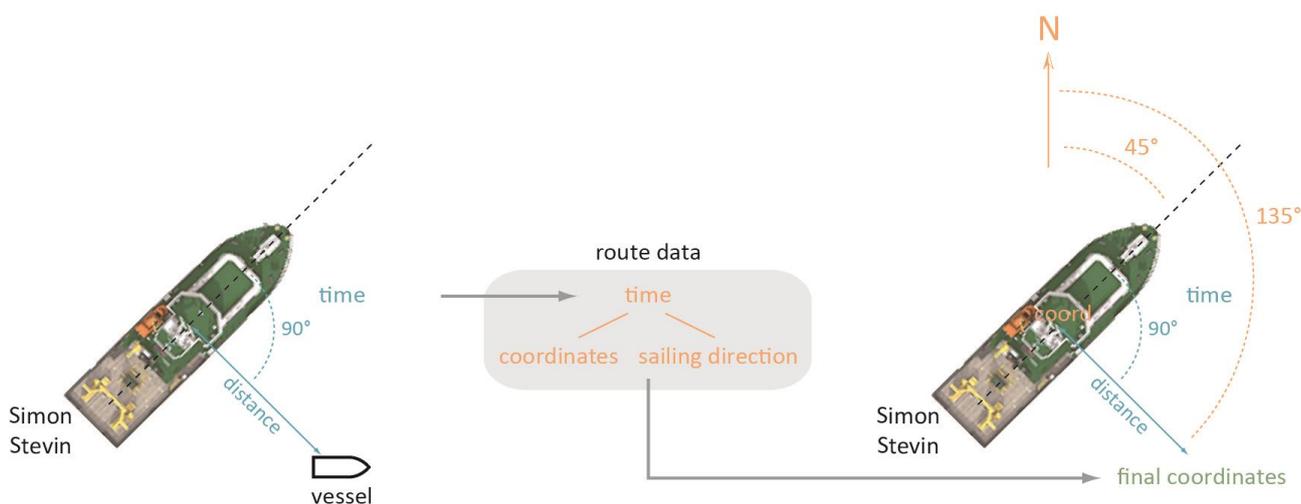


Figure 2: On-site positioning of recreational fishing vessels

However, the quantitative data (i.e. the number of vessels) gathered during these surveys cannot be interpreted in the same manner as the intensity data gathered by means of harbour observations. The latter provide a total image of the number of outbound movements on a given day, while the number of boats observed from RV Simon Stevin is strongly determined by the route followed on a given day. As a result, only an unknown fraction of the total number of active recreational fishing vessels is registered. It is therefore important not only to provide an overview of the individually registered fishing locations (Figure 10) but also to standardise with regard to effort (the number of passages of RV Simon Stevin) (Figure 12). To this end, a 1x1 km² grid has been linked to the route data of RV Simon Stevin, taking into account a 3 km visibility radius (both on the port and starboard sides), which results in the ‘number of passages per grid cell’. The number of observations per grid cell is calculated by combining the grid with the calculated final coordinates of the actively fishing vessels observed. For each grid cell, the relative probability of observing a recreational fishing vessel in case of a single passage is calculated on the basis of the ratio ‘number of actively fishing vessels observed per grid cell’ / ‘number of passages per grid cell’ (cf. Breen *et al.*, 2015). The reliability of the data is determined by the number of passages with the research vessel and is visualised in Figure 11.

5. The Belgian recreational fishing fleet

5.1 Size of the recreational fishing fleet

The 4 coastal marinas in Belgium/Flanders provide space for 3,553 pleasure craft, with Nieuwpoort accounting for over half of the total number of berths (Table 3) (Westtoer 2014). However, in terms of the number of equipped recreational fishing vessels, Blankenberge had the highest score in 2014 with 233 vessels, followed by Nieuwpoort (197), Zeebrugge (94) and Ostend (83). In percentage terms, Nieuwpoort had the lowest proportion of recreational fishing vessels (10.9%), while Zeebrugge had the highest score (29.8%). The last figure was probably an overestimation (see Table 3¹). In general, it is fair to say that approximately 17% of pleasure craft with a berth at the Belgian coastal marinas was equipped for recreational fishing in 2014.

Table 3: Overview of the number of berths at the coastal marinas (Westtoer 2014) and the share of recreational fishing vessels

Harbour	Number of berths	Percentage	Recreational fishing vessels	% compared to total number of berths per harbour
Nieuwpoort	1,813	51.0	197	10.9
Blankenberge	950	26.7	233	24.5
Ostend	475	13.4	83	17.5
Zeebrugge	315	8.9	94	29.8 ¹
TOTAL	3,553	100.0	607²	17.1

¹ Landing stages at Tijdokstraat and Werfkaai were not included in the calculations by Westtoer, while several recreational fishing boats are moored here; this results in an overestimation of the percentage.

² Only with regard to vessels with a berth in the coastal marinas. Trailer vessels were not taken into account (see below).

In addition to the 607 unique recreational fishing vessels inventoried in the coastal marinas, other Belgian vessels have been mapped as well. For instance, 19 vessels were launched via a trailer ramp during the intensity measurements. Another 5 vessels were observed from RV Simon Stevin during the observations at sea. This brings the preliminary total number of inventoried recreational fishing boats to **631 vessels**. The real number of recreational fishing vessels not based at one of the coastal marinas and transported by trailer is difficult to assess. However, just 6.8% of the boats observed during the intensity measurement were launched from a trailer, which suggests that the actual number is considerably lower than the number of vessels based at one of the marinas.

It should be pointed out that the recreational fishing fleet is dynamic. In the last few years, a major shift has taken place and particularly the number of recreational trawlers has fallen sharply due to the ban on the use of dyed fuel, which has raised the costs (Law of 27 December 2004 as amended by the Law of 8 June 2008). Incoming young recreational fishermen primarily focus on sea angling, whereby the share of trawlers decreases. Recent legal proceedings, such as the limitation of recreational catches of sea bass to 3 pieces per person a day (Regulation (EU) 2015/104 as amended by Council Regulation (EU) 2015/523) in addition to the current national daily limit (Ministerial Decision (MD) of 18 December 2014), will possibly also have an impact on the recreational fishing fleet.

5.2 Fishing gear

In terms of fishing gear, the inventoried boats can be divided into 5 categories: (1) angling, (2) otter trawl, (3) beam trawl, (4) combination of angling and beam trawl, (5) combination of angling and otter trawl (Figure 3). Pole-and-line vessels are by far the largest group (83.8%), followed by vessels equipped with otter trawls (8.4%) and beam trawls (4.6%), and finally the multipurpose vessels, visibly equipped to combine several fishing techniques (3.1%). The occurrence of recreational beam trawlers and otter trawlers in Belgium seems to be atypical when compared to the recreational fleet in other EU Member States (pers. comm. ICES WGRFS).



Figure 3: The fishing gear on board the inventoried vessels (2014-2015)

Figure 4 provides an overview of the various vessel types per coastal marina, including trailer vessels and boats observed at sea. The dominance of vessels used for sea angling is clear in each harbour. The number of rod tubes on board vessels varies greatly. The number of rod holders could be counted for 77% (421 boats) of 549 vessels equipped for sea angling (including a combination with beam trawl or otter trawl) (Figure 5). For some vessels, the exact number could not be determined, no use was made of rod holders, or only click systems that had been removed at the moment of observation were used; these vessels are indicated with 0 in Figure 5. If only boats with rod holders are taken into account, the average number of holders per vessel is 9 pieces; the median is 8 pieces. The relative use of these holders (the ratio between the number of rods and the number of holders) strongly depends on the target species of a specific fishing trip.

The observations in Zeebrugge indicate the absence of recreational beam trawlers, while Nieuwpoort is by far the principal harbour for this type of fishing gear. Blankenberge is the main harbour for otter trawlers. Out of 62 otter trawlers (including a combination of pole and line and otter trawl) based at one of the coastal marinas, 24 vessels make use of wooden otter boards and 29 of metal otter boards (20 of which straight otter boards and 9 with a profile), while the type of otter board is unknown for 9 boats. Of all vessels that used towed fishing gear, 49% had a

sieve and 69% had a boiler on board at the moment of observation. The separator trawl was clearly visible on a number of vessels. The requirement to use the separator trawl applies between 1 December and 31 May (MD of 8 July 2002).

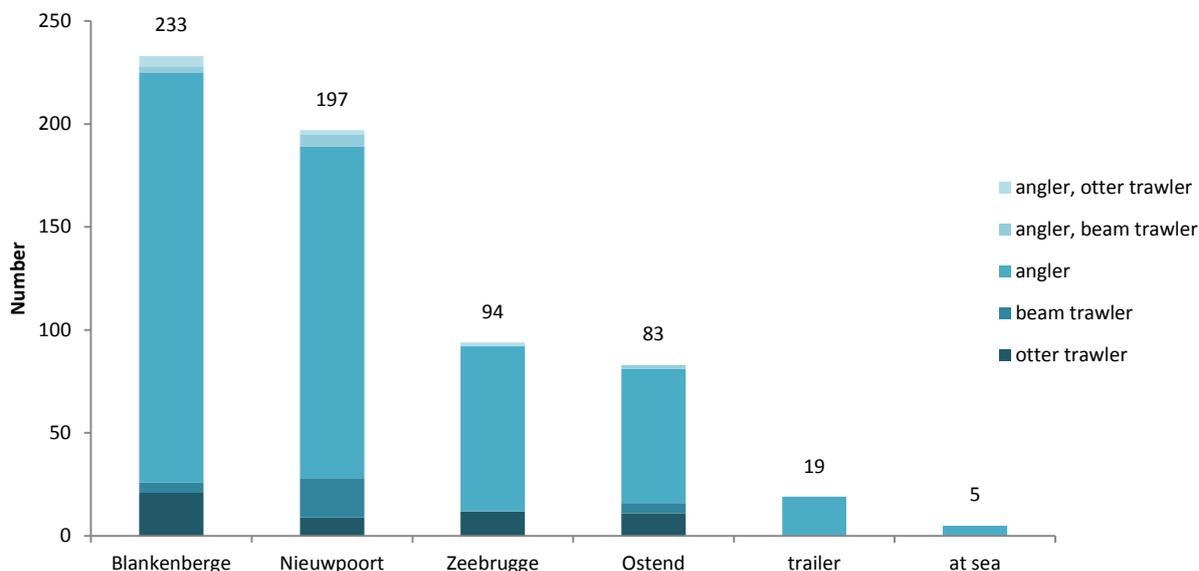


Figure 4: The fishing gear on board the inventoried vessels per coastal marina, including trailer vessels and observations at sea (2014-2015)

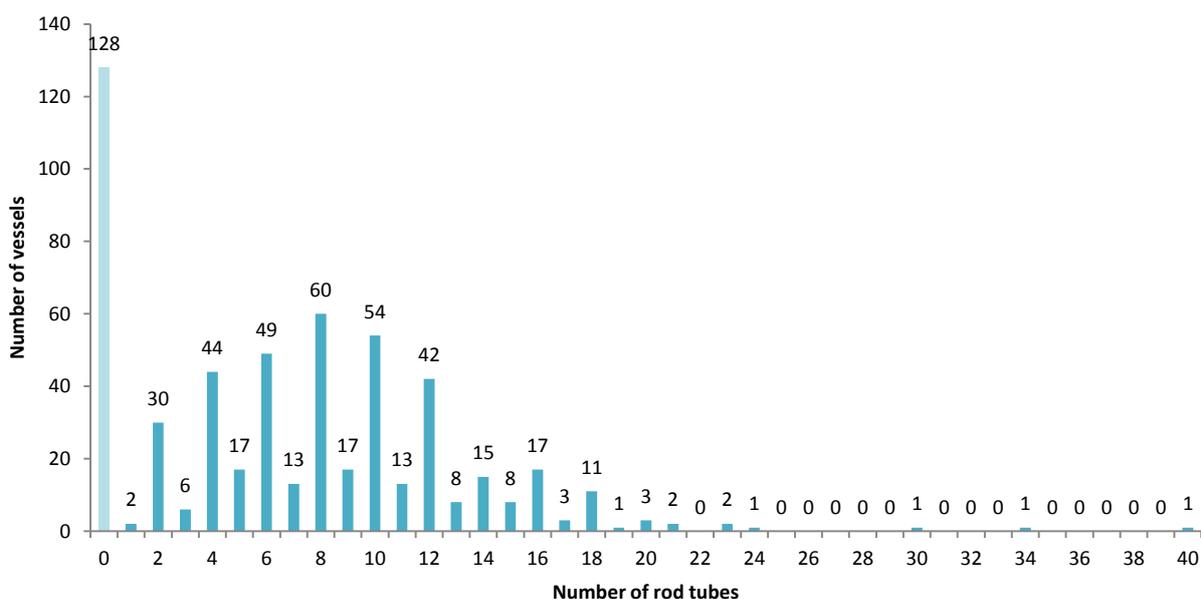


Figure 5: Number of rod holders installed on pole-and-line vessels (2014-2015)

5.3 Dimensions of the vessels

The RD of 14 August 1989 states that the maximum length of beam trawlers that do not have a fishing licence is 8 m. The exact length of only a few beam trawlers could be determined because these are mostly older ships whose brand (and series) is not indicated on the ship. The length of otter trawlers may exceed 8 m.

The dimensions also determine whether a vessel may proceed to sea or not in certain weather conditions. The RD of 14 August 1989 stipulates that rowing boats of any size as well as pleasure craft whose overall length is less than or

equal to 6 m may not proceed to sea in case of onshore winds of Beaufort force 3 or offshore winds of Beaufort force 4 or higher.

The dimensions of 49.4% of the vessels could be determined (Figure 6). 98% of these are pole-and-line vessels, since the dimensions of trawlers could not be established for the above-mentioned reason. The average vessel length is 7.23 m; the median is 6.93 m. Only 36 vessels whose length could be determined are less than 6 m long and are consequently subject to the above-mentioned limitation as stipulated in the RD of 4 August 1981. Most of the vessels (72%) are between 6 and 8 m long. It is not entirely clear what the division would look like if the longitudinal dimensions of all ships were known, but the share of ships of a length between 7 and 8 m would probably increase most.

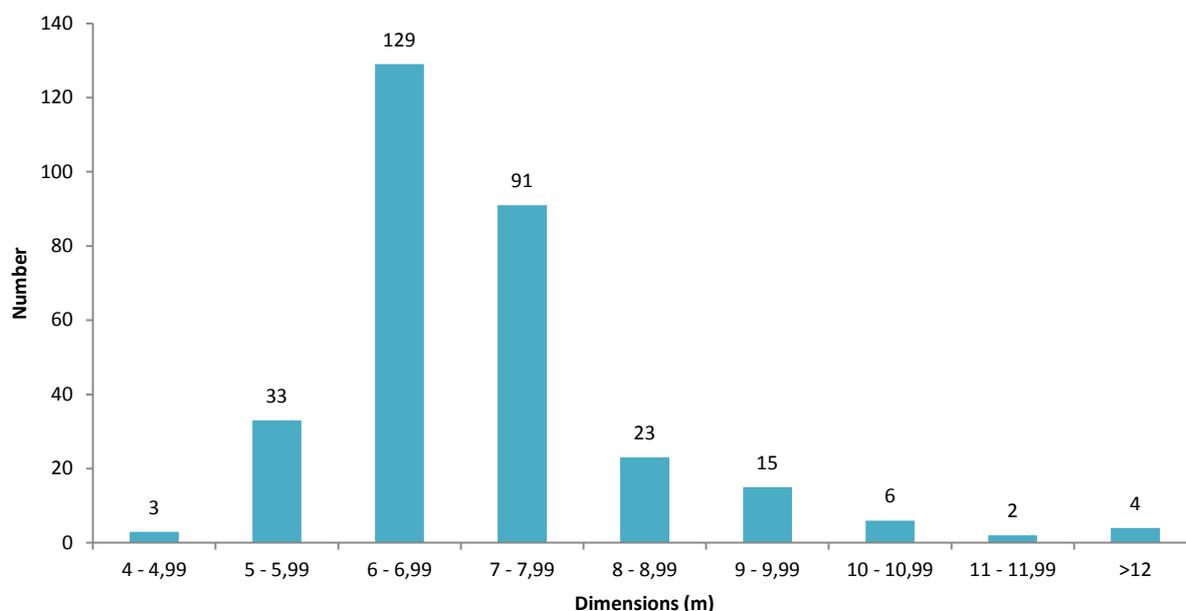


Figure 6: Dimensions of the inventoried vessels (2014-2015)

5.4 Engine power

Mapping the engine power of the different vessels has been carried out taking the legal limitation of engine power (<221 kW/300 hp) as stipulated by the RD of 19 April 2014 into account. The objective of this RD is to establish safety conditions for professional sea angling in a limited cruising area, and as such provides a first framework for the transition from recreational fisheries to the commercial segment. The possibilities and bottlenecks for such a transition are currently examined within the LIVIS project, so this subject will not be discussed further here.

The engine power of 257 vessels (40.7%) could be determined (Figure 7). This rather low figure is mainly the result of the use of inboard engines whereby the engine power could usually not be deduced. Interviews with several boat owners have resulted in additional data, including with regard to boats with inboard engines.

The average power of the vessels taken into account is 155 hp with a median of 115 hp. Over half of the vessels (59%) have an engine power ranging between 50 and 150 hp, while 30% have an engine power ranging between 150 and 250 hp (Figure 7). It is unclear how the categorisation of the engine power would change if all ships were taken into account. In all probability, trawlers will mostly have an engine power of less than 200 hp, while a few well-equipped pole-and-line vessels will easily exceed the 250 hp limit.

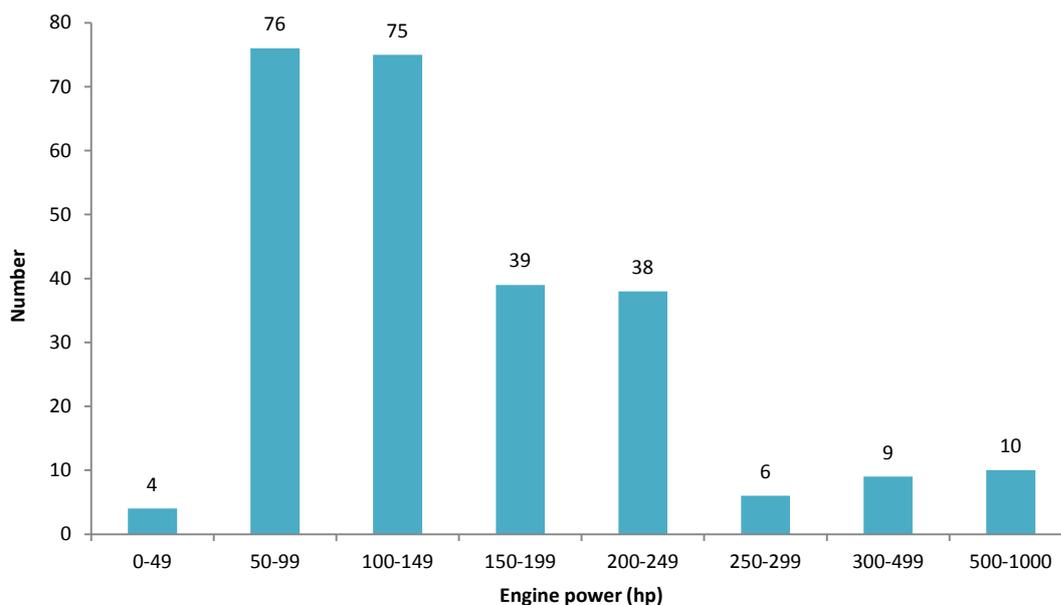


Figure 7: Engine power of the inventoried vessels (2014-2015)

6. Fishing intensity

The intensity measurements are primarily aimed at the assessment of the number of movements of recreational vessels to and from the Belgian coastal marinas. The raw observation data are presented in Table 1 (see 2.2 *Methodology – Intensity measurements*). Due to the limited number of observation days, the data below need to be regarded as preliminary.

A total of 269 ship movements have been registered so far (inbound and outbound movements on the same day are considered 1 movement) during the observations in the coastal marinas. Simultaneous observations took place in the 4 coastal marinas over a period of 3 days (Table 1). This enables us to make a first estimation of the average relative importance of each separate harbour: Nieuwpoort accounts for an average of 34% of the ship movements, followed by Blankenberge (29%), Zeebrugge (20%) and Ostend (17%). Based on these relative values, extrapolation can be used to estimate the number of ship movements in the other harbours for the days when observations took place in 1 harbour. For this exercise, only the observation days with winds of ≤ 4 Beaufort have been taken into account, since monitoring in the harbours (see Table 1) and at sea as well as interviews with recreational fishermen have demonstrated that vessels do not proceed to sea in case of winds of Beaufort force 4 or higher. The extrapolation of the number of ship movements has resulted in an average of approximately 63 active vessels a day. The number of potential days at sea a year has been calculated on the basis of the average number of days with wind speeds of ≤ 5.5 m/s (4 Beaufort) over a period of 12 years (2002-2013) at the Zeebrugge Weather Station. This approach has resulted in 171 potential days at sea a year. A first estimation of the number of ship movements a year is calculated by multiplying the number of potential days at sea by the number of active vessels a day, resulting in 10,735 ship movements on a yearly basis.

In almost all cases the number of persons on board the vessels could be determined (Figure 8). On average, 2.4 persons were on board a vessel, with a median of 2 persons. In 78% of the cases, only 1 or 2 persons were spotted on board. The average number of persons on board combined with the number of ship movements enables us to estimate the average number of individual fishing trips a year from the coastal marinas: 25,765 individual fishing trips a year. However, the observations indicate there is a clear difference between weekdays on the one hand and weekends on the other, with an average of 2.0 and 4.9 persons having been counted on board a vessel respectively. This difference has not yet been taken into account in the calculation of the number of individual fishing trips a year due to the limited number of observations. Nevertheless, this figure points to a considerably lower number of individual fishing trips (and as a result also fishermen) in comparison to the neighbouring countries (e.g. the Netherlands: >500,000 recreational sea fishermen (van der Hammen and de Graaf, 2015); United Kingdom: >1 million recreational fishermen (Armstrong et al., 2013)), which is inextricably linked to the limited Belgian coastline (65 km),

the limited number of coastal marinas and the fact that motorised boats without a berth can only be launched via the trailer ramps in these harbours. Note that coastal anglers have also been taken into account in these foreign studies.

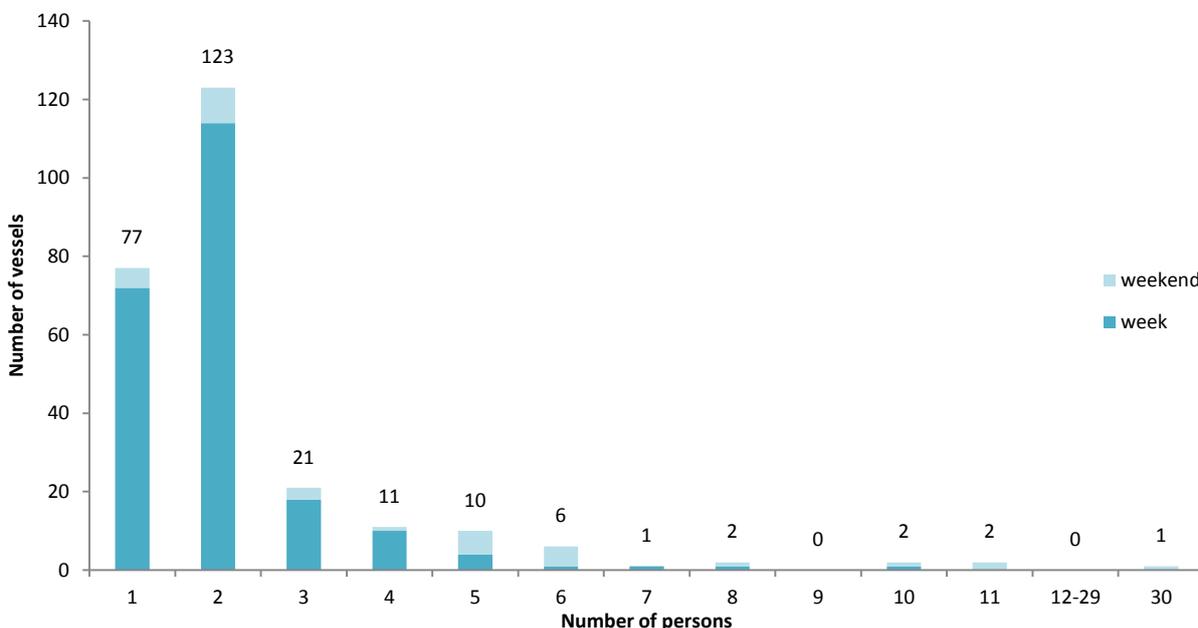


Figure 8: Number of persons on board a vessel (2014-2015)

In over 60% of the cases, an exact time registration of both the inbound and outbound movement of a vessel was possible. If the outbound movement took place before 5 am or if the inbound movement took place after 5 pm, only 1 time could be registered, so that only the minimum time at sea could be determined for these vessels. These combined registrations have consequently resulted in an average minimum time at sea (Figure 9). Note that this time does not correspond to the actual fishing time, but partly depends on the distance to the real fishing location, the catches, the engine power, the oceanographic conditions, etc. On average, a single fishing trip by a pole-and-line vessel (7h 14min) takes over 2 hours longer than a trip by a trawler (4h 59min). Only Zeebrugge has bucked the trend. This is probably because both moles extend far into the sea (so vessels have to sail further) and because of the considerable slower speed of trawlers compared to most pole-and-line vessels, which results in longer times at sea in comparison with the other marinas.

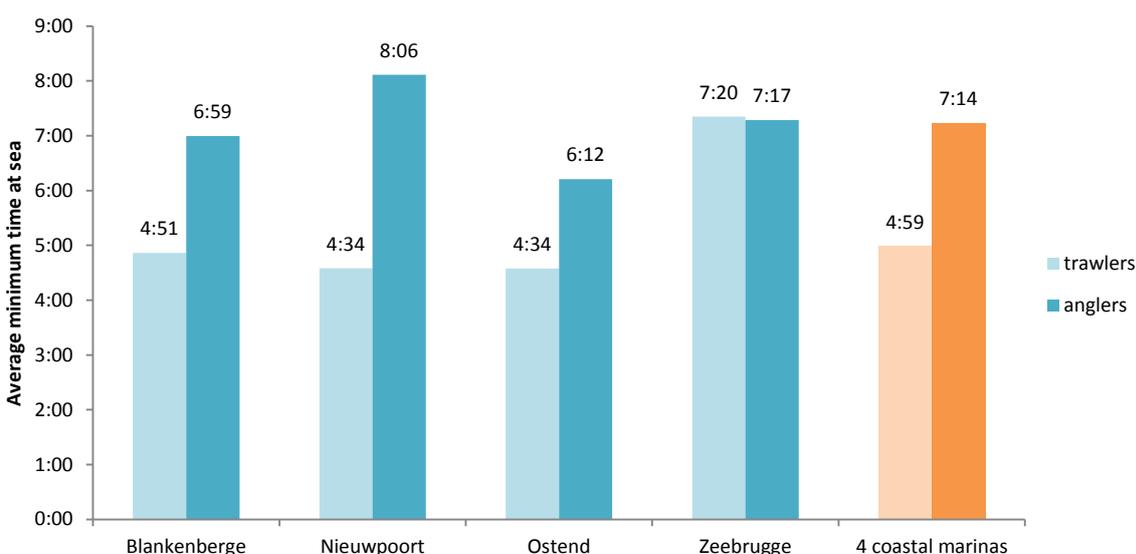


Figure 9: The average minimum time at sea for the different coastal marinas, with a distinction between pole-and-line vessels and trawlers (2014-2015)

7. Density of recreational fishing vessels in the Belgian part of the North Sea

Within the scope of the marine spatial planning process, it is very important that detailed spatial information is collected on all industrial, scientific and recreational activities in the Belgian part of the North Sea (BNS) so as to better assess the cumulative impact of various activities on a particular area as well as to create synergies. It is therefore also important to gather geographical data concerning the recreational fishing locations in the BNS by means of systematic monitoring.

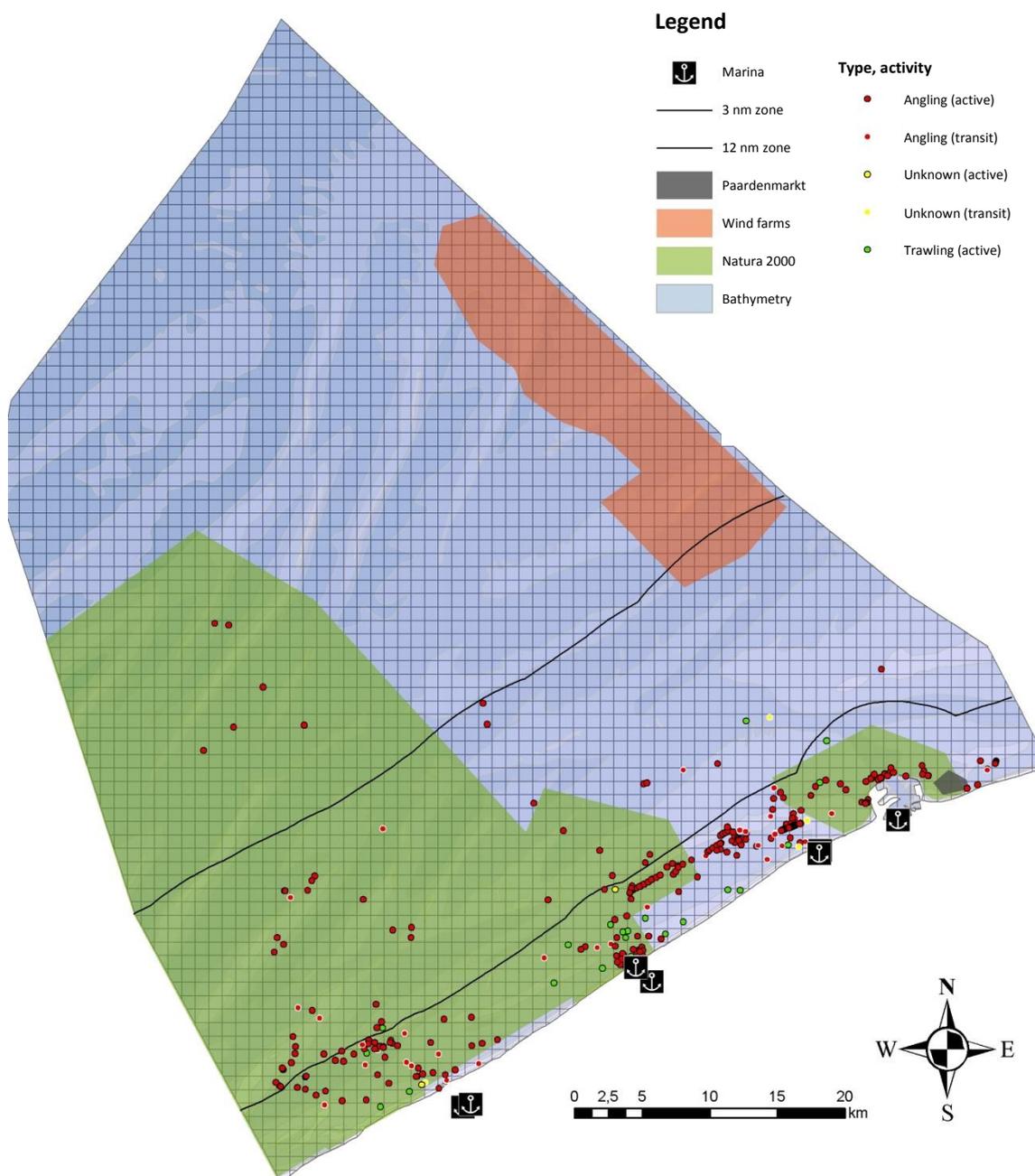


Figure 10: Individual observations of recreational fishing vessels (2014-2015)

A first insight into the principal fishing locations in the BNS has been obtained on the basis of the 329 on-site observations collected over a period of 1 year (see 2.3 Methodology – Positioning at sea). As was the case with the observations in the marinas, mainly pole-and-line vessels were observed at sea as well (92%). In only 6% of the cases, the vessel was equipped with towed gear, and the type of fishing gear could not be determined in 2% of the cases. The highest activity was observed within the 3 nm zone (Figure 10). An additional factor is that fishing with vessels equipped with towed gear is prohibited beyond the 3 nm zone (RD of 14 August 1989). No activity was furthermore

registered in the wind farms (ban on navigation in accordance with RD of 11 April 2012), even though the individual observations strongly depend on the route followed. As can be seen on the reliability map, only the southern part of all offshore wind farm concession zones has been sporadically covered by the observation route, while the northern part has never been observed (Figure 11). In addition, this map indicates better coverage within the 12 nm zone. A considerable part of the exclusive economic zone has not yet been monitored for the positioning of recreational vessels. Monitoring this zone will probably involve changes to the density map as far as the areas of the BNS located further out to sea are concerned (Figure 12). In accordance with the RD of 20 March 2014, recreational fisheries using seabed-disturbing techniques have been banned in the 'Flemish Banks', an area covered by the Habitats Directive, except when individual authorisation has been given by the minister to applicants who are able to demonstrate that they have been active recreational shrimp fishermen for at least three years. With this authorisation, applicants may put to sea no more than 10 times a year and the authorisation is valid for no more than six years. At the Paardenmarkt munitions dump site of the eastern mole of Zeebrugge, no activities are allowed that disturb the seabed either (RD of 20 March 2014).

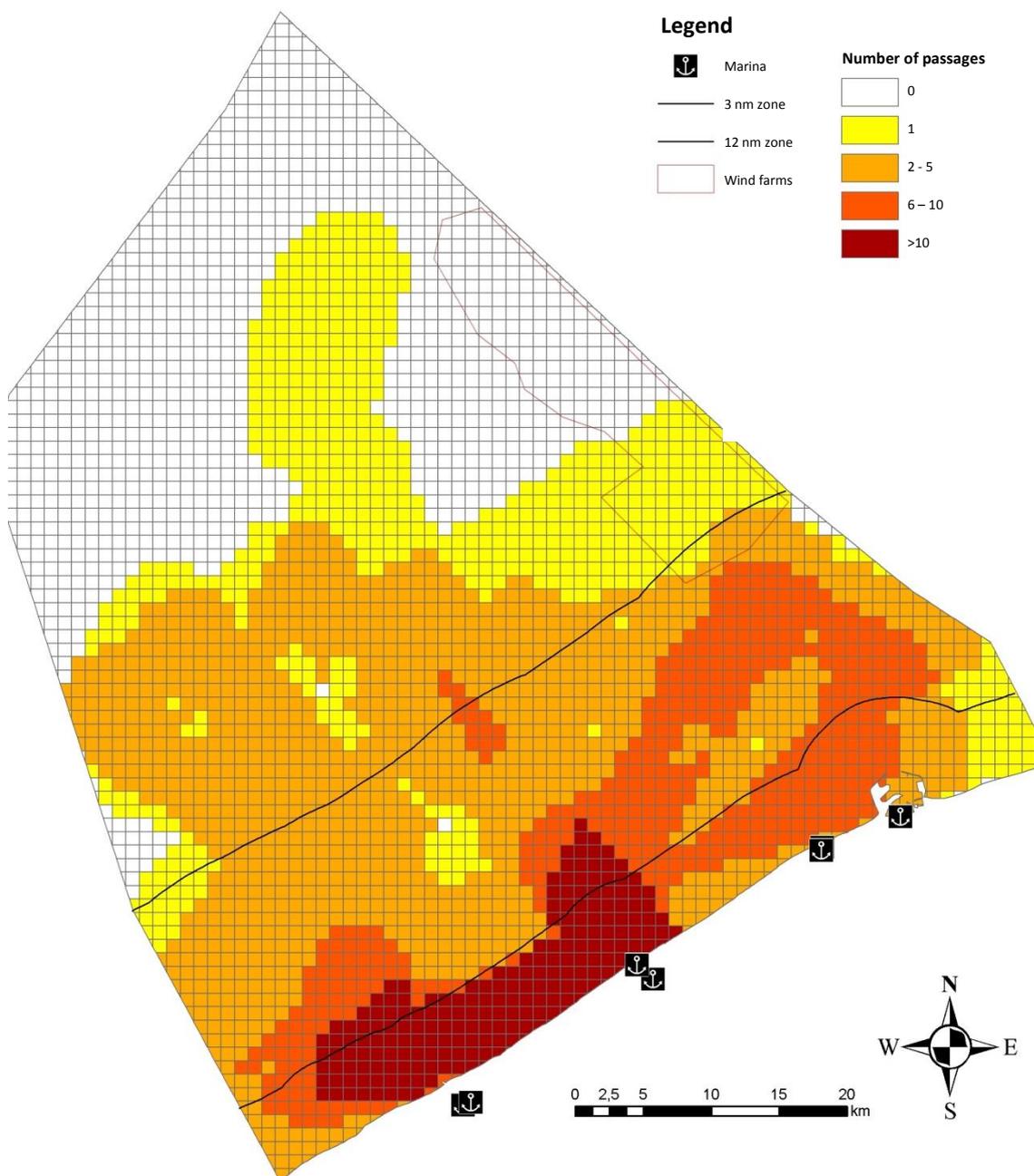


Figure 11: Degree of reliability of the observations based on the number of passages of the research vessel (2014-2015)

As already stated, the individual vessel locations strongly depend on the route selected on a given day. With this in mind, it is important to correct the number of observations at a given location with the number of passages of the research vessel through a particular marine area so as to establish density scores (see 2.3 Methodology – Positioning at sea). This score has to be interpreted as the probability that a vessel is observed in a particular area in case of a single passage (Figure 12).

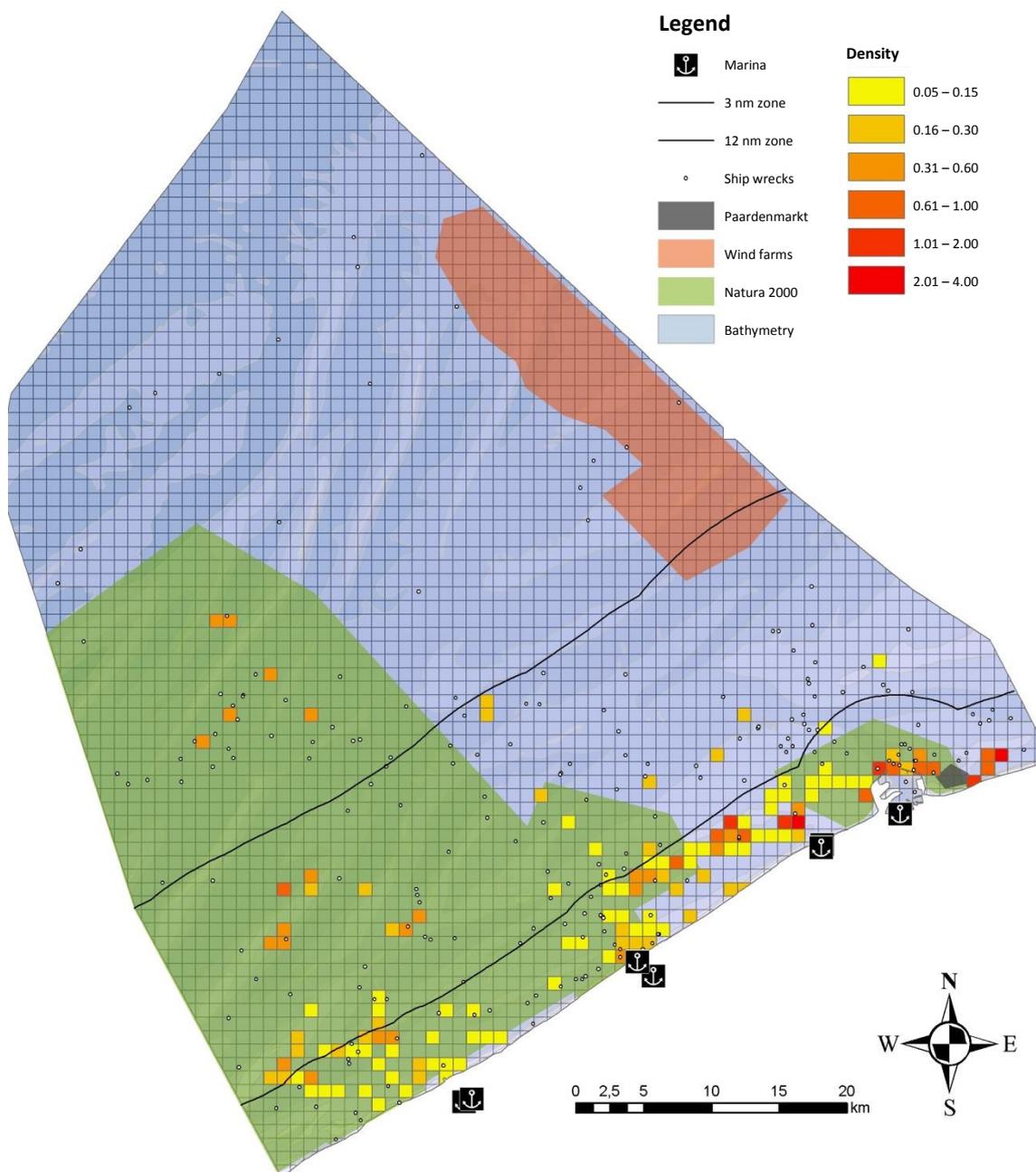


Figure 12: Density map of recreational fisheries in the BNS (only vessels fishing actively), including the positions of shipwrecks (2014-2015)

Observations beyond the 3 nm zone often plot in the vicinity of shipwrecks. However, a continuation of this systematic monitoring as well as actively involving recreational fisherman in the studies is a vital factor in better understanding the reasons for this geographical distribution.

8. Key figures

The key figures below give an indication of the magnitude and characteristics of Belgian recreational sea fisheries using vessels:

- At least 631 vessels equipped for recreational fishing have been inventoried
- Of these, 83.6% are pole-and-line vessels, 8.4% are otter trawlers, 4.6% are beam trawlers and 3.1% combine various techniques
- Blankenberge (233) and Nieuwpoort (197) are by far the principal marinas in terms of recreational fishing vessels, followed by Zeebrugge (94) and Ostend (83)
- 72% of vessels are between 6 and 8 m long
- 89% of vessels have an engine power ranging between 50 and 250 hp; the maximum engine power is 900 hp
- On average, there are 2.4 persons on board a vessel, but in 78% of cases there are ≤ 2 persons on board
- The estimated number of fishing trips for all boats is 10,735 days a year
- The estimated number of fishing trips for all individuals is 25,765 days a year
- Recreational sea fisheries mainly take place within the 3 nm zone, but further on-site research is required

9. Future and opportunities

The above-mentioned monitoring data are the result of observations that took place within a period of 1 year (April 2014 – April 2015). However, recreational fishing is characterised by strong annual variations in effort and catches (e.g. Strehlow *et al.* 2012). It is therefore important to:

- systematically maintain these monitoring activities over a time period of several years. The monitoring of recreational fisheries will also be included in the programme of measures (2015) of the Marine Strategy Framework Directive. De Snijder *et al.* (2014) also mention the importance of a more systematic data collection of recreational fisheries.
- expand the monitoring activities where necessary and actively involve recreational fishermen who have a great deal of traditional ecological knowledge. Examples from New Zealand may be taken into consideration, such as carrying out aerial surveys above the BNS or installing webcams in the harbour channels (Hartill *et al.*, 2013). After all, the main advantage of aerial surveys is that a large area can be mapped efficiently and quickly, which strongly reduces the distortion associated with the selected route of a research vessel. In New Zealand, these data are supplemented by a number of face-to-face interviews (up to 25,000 a year) at the trailer ramps. Information is collected on the fish species caught, their weight and size, as well as the fishing location, the fishing gear used and the actual duration of fishing (Hartill *et al.*, 2013). In the Netherlands, the total number of recreational fishermen has been estimated on the basis of a screening survey conducted among ~50,000 households. In addition, logbook surveys were conducted (2010-2011; 2012-2013) in which ~2,500 recreational fishermen forwarded their logbook data in digital format on a monthly basis with information on the fishing location, the time, the fishing gear, the species caught, the number of specimens and the size (van der Hammen and de Graaf, 2015).
- include recreational fishermen who fish from the coast (i.e. without a vessel) in the monitoring activities as well. No data on the magnitude of the group of recreational coastal fishermen are currently available, so that the impact of recreational fisheries is underestimated in this brief. So-called bus-route surveys can contribute to the assessment of the magnitude of this group (e.g. Kinloch *et al.* 1997). In combination with interviews or logbook data, the impact this group of recreational fishermen has on the BNS can be estimated as well.
- investigate possibilities to have this sector act as a partner or co-custodian of marine areas, since recreational fisheries are characterised by a strong link to the coastal ecosystems. This form of partnership can result in a higher degree of involvement and understanding among the parties (recreational fishermen and the government). This co-operation can also reinforce the achievement of the current EU and national policy objectives for conserving and restoring certain marine ecosystems (VLIZ, 2014) and consequently contribute to the implementation of the Habitats Directive (92/43/EEC), the Marine Strategy Framework Directive (2008/56/EC), the Common Fisheries Policy (CFP; Regulation (EU) N° 1380/2013) and the Maritime Spatial Planning Directive (2014/89/EU).

10. References

- 2010/93/: 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 [File number: 32010D0093]
- Armstrong, M., Brown, A., Hargreaves, J., Hyder, K., Pilgrim-Morrison, S., Munday, M., Proctor, S., Roberts, A., Williamson, K. 2013. Sea Angling 2012 – a survey of recreational sea angling activity and economic value in England. Department of Environment, Food and Rural Affairs.
- Breen, P., Vanstaen, K., Clark, R.W.E. 2015. Mapping inshore fishing activity using aerial, land, and vessel-based sighting information. *ICES Journal of Marine Science*, 72(2), 467-479.
- De Snijder, N., Brouckaert, E., Hansen, K., Heyman, J., Polet, H., Welvaert, M. 2014. *Vistraject. Duurzaamheidstraject voor de Belgische visserijsector*. (1st edition). Devriendt Printing, Koekelare.
- Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. [File number: 31992L0043]
- Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive). [File number: 32008L0056]
- Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning. [File number: 32014L0089]
- Hartill, B., Bian, R., Rush, N., Armiger, H. 2013. Aerial-access recreational harvest estimates for snapper, kahawai, red gurnard, tarakihi and trevally in FMA 1 in 2011–12.
- ICES 2010. Report of the Planning Group on Recreational Fisheries Surveys (PGRFS), 7-11 June 2010, Bergen, Norway. ICES CM 2010/ACOM:34. 168 pp.
- ICES 2011. Report of the Planning Group on Recreational Fisheries Surveys (PGRFS), 2-6 May 2011, Esporles, Spain. ICES CM 2011/ACOM:23. 111 pp.
- ICES 2012. Report of the Working Group on Recreational Fisheries Surveys (WGRFS), 7-11 May 2012, Esporles, Spain. ICES CM2012/ACOM:23 55 pp.
- ICES 2013. Report of the Working Group on Recreational Fisheries Surveys (WGRFS), 22-26 April 2013, Esporles, Spain. ICES CM2013/ACOM:23 49 pp.
- ICES 2014. Report of the Working Group on Recreational Fisheries Surveys (WGRFS), 2-6 June 2014, Sukarrieta, Spain. ICES CM2014/ACOM:37 62 pp.
- ILVO 2007. Resultaten van een pilootstudie over de recreatieve visserij op kabeljauw in de Belgische wateren / Results of a pilot study on the recreational cod fisheries in the waters under Belgian jurisdiction. Ministry of the Flemish Community: Ostend. 8 pp.
- Kinloch, M. A., McGlennon, D., Nicoll, G. and Pike, P.G. 1997. Evaluation of the Bus-Route Creel Survey Method in a Large Australian Marine Recreational Fishery: I. Survey Design. *Fisheries Research* 33 (1-3): 101–121.
- Koninklijk besluit van 4 augustus 1981 houdende politie- en scheepvaartreglement voor de Belgische territoriale zee, de havens en de stranden van de Belgische kust. [File number: 1981-08-04/31]
- Koninklijk besluit van 14 augustus 1989 tot vaststelling van aanvullende nationale maatregelen voor de instandhouding en het beheer van de visbestanden en voor controle op de visserijactiviteiten. [File number: 1989-08-14/45]
- Koninklijk besluit van 11 april 2012 tot instelling van een veiligheidszone rond de kunstmatige eilanden, installaties en inrichtingen voor de opwekking van energie uit het water, de stromen en de winden in de zeegebieden onder Belgische rechtsbevoegdheid. [File number: 2012-04-11/15]
- Koninklijk besluit van 20 maart 2014 tot vaststelling van het marien ruimtelijk plan. [File number: 2014-03-20/03]
- Koninklijk besluit van 19 april 2014 houdende de veiligheidsvoorwaarden voor de professionele hengeltvisserij op zee in een beperkt vaargebied. [File number: 2014-04-19/65]

Lescrauwaet, A.-K., Torreele, E., Vincx, M., Polet, H., Mees, J. 2013. Invisible catch: A century of bycatch and unreported removals in sea fisheries, Belgium 1929-2010. *Fish. Res.* 147: 161-174.

Ministerieel besluit van 8 juli 2002 houdende bepalingen wat betreft het gebruik van zeeflappen bij de garnalvisserij. [File number: 2002-07-08/32]

Ministerieel besluit van 18 december 2014 houdende tijdelijke aanvullende maatregelen tot het behoud van de visbestanden in zee. [File number: 2014-12-18/02]

Regeling van de Minister van Landbouw, Natuur en Voedselkwaliteit van 19 september 2008, nr. TRCJZ/2007/3190, houdende samenvoeging en vereenvoudiging van diverse regelingen op het gebied van de visserij (Uitvoeringsregeling visserij).

Regulation (EC) No 199/2008 of 25 February 2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy. [File number: 32008R0199]

Regulation (EC) No 665/2008 of 14 July 2008 laying down detailed rules for the application of Council Regulation (EC) No 199/2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy. [File number: 32008R0665]

Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC. [File number: 32013R1380]

Regulation (EU) 2015/104 of 19 January 2015 fixing for 2015 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in Union waters and, for Union vessels, in certain non-Union waters, amending Regulation (EU) No 43/2014 and repealing Regulation (EU) No 779/2014 [File number: 02015R0104-20150329]

Regulation (EU) 2015/523 of 25 March 2015 amending Regulations (EU) No 43/2014 and (EU) 2015/104 as regards certain fishing opportunities. [File number: 32015R0523]

Sparrevohn, C.R. & Storr-Paulsen, M. 2012. Using interview-based recall surveys to estimate cod *Gadus morhua* and eel *Anguilla Anguilla* harvest in Danish recreational fishing. *ICES Journal of Marine Science: Journal du Conseil*, 69, 323-330.

Strehlow, H.V., Schultz, N., Zimmermann, C., Hammer, C. 2012. Cod catches taken by the German recreational fishery in the western Baltic Sea, 2005-2010: implications for stock assessment and management. *ICES Journal of Marine Science: Journal du Conseil*, 69, 1769-1780.

Van den Steen 2010. Inventarisatie van de recreatieve visserij. Hogeschool Gent, Departement Biowetenschappen en Landschapsarchitectuur. Master thesis.

Van der Hammen, T., de Graaf, M. 2015. Recreational fisheries in the Netherlands: analyses of the 2012-2013 online logbook survey, 2013 online screening survey and 2013 random digit dialing screening survey. *IMARES C042/15*, pp. 55.

VLIZ 2014. Hoogtij(d) voor Kustvisserij. Position Paper GIFS INTERREG 2 Seas Project. Flanders Marine Institute (VLIZ): Ostend. 12 pp.

Westtoer 2014. Onderzoek gebruikers van kustjachthavens 2013. Westtoer: Bruges. 58 pp.

Wet van 27 december 2004 – Programmawet (File number: 2004-12-27/30)

Wet van 8 juni 2008 houdende diverse bepalingen (I). [File number: 2008-06-08/31]