6

Fisheries

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Citation:

Polet, H., Torreele, E., Pirlet, H., Verleye, T., 2015. Fisheries. In: Pirlet, H., Verleye, T., Lescrauwaet, A.K., Mees, J. (Eds.), Compendium for Coast and Sea 2015: An integrated knowledge document about the socio-economic, environmental and institutional aspects of the coast and sea in Flanders and Belgium. Ostend, Belgium, p. 137-152.

Version: 2 February 2016

In 2013, the worldwide production of fisheries products amounted to 191 million tons. Wild catches accounted for 49% (93.8 million tons) of the total production, of which 82.1 million tons were sea fish (*FAO Fisheries and Aquaculture Information and Statistics Service 2015*). The fleet of the European Union is responsible for 5% of the global fish catches. Half of the European catches have been caught by Denmark, the United Kingdom, France and Spain. The Belgian fisheries sector is rather small in the European context. In 2013, Belgian catches accounted for 0.2% of the European total (*FAO Fisheries and Aquaculture Information and Statistics Service 2015*). In 2014, the Belgian fishing fleet accounted for 0.1% of the European fleet with a tonnage and engine capacity of 0.9 and 0.7% of the European total, respectively (*Facts and figures on the Common Fisheries Policy, 2014*).

6.1 Policy context

The European fisheries efforts are mainly regulated by the Common Fisheries Policy (CFP) (regulation (EU) No. 1380/2013) proposed by the Directorate-General for Maritime Affairs and Fisheries (*DG MARE*) of the European Commission (EC) (more information: *overview of European legislation concerning the CFP*). The CFP has been developed within a sustainable development context, as stated by the EU strategy for Sustainable Development (COM (2001) 264) and in the *World Summit on Sustainable Development in Johannesburg (2002)* (see **Sustainable use**). Within this context, an ecosystem approach and a sustainable exploitation of living biological resources at sea will be pursued. The European fisheries policy is based on advice from the Advisory Councils (ACs) (see *Council Decision 2004/585/EC*), as well as from a number of national and international organisations and instances such as the Scientific, Technical and Economic Committee for Fisheries (STEFC) of the EC and the International Council for the Exploration of the Sea (ICES) (*Adriansens 2009*, *handleiding voor het GVB, 2009*). The European fisheries management relies on scientific data, collected by the member states based on the regulation (EC) No. 199/2008 and regulation (EC) No. 665/2008 which are currently being reformed by the EC (see **Sustainable Use**).

The regional Flemish government has the exclusive authority with regard to sea fisheries (decree of 28 June 2013) with the exception of the crew and examination conditions for which the federal government is still the competent authority. The Flemish ministry of Agriculture and Fisheries is responsible for the commercial fisheries policy (*Schauvliege 2014*). The *department of Agriculture* and Fisheries is responsible for the preparation of a policy on European and Flemish level. Within this department, the division *Visserijbeleid en Kwaliteit Dier* is responsible for the implementation of the European policy, the formulation of policy proposals, the development of regulations and the implementation of the fisheries policy. This concerns the implementation of the European (European Maritime and Fisheries Fund, EMFF) and Flemish (*Financieringsinstrument voor de Vlaamse Visserij- en aquacultuursector*, FIVA) policy for investments and actions in support of fisheries. The Belgian operational programme (EMFF) 2014-2020 (see **Sustainable use – Sustainable fisheries**) creates a framework and a manual for the funds of the EMFF. The implementation of the policy also implies the control of fishing activities and the reporting of the data in *annual* reports. The *Sea Fisheries service* is part of the latter division and guarantees the coordination, implementation and enforcement of the fisheries policy.

The policy is also supported by the Institute for Agricultural and Fisheries Research (*ILVO*). The Strategic Advisory Council for Agriculture and Fisheries (*SALV*) advises the Flemish government and the Flemish parliament concerning the policies and the development regulations on the economic, ecological, social and societal aspects of the (agriculture and) fisheries policy. This advice is prepared by the Technical Commission Fisheries of the SALV. *Milieu- en Natuurraad van Vlaanderen* (*Minaraad*) provides advice in a number of fisheries-related cases as well. The *Rederscentrale* is recognised as the producer organisation of fisheries products and as the professional association of specialists representing the employers. The Foundation for Sustainable Fishery Development (SDVO) aims to represent the interests of the Belgian sea fisheries cluster and to support them in all domains that contribute to a sustainable fisheries sector. The Redercentrale as well as SDVO are represented in the ACs that are relevant for Belgian fisheries. The Flanders' Agricultural Marketing Board (*VLAM*) coordinates the promotion campaigns of home-produced fish (e.g. fish of the year, seasonal fish). The Belgian fisheries policy is discussed in more detail in *Vanderperren & Polet (2009)* (CLIMAR project *phase 1* and *phase 2* BELSPO), the Belgian operational programme (EMFF) 2014-2020 and *VIRA 2014*. An extensive overview of the legislation concerning fisheries is given in the *coastal codex, theme fisheries*.

The regulation for recreational fisheries is listed on the following website of the *Agriculture and Fisheries department*. An extensive overview of the legislation for recreational fishermen using boats is elaborated within the LIVIS project and is discussed in *Verleye et al. (2015a)*.

6.2 Spatial use

The CFP is valid in the Belgian fisheries zone (law of 10 October 1978), the borders of which correspond to the exclusive economic zone (EEZ, law of 22 April 1999). In this zone, the performance of fisheries activities is subject to Belgian jurisdiction (although fisheries is a Flemish competence, see above). However, the rights of foreign vessels in the context of the CFP and the relevant international regulations are taken into account (*Maes et al. 2004* (*MARE-DASM project BELSPO*)). Hence, the Belgian fisheries zone gives unlimited access to all EU member states, except for Spain, Portugal and Finland, which may only catch unrestricted fish species and species without quota (*Douvere & Maes 2005*, *GAUFRE project BELSPO*).

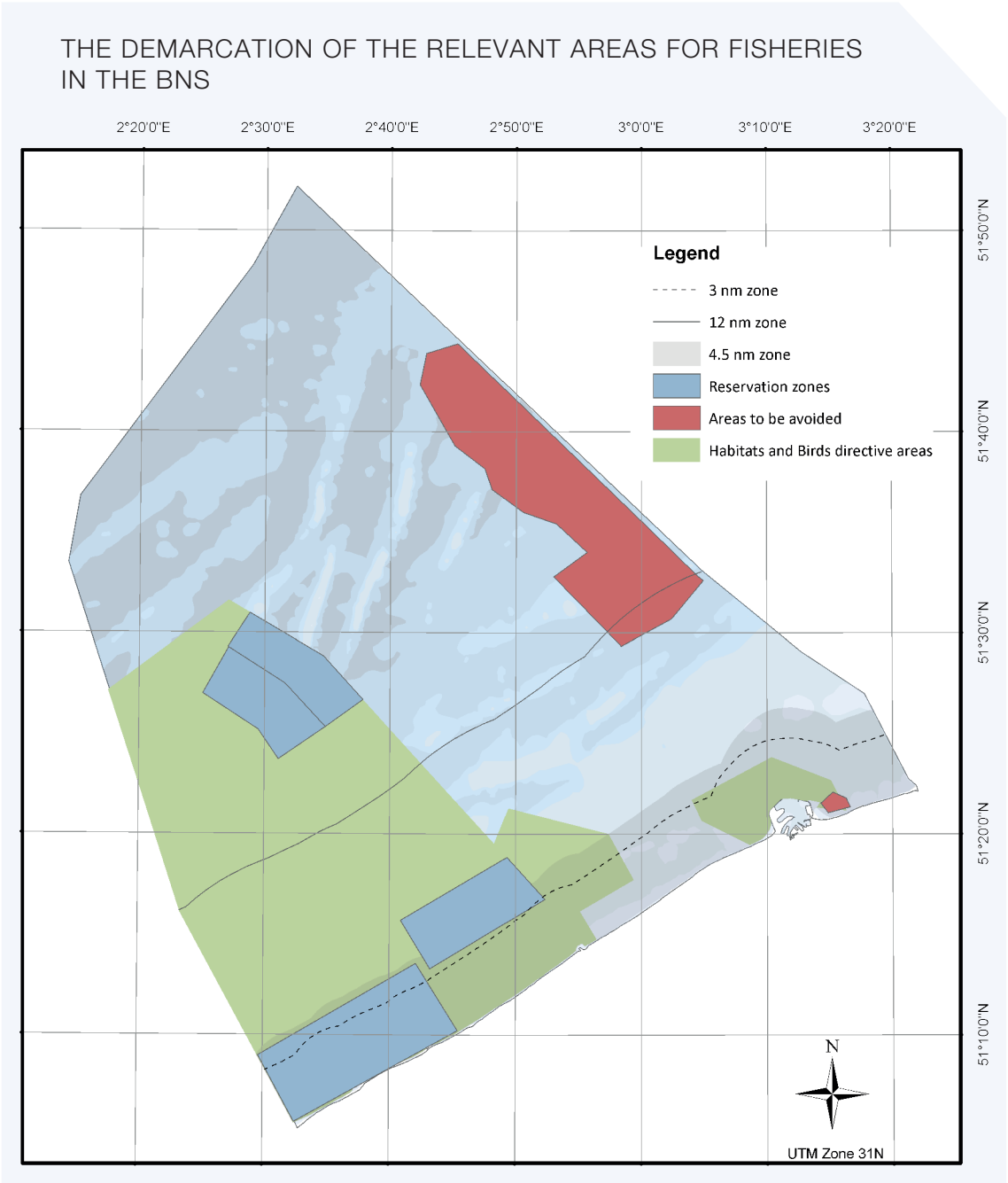

Figure 1. The demarcation of the relevant areas for fisheries in the BNS (Source: RBINS/IRSNB, *marineatlas.be* (based on RD of 20 March 2014)).

In the territorial waters (the zone from the baseline to 12 nautical miles (nm) offshore), fisheries are regulated by the national legislation (law of 19 August 1891). This legislation defines that only fishing boats of <221 kW are allowed to fish in the territorial sea, while in the 0-3 nm zone, only ships of <70 GT registered in the Coastal Fleet Segment are allowed to fish (see also **Societal interest – Belgian fishing fleet**). An extension of this zone towards 4.5 nm is included in the RD of 20 March 2014 on marine spatial planning, but has not yet been approved on a European level. In the territorial waters, fisheries are exclusively reserved for Belgian fishermen, although French and Dutch fishermen are allowed as well under certain conditions as a result of multilateral conventions (*Douvere & Maes 2005*, *GAUFRE project BELSPO*) and the European legislation:

- The treaty regarding the reform of the treaty establishing the Benelux Economic Union of 3 February 1958 (2008) attributes unlimited rights to Dutch fishermen for fishing in the Belgian territorial waters;
- The Belgian-French convention on *ijle haring* (herring caught between December and April) and European sprat fisheries in the French and Belgian territorial waters (1975) allows French fishing boats to catch sprat and herring in the Belgian territorial sea under certain conditions;
- Regulation (EU) No. 1380/2013 also includes the access to Belgian coastal waters and gives the Netherlands unrestricted access to the Belgian 3-12 nm zone and the French herring fisheries to the entire territorial sea (0-12 nm).

Fishing is forbidden at the Paardenmarkt site, a munitions dump site (*Maes et al. 2000*) (see also theme **Military use**). Furthermore, the royal decree of 11 April 2012 prohibits shipping (and therefore also fisheries) in a safety zone of 500 m around wind farms (see also theme **Energy (incl. cables and pipelines)**). The compatibility of offshore wind farms and passive fisheries and mariculture has been investigated in the context of the MARIPAS project (*Verhaeghe et al. 2011*) and in the *Aquavalue project* (see also theme **Aquaculture**).

In the marine spatial plan (royal decree of 20 March 2014, see also *Van de Velde et al. 2014*), measures have been established in 4 zones in the habitats directive area *Vlaamse Banken* (Flemish Banks) to stimulate alternative sustainable fisheries on the one hand, and to protect the environment on the other hand (see theme **Nature and environment**). These reservation areas have to be approved by Europe. Recreational fisheries are allowed in the entire protected area as long as the activities have no impact on the seabed (with some exceptions for the recreational shrimp fisheries).

A detailed overview of the fisheries activities of the Belgian, Dutch and British vessels in the BNS, i.e. the geographical distribution of the fleet (VMS-data) and information about the target species over the past three years (log data) is given in *Pecceu et al. (2014)*. The results of the analyses of fisheries intensity and the landings of target species are shown for each flag state, for each fishing technique and for each quarter (3 months). In any case, the BNS is of limited importance for the Belgian fisheries fleet because only 10% (past 5 years, unpublished data from ILVO) of the total landings originate from this area. By contrast, the Belgian coastal fishing vessels as well as the Dutch beam trawlers and pulse trawlers are quite active in the BNS.

Belgian fishermen are also active outside the BNS in the Southern and Central North Sea as well as in the western waters. In the context of the CFP and through multilateral conventions, Belgian fishing boats have acquired access to the coastal waters of a few other EU member states (*VIRA 2014*). Furthermore, Belgian fishermen have access to limited quota in Norwegian waters and in a few ICES-areas. A detailed list of these areas is given in *VIRA (2014)*.

A map with the historical fishing grounds (1929-1999) can be consulted on the website '*A century of sea fisheries in Belgium*' of Flanders Marine Institute (VLIZ).

6.3 Social interest

6.3.1 Employment

Employment in the fisheries sector has declined due to the crisis that has affected the fisheries sector (see **Sustainable use**). In 2013, the fisheries sector in Belgium consisted of 541 accredited sea fishermen. In addition, approximately 2,057 people worked in the fish-processing and marketing industry (assimilation and conservation companies (904), wholesale business (593) and retail (560)) (*VIRA 2014*). One of the most important challenges within the sector is to promote the attractiveness of the sector and to find well trained young adults, as also mentioned in *SALV-advies over de beleidsnota Landbouw en Visserij 2014-2019, deel visserij*. Efforts are made to improve the inflow of young persons into the sector, for example by means of the *Fund for young ship crew members*, in which Belgian ship owners annually deposit a mandatory contribution (for 2015: decision of the Flemish government of 3 July 2015). The

number of young ship crew members decreased in the period between 1980 and 2014 from 222 to 66, despite the increases in the maximum age in 1988 and 2001.

6.3.2 Belgian fishing fleet

Based on the decision of the Flemish government of 16 December 2005, the fishing fleet is divided into 3 segments:

- Large fleet segment: All fishing vessels with an engine power capacity between 221 kW and 1,200 kW;
- Small fleet segment: All fishing vessels with an engine power capacity of 221 kW or less, except for the coastal fleet segment;
- A coastal fleet segment: All fishing vessels with an engine power capacity of 221 kW or less and a tonnage of maximum 70 GT, which take part in sea trips of maximum 48 hours with the start and end situated in a Belgian port. Joining the coastal fleet segment occurs on a voluntary basis.

In 2014, the Belgian sea fishing fleet consisted of 79 ships with a total engine power of 46,289 kW and a gross tonnage of 14,556 GT (*Tessens & Velghe, 2015*). The reported total engine power does not correspond to the reported engine power in the *Officiële lijst van de Belgische vissersvaartuigen (2014)* because the latter does not take into account additional fictive engine power. Between 1950 (457 vessels) and 2000 (127 vessels), there was a strong decrease in the number of active fishing vessels. The total engine power capacity, however, does not reveal a comparable decrease (figure 2). This is mainly due to a trend towards larger vessels within the beam trawling section (*Rijnsdorp et al. 2008*), which was made possible by the aggregation of engine powers (*Operationeel Programma in uitvoering van het Nationaal Strategisch Plan voor de Belgische visserijsector 2007-2013*). The dynamics of the Belgian fishing fleet with changing owners, immatriculation numbers, ports of registration and technological equipment can be consulted in a database on the website '*A century of sea fisheries in Belgium*' of Flanders Marine Institute (VLIZ) and in a review article (*Lescrauwaet et al. 2013*).

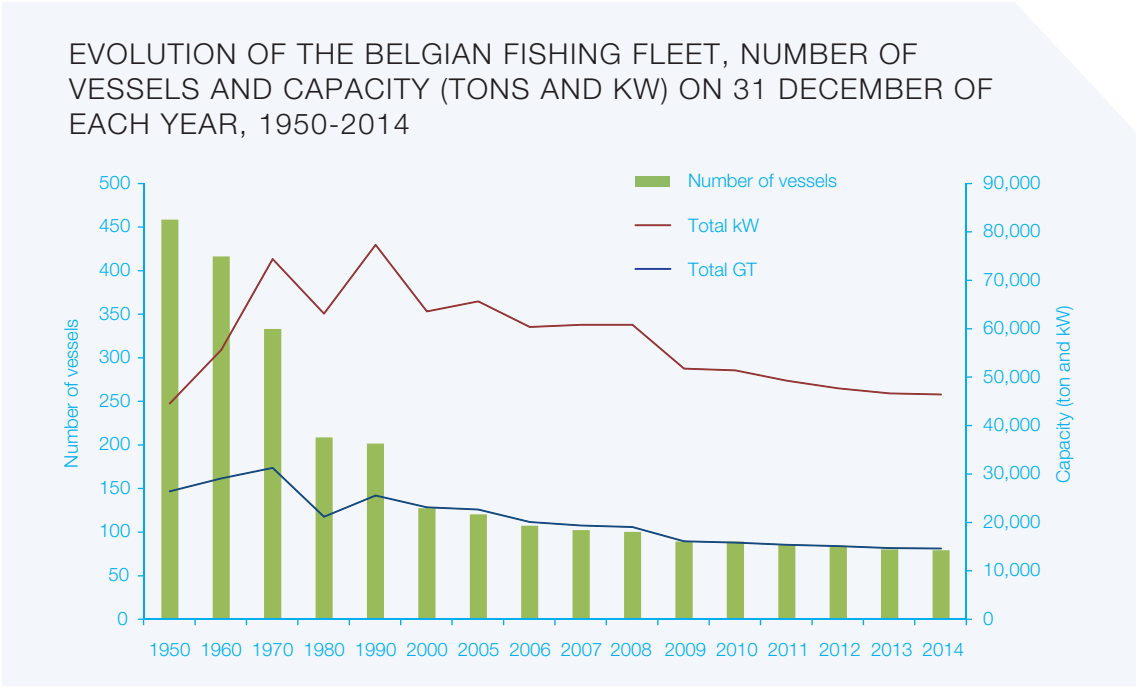

Figure 2. Evolution of the Belgian fishing fleet, number of vessels and capacity (tons and kW) on 31 December of each year, 1950-2014 (*Visserijrapport (VIRA) 2014*).

Another important challenge with regard to the development of the sector is the rejuvenation of the Belgian fishing fleet. The average age of the hull has increased to 25 years, with 52 ships older than 20 years (*VIRA 2014*). The age of the engines averages around 11 years since a number of vessels have used more efficient engines after the fuel crisis in 2008. However, there is an increasing demand for replacing the old vessels with new ships, but the CFP does not support the construction of new vessels (*VIRA 2014*). Other figures regarding the different fleet segments can be found in *Tessens & Velghe (2015)* (see **Societal interest - Landings and value**). In *VIRA (2014)* the profitability, labour costs, fuel costs, etc. of the fishing fleet are discussed as well.

6.3.3 Landings and value

The landings of the Belgian sea fisheries vessels between 1929 and 1999 have been collected for each species and for each fishing area on the website '*A century of sea fisheries in Belgium*' of VLIZ (figure 3). Landings peaked after the Second World War, when more than 70,000 tons of fish were landed in the Belgian ports each year. The supply subsequently decreased gradually until 2009 (19,175 ton), followed by an increase up to 24,273 tons in 2014 (*Tessens & Velghe 2015*). The long-lasting decrease of the landings until 2009 can be largely explained by a change in the species composition of the catch (*VIRA 2014*), but the fuel crisis, declining fish stocks, the declining fishing fleet, limiting quota and the fishing effort limits also contributed to lower landings (see **Sustainable use**). In 2014, 19,623 tons were landed in Belgian ports and 4,651 tons in foreign ports. The port of Zeebrugge covered 65.3% of the landings in Belgian ports, Ostend 33.8% and Nieuwpoort 0.9%. Plaice, sole and cod were the most important species in 2014 in terms of landing volume (*Tessens & Velghe 2015*).

The value of landings or turnover is the yield of landed fish and fish products sold by public auction (calculated on the total of both traded and non-traded products). The total value of landings of fish by Belgian fishing vessels increased almost constantly after the Second World War from approximately 80 million euros (indexed value with respect to the reference year 2007) to peaks of approximately 130 million euros at the end of the eighties and in the early nineties (website '*A century of sea fisheries in Belgium*', VLIZ). This was followed by a decrease to 68,367 million euros in 2009, followed by an increase to 81.267 million euros in 2014. Sole remains the most important fish species for Belgian fisheries with 44% of the value of landings in 2014 (*Tessens & Velghe 2015*). The value of landings of each species between 1929 and 1999 is available on the website '*A century of sea fisheries in Belgium*' (VLIZ). The recent value of landings for each species can be found on the *website* of the department of Agriculture and Fisheries.

6.3.4 Trade and consumption of fish products

In Belgium there are three active fish auctions: Zeebrugge, Ostend and Nieuwpoort. Zeebrugge and Ostend together constitute the *Vlaamse Visveiling* auction. The average prices of fish caught by Belgian fishing vessels have increased almost constantly after the Second World War with a peak of 4.48 euros per kilo in 2006. In 2014, the average price for fish in Belgian ports amounted 3.50 euros per kilo (*Tessens & Velghe 2015*).

Figures from the GfK Panel Services Benelux for VLAM reveal that in 2013, Belgians bought on average 9.4 kilos of fish, molluscs and crustaceans per capita, for a total amount of 104.5 euros. The degree of self-sufficiency for fish, molluscs and crustaceans in Belgium and Luxemburg from fisheries and aquaculture amounted to 14.6% in 2008 (Source: VLAM). In 2013, the value of imported fish products amounted to 1.64 billion euros with the Netherlands as the main provider. The export value totaled 835 million euros (97.7% within the EU) with France and the Netherlands as the most important outlets (*VIRA 2014*).

6.3.5 Fisheries communities

The social dimension of the fisheries sector (training, employment, wellbeing, safety, etc.) is discussed in detail in *VIRA (2014)*. The impact of the CFP on the social and economic aspects of fisheries communities was investigated in a European study: '*Regional social and economic impacts of change in fisheries-dependent communities 2011*' including a case study in Ostend (*Assessment of the status, development and diversification of fisheries-dependent communities. Oostende Case Study Report 2010*). The *GiFS project* investigated the socio-economic and cultural importance of inshore fisheries for coastal communities. Within the institute for Agricultural and Fisheries Research (*ILVO*), the *VISEO group* aims to gather knowledge about techniques, ecosystem and society by means of specific and integrated social scientific research, meeting the needs of the fisheries sector as well as the policy. The research topics include business economics research, supply chain research, international market research and research on the impact of the policy on the competitiveness of the sector and the environment.

Complementary to the *FAO Code of Conduct for Responsible Fisheries (1995)*, the FAO published *Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (2015)*. These guidelines aim to contribute to the visibility, acknowledgement and strengthening of the already important role of the small-scale fisheries, to promote the international efforts concerning the fight against famine and poverty, but also to stimulate responsible fisheries and a sustainable socio-economic development. FAO also published technical guidelines concerning a sustainable and socially responsible management of the recreational fisheries in *FAO Technical Guidelines for Responsible Fisheries – Recreational Fisheries (2012)*.

6.4 Impact

Fisheries activities have an effect on the (marine) ecosystem, but the precise impact is still being discussed. Besides killing, displacing, influencing and extracting organisms from the sea, some fishing techniques also have a certain impact on the seabed integrity (*Depestele et al. 2014*, *Teal et al. 2014*, *Depestele et al. 2015*). This will cause changes in the natural stability after fishing. Furthermore, other factors such as the use of fossil fuels and waste production influence the environment (*VIRA 2014*). An overview of the impact of fishing activities is given in *Polet & Depestele (2010)* and *Strategische Milieubeoordeling van het Nationaal Operationeel Programma voor de Belgische visserijsector, 2014 - 2020*. The latter Strategic Environmental Assessment (SEA) is required by the royal decree of 18 May 2008. In the following, a few of the effects will be further elaborated.

6.4.1 Overfishing and illegal, unreported and unregulated fisheries

A structural lack of stability between the capture capacity of a (mostly international) fishing fleet and the biological potential of the exploited fish stocks, will lead to overfishing of these fish stocks. Especially when overfishing causes a reduced reproduction capacity, this will often result in the collapse of the concerned fish stocks. Furthermore, fisheries may cause irreversible changes in the structures of populations and the food web (*Pauly et al. 1998*, *Polet et al. 2008*, *OSPAR QSR 2010*). Quota overviews and additional quota measures are published on the *website* of the Sea Fisheries service. Belgian quota overruns are rather exceptional. In 2014 however, the EC imposed a quota reduction in Belgium for some stocks of haddock, herring, plaice and stingray (*overview*) because the quota of the mentioned fish species had been exceeded in 2013 in the respective areas. The legal basis for these reductions is provided by *regulation (EC) No. 1224/2009*.

The effect on the marine biological communities is exacerbated by illegal, unreported and unregulated (IUU) fisheries (*handbook on IUU regulation, 2010*, *website* Sea Fisheries service, *website DG MARE*) and by discarding non-target or low-valued species (called bycatch). Some other illegal practices will also negatively impact the environment, such as high-grading, i.e. maximising the value of the catch by discarding smaller individuals of a certain species in favour of the larger ones (more information: *Vandendriessche et al. 2008*, *handleiding voor het GVB, 2009*). An estimation of the unreported catch and bycatch of the Belgian fisheries between 1929 and 2010 is given in *Lescrauwaet et al. (2013)*.

In 2010, *ICES* introduced the principle of Maximum Sustainable Yield (MSY) as a basis for their advice. The biomass levels have to be high enough and the fishing mortality has to be low enough to ensure a permanent maximum sustainable yield (*VIRA 2012*). In *Moreau & Volckaert (2012)* and in the context of *VIRA (2014)*, seven North Sea fish stocks were tested against the MSY reference framework. In 2013, four of these fish stocks were catalogued as biologically healthy: herring, haddock, plaice and mackerel. In the same year, the biomass of saithe was too low. The biomass of sole reached sufficiently high values, but its fishing mortality remained above the sustainable limit. The cod stock is evolving in a favourable direction, but still has negative values on both criteria (*ICES advices*).

6.4.2 Impact of fishing gear

The impact of fisheries on the ecosystem and the biological communities strongly depends on the fishing gear and the time and place of fishing, although some other factors such as mesh width and the expertise of the fishermen will also play an important role. In 2012, the European project *BENTHIS* was initiated to study in detail the impact of fisheries on benthic ecosystems, including one case study in the North Sea. Improved scientific insights based on high-resolution fisheries distribution data tend to nuance the effect of seabed disturbances on the associated mortality of benthic organisms (*Teal et al. 2014*, Eigaard et al. submitted). In table 1, an overview of the impact of the most abundant types of fishing gear in the Belgian fisheries is given. Note that otter trawling has increased in the past few years. However, limited research on the impact of this technique has been conducted. Some alternative fisheries technics are discussed in *Polet & Van Peteghem (2010)*.

Table 1. An overview of the impact of the most abundant types of fishing gear in the Belgian fisheries.

FISHING GEAR	IMPACT ON THE ECOSYSTEM	LITERATURE
Beam trawls (targeting fish and/or shrimp)	Seabed disturbance and associated effect on benthos and habitat	*Lindeboom & De Groot 1998 (Impact II)*, *Operationeel Programma in uitvoering van het Nationaal Strategisch Plan voor de Belgische visserijsector 2007-2013*, *Houziaux et al. 2008* (*Project BELSPO*), *Polet et al. 2008*, *Rabaut et al. 2008*, *Depestele et al. 2008*, *Polet et al. 2010*, *Polet & Depestele 2010*, *Depestele et al. 2012* (*WAKO-II project BELSPO*), *Van Lancker et al. 2012* (*QUEST-4D project BELSPO*), *Depestele et al. 2014* (*WAKO-II project BELSPO*), *Depestele et al. 2015*
	Bycatch and discards	*Operationeel Programma in uitvoering van het Nationaal Strategisch Plan voor de Belgische visserijsector 2007-2013*, *Polet et al. 2008*, *Depestele et al. 2008*, *Vandendriessche et al. 2008*, *Polet et al. 2010*, *Polet & Depestele 2010*, *Depestele et al. 2011*, *Depestele et al. 2012* (*WAKO-II project BELSPO*), *Verschueren et al. 2012*, *Depestele et al. 2014*, *Depestele 2015*
	Shifts in the feeding behaviour of seabirds caused by discards	*Depestele et al. 2012* (*WAKO-II project BELSPO*), *Sotillo et al. 2012*, *Sotillo et al. 2014*, *Depestele et al. 2014*, *Depestele 2015*
	Use of fuels and resources	*Depestele et al. 2007*, *Operationeel Programma in uitvoering van het Nationaal Strategisch Plan voor de Belgische visserijsector 2007-2013*, *Polet et al. 2008*, *Polet et al. 2010*, *Polet & Van Peteghem 2010*, *Polet & Depestele 2010*
Entangling nets (a type of gill net)	Bycatch of seabirds and marine mammals	*Haelters & Kerckhof 2004*, *Depestele et al. 2006*, *Depestele et al. 2008*, *Haelters & Camphuysen 2009*, *Depestele et al. 2012* (*WAKO-II project BELSPO*), *Depestele et al. 2014* (*WAKO-II project BELSPO*)
	Ghost fishing	*Depestele et al. 2006*, *Depestele et al. 2008*, *Depestele et al. 2012* (*WAKO-II project BELSPO*), *Depestele et al. 2014* (*WAKO-II project BELSPO*)
	Bycatch and discards	*Depestele et al. 2012* (*WAKO-II project BELSPO*), *Depestele et al. 2014* (*WAKO-II project BELSPO*)

6.4.3 Impact on other users

The spatial impact of fishing activities on other users of the sea is discussed in *GAUFRE project (BELSPO)*. In *Maes et al. (2004)* (*MARE-DASM project BELSPO*) a bottleneck analysis of commercial fisheries was conducted. The compatibility with other users in the BNS is also addressed in the marine spatial plan (royal decree of 20 march 2014, see also *Van de Velde et al. 2014*).

6.4.4 Recreational fisheries

In the BNS, recreational fisheries mainly consist of beach angling or angling on piers or beach heads, beach fisheries with passive nets, sea angling on boats and shrimp fisheries with small trawls. With the exception of passive fisheries using fixed nets, sport fisheries do not need a license in the Belgian waters. As a consequence, little is known about

the extent of this kind of fisheries (*Goffin et al. 2007*). In 2015, the Flemish government has decided to prohibit the use of entangling and gill nets by recreational fishermen in the intertidal zone in order to protect marine mammals (decision of the Flemish government of 13 March 2015). The royal decree of 21 December 2001 already forbade the use of entangling and gill nets below the low water line.

Sportvisserij Vlaanderen vzw represents approximately 2,000 recreational fishermen. The size of the recreational fishing fleet, as well as a first insight into the fishing effort and fishing locations is given by *Verleye et al. (2015a)* (LIVIS, *GIFS*). The LIVIS project also tries to create a framework in Belgium to stimulate the transition to a smaller fisheries segment that has yet to be established. A first estimation of the recreational catches of cod is given in *ILVO (2007)*, a broader survey of the recreational fisheries was carried out by Van Den Steen (2010). The socio-economic interest and a rough estimation of the catches are also discussed in *Persoon (2015).* In *Lescrauwaet et al. (2013)* an estimation of the extent of recreational fisheries between 1929 and 2010 is given.

In Oostduinkerke, 12 horseback shrimp fishermen (licensed as Unesco heritage) and 3 *kruwer* associations (manual shrimp fisheries in the intertidal zone with a small dredge) are also active. In the first place, they can be considered as a folklore tradition (see *http://www.paardevissers.be/* and *Provincie West-Vlaanderen 2008*, see theme **Maritime and coastal heritage**).

6.5 Sustainable use

6.5.1 Common Fisheries Policy (CFP)

The CFP (regulation (EU) No. 1380/2013) includes a set of rules for managing the European fishing fleets and aims for a sustainable exploitation of marine resources. It has to ensure that fisheries and aquaculture are environmentally, economically and socially sustainable and that they provide a source of healthy food for EU citizens. Improving the scientific knowledge about fish stock conditions constitutes an important pillar of the CFP (see also *Verleye et al. 2015b*). An overview of the European legislation in the context of the CFP is given on this *website*.

The EC strives towards long-term management, and will draft multi-annual plans that will contribute to a sustainable exploitation of the concerned fish stocks and the protection of the marine ecosystems. A few objectives included in the CFP are the gradual implementation of a landing obligation (ban on discards), the achievement of MSY for the fish stocks by 2020 (if possible by 2015), the implementation of transferable fishing concessions (member states' choice), and the focus on regional management by the Advisory Councils (ACs) (*website DG MARE*). The ecological, economic, social and governance impacts which are foreseen by this policy were investigated in the following study: *Europese studie (2010)*.

In order to achieve the goals of the CFP, the EU has introduced a number of conservation measures, which can be divided into 4 groups (*Adriansens 2009*, *website DG MARE*, *handleiding voor het GVB, 2009*):

- Europe defines the Total Allowable Catch (TAC) of specific fish stocks within a certain period. These TACs are divided among the member states by means of quota. The Flemish quota are available on the following website: *website dienst Zeevisserij*. The quota can be swapped among the member states. During the *World Summit on Sustainable Development in Johannesburg (2002)*, the international community committed itself to adopt a new management system for fish stocks based on the MSY concept at the latest by 2015 (*Adriansens 2009*, *handleiding voor het GVB, 2009*). At this moment, the MSY for certain species such as ray cannot be determined. *ICES* gives quantitative advice to Europe based on all available information for all fish stocks without a management plan or MSY value. The current Belgian fleet mainly focuses on mixed fisheries, catching species from sustainable fish stocks as well as non-target species. In order to face this challenge, fisheries management is evolving towards 'multi-species management'. This issue is discussed in the ICES Working Group on Mixed Fisheries Advice for the North Sea (*WGMIXFISH*). On the other hand, attention is paid to the effects of excessive selective fishing and balanced harvesting of fish stocks in accordance with their natural occurrence is advocated (*Garcia et al. 2012*).
- Technical measures have been introduced, such as a minimum mesh size, selective fishing gear, closed areas, minimum landing sizes and a gradual introduction of a ban on discards.
- The fishing effort is limited by restricting the number of days when fishing boats are allowed to fish at sea. In addition, the fishing effort is reoriented by closing certain zones (temporarily) for fishing activities. In this regard, the Irish Sea was temporarily closed for the Belgian fishing fleet in January 2013, in line with the advice of the quota commission (ministerial decree of 21 December 2012).

- Fleet measures have been set with maximum capacities for every member state in kilowatts (kW) and Gross Tonnage (GT). For fleet segments with overcapacity, the member states have to take measures in an action plan. The efficiency of the EU measures dealing with the overcapacity of the fishing fleet was critically reviewed in the following study: *studie van de Europese Rekenkamer (2011)*.

The European Maritime and Fisheries Fund (EMFF, regulation (EU) No. 508/2014) was established to support the implementation of the operational programmes of the EU member states which include the measures mentioned above as well as a further elaboration of the union priorities as discussed in the regulation (see also **Sustainable use – Sustainable fisheries**). The EMFF wants the fisheries and aquaculture sectors to become ecologically sustainable, economically viable and socially responsible (*VIRA 2014*). Over the period 2014-2020, 41,746 million euros will be reserved for Belgium. This represents 0.73% of the total EMFF budget (5,749 billion euro) (see also *website*). An overview of the national evaluation reports of the former European Fisheries Fund (EFF) is given in *Interim evaluation of the European Fisheries Fund (2007-2013)*.

Since 1 January 2010, the control system for ensuring compliance with the CFP has been settled by regulation (EC) No. 1224/2009, which refers to regulation (EC) No. 1005/2008 (see also *Verleye et al. 2015b*) in order to prevent and eliminate IUU-fisheries. As a result, fishing activities of all fishing vessels, with the exception of the small traditional vessels (< 12 m), can be monitored by means of a satellite tracking system (the so-called vessel monitoring system). Moreover, all ships have to be equipped with an electronic logbook, in which fishermen need to report the date, place and size of the catch for every species (*Visserijrapport (VIRA) 2012*, *website DG MARE*). The European Fisheries Control Agency (EFCA) was established in Vigo in 2006 to organise the collaboration and coordination between the member states with regard to the control and inspection of fisheries (*handleiding voor het GVB, 2009*).

6.5.2 Marine Strategy Framework Directive

Besides the CFP, the Marine Strategy Framework Directive (MSFD, 2008/56/EC) also offers a framework to limit or avoid the impact of fisheries on the marine environment. A number of descriptors have been developed to define a good environmental status, some of them directly or indirectly related to fisheries (see also theme **Nature and environment**). Examples are the descriptors 1 (biodiversity, *Cochrane et al. 2010*), 3 (populations of commercially exploited species, *Piet et al. 2010*), 4 (elements of the marine food chain, *Rogers et al. 2010*), 6 (integrity of the seabed, *Rice et al. 2010*) and 9 (polluting substances in marine organisms for human consumption, *Swartenbroux et al. 2010*).

The physical damage to the seabed due to fishing activities and the selective extraction of species, including the incidental catch of non-target species, has also been included in the indicative list of pressures and impacts. Furthermore, the need for a monitoring programme for the chemical pollution of commercial fish species has been highlighted. More information concerning the MSFD is provided in *Verleye et al. (2015b)*.

6.5.3 Data collection in Europe and Belgium

In-depth research and scientific information are necessary to underpin the CFP. On the European level, the fisheries research is regulated by guidelines providing a framework for data collection (regulation (EC) No. 199/2008 and regulation (EC) No. 665/2008, Data Collection Framework (*DCF*)). The EC is currently reviewing the DCF and is working on an EU Master Data Register. The basic principles for data collection, as mentioned in the CFP (i.e. increase of scientific knowledge about the state of fish stocks), are an important basis throughout this reviewing process. The renewed DCF and the accompanying EU Master Data Register is a seven-year programme (2014-2020) wherein multiple activities, carried out in the member states, such as data collection, studies, etc. will be combined. The funding of the new DCF is covered by the EMFF. Advice regarding the CFP on the basis of scientific information is provided by several organisations (more information: *handleiding voor het GVB, 2009*):

- The International Council for Exploration of the Sea (*ICES*) gives biological advice for proper management of fisheries in Europe by means of international collaboration with fisheries biologists. The conclusions of the ICES working groups dealing with fish stock evaluation are processed in the deliberations of the Advisory Committee (ACOM).
- The Scientific, Technical and Economic Committee for Fisheries (STECF) is the regular advisory body of the EC with regard to fisheries. This committee was founded in 1993 (93/619/EC) and renewed in 2005 (2005/629/EC) and again in 2014 under the new CFP. The STECF consists of a group of independent scientists, established in order to advise the EC on all aspects of the fisheries policy.

The *ILVO* Fisheries Biology research group gives advice on the condition and management of Belgian and European fisheries. This research group also conducts research on fisheries biology, stock assessment methods, marine ecosystem dynamics and the potential consequences of fisheries management on the fish stocks and fisheries in itself. In order to realise these general objectives, the research activities mainly focus on data collection concerning the size of fish stocks and the exploitation pattern of the commercially important species. This results in scientific advice supporting the development and implementation of the CFP.

Furthermore, economic data from fisheries, the fish processing industry and aquaculture are inventoried and studied. This results in both scientific and economic advice which supports the development and implementation of the CFP.

The important challenges include: the evolution from a 'single species' towards a 'multi species' approach within the context of the ecosystem approach, the development and implementation of a métier oriented programme, the promotion of collaboration between the fisheries sector and scientists by means of fisheries-science partnerships, the socio-economic impacts of changes in the policy and the evolution towards an integrated chain policy.

6.5.4 Sustainable fisheries

Fisheries have gone through various years of crisis. The government has tried to respond to this crisis with specific measures. Hence, there is movement towards a more sustainable Flemish fisheries sector, *inter alia* by means of investments in higher profitability, energy-saving techniques in a broad sense (engine, auxiliary engine, fishing gear, equipment, etc.), alternative, environmentally friendly or more selective fishing techniques, scrapping programmes to balance the catch capacity of the fleet and quota, emphasis on other target species, changes in landing volumes, improvement of the quality of fish products, improved working conditions and safety of the crew and the development of a sustainable aquaculture sector in Flanders (*Visserijrapport (VIRA) 2012*).

A number of initiatives to achieve a (more) sustainable fisheries sector are listed below:

Within the context of the European Maritime and Fisheries Fund (EMFF, the former EFF), every member state needs to develop an operational programme (EMFF) and a Strategic Environmental Assessment (SEA) of the operational programme (*Strategische Milieubeoordeling van het Nationaal Operationeel Plan voor de Belgische visserijsector 2014 - 2020*) (see royal decree of 18 May 2008). For the Belgian fisheries sector, a SWOT-analysis and a elaboration of the strategy have been carried out for 5 of the 6 priorities:

- Union priority 1: Promoting environmentally sustainable, resource-efficient, innovative, competitive and knowledge-based fisheries;
- Union priority 2: Fostering environmentally sustainable, resource-efficient, innovative, competitive and knowledge-based aquaculture;
- Union priority 3: Fostering the implementation of the CFP;
- Union priority 5: Fostering marketing and processing;
- Union priority 6: Fostering the implementation of the integrated maritime policy.

Union priority 4 (increasing employment and territorial cohesion) will not be implemented in Belgium as Belgium has no fishing communities or outlying fishing grounds.

Within Axis 4 (sustainable development of fisheries) of the national operational programme (2007-2013), the EFF subsidised projects dealing with topics such as sustainable fishing methods, quality-oriented fish and fish chain management, sustainable market, innovation, equal opportunities and economic viability (*ontwikkelingsstrategie EVF As 4 Belgisch Kustgebied, 2011*). A Fisheries Local Action Group (FLAG) manages the funds and is responsible for project approvals. The FLAG is a partnership of regional socio-economic actors from the fisheries sector, NGOs and administrations. One of the most prominent and practicable results is the *VALDUVIS* method, which determines sustainability scores for each landed fish box, using different indicators for the three pillars of sustainability.

To be able to face the profitability problems of the fishing fleet, the Flemish government has developed a *global action and restructuring plan (Task Force Fisheries 2006)*, aiming towards sustainable Flemish fisheries by means of structural measures. This plan is part of the Belgian implementation procedure of the European regulation (EC) No. 744/2008, which allows temporary support for a scrapping programme and a modernisation scheme. These measures are financed by Flemish public resources from *FIVA* (decree of 13 May 1997).

- In 2005, the maximum engine capacity was raised to 1,200 kW and three fleet segments were defined. The

scrapping of vessels was temporarily supported by governmental intervention (ministerial decree of 2 June 2009 – see **Societal interest - The Belgian fleet**);

- The adapted Flemish quota policy (in force since 1 February 2006) should contribute to an optimum and efficient quota use (more information: *Adriansens 2009*);
- Research on alternative fishing techniques is carried out in order to transform the remaining vessels into a sustainable fleet.

ILVO conducts research on sustainable fishing techniques. In this context, the design of the beam trawl has been modified to increase selectivity and to reduce seabed disturbance and towing resistance in order to increase fuel efficiency (*Depestele et al. 2007*, *Stouten et al. 2007*). Experimental modifications of the fishing gear have been tested to decrease discards of undersized fish and non-commercial organisms. It is expected that research with regard to a better species and length selection will remain necessary due to the proposed discard ban (e.g. *Depestele et al. 2011*). In addition, research is conducted on alternative fishing techniques such as handline fishing, gillnets, flyshooting and shrimp pulse trawls (Hovercran) (*Polet 2004*, *Van Craeynest 2009*, *Polet & Van Peteghem 2010*, *Verhaeghe et al. 2011*, *Verschueren et al. 2012*, *Depestele et al. 2012* (*WAKO-II project BELSPO*), *Depestele et al. 2014* (*WAKO-II project BELSPO*)).

Within the fisheries sector, a *societal covenant for sustainable fisheries (2011)* has been developed. This covenant has resulted in the report *Vistraject* (*De Snijder et al. 2015*), which identifies seven main goals concerning the transition of the sector towards sustainable Flemish fisheries. The three main principles are profitability, environmental care and the social aspect of fisheries. In June 2015, a societal covenant for the implementation of the goals of the *Vistraject* project was signed. The covenant establishes a task force, a guidance committee and four working groups, i.e. WG Fisheries, WG Policy, WG Innovation and WG Coast. In 2012, the Flemish government already developed an action plan on selective fishing *Actieplan Selectief Vissen (2012)* in order to react pro-actively on a few topics of the reform of the CFP of 2013. In this action plan, 10 priorities were proposed which must lead towards more sustainable fisheries. In the publication *activiteitenverslag van de rederscentrale 2010 (Wintein & Brouckaert 2011)* reference is made to a few initiatives dealing with sustainability.

Legislation reference list

Table with European legislation. The consolidated version of this legislation is available on *Eurlex*.

EUROPEAN LEGISLATION			
Abbreviations	Title	Year	Number
Directives			
Habitats Directive	Directive concerning the conservation of natural habitats and of wild fauna and flora	1992	43
Marine Strategy Framework Directive	Directive establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)	2008	56
Regulations			
DCF	Regulation 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	2008	199
Application of the DCF	Regulation 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	2008	665
	Regulation (EC) No 744/2008 of 24 July 2008 instituting a temporary specific action aiming to promote the restructuring of the European Community fishing fleets affected by the economic crisis	2008	744
	Regulation establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing, amending Regulations (EEC) No 2847/93, (EC) No 1936/2001 and (EC) No 601/2004 and repealing Regulations (EC) No 1093/94 and (EC) No 1447/1999	2008	1005
	Regulation establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006	2009	1224
Common Fisheries Policy	Regulation 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	2013	1380
European Maritime and Fisheries Fund	Regulation on the European Maritime and Fisheries Fund and repealing Council Regulations (EC) No 2328/2003, (EC) No 861/2006, (EC) No 1198/2006 and (EC) No 791/2007 and Regulation (EU) No 1255/2011 of the European Parliament and of the Council	2014	508
Andere (aanbeveling, communicatie, groenboek, witboek,…)			
	Commission Decision relating to the institution of a Scientific, Technical and Economic Committee for Fisheries	1993	619
	Communication from the Commission (COM): A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development	2001	264
	Council Decision establishing Regional Advisory Councils under the Common Fisheries Policy	2004	585

EUROPEAN LEGISLATION (continuation)			
Abbreviations	Title	Year	Number
	Commission Decision establishing a Scientific, Technical and Economic Committee for Fisheries	2005	629
	Green Paper (COM): Reform of the Common Fisheries Policy	2009	163
	Communication from the Commission (COM): Reform of the Common Fisheries Policy	2011	417

Table with Belgian and Flemish legislation. The consolidated version of this legislation is available on *Belgisch staatsblad* and the *Justel-databases*.

BELGIAN AND FLEMISH LEGISLATION		
Date	Title	File number
Laws		
Wet van 19 augustus 1891	Wet betreffende de zeevisserij in de territoriale zee	1891-08-19/30
Wet van 10 oktober 1978	Wet houdende vaststelling van een Belgische visserijzone	1978-10-10/30
Wet van 22 april 1999	Wet betreffende de exclusieve zone van België in de Noordzee.	1999-04-22/47
Royal decrees		
KB 21 december 2001	Koninklijk besluit betreffende de soortenbescherming in de zeegebieden onder de rechtsbevoegdheid van België	2001-12-21/72
KB van 18 mei 2008	Koninklijk besluit tot vaststelling van het feit dat een beoordeling van de gevolgen op het milieu vereist is voor het nationaal operationeel programma voor de visserijsector en dat een beoordeling van de gevolgen op het milieu niet vereist is voor het nationaal strategisch plan voor de visserijsector	2008-05-18/32
KB van 23 juni 2010	Koninklijk besluit betreffende de mariene strategie voor de Belgische zeegebieden	2010-06-23/05
KB van 20 maart 2014	Koninklijk besluit tot vaststelling van het marien ruimtelijk plan	2014-03-20/03
Decrees		
Decreet van 13 mei 1997	Decreet houdende oprichting van een Financieringsinstrument voor de Vlaamse visserij- en aquacultuursector	1997-05-13/31
Decreet van 28 juni 2013	Decreet betreffende het landbouw- en visserijbeleid	2013-06-28/15
Ministerial decrees		
MB van 2 juni 2009	Ministerieel besluit tot toekenning van een beëindigingspremie voor de definitieve onttrekking van vissersvaartuigen aan de zeevisserijactiviteit in het kader van een vlootaanpassingsregeling	2009-06-02/01
MB van 16 maart 2012	Ministerieel besluit tot uitvoering van het besluit van de Vlaamse Regering van 16 december 2005 tot de instelling van een visvergunning en houdende tijdelijke maatregelen voor de uitvoering van de communautaire regeling inzake de instandhouding en de duurzame exploitatie van de visbestanden, wat betreft het kustvisserssegment en de opdeling van bestaande visvergunningen	2012-03-16/10
MB van 21 december 2012	Ministerieel besluit houdende tijdelijke aanvullende maatregelen tot het behoud van de visbestanden in zee	2012-12-21/03
Others		
Besluit van de Vlaamse regering van 16 december 2005	Besluit van de Vlaamse regering tot de instelling van een visvergunning en houdende tijdelijke maatregelen voor de uitvoering van de communautaire regeling inzake de instandhouding en de duurzame exploitatie van de visbestanden	2005-12-16/48

BELGIAN AND FLEMISH LEGISLATION (continuation)		
Date	Title	File number
Besluit van de Vlaamse regering van 13 maart 2015	Besluit van de Vlaamse Regering houdende een verbod op het gebruik van warrelnetten en kieuwnetten in de Vlaamse strandzone ter bescherming van zeezoogdieren	2015-03-13/02
Besluit van de Vlaamse regering van 3 juli 2015	Besluit van de Vlaamse Regering houdende de vaststelling van de verplichte bijdrage van de reders van Belgische vissersvaartuigen voor het jaar 2015 aan het Fonds voor Scheepsjongens	2015-07-03/04