Discard Atlas of North Sea fisheries

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Prepared by	Floor Quirijns	9-1-2014	
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Editor
Floor Quirijns and Martin Pastoors (IMARES, The Netherlands)

Contributors

Name	Affiliation	Name	Affiliation
Alexander Kempf	TI-SF, Germany	Karin Linderholm	Hav och Vatten, Sweden
Ana Ribeiro Santos	Cefas, England	Lianne Kersbergen	Ministry EA, Netherlands
Ashley Wilson	DEFRA, England	Louise Cunningham	Scotland Marine, Scotland
Bart Maertens	LV Vlaanderen, Belgium	Marc Welvaert	LV Vlaanderen, Belgium
Bart Vanelsander	ILVO, Belgium	Martin Andersen	Ministry FAF, Denmark
Bent Pallisgaard	Ministry FAF, Denmark	Matthieu Reuvanot	DPMA, France
Björn Åsgård	Regeringskansliet, Sweden	Nick Bailey	Scotland Marine, Scotland
Clara Ulrich	DTU-AQUA, Denmark	Nuala Carson	DEFRA, England
Daniel Valentinsson	SLU Aqua, Sweden	Paul McCarty	Scotland Marine, Scotland
Eche Puig	DPMA, France	Sebastian Uhlmann	IMARES, Netherlands
Els Torreele	ILVO, Belgium	Simon Maximilien	DPMA, France
Henk Offringa	Ministry EA, Netherlands	Uffe Sveistrup	Ministry FAF, Denmark
Jorgen Dalskov	DTU-Aqua, Denmark	Youen Vermard	Ifremer, France
Jürgen Weis	Ministry FAC, Germany	Ruben Verkempynck	IMARES, Netherlands

Observers

Name	Affiliation
Barrie Deas	NFFO, NSRAC
Kenn Skau Fischer	DFA, NSRAC

Terminology

Term	Explanation
Catch	Total catch that a fishing vessel takes from the sea
Choke species	Species for with limited quota are available in a fishery, but which still would need to be landed
CPUE	Catch per Unit of Effort
Data quality	Proportion of the discard estimate that was derived from actual observations, relative to the overall amount of discards
DCF	Data Collection Framework in the European Union
Discard	Part of the catch that is returned to sea
Discard ratio	Proportion of the catch that is discarded
High-grading	Marketable sized fish that are discarded
Landings	Part of the catch that is landed and sold
LPUE	Landings per Unit of Effort
Métier	A group of fishing operations targeting a specific assemblage of species, using a specific gear, during a precise period of the year and/or within the specific area
Slipping	When fish are caught in a net and subsequently released into the sea without being brought on board of the vessel.
STECF	Scientific, Technical and Economic Committee for Fisheries of the European Union
VMS	Vessel Monitoring by Satellite. System to follow the movements of individual fishing vessels.

Colofon
The Discard Atlas of North Sea fisheries is a publication of the Scheveningen Group.

Contents

Executive summary

With the agreement on the reform of the Common Fisheries Policy (CFP) in May 2013, the issue of discards in European fisheries has acquired a new dimension. Article 14 of the new basic regulation stipulates that '*Member States may produce a 'discard atlas' showing the level of discards in each of the fisheries covered by the landing obligation*'. The Scheveningen Group is a group of Member States around the North Sea. The Scheveningen Group has taken up the invitation to develop a discard atlas for the North Sea. The ambition is both to document the current knowledge of how much discards are actually generated in the North Sea, and to assemble information on the strategies to mitigate discards. The information presented in this discard atlas has been compiled by a joint 'discard atlas working group' composed of scientists and policy-makers from the Member States of the Scheveningen Group.

The results presented in this discard atlas are based on landings and discards data from the official database of the Scientific, Technical and Economic Committee for Fisheries (STECF) of the European Union. Quantities of landings are derived from the national fisheries statistics which are recorded according to the control regulation (Council Regulation 1224/2009). These include logbook or sales slip records of the volume of landing by species and size grade per management area. Under the European Data Collection Framework, detailed biological data of the biomass, length, age, and species compositions of discards from the most important commercial fisheries are collected via national observer- or self-sampling programmes. Because the discard data are recorded from <2% of all fishing operations, they are extrapolated based on a fleet's fishing effort. Each Member State is obliged to provide these raised data for a selected number of species to the STECF as part of a detailed data call each year. However, not every Member State has the capacity to sample all relevant fisheries, so in case of missing values, fill-ins are made drawing upon available information from related fisheries. If an estimated discard total is largely derived from such filled-in data it may be less accurate and reliable than an estimate which is largely based on data. Therefore, data quality of discard estimates was assessed by calculating the proportion of the discard estimate that was derived from actual observations relative to the overall amount of discards (that also included fill-ins).

For this discard atlas, the STECF database was used to compile landings and discards data for some of the most-commonly caught species in the North Sea (STECF 2013a). Data are available from 2003 to 2012 but only data from 2010 to 2012 were used because the quality and scope of the data have improved over the years. Fisheries were defined based on target species and classified as either demersal, industrial or pelagic fisheries, and the fishing areas based on ICES Divisions (Skagerrak – ICES Division IIIa; North Sea – ICES Division IVabc; and Eastern Channel, ICES Division VIId). Discard ratios were used to express the percentage proportion of the catch that consisted of discards. To condense and compile these data into a presentable format as part of a 'discard atlas', two meetings were held upon invitation of the Dutch ministry of Economic Affairs between scientists and fisheries managers to agree on the content and format. It was agreed to present estimated totals of landings and discards (in tonnes) by year and species, country and fisheries. Based on these official STECF data, it was estimated that annual discard totals of some of the most-commonly caught species range between 140 and 220 thousand tonnes. However, this estimate only includes selected species and ignores largely (benthic) invertebrate species which in some fisheries contribute up to 40% of the discarded biomass in weight.

Main conclusions on the discards in different areas and fisheries are summarized in the table below

North Sea demersal fisheries	On average 40% of the catch in weight was discarded (i.e. discard ratio) in the North Sea between 2010 and 2012 with 78% of the discards coming from plaice and dab. Average discard ratios per species were highly variable, ranging from zero (e.g., megrim, blue ling) to over ninety percent (dab). The indicator of the quality of the discard information is the percentage of discard estimates (in weight) that are derived from monitored strata (fleet, gear, area, season). Discard estimates from non-monitored strata are derived by fill-ins. The data quality for North Sea demersal fisheries was 71%, 23% and 60% in 2010, 2011 and 2012.
North Sea pelagic and industrial fisheries	Discard ratios are generally low for the pelagic fisheries and next to zero for industrial fisheries. However, no specific observer programmes are conducted on the pelagic and industrial fisheries in the North Sea. No information on slipping is available but can be substantial in certain seasons and areas.
Skagerrak demersal fisheries	The average discard ratio in the Skagerrak was 23% for the years 2010-2012. Discard ratios varied between species from very low percentages (i.e. anglerfish and turbot) to almost ninety percent (whiting). New gear regulations were introduced in national legislation 2013 by Denmark and Sweden, which can be expected to reduce the discard ratios in the future.
Skagerrak pelagic and industrial fisheries	Discard estimates are in general uncertain. No observer programmes are conducted on the pelagic and industrial fisheries. Slipping in pelagic fisheries is known and can in some season and areas be substantial.
Eastern Channel demersal fisheries	Whiting, plaice and sole dominate the catches. Between 10-40% of dab, plaice and lemon sole catches are being discarded. For many of the demersal species discard ratios varied by in some cases an order of magnitude between years. The quality of the discard information in the Eastern Channel is generally low.
Easter Channel pelagic fisheries	The main landings for pelagic species are herring and horse mackerel. For these species almost no discard information was available.

To improve mitigation strategies for some of the above mentioned discard-intensive fisheries, it is important to know the reasons for discarding. Unfortunately, these are often unknown, because they are not recorded by fishers, also because a mix of market- and regulatory conditions may influence decisions to discard. Because there are different reasons for discarding, an overall solution asks for different more or less specific approaches.

Drawing upon length-based data from observer monitoring programmes, Catchpole *et al.* (2013) infer the main drivers and distinguish these four categories:

1. Discards of fish below the minimum landing size (MLS). The inferred driver for these discards is the mismatch between the selectivity of the fishing practices and the minimum length at which these fish can legally be landed.
2. Discards of fish below a minimum marketable size (MMS) or for a species that has limited market value (non-commercial species). The driver behind these discards was inferred to be a mismatch between the selectivity of fishing practice and the market demand for these fish.
3. Discards of fish with no associated quota and discarded above either the MMS or the MLS. This category consists entirely of commercial species. The inferred reasons for discarding these fish included inconsistencies in market opportunities, inconsistent sorting, poor condition of the fish or damage to the fish.
4. Discards due to quota restrictions or catch composition rules. These discards were generated through fishers' responses to quota restrictions and catch composition restrictions forcing fishers to discard marketable fish above MLS. However, this category may also refer to high graded, marketable fish (above MLS) which was discarded to catch even more valuable fish.

In pelagic fisheries for herring, mackerel and horse mackerel, unaccounted mortality due to slipping is a long-standing problem although the actual extent is largely unknown. The main reason for slipping is when catches contain large percentages of small pelagic species with low market value. In addition slipping can occur as a result of unwanted mixtures of species in the catch or when there is insufficient storage space on board a vessel to accommodate the entire catch from an individual haul. Discards of pelagic species often occur in fisheries for other (pelagic) species, e.g. herring is discarded in fisheries for mackerel and horse mackerel, and mackerel is discarded in fisheries for horse mackerel.

For some of the most-commonly discarded species such as plaice, dab, whiting and hake in the North Sea, Skagerrak and Eastern Channel, the reasons are summarised below.

Plaice. About half of the catches of plaice are discarded. Highest discard ratios occur in the fisheries targeting sole by Dutch, English and Belgium beam trawlers. To catch the 24cm of sole, the fishers use mesh width of 80mm in the nursery area for plaice. Almost all of the discards are below Minimum Landing Size. Beam trawlers (BT1) with 120 mm mesh targeting plaice in the Northern North Sea have only very low discard ratios for plaice. High fuel prices and limited days at sea have kept the beam trawlers closer to the harbour, i.e. in the nursery area where the young fish is abundant. Prices of plaice have been low in recent years, but high grading does not seem to take place. It is generally assumed that the import of Pangasius and other cheap flatfish from North America have suppressed the market for North Sea plaice. High discards are also observed in the German TR2 fisheries on Norway lobsters ('*Nephrops*').

Dab. Dab is an abundant species in the Southern North Sea, in particular in the German Bight. The vast majority of the dab catches are unwanted bycatch and discarded, due to a lack of opportunity to sell them as a consequence of their low prices. The low price is presumed not enough to outweigh the costs of landing. Quota were initially set as precautionary TACs and are not fully utilised.

Whiting. Similarly to dab, the low price is assumed to be the most dominant reason for the discarding of whiting by fishers in the Netherlands, Belgium, Sweden and Denmark. Off the eastern English coast and in the Skagerrak, local concentrations occur, and discards may be due to a lack of quota for the fishermen involved. Whiting is an substantial bycatch in the *Nephrops* fisheries.

Hake. The northern stock is recovering and currently more abundant. Quota limitations were the main driver for discarding, but it should be noted that the quota are uplifted in autumn 2013. Hake is by-caught in cod fisheries. Because of the high value of hake, only limited swapping occurs of hake quota between countries.

Cod. Discards of cod have been reduced successfully with cod avoidance measures. However, the catch composition rules, in particular in TR2, are still a driver for discards. Limited individual quota and high rent prices are also known factors.

Cod avoidance measures
At the December 2012 Council, a joint statement was made by the fisheries Ministers from Sweden, England, Germany, Denmark and the Netherlands to draw up and implement cod avoidance plans. An overview of cod avoidance measures by member state is presented in the report. An evaluation of the cod avoidance measures in Scotland, the Netherlands and Denmark is also presented. For example, in Scotland it seems likely that avoidance measures have contributed to the significant reduction in discard ratio of cod. This observation may encourage discussions about the utility of avoidance measures as helpful tools to reduce discards in other species and thereby meeting the landing obligations of the new CFP.

Other potential measures
An overview of new technical solutions to prevent discarding is presented in this report. This overview describes the experiences in different Member States. Other potential measures to prevent discarding relate to quota management, spatial measures and measures for species with high survival.
Quota management measures will be necessary in most Member States to facilitate the utilisation of quota under a discard ban. They can be an important tool to avoid unwanted bycatch or to allow those to be landed, for example by means of a national reserve or pooled quotas.
Spatial closures (real time closures - RTC, seasonal closures, permanent closures) may be helpful in cases where aggregations of juvenile or spawning fish occur. Spatial measures may also help fisheries to avoid undersized fish, and therefore add to the implementation of the landing obligation.
To allow the discarding of species with high survival probability may help to improve stock status and to avoid the closure of fisheries if quotas for these species are exhausted. However, it is difficult to prove in a scientifically sound way whether and under which circumstances species have high chances to survive a capture-and-discarding process. It should be elaborated whether e.g., elasmobranchs or robust flatfish species are potential candidates for an exemption to avoid unnecessary negative effects of a discard ban on stocks and fisheries.

Results-based management

In designing discard plans, and associated relevant measures to minimise discards as well as rules of control and enforcement, objectives of the landing obligation should be considered to design a satisfactory management system. A key factor in this context is the level of compliance and the link to the level of detail of technical regulations required to achieve an effective landing obligation. In the reform of the CFP it was called for a change to a results based management, incentivising good fishing practices. Within a results based management system authorities establish the overarching objectives and quality standards for the marine environment while fishermen have flexibility concerning the operational means to achieve those targets, provided that they take responsibility to account for the catch under landing obligation. Such a system should better enable fishermen to optimise the economic outcome of available fishing opportunities.

1 Introduction

The throwing back of unwanted catches ('discarding') is an inevitable consequence of any unselective fishing practice. This seemingly resource-wasting practice is also common among commercial fisheries in the North Sea. The intention of Articles 14 and 15 of the reformed Common Fisheries Policy (CFP) is to curtail discarding throughout European waters by introducing an obligation to land all catches of quota-regulated species. This landing obligation or discard ban will be applicable for both industrial, pelagic and demersal fisheries. Historically, it has been estimated that annually between 800 and 950 thousand tonnes (of roundfish, flatfish, invertebrates, elasmobranchs, benthos, and offal) were discarded by all active fisheries in the North Sea; which equated to 1/3 of the weight of total landings and 1/10 of biomass (Catchpole et al., 2005).

Article 14 of the new basic regulation stipulates that '*Member States may produce a 'discard atlas' showing the level of discards in each of the fisheries covered by the landing obligation*'. Note that the quotation marks around the concept discard atlas are in the original text, which may mean that the contents of a discard atlas may have multiple interpretations.

The Scheveningen Group is a group of Member States around the North Sea. The Scheveningen Group has taken up the invitation to develop a discard atlas. The ambition is both to document the current knowledge of how many discards are actually generated in the North Sea and to assemble information on the strategies to mitigate discards. The current knowledge on discards in different fisheries can be used to prioritize actions and to set a reference level at the start of the new policy. Furthermore, this may allow evaluation of the performance of the new policy over the coming years.

The information presented in this discard atlas has been compiled by a joint 'discard atlas working group' composed of scientists and policy-makers from the associated Member States. The working group has been convened under the auspices of the Scheveningen Group. The working group concluded that a North Sea discard atlas would need to be based on comprehensive information that would cover all major fisheries in the North Sea. In addition the data source should be publicly available and the procedures for combining information should be clearly described and reproducible. The group also concluded that the main focus should be on the compilation of information by area and its presentation in a tabular format. Therefore, this atlas is only to a (very) limited extend based on geographical information.

2 Material and methods for quantifying discards

2.1 General description of areas and fisheries

2.1.1 Physical and biological environment

The North Sea is a large sea basin containing a number of habitats and distinct regions resulting from its bathymetry, topographical features and hydrography. Information on this and on the fisheries operating in the North Sea was drawn from several sources (Paramor *et al.* 2009; ICES 2013; STECF 2013a).

The southern North Sea and Eastern Channel are mainly shallow (< 50 m) areas with a few deeper depressions (for example the Botney Gut and Silver Pit areas). Water temperatures in these shallow, coastal waters fluctuate widely. A number of recognised environmental changes (for example the Flamborough front) occurs in the region of the 50 m depth which describes a line roughly between the Humber estuary on the East coast of England and the Northern tip of Denmark. North of this, the continental shelf waters are deeper and exceed 100 m over an extensive part of the offshore areas. Some deep holes approaching 200 m depth are also present. To the North of Shetland, the 200 m shelf edge contour gives way to a slope quickly dropping away to over 1000 m. The shelf edge extends round into the North-eastern part of the North Sea along the edge of a trench, the Norwegian Deeps and into the northern part of the Skagerrak. The Southern part of the Skagerrak is shallower. Sea water temperatures in the Northern North Sea are less variable than in the South.

The seabed of the North Sea mainly comprises a variety of sand and mud sediments with small patches of gravel and pebbles. Fine sand predominate over wide areas giving way to soft silt clay muds in some of the deeper areas. Areas of gravel and pebbles are most prevalent to the Southeast of England and off the Danish coast. The hydrography of the area is strongly influenced by inflow of Atlantic water to the North of Scotland and also water from the channel. Together with water draining into the North Sea from numerous large rivers, the overall nutrient input generates a productive environment supporting a number of commercially-important stocks.

2.1.2 Stocks and fisheries

The variety of habitats and environmental conditions over the area influences the range of species of fish that are present and their distributions. This in turn has given rise to the development over time of a variety of fisheries prosecuted by fleets from a number of countries using a variety of gear types. The extent to which different countries participate in the various fisheries depends to a large extent on national quotas available to them.

As an illustration, the ICES MIXFISH working group, dealing with the main assessed demersal stocks in the North Sea, Skagerrak and English Channel, defines 43 fleets segments over the various countries (9), main gear (5) and, sometimes, vessel size (up to 3). These fleets engage in one to four different métiers (defined as *mesh-size*area*, e.g. TR1 in North Sea or TR2 in Eastern Channel), resulting in 118 combinations of *country*fleet*métier*area* catching cod, haddock, whiting, saithe, plaice, sole, *Nephrops* and hake. These categories, although quite numerous already, are still fairly broad-brushed and do not account for local specificities. An even more complex description of fishing in the North Sea is therefore possible. For practical purposes however, it may be desirable to identify a smaller number of fairly distinct fisheries. This task is not a straightforward question with a unique simple scientific answer, as grouping individual fishing activities into few categories ('*fisheries*') depends on the desired scale (sea basin, national, local) and criteria (e.g. *gear*mesh size* – e.g. TR1 vs TR2, or target species, e.g. fishery for cod vs. fishery for Norway lobster), often with unclear

boundaries. Detailed considerations on this topic have been provided to the second STECF expert group on landing obligations (STECF EWG 13-17), including issues and trade-offs linked to the various alternatives for defining fisheries (STECF 2013d).
Below, an overview is presented of the main fisheries in the North Sea, subdivided by general type of gear and by subtype based on mesh size.

Fisheries using otter trawls or seines
TR1 (mesh size >=100 mm)
Figure 2.12a shows that the distribution of activity of TR1 gear is predominantly in the more northerly parts of the North Sea extending in a broad sweep from North of Shetland, following the shelf edge adjacent to the Norwegian Deeps and across to the Northern Danish coast. At least three different fisheries operate within this gear category:

1. A mixed demersal fishery targeting cod and associated species (mainly haddock and whiting in the Western and Northern North Sea, mainly plaice in the South-eastern North Sea) with trawls and seines nets operates over much of the area indicated above. Of particular importance are the areas off Denmark, around Shetland and adjacent to the Norwegian Deeps. The main countries involved are Scotland, Denmark and Germany.
2. A mixed fishery that is characterised by a greater preponderance of 'groundfish' species targeting in particular anglerfish and megrim. The main area of operation for this fishery is along the shelf edge at depths around 200 m and this fishery is particularly important in Scotland.
3. A fishery for saithe, mainly to the far north of the North Sea area especially by French, German and Norwegian vessels.

In recent years, the increasing population of hake is seasonally abundant in the North Sea. Hake is regularly caught in TR1 fisheries, particularly by type 2 and 3.

TR2 (mesh size 70-100 mm)
Figure 2.12b shows the distribution of activity of TR2 gear. The use is more widespread than the TR1 gear and associated mainly with three fisheries.

1. The fishery for Norway lobster (Nephrops). This species lives on areas of soft clay muds which are distributed patchily throughout the North Sea and Skagerrak. Bycatch limits for fish species apply in the smaller meshed (80-89 mm) Nephrops fishery. The bycatch limits do not create undue problems in inshore areas where fish abundance is low. In more northerly offshore areas where fish are more abundant, adhering to the bycatch limits is more challenging.
2. A mixed fishery taking place in the more southerly parts of the North Sea and centred on the eastern Channel in which whiting and non-quota species are important constituents. This is predominantly a French fishery.
3. A 90-99 mm mesh mixed demersal fishery centred on the Skagerrak and prosecuted by Denmark and Sweden. In the Skagerrak, also a directed Nephrops fishery with sorting grid (70-89 mm mesh size) is prosecuted by Swedish vessels.

TR3 (mesh size 16-32 mm)
The distribution of small meshed TR3 fisheries are shown in Figure 2.12c. Shrimp (Crangon) species are the target and two distinct areas can be identified: in the South, and off the German, Dutch and Belgian coasts.

Fisheries using beam trawls
Two beam-trawl categories operate in the North Sea and the distribution of activity by these is shown in Figure 2.12d and Figure 2.12e.

BT1 (mesh size >120 mm)
The larger meshed BT1 beam-trawl gear is principally used in the plaice fishery of the Central and Eastern North Sea. Cod is also taken in this fishery. Denmark, Belgium and England mainly carry out this fishery.

BT2 (mesh size between 80 mm and 120 mm)
The BT2 gear (accounting for around 40% of all fishing effort in the North Sea) is mainly used in a fishery located in most Southerly parts of the North Sea and into the Channel. This mixed flatfish fishery for sole, plaice and other flatfish, is operated principally by the Netherlands, Belgium and Germany.

Fisheries using fixed gear fishing methods
A number of fixed gears are employed in the North Sea, the most important being gill nets and trammel nets. Figure 2.13 shows the distribution of effort.

1. The main gillnet activity (GN1) is from a Danish fishery targeted mainly at cod and plaice. The importance of anglerfish in this fishery has risen in recent years and activity directed at this species has increased by Scottish vessels.
2. Trammel net fisheries (GT1) are operated by a number of countries and are particularly important in more coastal waters, for example off the English North Sea and Channel coasts for sole. Catches of plaice and cod are also important particularly in the fishery operated by Denmark.
3. Fairly small scale fisheries using longlines (LL) make catches of cod, hake and ling.

Fisheries using other gears (pots, dredges etc.)
Most countries also have inshore fisheries prosecuted by under 10m vessels using a variety of gears (including pots, dredges etc.) for a variety of fish and shellfish species.

Fisheries for pelagic and industrial species
The pelagic and industrial fisheries are more specialised typically targeting and catching predominantly one species at a time. In the North Sea the main pelagic species is herring and the main industrial fisheries are for Norway pout and sandeel.

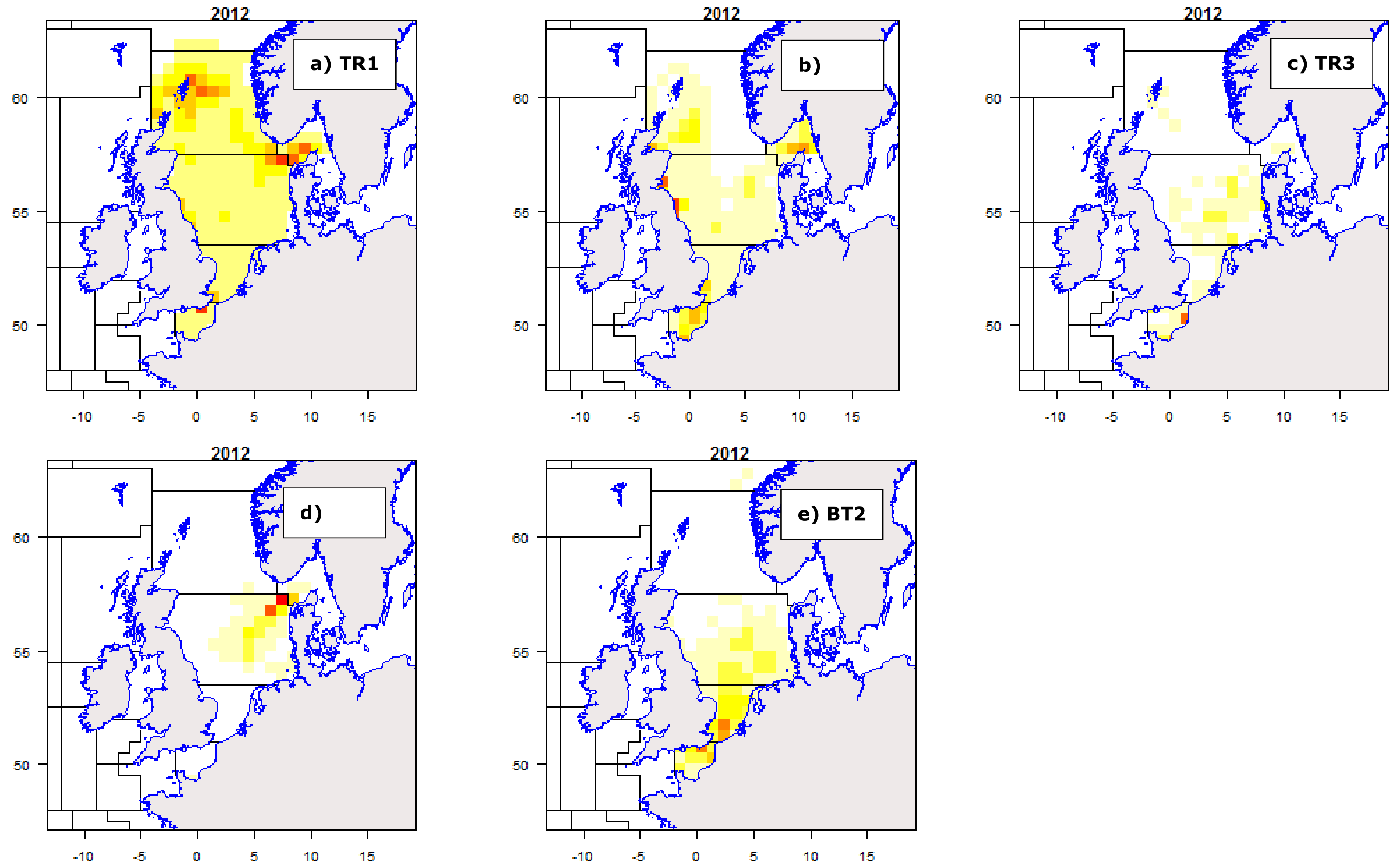

Figure 2.1-1 Distribution of North Sea, Skagerrak and Eastern Channel international fishing effort (EU) in hours fishing by ICES statistical rectangle. Figures shown for 3 trawl gears TR1, TR2 and TR3 and for two beam trawls BT1 and BT2. Note: a) that within each plot the darker the shading, the higher the effort; b) that the scales are different between the plots and so the plots should not be used to infer relative magnitude of effort between gears, but rather for examining distribution of effort.

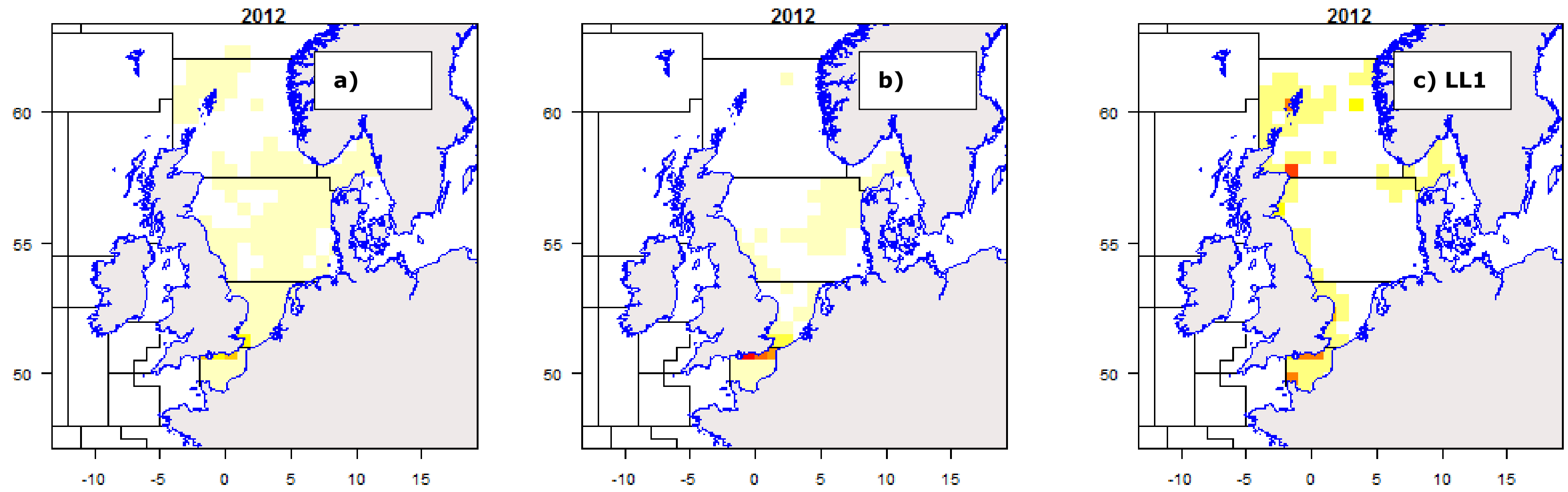

Figure 2.1-2 Distribution of North Sea, Skagerrak and Eastern Channel international fishing effort (EU) in hours fishing by ICES statistical rectangle. Figures shown for gillnets GN1, trammel nets GT1 and long lines LL1. Note: a) that within each plot the darker the shading, the higher the effort; b) that the scales are different between the plots and so the plots should not be used to infer relative magnitude of effort between gears, but rather for examining distribution of effort.

2.2 General description of national sampling programmes for discards

Information on landings and discards in EU fisheries are derived and estimated from two data sources:

- Landings information from national fisheries statistics
- Discard information from Data Collection Framework

Information on volume of landings is derived from the national fisheries statistics which are recorded according to the control regulation (Council Regulation 1224/2009). As part of it, logbooks or sales slips record volume of landings by species and size grade per management area. Even though the control regulation also prescribes that fishers have to report all discards above 50 kg per species per trip, only very limited information on discards is actually registered in the logbooks.

Discard information is collected according to provisions in the Data Collection Framework (DCF) (Council Regulation 199/2008) where Member States (MS) are obliged to carry out at-sea data collection programs. Under the DCF, national onboard observer programs were designed to estimate the catch of commercial marine fisheries, in particular of those individuals discarded at-sea. Discard estimates are included in several fish stock assessments (e.g. cod, haddock, plaice) so that the contribution of discards to the overall fishing mortality can be taken into account when deciding on management measures. The main sampling techniques to estimate discarding in commercial fisheries in the North Sea are at-sea observer and self-sampling programs.

In the at-sea observer programs, scientific observers are on board of commercial vessels during regular operations. Relevant information is recorded concerning e.g. catch, vessel, gear characteristics, mesh size, selective gear devices, fishing ground, weather and ownership. The observers handle the catch on board. The collected data are used for estimating the total discard by number and weight, subdivided by species, age, sex, maturity, area, quarter and métier. Observer programs have the potential to provide good quality data, but they are costly and often have relative low coverage; typically around 1% of the fishing activities. The low sampling levels and the inherent variation in discarding levels between trips, even with the same vessel and gear, lead to highly variable data. Bias could be introduced because of non-random selection of vessels or because of changed behaviour of vessels that carry an observer.

In self-sampling programmes, fishers themselves retain fractions of their discards on board during a number of fishing trips throughout the year. For each sampled haul, information on the composition and volume of the catch, environmental and operational characteristics are recorded. Discard samples from the self-sampling programme are either processed at-sea by the fishers themselves or returned to the laboratory and analysed by scientists. Self-sampling programmes have the potential to generate relatively large amounts of data and increase the involvement of stakeholders in the data collection process. However, concerns are sometimes raised about the potential interest of the self-sampler to demonstrate 'good' data. Cross-validation of self-sampling data is therefore an important method.

There is a large diversity in the fisheries of the different member states. Therefore, a strict and uniform protocol for sampling at-sea covering different fisheries does not exist (Uhlmann *et al.,* 2013). The differences in fisheries result in a considerable diversity in the onboard sampling practices which are further influenced by the volume of the catch and the diversity of the catch composition.

2.3 Description of the data sources

The results presented in this discard atlas are based on the STECF database on fisheries data that is generated by the STECF Expert Working Group on the Evaluation of Fishing Effort Regimes (STECF EWG 13-13). Each year a DCF fishing data call is launched and each member state is requested to deliver data on landings and discards (and effort) in a predefined format. A detailed description of available data from each member state can be found in STECF (2013a). In general, landings and discard data are available from 2003 to 2012. The quality of data has improved over the years and the number of species included has increased. In order to select the data with the highest quality for this study, only data from 2010 to 2012 were used.

Other data sources for the North Sea discard atlas have also been considered.

A new data compilation process specifically for this discard atlas was ruled out because of the amount of work involved in generating a new data call, specifying the requirements and developing a raising procedure. It was also considered unhelpful to generate yet another data compilation process.

The ICES WGMIXFISH approach was explored but did not cover all the areas and all the species of interest (for example it lacks the information on non-target species and pelagic species). Data derived from Individual expert group reports were ruled out because there is no subdivision available by country and gear.

In line with the cod management plan (Council Regulation 1342/2008), the greater North Sea is described as management area 3b in annual Annex IIa of the TAC and Quota Regulations (e.g. Council Regulation 40/2013). The greater North Sea can be further subdivided into:
- 3b1 - Skagerrak (ICES area IIIaN)
- 3b2 - North Sea (ICES area IV and EU waters of ICES area IIa)
- 3b3 - Eastern channel (ICES area VIId).

For this discard atlas the same definitions were used. Information on landings, discards and catch are presented for each of the three sub-areas separately.

Based on raw data submitted by Member States to STECF, the integration of fisheries specific international landings and discards is carried out by the STECF Expert Working Group on the Evaluation of Effort Regimes (STECF 2013a). The latest meeting of this group was in October 2013. Aggregated estimates for landings and discards from this meeting were utilized to give a comprehensive overview on landings and discards for this discard atlas. Only TAC regulated species are included in the discard atlas because they will be subject to the landing obligation.
The data aggregation and estimation procedures of the STECF effort group follow simple raising strategies as outlined below and are generally consistent with the method used in the discard estimates published by the FAO (Kelleher, 2004). The basic idea is to link the information about fisheries specific discards and landings from each member state and replacing poor or lacking values with aggregated information from other countries to get an as much as possible complete picture of discarding in the various fisheries (see also Figure 2.3-1):

Aggregation of national data
The national fisheries data were classified according to their management areas or sub-areas, species, years, quarters and effort regulated gear groups as outlined in Annex 1 of the cod management plan 1342/2008 (i.e. TR1, TR2, TR3, BT1, BT2, GN1, GT1, LL1). Information for effort unregulated gears (e.g., pelagic trawls) was also available from the DCF data call. Unregulated gears were not further grouped but data were aggregated over mesh size ranges.

Estimation of discard ratios by fisheries and raising of discard for non-sampled fisheries
The discard ratio is the proportion of the catch consisting of discards. If a member state has not submitted discard information for a certain fishery (gear, area, season) the average discard ratio from other member states submitting discard information within the same fishery was used.
Let the following notation be: D=discards, L= landings, *snf* = sampled national fishery with a discard estimate from 0 to X (in tonnes), *unf* = un-sampled national fishery without a discard estimate. The available landings and discards information were aggregated (summed) over fisheries to metier level (by species, year, quarter, regulated area, gear group and special condition). Mean discard ratios (DR) were calculated:

$$DR = \frac{\sum_{snf} D_{snf}}{\sum_{snf}(L_{snf} + D_{snf})}$$ if $D_{snf} \geq 0$ and with $L_{snf} + D_{snf} > 0$ and $L_{snf} > 0$

If no discard information was available, fisheries specific discard amounts were calculated by:

$$D_{unf} = \frac{L_{unf}.DR}{(1-DR)}$$

If no country has submitted discard information for a specific fishery and no average DR could be estimated for a metier, it would remain without discard estimate.

Estimation of further aggregated landings, discards and catch

Catches by national metier were estimated as the sum of landings and discards. To be able to give more aggregated overviews (e.g., per species in a management area) landings, discards and catches were further summed over metiers. Where discard information was lacking (no country has submitted data) no further raising was applied. This could lead to an underestimation of discards but avoided the introduction of speculative discard estimates.

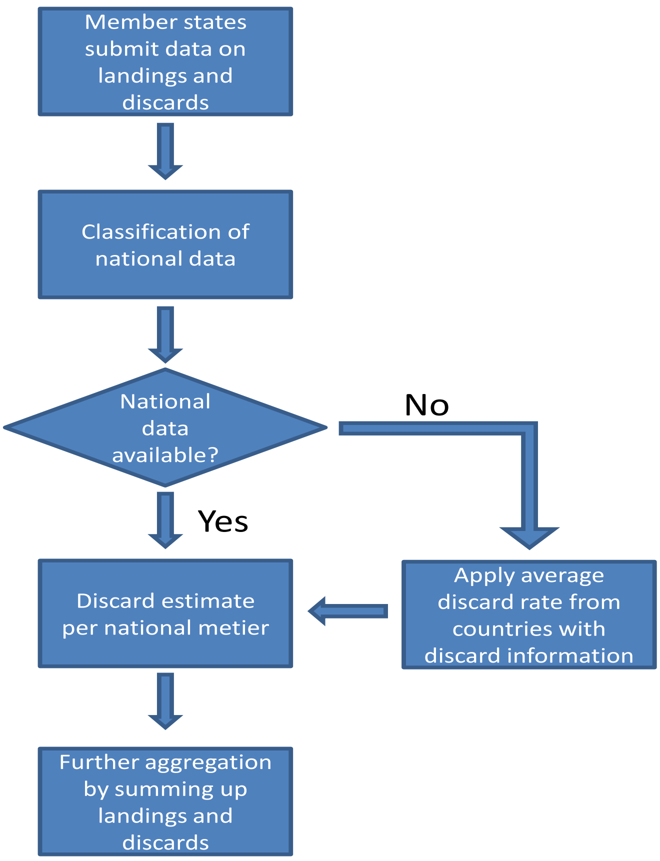

Figure 2.3-1 *Schematic overview over the discard raising procedure used in the STECF database.*

2.4 Limitations and known issues with the catch database used

A note on possible outliers and high discards values
STECF considers that overall, discards information in the North Sea is of good quality with broad coverage (also in comparison with most other areas), so the main patterns can be considered accurate. However, STECF draws attention that in some cases very high discards values may appear in the results. For example, herring discards of 13.307 tonnes in Skagerrak 2010 against 355 and 29 tonnes in 2011 and 2012 respectively (Table 3.2.1), or roundnose grenadier discards of 450 tonnes in Skagerrak in 2011 against 8 and 2 tonnes in 2010 and 2012 respectively (table 3.2.6). Such values are usually associated with low landings values and are typically artefacts of the automatic raising procedure for uncommon species or for species with high discards ratios. For uncommon species (such as roundnose grenadier), sampling coverage might be insufficient to give a proper estimate. The raising could be based on very few fish in very few hauls which generated a very wide confidence interval. For species with discards ratios close to 100%, actual discards quantities cannot really be estimated from the landings, because there are almost no landings to raise from. In those cases, small differences in estimated discards ratio (few tens of a percent) can give strong differences in tonnage. In these two cases, it is important to interpret results with even more care than for other 'usual' species with 'usual' discards ratios. STECF underlines that it is not possible to track and remove every single outlier of every single species for every single country, given the size of the data base. The STECF database relies on individual countries to provide the best possible discards estimates. The combined outcomes of the database cannot be any better than the inputs (STECF 2013a, 2013c).

Considerations of differences between ICES and STECF specifically for the North Sea
For a number of stocks, ICES (WGMIXFISH) and STECF (EWG 13-13) have compiled similar information that seemed to have substantial differences (see for example ICES 2013b). This question was also addressed in some details by STECF 13-16 (STECF 2013b). Because this issue is quite relevant for the current North Sea atlas, the extract of this STECF report is presented in annex 2 and summarised below.

At the stock level, there is globally a fairly good agreement between the discards ratios estimated by ICES and STECF respectively. This agreement has been consistently improving year after year due to increased focus on data accuracy in all European countries. STECF EWG 13-16 has shown that for North Sea demersal stocks, there is a broad convergence between STECF and ICES estimates of discards at the overall stock level, with an absolute difference in discard ratio of less than 10% (expressed in % of catch) (STECF 2013b). However, this overall consistency at the stock level can nevertheless hide major discrepancies at the fleet and country level. Discard data is only sampled for a fraction of the national fleets. The way the discard data is raised within a nation can be affected by the grouping of vessels implied by a fleet specific data call. Additionally, once the 'raw' data is supplied, an expert group has several options on how to assign (raise) a discard ratio to unsampled fleets. The assignment process for unsampled fleets is different for WGMIXFISH and STECF, as described in the Annex 2. Differences could then result from different rules for assigning discards to metiers where discard data is missing. It could also be an effect of countries submitting different discard estimates to various working groups. Both are likely to happen at the same time.

A brief illustration of this is given below with the example of 2012 whiting catch data in the North Sea. The total landings for the entire area is consistent and the absolute difference in the estimated discards ratio are within 10%. However, the breakdown between gears differs both with regards to the landings and to the discards. The overall picture is coherent in terms of the scale of discards ratio for the main gears (TR1-TR2), which are likely to be well sampled. Discards and discards ratio estimates for less important gears are obviously more uncertain and less sampled.

Table 2.4-1

Comparison of 2012 landings and discard estimates between the WGMIXFISH and STECF expert groups.

ICES INTERCATCH			
Gear	**2012 Landings**	**2012 Discards**	**2012 Discard Ratio**
BEAM	6	29	0.83
BT1	1	0	0.33
BT2	33	1372	0.98
GN1	7	7	0.49
GT1	3	2	0.40
LL1	2	1	0.33
other	279	140	0.33
OTTER	294	146	0.33
TR1	7925	837	0.10
TR2	3815	3223	0.46
Total	**12365**	**5757**	**0.32**

STECF			
Gear	**2012 Landings**	**2012 Discards**	**2012 Discard Ratio**
BEAM	8	20	0.71
BT1	1		0.00
BT2	280	1657	0.86
DEM_SEINE	39		0.00
DREDGE	0		0.00
GN1	2	207	0.99
GT1	1	9	0.86
LL1	0		0.00
none	0		0.00
OTTER	58	1425	0.96
PEL_SEINE	1	0	0.07
PEL_TRAWL	339		0.00
POTS	0		0.00
TR1	7805	713	0.08
TR2	3474	4448	0.56
TR3	74		0.00
Total	**12083**	**8477**	**0.41**

The main conclusion for the discard atlas is that any discard data that is based on stratified sampling is sensitive to the raising method used for unsampled strata. The choice of method may potentially differ according to objectives.

3 Landings and discard estimates by area and fishery

Landings and discard data and discard ratios presented throughout this atlas are expressed in tonnage (weight). As discards usually contain larger proportions of small individuals compared to landing, it must be kept in mind that the estimated discards ratios would probably be higher if they would be expressed in numbers of fish.

In the following an overview is presented of landings and discards for regulated species. The sections have been grouped by area (North Sea, Skagerrak and Eastern Channel) and by type of fisheries (demersal and pelagic/industrial).

Table 3.1-1
Overview of species in the categories 'demersal' and 'pelagic/industrial'

Demersal		Pelagic and industrial	
ANF	Anglerfish	NOP	Norway pout
BLI	Blue ling	SAN	Sandeel
BLL	Brill	ANE	Anchovy
COD	Cod	BFT	Bluefin tuna
DAB	Dab	BOC	Boarfish
GHL	Greenland halibut	BOR	Boarfishes
HAD	Haddock	HER	Herring
HKE	Hake	HOM	Horse mackerel
LDB	Four-spot megrim	JAX	Horse mackerels
LEM	Lemon sole	MAC	Mackerel
LEZ	Megrims	REB	Beaked redfish
LIN	Ling	RED	Atlantic redfishes
MEG	Megrim	REG	Golden redfish
NEP	Norway lobster	SAL	Salmon
PLE	Plaice	SPR	Sprat
POK	Saithe	SWO	Swordfish
POL	Pollack	WHB	Blue whiting
PRA	Northern prawn		
RNG	Roundnose grenadier		
SOL	Sole		
TUR	Turbot		
USK	Tusk		
WHG	Whiting		

Each of the sections contains a description of the mains results that are shown in the data tables for a region and category. If sufficient information is available for a region, a set of six tables demonstrates different 'views' on the available data. The views comply with the requirement that a table should fit on one page. If sufficient information was not available, only the overview table for that region would be presented. The different 'views' would not be presented because they were not considered to provide meaningful information.

Annex 3 contains more detailed tables ('view') on the information by region. The tables are structured according to species, country and gear. Here the information is not restricted to the one-table-per-page criterion.

3.1 Area IV (North Sea)

3.1.1 Demersal fisheries

On average 40% of the catch in weight from demersal fisheries was discarded in the North Sea. The large majority of discards consisted of plaice and dab. Average discard ratios were highly variable between species ranging from zero (e.g., megrim, blue ling) to over ninety percent (dab) (Table 3.1-2).

The highest average catch between 2010 and 2012 was estimated for plaice with a discard ratio of 43%. Dab had the second highest average catch and by far the highest discard ratios (91% on average). The high abundance of dab and the low market value contributed to this result. Discard ratios above ninety percent mean that small changes in discard ratios lead to very high changes in absolute discard estimates in tonnes. Therefore, absolute discard estimates in tonnes have to be taken with great care for dab.
In contrast to the two mentioned flatfish species, discard ratios for sole were much lower (13% on average) demonstrating the high market value and the ability of fishermen to avoid unwanted by-catch of sole.

The roundfish species saithe, haddock, cod and whiting were among the top ten species related to their average catch between 2010 and 2012. Discard ratios showed large differences between these species as a result of differences in fisheries, spatial distribution and abundance of stocks as well as market value. While the average discard ratio was 43% for whiting, only 10% of the catch of saithe was discarded. Discard ratios for cod (15%) and haddock (21%) were in between these two extremes.

Large variations in discard ratios are apparent for some of the relatively seldom caught species like pollack, roundnose grenadier and ling. It is unclear whether this reflects the true variability or an artefact of the discard sampling.

Discard ratios for the more abundant species hake and lemon sole were more stable and on average 25% and 22% respectively. Discard ratios for the high value species turbot and brill were below 5% in all years. For some by-catch species (anglerfish, megrims, Greenland halibut, blue ling, tusk) extremely low or even zero discards were reported. Although by-catch species have a relatively low importance in terms of catch in tonnes, they can become important 'choke species' under a discard ban, i.e. species with limited quota available in specific fisheries but which still would need to be landed.

Quality of discard information
Table 3.1-2 also highlights how much of the final discard estimates stem from reported data and how much had to be filled in by assuming an average discard ratio from countries that have submitted data for a given metier/fishery. The quality is expressed as %DQ (% data quality) derived as the amount of discards from submitted data relative to the overall estimate of discards (in tonnes).

The overall %DQ was 71% in 2010, 23% in 2011 and 60% in 2012. Data quality improved for dab, cod, Norway lobster, lemon sole, turbot and anglerfish in 2012. Only for a few species (e.g., hake and sole) the data quality decreased in 2012.

Data quality was low in some years for whiting, plaice, dab, *Nephrops*, turbot and ling. In general, for cod, saithe, haddock, sole and anglerfish the coverage of discard estimates was high. For the three species with the highest discard ratios and catches (plaice, dab, whiting), care is needed in interpreting the results as they could be biased to some extent by the usage of average discard ratios instead of reported data. Especially the 2011 estimates are of concern because more than 50% of the discard estimates for these species stem from fill-ins. This would require a critical evaluation of the data available and submitted for that year. Discard estimates for cod, saithe, haddock, sole and anglerfish show this problem to a lesser extent.

Discard ratios per species and quota availability
Average discard ratios for the top ten species varied between countries dependent on the type of fisheries, main fishing areas, national markets and availability of quotas (Table 3.1-3). For example, average discard ratios for plaice were above 50% for the Netherlands, Germany and Belgium fishing mainly with smaller meshed beam trawls for sole and plaice. Denmark fishes for plaice mainly with large meshed otter trawls and reported only 8% discards on average. Dab was heavily discarded by all countries as there is hardly any market for this species.

Scotland has the highest absolute discard estimates for the main roundfish stocks cod, whiting, haddock and saithe. Apart for whiting this also applies to discard ratios. Reasons are, for example, high discard ratios in the *Nephrops* fisheries, higher abundance of cod in the northern part of the North Sea and limiting quotas for saithe. The Scottish and English discard ratios were close to zero for *Nephrops* (because Nephrops discard data had not been submitted to STECF by England) while for other countries discard ratios up to 33% were estimated.

The discard ratios for sole were below 10% for England, Germany and France but above 10% for Belgium and the Netherlands. Hake was discarded to some extent by all countries. The high discard estimated for Germany in 2011 appears as an outlier. For anglerfish hardly any discards were reported.

Discard ratios per country
The importance of species in the catch varied by country (Table 3.1-5). The Netherlands mainly fish for flatfish in the Southern North Sea similar to Belgium. Plaice, sole and dab made up the majority of catches between 2010 and 2012. In contrast, Scotland has its main fisheries in the northern part of the North Sea. Therefore, haddock, cod and *Nephrops* were under the top 3 species and no flatfish species could be found among the top 6 species. France mainly fishes for saithe in the northern part of the North Sea and for whiting in the South. Denmark, England and Germany have a wider range of fisheries. Therefore, flatfish as well as roundfish could be found among the top 6 species and catches were distributed more evenly over flatfish and roundfish.

Discard ratios per gear
Large meshed otter trawls and demersal seines (TR1) are mainly used to fish for roundfish as saithe, cod, haddock and whiting in the central and northern part of the North Sea (Table 3.1-). In addition, in the last years more and more plaice is targeted with TR1 at least in some countries (e.g., Denmark, Germany). Estimated discard ratios were moderate to low (<10% for saithe and plaice) in these fisheries.

Smaller meshed otter trawls (TR2) are the main gear in the *Nephrops* fisheries with by-catch of cod and haddock in the northern part of the North Sea and plaice, whiting and dab in the Southern part. French fishermen use TR2 gears in mixed demersal fisheries in the North Sea and at particular times of the year they use the TR2 gears to target whiting in the southern North Sea. The estimated discard ratios in TR2 were high compared to the TR1 fisheries. However, in absolute terms the catch of cod and haddock in the TR2 fisheries was considerably lower than in the TR1 fisheries. The high discard estimate for plaice in 2011 appears to be an outlier resulting from a low percentage of reported data in this year.

Flatfish fisheries with beam trawls (BT2) produced high discard ratios especially for plaice, dab and whiting. Discard ratios for cod were low in this fishery (11%).

Lowest discard ratios were reported for fisheries with gillnets (GN1) and large meshed beam trawls (BT1). However, reported data from these fisheries are scarce. Therefore, the very low discard estimates (often a zero estimate) have to be interpreted with care.

Table 3.1-2

North Sea || demersal fisheries: landings and discards per species and year and area; table sorted in descending order on average catch 2010-2012.

		2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	Avg LAND	AVG DISC	AVG CATCH	AVG %DR	AVG %DQ
SPECIES		**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**	**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**	**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**	**10-'12**	**10-'12**	**10-'12**	**10-'12**	**10-'12**
PLE	Plaice	58962	30124	89086	34%	79%	64707	67974	132681	51%	31%	69868	47296	117164	40%	57%	64513	48464	112977	43%	49%
DAB	Dab	7061	52024	59085	88%	67%	6611	106262	112873	94%	3%	5964	43934	49898	88%	60%	6545	67407	73952	91%	32%
POK	Saithe	34112	2156	36268	6%	73%	33530	3399	36930	9%	79%	33297	5537	38834	14%	75%	33646	3698	37344	10%	76%
HAD	Haddock	26640	8676	35316	25%	96%	26411	9016	35427	25%	93%	29242	3606	32848	11%	93%	27431	7099	34530	21%	94%
COD	Cod	25971	5131	31102	16%	90%	22510	3343	25854	13%	80%	22260	4072	26331	15%	92%	23580	4182	27762	15%	88%
WHG	Whiting	10784	12399	23182	53%	65%	18678	10787	29466	37%	44%	12083	8489	20571	41%	47%	13848	10558	24406	43%	53%
NEP	Norway lobster	19640	285	19925	1%	47%	15716	861	16576	5%	21%	12410	1959	14369	14%	65%	15922	1035	16957	6%	51%
SOL	Sole	12209	1514	13723	11%	97%	10394	1224	11617	11%	99%	11142	2428	13570	18%	75%	11248	1722	12970	13%	87%
HKE	Hake	5726	1246	6972	18%	40%	5861	2214	8075	27%	78%	6611	2675	9286	29%	13%	6066	2045	8111	25%	42%
ANF	Anglerfish	8178	20	8198	0%	78%	8257	15	8272	0%	68%	6916	9	6925	0%	93%	7784	15	7798	0%	78%
LIN	Ling	2681	3870	6552	59%	10%	2920	294	3214	9%	45%	2753	127	2879	4%	6%	2785	1430	4215	34%	12%
LEM	Lemon sole	2492	502	2993	17%	69%	3255	706	3960	18%	31%	3024	1337	4361	31%	75%	2924	848	3772	22%	61%
TUR	Turbot	2325	5	2330	0%	15%	2690	58	2748	2%	7%	2869	120	2989	4%	89%	2628	61	2689	2%	61%
LEZ	Megrims	1480	6	1486	0%	89%	1445	0	1445	0%	59%	1453	0	1453	0%	0%	1459	2	1461	0%	87%
POL	Pollack	894	546	1440	38%	47%	698	1	699	0%	48%	704	16	720	2%	63%	765	188	953	20%	47%
PRA	Northern prawn	251	0	251	0%	100%	402	21	423	5%	100%	287	2	289	1%	58%	313	8	321	2%	96%
USK	Tusk	140	1	140	0%	54%	152	0	152	0%	93%	132	0	132	0%	100%	141	0	142	0%	73%
GHL	Greenland halibut	166	0	166	0%	93%	102	0	102	0%	100%	114	0	114	0%	0%	127	0	127	0%	98%
BLL	Brill	103	0	103	0%	100%	99	5	104	4%	100%	108	2	110	2%	100%	103	2	106	2%	100%
BLI	Blue ling	58	0	58	0%	0%	9	0	9	0%	63%	15	0	15	0%	0%	27	0	27	0%	63%
RNG	Roundnose grenadier	24	0	24	0%	0%	0	2	2	82%	100%	0	0	1	14%	100%	8	1	9	6%	100%
Grand Total		**219896**	**118505**	**338401**	**35%**	**71%**	**224446**	**206182**	**430628**	**48%**	**23%**	**221252**	**121608**	**342859**	**35%**	**60%**	**221865**	**148765**	**370630**	**40%**	**46%**

Note: %DR refers to the discard : catch ratio (discard/catch). %DQ refers to the quality of the discard estimate (the proportion of the discard estimate derived from actual data). The colour coding refers to DQ values larger than 66% (green), between 33% and 66% (orange) and below 33% (red).

Table 3.1-3

North Sea || demersal fisheries: Quota by species, country and year.

SPECIES	TAC area	COUNTRY	INITIAL 2010	FINAL 2010	% change 2010	INITIAL 2011	FINAL 2011	% change 2011	INITIAL 2012	FINAL 2012	% change 2012
ANF	Norwegian waters of ICES division IV (south of 62 ° N)	BEL	46	47	2%	45	42	-7%	45	41	-9%
		DEU	19	24	26%	18	22	22%	18	23	28%
		DNK	1182	1258	6%	1152	1166	1%	1152	1158	1%
		GBR	276	194	-30%	269	251	-7%	269	262	-3%
		NLD	17	17	0%	16	19	19%	16	16	0%
	EU waters of ICES zones IIa and IV	BEL	401	441	10%	341	341	0%	324	358	10%
		DEU	432	473	9%	367	367	0%	349	386	11%
		DNK	884	972	10%	752	752	0%	714	789	11%
		FRA	82	89	9%	70	64	-8%	66	72	9%
		GBR	9233	9763	6%	7846	7537	-4%	7455	8199	10%
		NLD	303	333	10%	258	258	0%	245	281	15%
		SWE	10	11	10%	9	9	0%	8	9	13%
ANF Sum			12885	13622		11143	10828		10661	11594	
COD	Norwegian waters of ICES division IV (south of 62 ° N)	SWE	382	382	0%	382	382	0%	382	382	0%
	ICES area IV , EU waters of ICES area IIa and ICES area IIIa to the Skagerrak	BEL	991	1096	11%	793	838	6%	782	861	10%
		DEU	3612	2967	-18%	2889	2635	-9%	2850	2437	-14%
		DNK	5696	6383	12%	4557	5095	12%	4495	4953	10%
		FRA	1225	1245	2%	980	1000	2%	966	871	-10%
		GBR	13067	14281	9%	10455	12485	19%	10311	12336	20%
		NLD	3219	2771	-14%	2575	2168	-16%	2540	2089	-18%
		NOR	5704	5704	0%	4563	4563	0%	4501	4501	0%
		POL	0	5	#######	0	3	#######	0	0	#######
		SWE	38	38	0%	34	34	0%	30	34	13%
COD Sum			33934	34872		27228	29201		26857	28465	
DAB/FLE	EU waters of ICES zones IIa and IV	BEL	513	763	49%	503	753	50%	503	804	60%
		DEU	2890	2515	-13%	2832	2457	-13%	2832	2432	-14%
		DNK	1927	1927	0%	1888	1888	0%	1888	1888	0%
		FRA	200	270	35%	196	276	41%	196	196	0%
		GBR	1620	1395	-14%	1588	1633	3%	1588	1652	4%
		NLD	11654	11934	2%	11421	11421	0%	11421	11456	0%
		SWE	6	6	0%	6	6	0%	6	6	0%
DAB/FLE Sum			18810	18810		18434	18434		18434	18434	

SPECIES	TAC area	COUNTRY	INITIAL 2010	FINAL 2010	% change 2010	INITIAL 2011	FINAL 2011	% change 2011	INITIAL 2012	FINAL 2012	% change 2012
HAD	Norwegian waters of ICES division IV (south of 62 ° N)	SWE	707	707	0%	707	707	0%	707	707	0%
	ICES area IV and EU waters of ICES area IIa	BEL	200	100	-50%	196	158	-19%	224	219	-2%
		DEU	876	634	-28%	858	744	-13%	979	630	-36%
		DNK	1376	920	-33%	1349	1066	-21%	1539	1285	-17%
		FRA	1526	671	-56%	1496	423	-72%	1707	1467	-14%
		GBR	22698	25367	12%	22250	24360	9%	25386	30249	19%
		NLD	150	50	-67%	147	130	-12%	168	202	20%
		NOR	8083	8083	0%	7625	7625	0%	9008	9008	0%
		POL	0	1	#######	0	0	#######	0	0	#######
		SWE	139	16	-88%	136	128	-6%	155	168	8%
HAD Sum			35755	36549		34764	35341		39873	43935	
HKE	EU waters of ICES zones IIa and IV	BEL	28	57	104%	28	39	39%	28	32	14%
		DEU	128	166	30%	128	120	-6%	128	102	-20%
		DNK	1119	1195	7%	1119	1086	-3%	1119	875	-22%
		FRA	248	617	149%	248	760	206%	248	568	129%
		GBR	348	1989	472%	348	1932	455%	348	1840	429%
		NLD	64	69	8%	64	96	50%	64	112	75%
		SWE	0	1	#######	0	2	#######	0	1	#######
HKE Sum			1935	4094		1935	4035		1935	3529	
PLE	ICES area IV , EU waters of ICES area IIa and ICES area IIIa to the Skagerrak	BEL	3665	4096	12%	4238	4701	11%	4874	6320	30%
		DEU	3436	3802	11%	3973	4168	5%	4569	4619	1%
		DNK	11911	10019	-16%	13772	12394	-10%	15840	14559	-8%
		FRA	687	401	-42%	795	655	-18%	914	854	-7%
		GBR	16951	14763	-13%	19599	15996	-18%	22542	18943	-16%
		NLD	22907	26575	16%	26485	30947	17%	30462	33906	11%
		NOR	4268	4168	-2%	4538	4538	0%	5209	5209	0%
		SWE	0	1	#######	0	1	#######	0	0	#######
PLE Sum			63825	63825		73400	73400		84410	84410	
POK	Norwegian waters of ICES division IV (south of 62 ° N)	SWE	880	880	0%	880	880	0%	880	880	0%
	ICES zones IIIa and IV and EU waters of ICES zones IIa , IIIb, IIIc and subdivisions 22-32	BEL	37	37	0%	32	15	-53%	27	17	-37%
		DEU	11002	11794	7%	9565	10530	10%	8241	8403	2%
		DNK	4357	8471	94%	3788	6550	73%	3263	5362	64%
		FRA	25891	16523	-36%	22508	15142	-33%	19395	15370	-21%
		GBR	8435	12094	43%	7333	10455	43%	6318	8139	29%
		NLD	110	44	-60%	96	31	-68%	82	35	-57%
		NOR	56613	56613	0%	49476	49476	0%	41546	41546	0%
		POL	0	684	#######	0	584	#######	0	0	#######
		SWE	599	784	31%	520	535	3%	448	448	0%
POK Sum			107924	107924		94198	94198		80200	80200	

SPECIES	TAC area	COUNTRY	INITIAL 2010	FINAL 2010	% change 2010	INITIAL 2011	FINAL 2011	% change 2011	INITIAL 2012	FINAL 2012	% change 2012
SOL	EU waters of ICES zones IIa and IV	BEL	1171	1439	23%	1171	1515	29%	1346	1558	16%
		DEU	937	641	-32%	937	794	-15%	1077	1075	0%
		DNK	535	761	42%	535	655	22%	615	601	-2%
		FRA	234	917	292%	234	770	229%	269	791	194%
		GBR	602	1207	100%	602	1057	76%	692	1217	76%
		NLD	10571	10142	-4%	10571	10770	2%	12151	12465	3%
		NOR	50	50	0%	50	50	0%	50	50	0%
SOL Sum			14100	15157		14100	15611		16200	17757	
TUR/BLL	EU waters of ICES zones IIa and IV	BEL	347	297	-14%	340	290	-15%	340	258	-24%
		DEU	189	311	65%	186	267	44%	186	259	39%
		DNK	742	742	0%	727	727	0%	727	727	0%
		FRA	89	89	0%	88	88	0%	88	88	0%
		GBR	732	610	-17%	717	686	-4%	717	515	-28%
		NLD	2633	2683	2%	2579	2579	0%	2579	2790	8%
		SWE	5	5	0%	5	5	0%	5	5	0%
TUR/BLL Sum			4737	4737		4642	4642		4642	4642	
WHG	ICES area IV and EU waters of ICES area IIa	BEL	236	129	-45%	286	81	-72%	337	267	-21%
		DEU	266	156	-41%	321	151	-53%	379	164	-57%
		DNK	1022	154	-85%	1236	284	-77%	1458	326	-78%
		FRA	1536	2367	54%	1857	2779	50%	2191	3352	53%
		GBR	7391	7782	5%	8933	9150	2%	10539	10935	4%
		NLD	591	604	2%	714	625	-12%	843	703	-17%
		NOR	790	640	-19%	1483	1483	0%	1306	1306	0%
		SWE	2	2	0%	2	2	0%	3	3	0%
WHG Sum			11834	11834		14832	14554		17056	17056	

Table 3.1-4

North Sea || demersal fisheries: landings and discards per species, country and year; table sorted in descending order on average catch 2010-2012, top 10 species, top 5 countries per species.

SPECIES	SPEC_NAME	COUNTRY	2010 Landings	2010 Discards	2010 %DR	2011 Landings	2011 Discards	2011 %DR	2012 Landings	2012 Discards	2012 %DR	Avg 2010-2012 Landings	Avg 2010-2012 Discards	Avg 2010-2012 Catch	Avg 2010-2012 %DR
ANF	Anglerfish	SCO	5864.983	0.005	8.52517E-07	6120.677	0	0	4725.805	0	0	5570.488333	0.001666667	5570.49	2.99196E-07
		DNK	1413.735	6.261	0.004409167	1310.492	0.688	0.000524718	1373.047	8.736	0.006322266	1365.758	5.228333333	1370.986333	0.003813556
		ENG	450.487	0.283	0.000627815	465.12	0.021	4.51476E-05	306.901	0	0	407.5026667	0.101333333	407.604	0.000248607
		DEU	241.216	0.42	0.001738152	132.798	0.468	0.003511773	283.01	0.109	0.000384997	219.008	0.332333333	219.3403333	0.001515149
		BEL	101.929	6.09	0.05637897	115.742	9.575	0.076406234	132.024	0.011	8.33112E-05	116.565	5.225333333	121.7903333	0.042904336
COD	Cod	SCO	11547.501	3932.477	0.254036343	10108.347	2249.87	0.18205458	10474.04	3213.959	0.23480123	10709.96267	3132.102	13842.06467	0.226274192
		DNK	5735.003	371.396	0.060820788	5010.938	193.185	0.037121528	4970.232	365.904	0.068570966	5238.724333	310.1616667	5548.886	0.055896205
		DEU	2869.69	197.411	0.064364036	2223.625	207.531	0.085363095	2134.48	147.479	0.064628243	2409.265	184.1403333	2593.405333	0.071003299
		NLD	2541	314.335	0.110086907	1910	200.157	0.09485408	1855	227.032	0.109043473	2102	247.1746667	2349.174667	0.105217662
		ENG	1902.05	117.318	0.058096395	1692.243	225.281	0.117485361	1229.487	52.736	0.041128571	1607.926667	131.7783333	1739.705	0.075747517
DAB	Dab	NLD	5015	39591.008	0.887571199	4627	80598.72	0.945708878	3986	28827.517	0.87852567	4542.666667	49672.415	54215.08167	0.916210277
		DEU	355.656	6203.132	0.945774128	313.503	10269.511	0.970376775	238.92	6584.545	0.964985532	302.693	7685.729333	7988.422333	0.962108538
		FRA	122.355	2246.232	0.948342619	187.629	10537.627	0.982505872	86.664	1068.59	0.924982731	132.216	4617.483	4749.699	0.972163289
		BEL	331.445	854.984	0.720636465	241.575	3174.096	0.929274512	451.622	4128.446	0.90139404	341.5473333	2719.175333	3060.722667	0.888409578
		DNK	523.727	2513.699	0.827575388	608.312	1059.501	0.635263666	540.708	1076.42	0.665636857	557.5823333	1549.873333	2107.455667	0.735423932
HAD	Haddock	SCO	22612.347	8186.677	0.265809624	21107.703	8091.346	0.277109915	25494.523	3226.838	0.112349759	23071.52433	6501.620333	29573.14467	0.219848799
		ENG	1753.038	163.389	0.085257096	1702.152	436.591	0.204134391	1324.993	38.854	0.028488533	1593.394333	212.9446667	1806.339	0.117887432
		DNK	749.422	87.471	0.104518738	739.568	69.915	0.086369942	1040.054	224.426	0.177484816	843.0146667	127.2706667	970.2853333	0.131168289
		FRA	207.51	2.627	0.012501368	1593.289	21.459	0.01328938	185.672	6.759	0.035124278	662.157	10.28166667	672.4386667	0.015290118
		DEU	655.437	33.577	0.048731956	576.868	138.959	0.19412372	491.69	53.178	0.09759795	574.665	75.238	649.903	0.115768045
HKE	Hake	SCO	2941.251	594.04	0.168031429	2958.807	74.801	0.024657438	3122.008	2196.787	0.413023439	3007.355333	955.2093333	3962.564667	0.241058358
		DNK	1877.326	534.188	0.221515612	1812.746	468.305	0.205302293	2135.487	259.912	0.108504679	1941.853	420.8016667	2362.654667	0.178105447
		DEU	273.246	48.592	0.150982793	290.575	1553.3	0.842410684	384.23	41.852	0.098225224	316.017	547.9146667	863.9316667	0.634210653
		FRA	351.05	6.95	0.019413408	433.694	45.426	0.094811321	551.987	2.736	0.004932191	445.577	18.37066667	463.9476667	0.03959642
		ENG	140.713	29.99	0.175685255	176.932	5.56	0.030467089	240.586	150.101	0.38419758	186.077	61.88366667	247.9606667	0.249570496
NEP	Norway lobster	SCO	15723.842	17.852	0.001134058	11364.436	3.04	0.00026743	8458.998	27.508	0.003241381	11849.092	16.13333333	11865.22533	0.001359716
		NLD	692	77.531	0.100750977	1031	367.056	0.262547423	1024	894.05	0.466124449	915.6666667	446.2123333	1361.879	0.327644624
		ENG	1482.584	2.818	0.00189713	1258.358	0	0	1142.722	4.544	0.003960721	1294.554667	2.454	1297.008667	0.001892046
		DNK	601.727	132.897	0.180904789	825.346	182.384	0.180984986	724.351	406.648	0.359547621	717.1413333	240.643	957.7843333	0.251249672
		DEU	376.617	41.212	0.098633652	553.993	200.416	0.265659609	386.91	303.3	0.439431477	439.1733333	181.6426667	620.816	0.292586961
PLE	Plaice	NLD	27227	21341.695	0.439412568	28761	42060.192	0.593892743	31610	32701.806	0.508488379	29199.33333	32034.56433	61233.89767	0.523150829
		ENG	11366.707	2479.243	0.179059075	12221.974	1435.234	0.105089854	14037.838	1422.51	0.092010219	12542.173	1778.995667	14321.16867	0.124221403
		DNK	9535.988	1587.171	0.142690669	11815.79	637.498	0.051191139	12312.401	589.352	0.045679994	11221.393	938.007	12159.4	0.07714254
		DEU	3727.998	2438.475	0.395440797	3825.997	18932.05	0.831883773	3837.44	2144.608	0.358507321	3797.145	7838.377667	11635.52267	0.673659267
		BEL	3565.63	1069.01	0.230656534	4509.292	3808.868	0.4578979	5022.73	9669.415	0.65813501	4365.884	4849.097667	9214.981667	0.526218916

SPECIES	SPEC_NAME	COUNTRY	2010 Landings	2010 Discards	2010 %DR	2011 Landings	2011 Discards	2011 %DR	2012 Landings	2012 Discards	2012 %DR	Avg 2010-2012 Landings	Avg 2010-2012 Discards	Avg 2010-2012 Catch	Avg 2010-2012 %DR
POK	Saithe	DEU	11073.455	399.358	0.034809074	9323.694	297.96	0.030967649	7858.58	3.056	0.000388723	9418.576333	233.458	9652.034333	0.02418744
		SCO	7845.552	1473.194	0.158089297	6542.434	2551.162	0.280544902	5474.557	4121.345	0.429490109	6620.847667	2715.233667	9336.081333	0.290832264
		FRA	5381.23	3.756	0.000697495	7813.009	5.092	0.000651309	12445.01	0.011	8.83888E-07	8546.416333	2.953	8549.369333	0.000345406
		DNK	4859.241	33.932	0.00693456	5238.33	2.575	0.000491327	4309.078	55.514	0.012719173	4802.216333	30.67366667	4832.89	0.006346858
		ENG	4102.076	240.696	0.055424508	3753.03	497.703	0.117086394	2251.35	1344.041	0.37382332	3368.818667	694.1466667	4062.965333	0.170847302
SOL	Sole	NLD	9133	1307.889	0.125266057	7960	996.667	0.11127655	8823	2084.458	0.191103922	8638.666667	1463.004667	10101.67133	0.144827981
		BEL	1254.052	126.739	0.091787244	868.234	191.034	0.180345295	602.449	285.392	0.321444943	908.245	201.055	1109.3	0.181244929
		ENG	617.818	16.23	0.025597431	428.063	5.212	0.012029312	312.76	3.516	0.011116873	452.8803333	8.319333333	461.1996667	0.018038463
		DEU	524.643	25.552	0.046441716	328.755	28.226	0.079068634	426.79	31.692	0.069123761	426.7293333	28.49	455.2193333	0.062585215
		FRA	245.426	10.812	0.042195147	461.572	1.947	0.004200475	533.456	17.837	0.032354846	413.4846667	10.19866667	423.6833333	0.024071437
WHG	Whiting	SCO	6531.445	5069.278	0.436979488	7514.284	3554.265	0.321113906	8701.849	1905.839	0.179665824	7582.526	3509.794	11092.32	0.316416584
		FRA	2280.083	3205.086	0.584318551	9288.311	5493.626	0.371644528	1540.201	2469.513	0.615882579	4369.531667	3722.741667	8092.273333	0.46003657
		NLD	585	2896.662	0.831976797	519	790.01	0.603517162	451	2020.125	0.817492033	518.3333333	1902.265667	2420.599	0.785865675
		ENG	866.236	444.77	0.339258554	955.406	415.29	0.302977465	764.704	373.247	0.327999184	862.1153333	411.1023333	1273.217667	0.322884566
		DNK	157.668	190.567	0.54723678	134.762	109.396	0.448054129	505.703	1471.285	0.744205326	266.0443333	590.416	856.4603333	0.689367595

Table 3.1-5

North Sea || demersal fisheries: landings and discards per country, species and year; table sorted in descending order on average catch 2010-2012, top 6 species per country.

COUNTRY	SPECIES	SPEC_ NAME	2010 Landings	2010 Discards	2010 %DR	2011 Landings	2011 Discards	2011 %DR	2012 Landings	2012 Discards	2012 %DR	Avg 2010-2012 Landings	Avg 2010-2012 Discards	Avg 2010-2012 Catch	Avg 2010-2012 %DR
NLD	PLE	Plaice	27227	21341.695	0.439412568	28761	42060.192	0.593892743	31610	32701.806	0.508488379	29199.33333	32034.56433	61233.89767	0.523150829
	DAB	Dab	5015	39591.008	0.887571199	4627	80598.72	0.945708878	3986	28827.517	0.87852567	4542.666667	49672.415	54215.08167	0.916210277
	SOL	Sole	9133	1307.889	0.125266057	7960	996.667	0.11127655	8823	2084.458	0.191103922	8638.666667	1463.004667	10101.67133	0.144827981
	WHG	Whiting	585	2896.662	0.831976797	519	790.01	0.603517162	451	2020.125	0.817492033	518.3333333	1902.265667	2420.599	0.785865675
	COD	Cod	2541	314.335	0.110086907	1910	200.157	0.09485408	1855	227.032	0.109043473	2102	247.1746667	2349.174667	0.105217662
	TUR	Turbot	1180	2.14	0.001810276	1495	48.652	0.031517466	1696	100.74	0.056068212	1457	50.51066667	1507.510667	0.033506009
SCO	HAD	Haddock	22612.347	8186.677	0.265809624	21107.703	8091.346	0.277109915	25494.523	3226.838	0.112349759	23071.52433	6501.620333	29573.14467	0.219848799
	COD	Cod	11547.501	3932.477	0.254036343	10108.347	2249.87	0.18205458	10474.04	3213.959	0.23480123	10709.96267	3132.102	13842.06467	0.226274192
	NEP	Norway lobster	15723.842	17.852	0.001134058	11364.436	3.04	0.00026743	8458.998	27.508	0.003241381	11849.092	16.13333333	11865.22533	0.001359716
	WHG	Whiting	6531.445	5069.278	0.436979488	7514.284	3554.265	0.321113906	8701.849	1905.839	0.179665824	7582.526	3509.794	11092.32	0.316416584
	POK	Saithe	7845.552	1473.194	0.158089297	6542.434	2551.162	0.280544902	5474.557	4121.345	0.429490109	6620.847667	2715.233667	9336.081333	0.290832264
	ANF	Anglerfish	5864.983	0.005	8.52517E-07	6120.677	0	0	4725.805	0	0	5570.488333	0.001666667	5570.49	2.99196E-07
DEU	PLE	Plaice	3727.998	2438.475	0.395440797	3825.997	18932.05	0.831883773	3837.44	2144.608	0.358507321	3797.145	7838.377667	11635.52267	0.673659267
	POK	Saithe	11073.455	399.358	0.034809074	9323.694	297.96	0.030967649	7858.58	3.056	0.000388723	9418.576333	233.458	9652.034333	0.02418744
	DAB	Dab	355.656	6203.132	0.945774128	313.503	10269.511	0.970376775	238.92	6584.545	0.964985532	302.693	7685.729333	7988.422333	0.962108538
	COD	Cod	2869.69	197.411	0.064364036	2223.625	207.531	0.085363095	2134.48	147.479	0.064628243	2409.265	184.1403333	2593.405333	0.071003299
	HKE	Hake	273.246	48.592	0.150982793	290.575	1553.3	0.842410684	384.23	41.852	0.098225224	316.017	547.9146667	863.9316667	0.634210653
	HAD	Haddock	655.437	33.577	0.048731956	576.868	138.959	0.19412372	491.69	53.178	0.09759795	574.665	75.238	649.903	0.115768045
DNK	PLE	Plaice	9535.988	1587.171	0.142690669	11815.79	637.498	0.051191139	12312.401	589.352	0.045679994	11221.393	938.007	12159.4	0.07714254
	COD	Cod	5735.003	371.396	0.060820788	5010.938	193.185	0.037121528	4970.232	365.904	0.068570966	5238.724333	310.1616667	5548.886	0.055896205
	POK	Saithe	4859.241	33.932	0.00693456	5238.33	2.575	0.000491327	4309.078	55.514	0.012719173	4802.216333	30.67366667	4832.89	0.006346858
	HKE	Hake	1877.326	534.188	0.221515612	1812.746	468.305	0.205302293	2135.487	259.912	0.108504679	1941.853	420.8016667	2362.654667	0.178105447
	DAB	Dab	523.727	2513.699	0.827575388	608.312	1059.501	0.635263666	540.708	1076.42	0.665636857	557.5823333	1549.873333	2107.455667	0.735423932
	ANF	Anglerfish	1413.735	6.261	0.004409167	1310.492	0.688	0.000524718	1373.047	8.736	0.006322266	1365.758	5.228333333	1370.986333	0.003813556
ENG	PLE	Plaice	11366.707	2479.243	0.179059075	12221.974	1435.234	0.105089854	14037.838	1422.51	0.092010219	12542.173	1778.995667	14321.16867	0.124221403
	POK	Saithe	4102.076	240.696	0.055424508	3753.03	497.703	0.117086394	2251.35	1344.041	0.37382332	3368.818667	694.1466667	4062.965333	0.170847302
	HAD	Haddock	1753.038	163.389	0.085257096	1702.152	436.591	0.204134391	1324.993	38.854	0.028488533	1593.394333	212.9446667	1806.339	0.117887432
	COD	Cod	1902.05	117.318	0.058096395	1692.243	225.281	0.117485361	1229.487	52.736	0.041128571	1607.926667	131.7783333	1739.705	0.075747517
	NEP	Norway lobster	1482.584	2.818	0.00189713	1258.358	0	0	1142.722	4.544	0.003960721	1294.554667	2.454	1297.008667	0.001892046
	WHG	Whiting	866.236	444.77	0.339258554	955.406	415.29	0.302977465	764.704	373.247	0.327999184	862.1153333	411.1023333	1273.217667	0.322884566
FRA	POK	Saithe	5381.23	3.756	0.000697495	7813.009	5.092	0.000651309	12445.01	0.011	8.83888E-07	8546.416333	2.953	8549.369333	0.000345406
	WHG	Whiting	2280.083	3205.086	0.584318551	9288.311	5493.626	0.371644528	1540.201	2469.513	0.615882579	4369.531667	3722.741667	8092.273333	0.46003657
	DAB	Dab	122.355	2246.232	0.948342619	187.629	10537.627	0.982505872	86.664	1068.59	0.924982731	132.216	4617.483	4749.699	0.972163289
	HAD	Haddock	207.51	2.627	0.012501368	1593.289	21.459	0.01328938	185.672	6.759	0.035124278	662.157	10.28166667	672.4386667	0.015290118
	PLE	Plaice	187.416	365.063	0.660772627	335.752	704.756	0.677319156	196.919	82.245	0.294611769	240.029	384.0213333	624.0503333	0.615369166
	COD	Cod	367.405	84.925	0.187750094	600.698	198.148	0.248042802	273.774	21.818	0.073811199	413.959	101.6303333	515.5893333	0.197114887
BEL	PLE	Plaice	3565.63	1069.01	0.230656534	4509.292	3808.868	0.4578979	5022.73	9669.415	0.65813501	4365.884	4849.097667	9214.981667	0.526218916
	DAB	Dab	331.445	854.984	0.720636465	241.575	3174.096	0.929274512	451.622	4128.446	0.90139404	341.5473333	2719.175333	3060.722667	0.888409578
	SOL	Sole	1254.052	126.739	0.091787244	868.234	191.034	0.180345295	602.449	285.392	0.321444943	908.245	201.055	1109.3	0.181244929
	COD	Cod	624.32	85.338	0.120252291	645.688	51.78	0.074239965	851.258	18.288	0.021031665	707.0886667	51.802	758.8906667	0.068260162
	LEM	Lemon sole	334.182	39.761	0.106329039	384.822	60.272	0.135414092	403.596	104.257	0.20528972	374.2	68.09666667	442.2966667	0.153961519
	NEP	Norway lobster	114.095	12.114	0.095983646	288.134	107.78	0.272230838	363.957	322.653	0.46992179	255.3953333	147.5156667	402.911	0.366124694

Table 3.1-6

North Sea || demersal fisheries: landings and discards per gear, species and year; table sorted in descending order on average catch 2010-2012, top 6 species per gear.

REG_ GEAR	SPECIES	SPEC_ NAME	2010 Landings	2010 Discards	2010 %DR	2011 Landings	2011 Discards	2011 %DR	2012 Landings	2012 Discards	2012 %DR	Avg 2010-2012 Landings	Avg 2010-2012 Discards	Avg 2010-2012 Catch	Avg 2010-2012 %DR
TR1	POK	Saithe	33726.423	2044.366	0.057151829	33039.581	2529.975	0.07112754	32942.673	5500.031	0.143070867	33236.22567	3358.124	36594.34967	0.091766189
	HAD	Haddock	23676.226	3661.266	0.133928379	22446.701	3961.791	0.150019585	26864.453	1555.283	0.054725456	24329.12667	3059.446667	27388.57333	0.111705222
	COD	Cod	19387.252	3585.536	0.15607753	17118.255	1681.569	0.089445997	17642.368	2742.114	0.13451968	18049.29167	2669.739667	20719.03133	0.128854463
	PLE	Plaice	13755.338	491.435	0.034494478	17248.979	744.52	0.041377166	19797.842	4083.194	0.170980606	16934.053	1773.049667	18707.10267	0.094779491
	WHG	Whiting	5967.1	2820.423	0.320957681	6768.48	1025.658	0.131593513	7805.194	713.907	0.083800744	6846.924667	1519.996	8366.920667	0.181667314
	HKE	Hake	3827.299	1225.933	0.242603744	4429.778	2211.91	0.333034313	5315.912	2606.689	0.329019346	4524.329667	2014.844	6539.173667	0.308119053
BT2	PLE	Plaice	34627.835	26658.069	0.4349788	35468.388	21149.455	0.373547523	34137.922	31070.456	0.47647951	34744.715	26292.66	61037.375	0.430763282
	DAB	Dab	4129.897	35526.903	0.895859046	3920.334	48551.689	0.925287157	3166.467	23576.588	0.881596661	3738.899333	35885.06	39623.95933	0.905640441
	SOL	Sole	10952.69	1479.442	0.119001471	9047.303	1222.041	0.118998935	9619.427	1915.449	0.166057182	9873.14	1538.977333	11412.11733	0.134854671
	WHG	Whiting	415.546	2704.92	0.866832069	414.685	916.894	0.688576495	280.215	1657.125	0.855360959	370.1486667	1759.646333	2129.795	0.826204556
	TUR	Turbot	1393.275	2.558	0.001832597	1620.971	53.366	0.031872914	1739.579	105.753	0.057308387	1584.608333	53.89233333	1638.500667	0.032891249
	COD	Cod	1790.067	264.969	0.128936427	1303.774	97.696	0.069709662	1011.809	137.634	0.119739735	1368.55	166.7663333	1535.316333	0.108620178
TR2	DAB	Dab	896.574	12685.911	0.93399043	806.177	56272.576	0.985876058	667.338	10520.709	0.940352592	790.0296667	26493.06533	27283.095	0.971043253
	PLE	Plaice	4949.561	1132.771	0.186239587	5287.811	45937.417	0.896773305	4963.473	2748.992	0.35643494	5066.948333	16606.39333	21673.34167	0.766212871
	NEP	Norway lobster	18614.502	163.487	0.00870631	14514.085	856.767	0.055739721	11314.683	1708.55	0.131192462	14814.42333	909.6013333	15724.02467	0.05784787
	WHG	Whiting	4225.314	6773.649	0.61584433	11422.406	8736.602	0.43338452	3473.995	4455.857	0.561909226	6373.905	6655.369333	13029.27433	0.510801228
	HAD	Haddock	2785.23	5014.024	0.642885076	3706.215	5039.875	0.576243213	2021.085	2010.915	0.498738839	2837.51	4021.604667	6859.114667	0.586315416
	COD	Cod	1259.099	1249.026	0.497991926	1093.426	1436.155	0.567744223	653.212	1119.004	0.631415132	1001.912333	1268.061667	2269.974	0.558623873
GN1	COD	Cod	2605.266	13.976	0.005335895	2208.948	112.944	0.048643089	1763.745	59.003	0.032370355	2192.653	61.97433333	2254.627333	0.027487617
	ANF	Anglerfish	1340.587		0	1518.871	0	0	1614.377	0	0	1491.278333	0	1491.278333	0
	PLE	Plaice	1607.46	0	0	1493.236	2.682	0.001792879	928.76	3.481	0.003734013	1343.152	2.054333333	1345.206333	0.001527151
	SOL	Sole	720.325		0	608.661	0	0	776.203	0	0	701.7296667	0	701.7296667	0
	HKE	Hake	406.584		0	379.953	0	0	424.166	0.179	0.000421827	403.5676667	0.059666667	403.6273333	0.000147826
	TUR	Turbot	251.889	0	0	323.415	2.933	0.008987339	255.925	11.348	0.04245846	277.0763333	4.760333333	281.8366667	0.016890398
BT1	PLE	Plaice	2988.465		0	3945.039		0	7874.925		0	4936.143	0	4936.143	0
	COD	Cod	307.524		0	404.18		0	687.564		0	466.4226667	0	466.4226667	0
	LEM	Lemon sole	207.264		0	276.453	10.252	0.035758009	353.536		0	279.0843333	3.417333333	282.5016667	0.012096684
	DAB	Dab	102.139		0	103.276	196.069	0.654993402	231.781		0	145.732	65.35633333	211.0883333	0.309616038
	ANF	Anglerfish	86.51		0	112.344	0	0	148.395		0	115.7496667	0	115.7496667	0
	TUR	Turbot	71.443		0	71.112	0	0	132.702		0	91.75233333	0	91.75233333	0
Grand Total			**197074.684**	**107498.664**	**0.352948361**	**201102.837**	**202750.836**	**0.502040342**	**198609.726**	**98302.261**	**0.331082157**	**198929.0823**	**136183.9203**	**335113.0027**	**0.406382084**

3.1.2 Pelagic and industrial fisheries

The pelagic and industrial fisheries in the North Sea are largely carried out as single species fisheries. The management of pelagic stocks is carried out in conjunction with one or several non-EU coastal states.

- The main catches of pelagic stocks in the North Sea are for herring and mackerel, the main catches of the industrial fishery are for sandeel and sprat.
- Discarding in pelagic fisheries is more sporadic than in demersal fisheries. Pelagic fishing pursues schooling fish, creating hauls with low diversity of species and sizes. Consequently, discard rates typically show high fluctuation (100% or 0% discards). High discard rates occur during 'slippage' events, when the entire (part of a) catch is released. The main reasons for 'slipping' are daily or total quota limitations, illegal sizes, mixtures with unmarketable bycatch and capacity issues with handling the catch (ICES 2013a).
- Discard ratios for the pelagic fisheries are generally low and next to zero for industrial fisheries (table 3.1.6). This is partly due to the absence of specific observer programmes for the pelagic and industrial fisheries in the North Sea.
- Discards of pelagic species often occur in fisheries for other (pelagic) species: herring is discarded in fisheries for mackerel and horse mackerel, mackerel is discarded in fisheries for horse mackerel (Borges et al 2008, Van Overzee et al 2014).
- The estimated discards for horse mackerel in 2010 is doubtful as it is based on fill-in data for the TR1 fleet which would not be expected to discard horse mackerel in the amount suggested here.

Quota

- Substantial quota exchange occurs between countries.
- Industrial species are not included in the quota overview.

Data quality

- 2010 data shows large discard of horse mackerel based on fill-ins.
- Major part of the estimated discards are derived from fill-ins.

Conclusion

Overall, the quality of discard information is low for the pelagic fishery in the North Sea. Estimates of slipping are not (and cannot be) included in the database. For that reason the detailed tables by country and gear are not presented in this section.

Table 3.1-7

North Sea || pelagic and industrial fisheries: landings and discards per species and year and area. Table sorted in descending order on average catch 2010-2012.

		2010	2010	2010	2010		2010	2011	2011	2011	2011		2011	2012	2012	2012	2012		2012	Avg LAND	AVG DISC	AVG CATCH	AVG %DR		AVG %DQ
SPECIES		**LAND**	**DISC**	**Catch**	**%DR**		**%DQ**	**LAND**	**DISC**	**Catch**	**%DR**		**%DQ**	**LAND**	**DISC**	**Catch**	**%DR**		**%DQ**						
SAN	Sandeel	255311	0	255311	0%	●	0%	236909	0	236909	0%	●	0%	57553	0	57553	0%	●	0%	183258	0	183258	0%	●	0%
HER	Herring	84853	17	84870	0%	●	100%	115653	54	115707	0%	●	100%	263173	1380	264554	1%	●	30%	154560	484	155043	0%	●	33%
MAC	Mackerel	114997	1182	116179	1%	●	11%	127189	1537	128726	1%	●	0%	138095	8589	146684	6%	●	7%	126760	3769	130530	3%	●	7%
SPR	Sprat	135898	50	135948	0%	●	100%	131740	37	131777	0%	●	100%	74430	46	74476	0%	●	100%	114023	44	114067	0%	●	100%
NOP	Norway pout	71309	5	71314	0%	●	100%	4070	0	4071	0%	●	100%	225	9	235	4%	●	100%	25201	5	25206	0%	●	100%
JAX	Horse mackerels	3533	28653	32186	89%	●	1%	3480	2349	5829	40%	●	0%	2193	3	2196	0%	●	100%	3069	10335	13404	77%	●	1%
RED	Atlantic redfishes	435	2390	2825	85%	●	2%	260	267	527	51%	●	3%	309	0	310	0%		100%	335	886	1220	73%	●	2%
BOR	Boarfishes	0	0	0			####	0	0	0			####	1745	0	1745	0%		####	582	0	582	0%	●	0%
WHB	Blue whiting	117	22	138	16%	●	100%	112	0	112	0%	●	0%	334	56	390	14%	●	100%	188	26	214	12%	●	100%
ANE	Anchovy	0	0	0	0%	●	0%	0	0	0	100%	●	100%	27	0	27	0%	●	100%	9	0	9	2%	●	100%
Grand Total		**666452**	**32319**	**698771**	**5%**	●	**2%**	**619418**	**4244**	**623662**	**1%**	●	**2%**	**538087**	**10084**	**548171**	**2%**	●	**11%**	**607986**	**15549**	**623535**	**2%**	●	**4%**

Note: %DR refers to the discard : catch ratio (discard/catch). %DQ refers to the quality of the discard estimate (the proportion of the discard estimate derived from actual data). The colour coding refers to DQ values larger than 66% (green), between 33% and 66% (orange) and below 33% (red).

Table 3.1-8

North Sea || pelagic and industrial fisheries: Quota by species, area and country for 2010, 2011 and 2012. country and year. Source: FIDES. Extraction: 19/11/2013.

SPECIES	TAC area	COUNTRY	INITIAL 2010	FINAL 2010	% change 2010	INITIAL 2011	FINAL 2011	% change 2011	INITIAL 2012	FINAL 2012	% change 2012
HER	Norwegian waters of ICES division IV (south of 62 ° N)	SWE	846	846	0%	846	846	0%	922	922	0%
	EU and Norwegian waters of ICES area IV north of 53 ° 30'N .	DEU	14147	2455	-83%	17423	4321	-75%	41852	17108	-59%
		DNK	22497	36837	64%	27707	46442	68%	64369	88621	38%
		FRA	9653	8590	-11%	11888	9530	-20%	21286	17592	-17%
		GBR	24223	23097	-5%	29832	27687	-7%	57836	55880	-3%
		NLD	21581	15332	-29%	26579	20342	-23%	53537	53558	0%
		NOR	47647	47647	0%	58000	58000	0%	117450	117450	0%
		SWE	1672	3828	129%	2035	2714	33%	4120	4268	4%
	ICES zones IVc and VIId	BEL	7100	2	-100%	7100	10	-100%	8774	14	-100%
		DEU	202	5043	2397%	248	4987	1911%	573	7308	1175%
		FRA	5235	6560	25%	6447	7190	12%	10871	11871	9%
		GBR	1830	1799	-2%	2254	2276	1%	4189	4164	-1%
		NLD	8193	9317	14%	10092	11618	15%	19261	20863	8%
	ICES areas IV , VII and in EU waters of IIa	BEL	67	67	0%	82	0	-100%	89	0	-100%
		DEU	67	67	0%	82	82	0%	89	89	0%
		DNK	13008	13008	0%	15833	14643	-8%	17134	17134	0%
		FRA	67	67	0%	82	82	0%	89	89	0%
		GBR	247	247	0%	301	211	-30%	326	326	0%
		NLD	67	67	0%	82	1444	1661%	89	178	100%
		SWE	64	64	0%	77	77	0%	84	84	0%
HER Sum			178413	174940		216990	212502		422940	417519	
JAX	EU waters of ICES zones IIa , IVa , VI , VIIa -c , VIIe - k , VIIIabde , EU and international waters of ICES area Vb and international waters of ICES zones XII and XIV	DEU	12243	19524	59%	12142	23599	94%	12096	17471	44%
		DNK	15691	6550	-58%	15562	7436	-52%	15502	4356	-72%
		ESP	16699	2040	-88%	16562	2419	-85%	16498	5510	-67%
		FRA	6301	17012	170%	6250	14539	133%	6226	10747	73%
		FRO	2000	2000	0%	0	0	#######	0	0	#######
		GBR	14765	15652	6%	14643	15939	9%	14587	15997	10%
		IRL	40775	48321	19%	40439	42615	5%	40284	46791	16%
		NLD	49123	66185	35%	48719	64016	31%	48532	71420	47%
		PRT	1609	1	-100%	1595	1	-100%	1589	21	-99%
		SWE	675	75	-89%	675	983	46%	675	23	-97%
	EU waters of ICES areas IVb , IVc and VIId	BEL	48	68	42%	47	54	15%	44	51	16%
		DEU	1843	4229	129%	1805	3685	104%	1708	5367	214%
		DNK	20875	5107	-76%	20447	14947	-27%	19339	12854	-34%
		FRA	1732	2678	55%	1696	2344	38%	1604	1944	21%
		GBR	4968	4396	-12%	4866	4700	-3%	4602	3133	-32%
		NLD	12568	27257	117%	12310	19726	60%	11642	15977	37%
		NOR	3600	3600	0%	3550	3550	0%	3550	3550	0%
		PRT	44	44	0%	43	13	-70%	41	1	-98%
		SWE	75	75	0%	75	83	11%	75	75	0%
JAX Sum			205634	224814		201426	220648		198594	215288	
MAC	ICES zones IIIa and IV and EU waters of ICES zones IIa , IIIb , IIIc and subdivisions 22-32	BEL	475	175	-63%	425	37	-91%	421	62	-85%
		DEU	495	849	72%	443	789	78%	439	961	119%
		DNK	12529	14031	12%	11209	19626	75%	11097	17575	58%
		FRA	1496	1511	1%	1339	1829	37%	1326	1932	46%
		GBR	1395	1754	26%	1248	1756	41%	1236	1944	57%
		NLD	1507	1072	-29%	1348	1498	11%	1335	1685	26%
		NOR	103374	103374	0%	169019	169019	0%	89537	167197	87%
		SWE	4485	2990	-33%	4038	3252	-19%	4001	4727	18%
MAC Sum			125756	125756		189069	197806		109392	196083	

3.2 Area IIIa (Skagerrak)

3.2.1 Skagerrak demersal fisheries

Trawls largely dominate catches in the Skagerrak demersal fisheries. The major fisheries are mixed *Nephrops*/fish trawl fishery (90 mm), Northern prawn (Pandalus) trawls (35-69 mm), demersal trawls targeting mixed fish (120 mm) and a directed *Nephrops* fishery using sorting grid (70-99 mm). Gill-nets and longlines represent a stable but relatively small proportion of the gears. New gear regulations were introduced in national legislation 2013 by Denmark and Sweden, which can be expected to reduce the discard ratios in the future.

Quality of discards estimates
Table 3.2.1 highlights how much of the final discard estimates stem from reported data and how much had to be filled in by assuming an average discard ratio from countries that have submitted data for a given metier/fishery.

Average DQ% were very high in the Skagerrak (96%, 99% and 99%) for the three years. Therefore discard estimates are of good quality in this area.

Discards per species
The average discard ratio in the Skagerrak was 23% for the years 2010-2012 (Table 3.2.2). Discard ratios varied between species from very low percentages (i.e. anglerfish and turbot) to almost ninety percent (whiting).

Average discard ratios for the ten species with the highest catches 2010-2012 varied between countries for some species (Table 3.2.2). This can be attributed to differences in fishing areas, type of fisheries, national quota availability and market situation. An example is plaice where Denmark discards 10% and fishes mainly with large-mesh otter trawls (TR1), while Sweden (33% discard ratio) catches most plaice as by-catch in trawls for Norway lobster (TR2). For other species however, differences between the main fishing countries are generally quite small (cod, northern prawn, Norway lobster and whiting).

For 2010-2012, plaice was the species with highest average catch with a discard ratio of 10%, followed by cod (34%) and Norway lobster (41%). The relatively higher discard ratios for cod in the Skagerrak compared to the North Sea is likely a result of the fact that in the Skagerrak cod was predominantly caught by 90 mm trawls (i.e. trawls with insufficient size selectivity in relation to minimum landing size), and that the Skagerrak is an area with high relative abundance of juvenile cod. High-grading has also been reported as an important factor in this area.

The main reason for Norway lobster discards is a mis-match between trawl selectivity and minimum landing size, which is 40 mm carapace length in area IIIa. Discards of Northern prawn (9%) are generally attributed to small individuals with low commercial value.

Other roundfish species like whiting, haddock and hake, showed large differences in terms of discard ratios. For whiting (87%) main explanations are related to selectivity and a low market value, while for haddock (32%) and hake (17%) most discards can be attributed to catches smaller than MLS. Discards of saithe and pollack appear to be more modest (9% and 1% respectively).

Dab, a species that is not subject to catch limits in the Skagerrak, exhibit high discard ratios due to low commercial value. Other regulated species with relatively small catches are often difficult to quantify precisely in terms of discards. Although some species have a low importance in terms of catch volumes, they can become important choke species under a landing obligation.

Discard ratios per country
The important species caught varied by country and is related to quota availability (Table 3.2.3). Denmark has relatively large catches of most demersal fish species with plaice and cod as the top two. Sweden mainly fishes for the two valuable crustaceans, northern prawn and Norway lobster, with

relatively small catches of demersal fish species. Germany had some catches of saithe, cod and haddock, while the Netherlands fished some plaice in 2010.

Discard ratios per gear

Trawls with a mesh size range of 70-99 mm (TR2) dominated catches in the Skagerrak for 2010-2012 (Table 3.2.4). The reason for this being that in accordance with current technical regulation (Council Reg. 850/98), trawls and seines >90 mm are not restricted in terms of catch composition. Thus, TR2 trawls are used both in fisheries for Norway lobster and for demersal fish. The high discard ratios for cod (51%), haddock (50%) and Norway lobster (41%) is thus much influenced by a mis-match between the selectivity of the gears and minimum landing sizes. Also quota availability is an issue particularly for cod.

In the Skagerrak, large mesh otter trawls (TR1) are predominantly used to catch plaice. Also some demersal fish like cod, haddock and saithe is caught. Discard ratios are, as expected, lower compared to TR2 but are still significant for cod (27%).

The fishery for northern prawn (OTTER) exhibits relatively low absolute catch and shows modest discard ratios for saithe, cod, haddock and whiting. The fishery is performed with gears of poor size selectivity for fish (mesh size 35-45 mm). The relatively modest amounts of discards can most likely be attributed to the fact that the fishery takes place in the deeper parts of the Skagerrak where the abundance of juvenile gadoids normally is low. Also the widespread voluntary uptake of sorting grids in the northern prawn fishery may have reduced unwanted catch.

Lowest discard ratios were reported for fisheries with gill nets (GN1). For large meshed beam trawls (BT1) no discard data was reported.

Table 3.2-1

Skagerrak || demersal fisheries: landings and discards per species and year and area. Table sorted in descending order on average catch 2010-2012.

		2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	Avg	AVG	AVG	AVG	AVG
SPECIES		**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**	**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**	**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**	LAND	DISC	CATCH	%DR	%DQ
PLE	Plaice	8162	722	8884	8%	93%	7309	839	8148	10%	100%	6942	995	7937	13%	99%	7471	852	8323	10%	98%
COD	Cod	3471	1693	5164	33%	98%	3262	1940	5202	37%	99%	3658	1763	5420	33%	98%	3464	1798	5262	34%	98%
NEP	Norway lobster	2631	1884	4516	42%	100%	2283	1458	3741	39%	100%	2235	1599	3834	42%	100%	2383	1647	4030	41%	100%
POK	Saithe	4743	575	5318	11%	96%	3483	383	3865	10%	90%	2368	117	2486	5%	95%	3531	358	3890	9%	94%
PRA	Northern prawn	2600	115	2715	4%	100%	2756	271	3027	9%	100%	2517	405	2922	14%	100%	2624	264	2888	9%	100%
HAD	Haddock	1347	721	2068	35%	83%	2006	1233	3238	38%	99%	2368	679	3047	22%	98%	1907	878	2785	32%	94%
DAB	Dab	484	256	739	35%	88%	453	579	1031	56%	97%	564	501	1065	47%	99%	500	445	945	47%	96%
HKE	Hake	376	98	474	21%	99%	437	34	471	7%	100%	324	108	432	25%	89%	379	80	459	17%	95%
LEM	Lemon sole	301	63	364	17%	99%	217	23	240	9%	99%	440	47	487	10%	99%	319	44	364	12%	97%
WHG	Whiting	54	381	435	88%	96%	46	357	404	89%	100%	34	141	175	80%	97%	45	293	338	87%	98%
ANF	Anglerfish	320	1	321	0%	99%	278	1	279	0%	99%	349	2	351	1%	100%	316	1	317	0%	100%
POL	Pollack	302	4	306	1%	97%	169	3	172	2%	82%	213	0	213	0%	79%	228	2	230	1%	91%
RNG	Roundnose grenadier	0	8	8	98%	100%	0	452	452	100%	100%	0	2	2	90%	100%	0	154	154	100%	100%
LIN	Ling	73	66	139	47%	97%	76	0	77	0%	100%	84	5	88	5%	98%	78	24	101	23%	97%
TUR	Turbot	41	0	42	1%	100%	48	2	51	5%	97%	145	5	149	3%	95%	78	2	81	3%	96%
SOL	Sole	50	0	50	0%	98%	59	3	62	5%	100%	91	1	92	1%	100%	67	1	68	2%	100%
USK	Tusk	3	0	3	7%	100%	2	0	2	1%	100%	2	0	2	0%	0%	2	0	2	3%	100%
Grand Total		**24960**	**6589**	**31549**	**21%**	**96%**	**22885**	**7577**	**30462**	**25%**	**99%**	**22334**	**6369**	**28703**	**22%**	**99%**	**23393**	**6845**	**30238**	**23%**	**98%**

Note: **%DR** refers to the discard : catch ratio (discard/catch). **%DQ** refers to the quality of the discard estimate (the proportion of the discard estimate derived from actual data). The colour coding refers to larger than 66% (green), between 33% and 66% (orange) and below 33% (red).

Table 3.2-2

Skagerrak || demersal fisheries: landings and discards per species, country and year. Table sorted in descending order on average catch 2010-2012, top 10 species.

SPECIES	SPEC_ NAME	COUNTRY	2010 Landings	2010 Discards	2010 %DR	2011 Landings	2011 Discards	2011 %DR	2012 Landings	2012 Discards	2012 %DR	Avg 2010-2012 Landings	Avg 2010-2012 Discards	Avg 2010-2012 Catch	Avg 2010-2012 %DR
PLE	Plaice	DNK	6497.892	577.131	0.081573021	7114.899	754.237	0.095847498	6767.06	947.916	0.122867006	6793.283667	759.7613333	7553.045	0.100590071
		NLD	1530	51.08	0.032307031	5		0	10		0	515	17.02666667	532.0266667	0.032003408
		SWE	121.742	91.825	0.429958748	175.819	82.929	0.320501028	152.336	45.507	0.23001572	149.9656667	73.42033333	223.386	0.328670254
		DEU	12.641	1.47	0.104174049	13.06	1.764	0.118996222	12.46	1.853	0.129462726	12.72033333	1.695666667	14.416	0.117623936
COD	Cod	DNK	2949.23	1514.775	0.339330937	2700.735	1770.213	0.395936835	2819.66	1447.684	0.339247082	2823.208333	1577.557333	4400.765667	0.358473378
		SWE	440.333	148.602	0.252323261	502.041	157.815	0.239165818	479.272	281.815	0.370279613	473.882	196.0773333	669.9593333	0.2926705
		DEU	57.49	25.307	0.305651171	59.631	11.693	0.163942011	358.74	33.243	0.084807249	158.6203333	23.41433333	182.0346667	0.128625683
		NLD	24	4.218	0.149479056			0			0	8	1.406	9.406	0.149479056
NEP	Norway lobster	DNK	1971.346	1492.103	0.430814197	1789.741	1095.013	0.379586266	1511.235	976.902	0.392623879	1757.440667	1188.006	2945.446667	0.403336449
		SWE	657.901	390.596	0.37252944	492.215	362.055	0.423817997	723.577	621.929	0.46222685	624.5643333	458.1933333	1082.757667	0.42317256
		DEU	2.172	1.43	0.397001666	1.524	0.797	0.343386471	0.02	0	0	1.238666667	0.742333333	1.981	0.374726569
POK	Saithe	DNK	3666.632	114.849	0.030371434	2037.392	328.972	0.139020032	1604.09	48.793	0.029519936	2436.038	164.2046667	2600.242667	0.063149747
		SWE	700.639	454.536	0.393478044	509.837	19.025	0.035973468	380.263	63.419	0.14293796	530.2463333	178.9933333	709.2396667	0.252373551
		DEU	375.754	5.637	0.014780108	935.393	34.766	0.035835363	384.02	5.172	0.013289071	565.0556667	15.19166667	580.2473333	0.026181364
PRA	Northern prawn	SWE	1476.404	57.908	0.037741998	1486.543	166.924	0.100953935	1289.941	268.432	0.172251444	1417.629333	164.4213333	1582.050667	0.103929246
		DNK	1123.382	57.505	0.048696446	1269.07	104.139	0.075836235	1226.647	136.504	0.100138576	1206.366333	99.38266667	1305.749	0.076111616
HAD	Haddock	DNK	1161.007	510.388	0.305366475	1709.051	1104.998	0.392671912	1978.515	608.135	0.235105252	1616.191	741.1736667	2357.364667	0.314407727
		SWE	119.423	197.182	0.622801282	194.035	116.027	0.374205804	207.995	59.587	0.222686877	173.8176667	124.2653333	298.083	0.416881652
		DEU	66.779	13.667	0.169890361	102.721	11.531	0.100926023	181.35	11.777	0.060980598	116.95	12.325	129.275	0.095339393
DAB	Dab	DNK	357.022	183.718	0.339752931	441.326	512.083	0.537107369	557.671	427.637	0.434013527	452.0063333	374.4793333	826.4856667	0.4530984
		SWE	1.308	42.661	0.970251768	1.853	52.459	0.96588231	0.81	69.511	0.988481392	1.323666667	54.877	56.20066667	0.976447492
		NLD	122	28.124	0.187338467			0	1		0	41	9.374666667	50.37466667	0.186098833
		DEU	3.177	1.067	0.251413761	9.653	14.013	0.592115271	4.74	3.612	0.432471264	5.856666667	6.230666667	12.08733333	0.515470741
HKE	Hake	DNK	332.399	85.032	0.203703127	403.873	20.105	0.047419913	294.961	97.876	0.249151684	343.7443333	67.671	411.4153333	0.164483417
		SWE	39.843	13.124	0.247776918	31.165	13.751	0.306149256	23.329	9.462	0.288554786	31.44566667	12.11233333	43.558	0.27807368
		DEU	1.292	0.175	0.11929107	1.697	0.03	0.017371164	5.81	0.533	0.084029639	2.933	0.246	3.179	0.077382825
		NLD	2	0.094	0.044890162			0			0	0.666666667	0.031333333	0.698	0.044890162
LEM	Lemon sole	DNK	260.03	40.54	0.134877067	208.17	18.858	0.083064644	425.09	35.444	0.07696283	297.7633333	31.614	329.3773333	0.095981104
		SWE	11.623	20	0.632451064	6.786	3.691	0.352295504	11.36	10.993	0.491790811	9.923	11.56133333	21.48433333	0.538128559
		NLD	27	2.51	0.085055913			0			0	9	0.836666667	9.836666667	0.085055913
		DEU	2.403	0.288	0.107023411	2.271	0.208	0.0839048	3.63	0.297	0.075630252	2.768	0.264333333	3.032333333	0.087171595
WHG	Whiting	DNK	32.938	258.018	0.886793879	32.276	225.971	0.875018877	26.337	116.802	0.816004024	30.517	200.2636667	230.7806667	0.86776622
		SWE	20.644	118.859	0.852017519	13.938	130.554	0.903537912	7.38	21.607	0.745403112	13.98733333	90.34	104.3273333	0.865928392
		DEU	0.56	4.437	0.88793276	0.151	0.81	0.842872008	0.66	2.399	0.784243217	0.457	2.548666667	3.005666667	0.847953865
Grand Total			**24169.006**	**6508.856**	**0.212167849**	**22251.866**	**7115.431**	**0.242290974**	**21449.959**	**6354.841**	**0.228551941**	**22623.61033**	**6659.709333**	**29283.31967**	**0.227423305**

Table 3.2-3

Skagerrak || demersal fisheries: landings and discards per country, species and year. Table sorted in descending order on average catch 2010-2012, top 4 countries and top 6 species per country.

COUNTRY	SPECIES	SPEC_ NAME	2010 Landings	2010 Discards	2010 %DR	2011 Landings	2011 Discards	2011 %DR	2012 Landings	2012 Discards	2012 %DR	Avg 2010-2012 Landings	Avg 2010-2012 Discards	Avg 2010-2012 Catch	Avg 2010-2012 %DR
DNK	PLE	Plaice	6497.892	577.131	0.081573021	7114.899	754.237	0.095847498	6767.06	947.916	0.122867006	6793.283667	759.7613333	7553.045	0.100590071
	COD	Cod	2949.23	1514.775	0.339330937	2700.735	1770.213	0.395936835	2819.66	1447.684	0.339247082	2823.208333	1577.557333	4400.765667	0.358473378
	NEP	Norway lobster	1971.346	1492.103	0.430814197	1789.741	1095.013	0.379586266	1511.235	976.902	0.392623879	1757.440667	1188.006	2945.446667	0.403336449
	POK	Saithe	3666.632	114.849	0.030371434	2037.392	328.972	0.139020032	1604.09	48.793	0.029519936	2436.038	164.2046667	2600.242667	0.063149747
	HAD	Haddock	1161.007	510.388	0.305366475	1709.051	1104.998	0.392671912	1978.515	608.135	0.235105252	1616.191	741.1736667	2357.364667	0.314407727
	PRA	Northern prawn	1123.382	57.505	0.048696446	1269.07	104.139	0.075836235	1226.647	136.504	0.100138576	1206.366333	99.38266667	1305.749	0.076111616
SWE	PRA	Northern prawn	1476.404	57.908	0.037741998	1486.543	166.924	0.100953935	1289.941	268.432	0.172251444	1417.629333	164.4213333	1582.050667	0.103929246
	NEP	Norway lobster	657.901	390.596	0.37252944	492.215	362.055	0.423817997	723.577	621.929	0.46222685	624.5643333	458.1933333	1082.757667	0.42317256
	POK	Saithe	700.639	454.536	0.393478044	509.837	19.025	0.035973468	380.263	63.419	0.14293796	530.2463333	178.9933333	709.2396667	0.252373551
	COD	Cod	440.333	148.602	0.252323261	502.041	157.815	0.239165818	479.272	281.815	0.370279613	473.882	196.0773333	669.9593333	0.2926705
	HAD	Haddock	119.423	197.182	0.622801282	194.035	116.027	0.374205804	207.995	59.587	0.222686877	173.8176667	124.2653333	298.083	0.416881652
	PLE	Plaice	121.742	91.825	0.429958748	175.819	82.929	0.320501028	152.336	45.507	0.23001572	149.9656667	73.42033333	223.386	0.328670254
DEU	POK	Saithe	375.754	5.637	0.014780108	935.393	34.766	0.035835363	384.02	5.172	0.013289071	565.0556667	15.19166667	580.2473333	0.026181364
	COD	Cod	57.49	25.307	0.305651171	59.631	11.693	0.163942011	358.74	33.243	0.084807249	158.6203333	23.41433333	182.0346667	0.128625683
	HAD	Haddock	66.779	13.667	0.169890361	102.721	11.531	0.100926023	181.35	11.777	0.060980598	116.95	12.325	129.275	0.095339393
	PLE	Plaice	12.641	1.47	0.104174049	13.06	1.764	0.118996222	12.46	1.853	0.129462726	12.72033333	1.695666667	14.416	0.117623936
	DAB	Dab	3.177	1.067	0.251413761	9.653	14.013	0.592115271	4.74	3.612	0.432471264	5.856666667	6.230666667	12.08733333	0.515470741
	POL	Pollack	7.122	0.042	0.005862647	6.562	0.006	0.00091352	21.09	0.013	0.000616026	11.59133333	0.020333333	11.61166667	0.001751112
NLD	PLE	Plaice	1530	51.08	0.032307031	5		0	10		0	515	17.02666667	532.0266667	0.032003408
	DAB	Dab	122	28.124	0.187338467			0	1		0	41	9.374666667	50.37466667	0.186098833
	LEM	Lemon sole	27	2.51	0.085055913			0			0	9	0.836666667	9.836666667	0.085055913
	COD	Cod	24	4.218	0.149479056			0			0	8	1.406	9.406	0.149479056
	ANF	Anglerfish	6	0.004	0.000666223			0			0	2	0.001333333	2.001333333	0.000666223
	TUR	Turbot	5		0			0			0	1.666666667	0	1.666666667	0
Grand Total			**23122.894**	**5740.526**	**0.198885856**	**21113.398**	**6136.12**	**0.225182699**	**20113.991**	**5562.293**	**0.216631542**	**21450.09433**	**5812.979667**	**27263.074**	**0.213218057**

Table 3.2-4

Skagerrak || demersal fisheries: landings and discards per gear, species and year. Table sorted in descending order on average catch 2010-2012, top 6 species per gear.

REG_ GEAR	SPECIES	SPEC_ NAME	2010 Landings	2010 Discards	2010 %DR	2011 Landings	2011 Discards	2011 %DR	2012 Landings	2012 Discards	2012 %DR	Avg 2010-2012 Landings	Avg 2010-2012 Discards	Avg 2010-2012 Catch	Avg 2010-2012 %DR
TR2	NEP	Norway lobster	2375.794	1685.668	0.415039707	2160.294	1376.691	0.389227266	2029.889	1529.461	0.429702333	2188.659	1530.606667	3719.265667	0.411534643
	COD	Cod	1197.182	1088.91	0.476319413	1234.203	1457.047	0.541401579	1253.711	1343.054	0.51720275	1228.365333	1296.337	2524.702333	0.513461323
	POK	Saithe	2849.422	173.67	0.057447805	1755.013	290.281	0.141926295	1331.154	99.241	0.069380136	1978.529667	187.7306667	2166.260333	0.086661175
	HAD	Haddock	382.062	485.754	0.559743079	616.418	887.578	0.590146516	960.98	554.896	0.366056327	653.1533333	642.7426667	1295.896	0.495983217
	PLE	Plaice	687.436	130.727	0.159781119	1033.399	163.545	0.136635465	976.449	162.806	0.142905671	899.0946667	152.3593333	1051.454	0.14490347
	HKE	Hake	218.039	79.187	0.266420165	281.833	28.012	0.090406494	216.428	83.694	0.278866594	238.7666667	63.631	302.3976667	0.210421597
TR1	PLE	Plaice	5771.627	580.797	0.091429193	5315.666	668.619	0.111729137	5093.088	810.135	0.137236049	5393.460333	686.517	6079.977333	0.112914401
	COD	Cod	1160.29	548.87	0.321134358	1016.691	403.541	0.28413738	1376.222	346.727	0.201240431	1184.401	433.046	1617.447	0.267734275
	HAD	Haddock	935.853	216.516	0.187887734	1349.862	249.852	0.156185418	1315.253	113.079	0.079168569	1200.322667	193.149	1393.471667	0.138609923
	POK	Saithe	1264.87	31.503	0.024300876	836.665	65.434	0.072535276	478.896	12.579	0.025594384	860.1436667	36.50533333	896.649	0.04071307
	DAB	Dab	382.619	163.5	0.299385299	369.845	488.994	0.569366319	390.727	329.74	0.457675369	381.0636667	327.4113333	708.475	0.462135338
	LEM	Lemon sole	211.359	31.302	0.12899477	123.808	11.432	0.084531204	253.565	21.531	0.078267223	196.244	21.42166667	217.6656667	0.09841546
OTTER	PRA	Northern prawn	2594.812	115.404	0.042581108	2648.959	271.063	0.092829095	2384.815	404.936	0.145151306	2542.862	263.801	2806.663	0.093990978
	POK	Saithe	523.176	368.653	0.413367361	496.555	23.486	0.045161824	404.337	3.742	0.009169793	474.6893333	131.9603333	606.6496667	0.217523128
	COD	Cod	225.829	37.975	0.14395157	196.271	62.969	0.242898472	205.341	59.156	0.223654711	209.147	53.36666667	262.5136667	0.203291003
	HAD	Haddock	15.679	18.953	0.547268422	23.304	95.093	0.803170688	69.932	11.524	0.141475152	36.305	41.85666667	78.16166667	0.535513999
	WHG	Whiting	3.889	27.893	0.877635139	5.161	106.259	0.95367977	1.407	3.921	0.735923423	3.485666667	46.02433333	49.51	0.929596714
	ANF	Anglerfish	21.565	0	0	23.489	0	0	47.769	0	0	30.941	0	30.941	0
GN1	COD	Cod	760.689	15.529	0.020005978	668.885	13.805	0.020221477	640.072	11.756	0.018035433	689.882	13.69666667	703.5786667	0.019467143
	PLE	Plaice	226.814	3.272	0.01422077	487.514	3.906	0.007948394	261.228	14.723	0.053353675	325.1853333	7.300333333	332.4856667	0.021956836
	POL	Pollack	161.192	0.441	0.002728403	87.165	2.547	0.028390851	99.607	0	0	115.988	0.996	116.984	0.008513985
	POK	Saithe	77.433	0.823	0.010516765	40.299	2.123	0.050044788	13.762	0.948	0.064445955	43.83133333	1.298	45.12933333	0.028761781
	HKE	Hake	50.714	0.692	0.013461464	47.496	0.046	0.000967566	11.192	0.024	0.0021398	36.46733333	0.254	36.72133333	0.00691696
	ANF	Anglerfish	14.624	0	0	12.686	0	0	44.203	0	0	23.83766667	0	23.83766667	0
BT1	PLE	Plaice	713.909		0	204.771		0	432.19		0	450.29	0	450.29	0
	DAB	Dab	27.209		0	2.922		0	16.508		0	15.54633333	0	15.54633333	0
	COD	Cod	17.122		0	7.669		0	10.821		0	11.87066667	0	11.87066667	0
	TUR	Turbot	4.033		0	2.768		0	13.888		0	6.896333333	0	6.896333333	0
	LEM	Lemon sole	2.994		0	1.796		0	5.892		0	3.560666667	0	3.560666667	0
	ANF	Anglerfish	5.024		0	0.951		0	2.981		0	2.985333333	0	2.985333333	0
Grand Total			**22883.26**	**5806.039**	**0.202376468**	**21052.358**	**6672.323**	**0.240663653**	**20342.307**	**5917.673**	**0.225349486**	**21425.975**	**6132.011667**	**27557.98667**	**0.22251305**

3.2.2 Skagerrak pelagic and industrial fisheries

The pelagic and industrial fisheries in the Skagerrak are mainly carried out as single species fisheries, with Denmark and Sweden as dominating EU- countries. Herring and sprat caught with pelagic trawls and purse seines are the most important species, but for some years industrial catches of sandeel can be of significance. In addition, a small-scale mackerel fishery with hooks and drift-net is also performed in the Skagerrak.

- Discard estimates are in general uncertain. No observer programmes are conducted on the pelagic and industrial fisheries.
- Slipping in pelagic fisheries is known and can in some season and areas be substantial.
- Discards of Norway pout, blue whiting and mackerel stems from unwanted catches in demersal trawl fisheries (predominantly the fishery for Northern prawn)

Data quality

- Discards of Norway Pout and blue whiting are from the observer programme for demersal fisheries. These discard ratios are of good quality (100% DQ).
- The 2010 data shows large discard of herring based on fill-ins. This estimate is not reliable.
- For the main pelagic species fished, the major parts of the estimated discards are derived from fill-ins.

Conclusion

Although the discards ratios appear to be low in the pelagic fishery in the Skagerrak, estimates of slipping are not (and cannot be) included in the database. For that reason the detailed tables by country and gear are not presented here.

Table 3.2-5

Skagerrak || pelagic and industrial fisheries: landings and discards per species and year and area. Table sorted in descending order on average catch 2010-2012.

		2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	Avg LAND	AVG DISC	AVG CATCH	AVG %DR	AVG %DQ
SPECIES		**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**	**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**	**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**					
HER	Herring	21349	13307	34656	38%	1%	12001	355	12356	3%	100%	18361	19	18380	0%	100%	17237	4560	21797	21%	4%
SAN	Sandeel	9915	0	9915	0%	####	17	0	17	0%	####	1416	0	1416	0%	####	3783	0	3783	0%	####
SPR	Sprat	4459	0	4459	0%	0%	4477	0	4477	0%	100%	1349	0	1349	0%	100%	3428	0	3429	0%	29%
NOP	Norway pout	61	305	366	83%	100%	2	441	443	100%	100%	118	155	273	57%	100%	60	300	361	83%	93%
MAC	Mackerel	106	0	106	0%	100%	152	140	292	48%	0%	136	146	283	52%	1%	131	96	227	42%	27%
WHB	Blue whiting	19	315	334	94%	100%	1	72	72	99%	100%	17	170	187	91%	100%	12	185	198	94%	97%
JAX	Horse mackerels	1	1	2	66%	100%	0	1	1	94%	100%	0	0	0	43%	100%	0	1	1	74%	97%
Grand Total		**35910**	**13929**	**49838**	**28%**	**5%**	**16650**	**1009**	**17658**	**6%**	**86%**	**21399**	**491**	**21889**	**2%**	**70%**	**24653**	**5143**	**29795**	**17%**	**11%**

Note: **%DR** refers to the discard : catch ratio (discard/catch). **%DQ** refers to the quality of the discard estimate (the proportion of the discard estimate derived from actual data). The colour coding refers to larger than 66% (green), between 33% and 66% (orange) and below 33% (red).

3.3 Area VIId (Eastern Channel)

3.3.1 Eastern Channel demersal and pelagic fisheries

In the Eastern Channel, more than 400 small (<12 m long) beam- and otter trawlers and netters predominate the fleets. Beam trawlers target mainly sole, and otter trawlers other demersal species. Large otter trawlers operating further offshore target cod, whiting, plaice, mackerel, gurnards and cuttlefish.

Whiting, plaice and sole dominate the catches (Table 3.3-1). Between 10-15% of dab, plaice and lemon sole catches are being discarded. In 2010, the highest discard ratio was observed for dab with 64%. For many of the demersal species discard ratios varied in some cases by an order of magnitude between years. Overall, only small amounts of round fish (cod, haddock, saithe, hake) were caught, indicating that these were not the main target species.
The main landings for pelagic species are herring and horse mackerel. For these species almost no discard information was available (Table 3.3-2).

Conclusion
The quality of the discard information in the Eastern Channel is generally low. The two species with the highest discard ratios in the demersal fishery (whiting and plaice) are to a large extent reliant on fill-ins for unsampled metiers. Because the quality of the discard information was low, the only tables presented in this report refer to the overall landings and discards. More detailed tables by country or gear do not provide reliable additional information.

Table 3.3-1

Eastern Channel || demersal fisheries: landings and discards per species and year and area, table sorted in descending order on average catch 2010-2012.

		2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	Avg LAND	AVG DISC	AVG CATCH	AVG %DR	AVG %DQ
SPECIES		**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**	**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**	**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**					
WHG	Whiting	5492	599	6091	10%	19%	6294	61	6355	1%	29%	3341	946	4287	22%	5%	5043	535	5578	10%	11%
PLE	Plaice	2804	809	3613	22%	47%	3082	607	3690	16%	70%	2791	67	2858	2%	20%	2892	494	3387	15%	55%
SOL	Sole	2657	156	2813	6%	78%	3180	94	3274	3%	71%	3029	2	3031	0%	5%	2955	84	3039	3%	75%
DAB	Dab	980	1707	2687	64%	9%	1228	364	1592	23%	41%	998	285	1283	22%	53%	1069	785	1854	42%	19%
COD	Cod	1001	14	1015	1%	56%	981	402	1382	29%	1%	805	22	827	3%	11%	929	146	1075	14%	4%
LEM	Lemon sole	176	14	190	8%	96%	420	51	472	11%	89%	397	88	485	18%	96%	331	51	382	13%	94%
TUR	Turbot	219	55	274	20%	39%	275	1	277	1%	73%	290	1	292	0%	71%	262	19	281	7%	41%
POL	Pollack	148	0	148	0%	99%	185	0	185	0%	0%	107	0	107	0%	0%	147	0	147	0%	99%
ANF	Anglerfish	152	18	170	10%	98%	143	7	150	4%	97%	87	18	105	17%	96%	127	14	141	10%	97%
BLL	Brill	134	0	134	0%	100%	121	2	122	1%	100%	103	1	104	1%	100%	119	1	120	1%	100%
HKE	Hake	28	0	28	0%	0%	60	0	60	0%	0%	13	0	13	0%	0%	34	0	34	0%	#######
HAD	Haddock	14	0	14	0%	0%	36	0	36	0%	0%	17	0	17	0%	0%	23	0	23	0%	#######
POK	Saithe	17	0	17	0%	####	14	0	14	0%	####	4	0	4	0%	####	11	0	11	0%	####
LIN	Ling	8	0	8	0%	####	10	0	10	0%	####	12	0	12	0%	####	10	0	10	0%	####
LEZ	Megrims	14	0	14	0%	####	3	0	3	0%	####	1	0	1	0%	####	6	0	6	0%	####
NEP	Norway lobster	4	0	4	0%	####	8	0	8	0%	####	1	0	1	0%	####	4	0	4	0%	####
Grand Total		**13849**	**3372**	**17221**	**20%**	**25%**	**16042**	**1589**	**17631**	**9%**	**45%**	**11997**	**1431**	**13428**	**11%**	**22%**	**13963**	**2131**	**16093**	**13%**	**29%**

Table 3.3-2

Eastern Channel || pelagic fisheries: landings and discards per species and year and area.

		2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	2012	Avg LAND	AVG DISC	AVG CATCH	AVG %DR	AVG %DQ
SPECIES		**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**	**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**	**LAND**	**DISC**	**Catch**	**%DR**	**%DQ**					
HER	Herring	18679	35	18714	0%	32%	18304	152	18457	1%	60%	34356	994	35351	3%	61%	23780	394	24174	2%	60%
JAX	Horse mackerels	21181	0	21181	0%	0%	19189	130	19319	1%	69%	19382	71	19453	0%	61%	19917	67	19984	0%	66%
MAC	Mackerel	4045	30902	34947	88%	1%	7678	1097	8776	13%	1%	4869	1972	6840	29%	0%	5531	11324	16854	67%	1%
Grand Total		**43906**	**30937**	**74843**	**41%**	**1%**	**45210**	**1380**	**46590**	**3%**	**14%**	**58608**	**3037**	**61645**	**5%**	**22%**	**49241**	**11785**	**61026**	**19%**	**3%**

Note: **%DR** refers to the discard : catchratio (discard/catch). **%DQ** refers to the quality of the discard estimate (the proportion of the discard estimate derived from actual data). The colour coding refers to larger than 66% (green), between 33% and 66% (orange) and below 33% (red).

4 Management measures to mitigate discards

4.1 Generic measures to manage discards

In 2007 a gear expert group from the EU and Norway identified possible technical conservation measures to reduce discards of fish below marketable size, protected species (e.g. cod) and species of low commercial value (e.g. Norway pout in shrimp fisheries). Around 15 fisheries were identified as potentially problematic with respect to discarding or due to the use of human consumption species for reduction to fish meal or oil. The findings of this group were updated in March 2009 at a second meeting held in Ålesund, Norway. This report was reviewed and updated at two technical meetings on the harmonisation of technical measures between EU and Norway in 2013 (distributed by EU Council secretariat on 6 September 2013). The latter report provides a comprehensive overview of discard problems and gear adaptations in relation to the stocks with a joint interest between EU and Norway.

1. **Fishing in the Skagerrak by trawl/seine nets with 70-89 mm square-mesh codends** and sorting grid with 35 mm bar spacing, and trawl/seine net fishery with 90-99 mm. Following the recommendations from a technical working group, EU and Norway have agreed to increase the minimum mesh size to 120 mm or a gear with same level of selectivity. The mesh size is compulsory in Norwegian waters in the Skagerrak from January 1st 2013 and through national legislation for Danish and Swedish vessels from February 1st 2014.
2. **Trawl/seine net fishery with 80-89 mm codends.** Discarding of cod, haddock, plaice and whiting are reported in the *Nephrops* trawl/seine net fishery with 80-99 mm. Significant progress has been made in England to reduce discarding in these fisheries. Discarding of over quota fish, particularly cod is reported by ICES as a problem. Discarding of undersize *Nephrops* occurs but is not considered a major problem except, according to ICES in the Firth of Forth fishery. Discarding of undersized whiting in the directed fisheries for this species remains a problem. There was evidence of high-grading in this fishery and over quota catches of cod. Discarding in the seine net fisheries is reported to be low based on limited information.
3. **Trawl/seine net fishery with 100-110 mm codends.** A targeted plaice trawl fishery by Danish and Dutch vessels and a German/French/Norwegian saithe fishery in the northern North Sea with 100-119 mm occurs. Discards in the other fisheries are largely unknown, although are not thought to be significant. Discards in the directed saithe fishery are reported to be low, even with 110mm. Increasing the mesh size to 120mm would result in a considerable loss of target species, a.o. lemon sole.
4. **Trawl/seine net fishery with ≥120 mm codend.** This category constitutes the major mixed demersal fisheries in the North Sea and involves principally vessels from England and Denmark but also smaller numbers of vessels from France, Netherlands and Belgium as well as a few Norwegian vessels. There are trawl and Danish seine/pair seine fisheries for mixed demersal species such as cod, haddock, plaice and whiting as well in deeper waters on the shelf edge targeting anglerfish, megrim, cod, haddock, hake and saithe. Data suggest that discard problems are mostly restricted to quota or market-driven discarding, principally of cod. However, discards of hake have increased in recent years as the catchability seems to have increased in the North Sea out of line with the TAC.
5. **Beam trawl with 80-89 mm codend.** This is a beam trawl fishery targeting primarily sole, with a bycatch of plaice and other species of flatfish. The beam trawls are traditionally rigged with chain-mats ground-gear. EU vessels from Netherlands, Belgium, England and Germany are involved. Discarding of plaice, dab and whiting remains a problem in this fishery. Up to 40% (in weight) of plaice and up to 100% of whiting is discarded. In recent years dab discards are also reported to be very high in the Dutch fishery and in fact the industry has identified dab as a potential 'choke' species in this fishery on introduction of the discard ban. Discarding of cod has been a problem in the past but has been insignificant in recent years. For the Belgian beam trawlers fishing for sole with 80 mm mesh size, data for all areas (not only in the North Sea) for

the period 2008-2011 show mean discard ratios of 25% for plaice and 6% for sole. The use of 'codend blinders' which exacerbated the discard problem seems to have decreased or disappeared due to the introduction of the OMEGA mesh gauge.

6. **Beam trawl with 100-119 mm codend.** This is a beam trawl fishery using tickler chain and chain matrix trawls in a small area in the central North Sea on the Southern Dogger Bank. New discard data were generated for the Dutch fleet in 2012 and showed discarding of plaice to be much less than the 80-89 mm beam trawl due to the larger mesh-size. This data shows that dab discards to be higher than plaice.
7. **Beam trawl with ≥120 mm codend.** This is a beam trawl fishery for plaice involving Dutch, Belgium and German vessels using tickler chain and chain matrix gear. The fishery is concentrated in the northern North Sea, north of 56°N. No discard data are available but discards are expected to be low in comparison to the small mesh beam trawl fishery for sole.
8. **Pandalus trawl fishery.** Involves vessels from Denmark, Norway and Sweden in the north-eastern North Sea and the Skagerrak. In recent years the fishery has been concentrated in the Skagerrak and the Norwegian Deep. The minimum mesh size is 35 mm and the use of sorting grids was made mandatory in the Skagerrak in 2013. There is a bycatch of blue whiting and Norway pout in the fishery which given the small size of these species such bycatch is unavoidable. To allow retention of fish bycatch (mainly cod, saithe and anglerfish) the use of a secondary size selective device e.g. large mesh tunnel or codend of 120 mm square mesh is permitted in combination with the grid provided a vessel has quota for such bycatch. In the North Sea the use of the grid is still optional in the Pandalus fishery. The use of sorting grids in this fishery is a positive development and will almost totally eliminate discarding of fish species that has been a problem in the past in the Pandalus fishery. Further improvements in selectivity are not considered necessary.
9. **Norway pout fishery.** Conducted by Danish and Norwegian vessels. Most of the fishery takes place at depths between 100 to 200 m along the shallower western/southern slope of the Norwegian Deep and at the Fladen Grounds. The fishery is seasonal with the Norwegian fishery concentrated in the summer months and the EU fishery (Danish fishery) on the Fladens concentrated later in the autumn. Since 2010 most vessels are required to use a sorting grid in Norwegian waters with a maximum bar spacing of 40 mm while under national legislation all Danish vessels are required to use sorting grids with a bar spacing of 35mm. With the introduction of the sorting grid into this fishery the bycatch problems in these fisheries have been solved regarding larger fish. Bycatches of herring are observed in the Danish fishery but these are depth and season dependent so spatial avoidance is possible. It should be noted that in the EU all registered bycatch is counted against the herring bycatch quotas.
10. **Sandeel fishery.** Takes place mainly in the shallow areas of the North Sea. The bulk of the catch is taken by mainly Danish, Swedish and Norwegian vessels but also vessels from UK and Netherlands and one Lithuanian vessel are involved. Mesh sizes <16 mm are required to catch sandeel and may be used in EU waters from 1 March to 31 October and in Norwegian waters from 23 April to 23 June. Discarding is not considered to be a problem in the sandeel fishery, and by-catches are in general very small. However, bycatches of small mackerel early in the season have been observed, but these are depth and season dependent so spatial avoidance is possible. In such cases misreporting can occur.
11. **Pelagic Fisheries** for herring, mackerel and horse mackerel. Unaccounted mortality due to slipping is considered a long-standing problem although the actual extent is largely unknown. The main reason for slipping is when catches contain large percentages of small pelagic species with low market value. In addition, it can also be as a result of catches being mixed, or for practicality reasons when there is insufficient storage space on board a vessel to accommodate the entire catch from an individual haul. In pelagic trawls slipped fish are thought to have a much higher mortality rate leading to research in several countries into the use of sorting grids in pelagic trawls. Spatial and temporal measures using fishermen's knowledge of the movement of pelagic stocks (in particular mackerel) may be appropriate. Unwanted bycatch of other species such as cod, whiting and saithe are also reported in pelagic trawl and purse seine fisheries although no reliable estimates of the extent are available.

4.2 Drivers and incentives for discarding

It was observed that most measures were effort driven as part of the cod recovery plan(s), and therefore related to cod avoidance. Relatively few measures are taken as yet with a view to solve other discard problems, that may arise from either low prices (high grading, for instance in dab, a control issue) or too restrictive quota (possible future choke species e.g. rays, hake). There is also the issue of catches of sharks (e.g. unintentional large catches of spurdog that may have low survival rates).

The choice of what to discard may be driven by regulations, market forces, and onboard capacity to store and/or handle the catch. Eventually, it will be a decision of the individual vessel operator or crew. For example, catch composition rules or quota regulations may dictate that catches despite their marketable size and value have to be discarded, because they exceed a given quantity. Another form of discarding is 'high grading' where marketable catches are discarded only to retain more valuable catch.

As part of the European Common Fisheries Policy Reform, the elimination or at least reduction of discarding has been prescribed in article 15. From monitoring data under the Data Collection Framework, it is known how many different species are caught and in what quantities and sizes. These data together with species-specific minimum length restrictions were used in a recent study by Catchpole *et al.* (2013) to infer the main causes for discarding.

'*The first category includes fish discarded below the MLS. The inferred driver for these discards is the mismatch between the selectivity of the fishing practices and the minimum length at which these fish can legally be landed. This driver is called 'under MLS'.*

The second category includes fish discarded below a minimum marketable size (MMS) together with species that have no market outlet (non-commercial species). The MMS was defined as the minimum length at which fish were landed; this category includes only species for which there was no MLS. To account for variability in marketing opportunities and practices, the MMS was calculated for each gear–area and year combination. The driver behind these discards was inferred to be a mismatch between the selectivity of fishing practice and the market demand for these fish. This driver is named 'no market'.

The third category of discards included species with no associated quota and discarded above either the MMS or the MLS. Therefore, this category consisted entirely of commercial species. These fish, at the length discarded, were also intermittently landed by some fishers. The inferred reasons for discarding these fish included inconsistencies in market opportunities, inconsistent sorting, poor condition of the fish, and/or damage to the fish. This category, named 'inconsistencies', represents the amount of discards attributed to inconsistencies in sorting and marketing opportunities.

The fourth category of discards is named 'quota restriction' and describes fish with an associated quota which were discarded above the length normally landed. This length was taken as the MLS usually but in instances where species–area combinations had associated quotas but no MLS, the length normally landed was taken as the minimum length landed (MMS). The 'quota restriction' category describes discards generated through fishers' responses to quota restrictions and includes highgraded fish as well as those discarded once a vessel had exhausted its quota. Highgraded fish are those discarded in preference for larger, higher-value individuals; highgrading might occur at the trip level but also at the year level when fishers have a limiting quota for a valuable species.'

In Catchpole's *et al*. (2013) study, the above criteria were applied to data from English, Danish, French and Greek observer programmes of mainly otter- and beam-trawl fisheries, spanning from the Baltic to the Mediterranean Seas. It was demonstrated that '*discards were found to be driven mostly by legislation (MLS and quotas) in the French Nephrops trawl fishery, by MLS and market inconsistencies in the Danish demersal trawl fishery, and largely by market inconsistencies in the Spanish demersal trawl fishery and by a combination of MLS, an absence of market and market inconsistencies in the Greek trawl fishery.*'

From the comparisons of the different national case studies it was evident that the relative proportion and hence contribution of these inferred drivers to total discard quantities differed at a greater scale between fishing regions than between fisheries. A similar conclusion was drawn by Uhlmann *et al*. (2013) who compared discard rates and ratios across European fishing regions and fisheries.
While Catchpole *et al*. (2013) determined how much of fleet-level discards can be attributed to each of the above drivers without zooming in on individual species, from chapter 3 it can be concluded that some of the most-commonly discarded species include plaice, dab, whiting, hake and cod. In the following the main reasons contributing to their discarding are discussed:

Plaice. About half of the catch of plaice is discarded. Highest discard ratios occur in the fisheries targeting sole with 80mm by the Netherlands, England and Belgium beam trawlers. This is both a biological and technical matter. In order to catch the 24 cm of sole, the fishermen use mesh width of 80mm in the nursery area for plaice. Some 95% of the discards are below Minimum Landing Size.
The BT1 with 120 mm targeting plaice in the Northern North Sea has only very low discards ratios. High fuel prices and limited days at sea, keep the beamtrawls close to harbour, i.e. in the nursery area where the young fish is abundant. Prices of fish are low, but high-grading does not seem to take place. It is generally assumed that the import of pangasius and cheap flatfish from North America have suppressed the market for North Sea plaice. High discards of plaice are also observed in the German TR2 fisheries on *Nephrops*.

Dab. Dab is an abundant species in the Southern North Sea, in particular in the German Bight.
The vast majority of the dab catches are by-catch and discarded. Main reason is the low price. The low price is presumed not enough to outweigh the costs of landing. Quota were initially set as precautionary TACs and are not fully utilised.

Whiting. Similarly to dab, the low price is presumed the most dominant reason for the discarding by fishermen in the Netherlands, Belgium, Sweden and Denmark. Off the eastern English coast and in the Skagerrak local concentrations occur, and discards may be due to lack of quota. Whiting is an important bycatch in the *Nephrops* fisheries.

Hake. The Northern hake stock is recovering and currently more abundant. Quota limitations were the main driver for discarding, but it should be noted that the quota are uplifted in autumn 2013. Hake is a bycatch in cod fisheries. Swaps of quota from other countries are not that frequent, because hake is valuable.

Cod. Despite a recovery of the stock, discards have been reduced successfully with cod avoidance measures. Catch composition rules, in particular in TR2 are a driver for discards. Limited individual quota and high rent prices are also known factors.

4.3 Cod avoidance measures

At the December 2012 Council, a joint statement was made by the fisheries Ministers from Sweden, United Kingdom, Germany, Denmark and the Netherlands to draw up and implement cod avoidance plans. An overview of cod avoidance measures by Member State can be found in table 4.3-1. It should be noted that most cod avoidance measures were already in place before 2013.

Table 4.3-1
Overview of Cod Avoidance Measures by Member State (excerpt from May 2013 EU-Norwegian working group report and updated in September 2013).

Member State	Cod Avoidance Measures
Denmark	Gear changes mainly in the Skagerrak (increase in mesh size to 120 mm; use of SELTRA trawl with 90 mm codend; and sorting grid in the Pandalus fishery and *Nephrops* fishery) Real-time closures under Reg. (EC) 724/2010 in the Skagerrak (15 in 2011 and 12 in 2012) and two in the North Sea in 2011. 26 TR1 vessels using CCTV representing 50% of total cod landings.
Sweden	Main measures taken in the Skagerrak For the Swedish costal area fishing with trawls is prohibited inside four nautical miles from the coastline, unless for some areas where trawl fishery with grid for *Nephrops* and Pandalus is allowed. In the period Jan-March all fishing for cod, haddock and saithe is prohibited inside four nautical miles from the coastline. Area closures for all fishery in spawning areas for cod. Fishing with grid in all directed fisheries for Pandalus and *Nephrops*.
Netherlands	Cod avoidance plan in place since July 2011, comprising: • choice between increases in cod end mesh sizes (10 mm) or use of large mesh panels (over and above the mandatory 180 mm panel) in the demersal trawl fishery (TR1 and TR2), and: • Respecting monthly real-time (LPUE) closures in the Southern North Sea and Channel created jointly with the English control authorities (MMO), and: • Seasonal closures (larger areas Dec-April), and: • Moving on provisions when catch composition contains more than 5% of cod, and: • Self-sampling and observer programmes. Furthermore, in 2013 13 TR-vessels are using CCTV, together with a discards ban (all cod is landed).
Germany	Self-sampling programme Saithe fleet has moved to 120 mm codend mesh size Two vessels using CCTV Sufficient bycatch quota in the saithe and plaice fisheries
Belgium	Belgium has no cod avoidance plan in place, because there is no directed fishery for cod in Belgium. Nevertheless, Belgium took technical measures to reduce bycatch of cod during mixed fisheries operations. • Pair-trawling is strictly forbidden for years now. • To reduce bycatches of roundfish, there is an obligation to configure the net of beam trawls with a top panel with meshes of at least 300 mm instead of the regulatory 180 mm top panels. For other demersal trawls, the obligation to equip nets with a square mesh panel of 110 mm for all types of trawls was expanded to all areas. • The effort allocation rules are converted in a maximum number of days at sea per vessel and per gear type. General rule is a total of 180 days for any type of gear in all areas, out of which a maximum of 75 days may be allocated to TR1 gear. • Cod quota allocation is, as a general rule and to avoid any targeting of cod by the national fleet, expressed as a maximum average quantity per day at sea. To avoid highgrading and problems with any occasional high catch rates , the allocation is expressed as an average during the fishing trip. • For recreational angling, specific measures are in place, with the adoption of a bag limit. There is a national action plan for the increase of the selectivity of gears deployed. All efforts must go to the avoidance of discards by increasing selectivity measures.
UK-Scotland	The Conservation Credits Scheme has opted to achieve the reduction through a two tiered approach, first by cod avoidance (thereby reducing discards) and then by a reduction in effort (reducing total catch). Cod avoidance is achieved by a number of measures. These include: Real-time closures and seasonal and permanent closures Selectivity measures in the TR2 fleet (flip-flap trawl; Faithlie trawl) Selectivity measures in the TR1 fleet (Orkney/Shetland trawls; 200 mm square mesh panel; or 600 mm belly panels) 19 TR1 vessels fitted with CCTV representing 17% of total cod landings and 4 TR2 vessels fitted with CCTV with a stipulation to keep cod catches less than 1.5% Observer programmes for vessels with < 1.5% cod catches Three seasonal and one temporal closure In 2012 TR2 vessels fishing in ICES Division IVa (with the exception of the inshore Moray Firth area) are required to fish with a specified 'highly selective gear' that has been trialled and shown to reduce cod catches by not less than 60% compared to the catches taken in a standard TR2 trawl. Scottish TR2 fishing vessels operating in other, less cod abundant, parts of the Cod Recovery Zones are required to fish while having inserted in their gears a 200 mm Square Mesh Panel, at 12-15 m from the codend.

Member State	Cod Avoidance Measures
UK-England	Cod Avoidance Recovery Scheme: • 11 TR1 vessels and 1 GN1 vessel in the North Sea. • Selective gears in TR1 fleet (Shetland/Eliminator/Orkney trawl; 130mm codend; or large SMP option). Tiered days depending on option chosen • Highly selective gears in TR2 fleet (additional days made available for its use. • Observer programme in TR 2 fleet • Real-time closures jointly created by the English and Dutch control authorities. • Additional days made available to vessels which undertake action to catch less than 5% cod. Other initiatives: • A database summarising EU gear selectivity trials and scientific literature – work ongoing. • Vessels in the South West beam trawl fleet took part in a pilot in 2009 (Project 50%) to reduce discards by improving the selectivity of their nets[1]. • As a condition of a sole-avoidance scheme in the South West of England (Channel), nine BT vessels must fully document their catch of plaice from their inshore sole fishery including non-marketable fish. This has overlap with the Southern North Sea where there is a similar problem with a high volume and rate of discards of plaice.
UK-Northern Ireland	From 1st February 2013 to 31st January 2014 all Northern Irish TR2 vessels must use one of the following approved highly selective fishing gears (HSG) at all times in any sea area covered by the long-term cod plan including the North Sea. 24 vessels have fished in the North Sea at some time since 2010. The permissible HSG are: • Seltra '300' Trawl (4 m box section with 300 mm square mesh) • Seltra '270' Trawl (3 m box section with 270 mm diamond mesh) • Faithlie Panel • Flip – flap trawl • CEFAS net grid • Inclined separator panel (specification as per the Annex to Council Regulation 254/2002) • Swedish grid (as specified in Appendix 2 to Annex III of EC 43/2009) • 200 mm square mesh panel (only available for vessels 12 metres and under) • 300 mm square mesh panel (available for all vessels) • The selective gear research programme will continue with additional focus being placed on overall discard reduction over the next two years. It is likely that the current range of selective gear options will be rationalised on the basis of effectiveness compared to other gears and practicality of operation.
France	France fisheries exert only a small contribution to overall North Sea cod mortality. Measures that have been taken are: • Observer programme to ensure cod catches less than 1.5% • Respecting voluntarily Real-time Closures created in Norway's waters and in UK waters by Marine Scotland • Several trials ('SAUPLIMOR', 'SELECCAB', 'SELECMER') to improve fishing gears' selectivity have been implemented during the last three years on-board vessels fishing in the North Sea to avoid undesirable cod catches and discards. • The last trial ('SELECFISH') has started at the beginning of 2013 with the aim to develop more selective trawls to reduce undesirable catches and thus discards quantities. In particular, it aims at testing several types of selective devices through testing several configurations of square mesh cylinders, and several configurations of sorting grid associated with a square mesh panel (SMP).
Norway	In Norway fisheries are regulated by quota on groups and vessels. A certain amount is set aside to cover bycatch by vessels not allowed to conduct directed fisheries on cod. RTC system is in place as well as precautionary closures administered by the Coast Guard.

4.4 Effectiveness of cod avoidance measures

4.4.1 Experience in Scotland with the use of 'avoidance measures' to reduce catch rate and discards of cod as part of the 'Conservation Credits' approach to the EU Cod Recovery plan

In considering possible approaches which might contribute to the requirement to reduce discards, it is worth reviewing the experience of existing fish 'avoidance schemes'. A central part of the 2009 EU cod recovery plan was the introduction of an effort regime in which Member States were given responsibility to distribute their allocated effort amongst vessels. Part of the basic regulation (cite) also contains Article 13.2c giving provision for alternative management approaches to be used as long as they resulted in reductions in fishing mortality equivalent to those expected under the effort regime. Given that a large component of cod mortality in the mid-2000s was attributed to discards, reductions in these would be expected to help towards reaching the target mortality.

[1] http://www.cefas.defra.gov.uk/our-science/fisheries-information/discards-and-fishing-gear-technology/project-50.aspx

In England, considerable use has been made of Article 13.2 c and in Scotland this has been implemented in the Conservation Credits Scheme. Two main types of measure were introduced from the outset to encourage avoidance of cod and to allow effort 'buy back'. The first, a compulsory measure, involves the use of Real Time Closures (RTCs) which are established where landings rate data linked to VMS indicates areas of cod concentrations. A method was established making use of almost real-time information on landings of cod linked to VMS data showing the areas of fishing activity. Areas of high cod abundance (landings /ping) are designated as closures. The scheme has been in place since the early years of the cod plan and the numbers of closures gradually increased to account for the progressively more stringent requirement to reduce fishing mortality. The size of the closure areas has also been increased by 4 times (to 15 nm x15 nm). During 2012, 173 closures were put in place each lasting for 21 days. Evaluation of the effect of closures has been attempted and there is some evidence of industry movement away from cod abundant areas at the time of closure. Estimating what the reduction in mortality has been is more difficult – largely because a controlled experiment cannot be set up at the scale required. However, there is some evidence of reduction in catch arising from the overall closure programme.

The second, voluntary option, involves the adoption of more selective gears designed to reduce cod catch rate. A schedule of gears is available and the more selective the gear, the larger the amount of effort that can be bought back. Some gears such as the 'Eliminator trawl' or the 'Swedish Grid' appear to be very effective and attract the highest buybacks. Trialling of other gears, designed by industry and tested in catch comparison trials by Marine Scotland Science shows that other gears such as the TR1 'Orkney trawl' (with large escape panels) and the 'highly selective' gears used in the *Nephrops* fishery (e.g. the flip –flap trawl) also reduce catches of cod but not by so much – these attract smaller buy backs. Although the potential measurement of the effectiveness of these gears is more straightforward, their actual contribution to reducing overall mortality depends on the extent of use and also on their careful rigging during fishing operations. The uptake of the TR1 gears has been modest (around 20% of the fleet) so the contribution would not be expected to be great. Further details of the scheme and its outcomes can be found in various publications (Holmes *et al*. 2009; Holmes *et al*. 2011 and Needle and Catarino 2011).

Each year, Member States taking advantage of the Article 13.2c provision are expected to provide a report of activity to the EU with results demonstrating that the reductions in fishing mortality – F achieved using the avoidance measures meet the requirements of the cod plan. Early expectations were that the results would indicate how much each measure had contributed to the overall reduction. It became clear fairly quickly however, that this was not possible. Instead, evaluation relies on examination of some basic metrics indicative of a positive direction of travel. These include a) reductions in discard rate of cod, b) reductions in partial F of cod and c) reductions in catch rate (below what would be otherwise expected). The most recent report from Scotland (from July 2013) suggests that in the North Sea, the scheme does seem to have had positive effects. The the STECF expert working group on the effort management regime notes in its 2013 report (STECF 2013a) that partial F by English vessels has dropped substantially and that some of this seems to be the result of the collective effect of the RTC and gear avoidance measures.

While it is possible that a number of other factors have also contributed to the more positive outcomes, it seems likely that 'avoidance measures' have contributed to the significant reduction in discard rate of cod. This observation may encourage some thinking around the role of avoidance as a helpful approach to reducing discards in other species and thereby meeting the landing obligations of the new CFP.

4.4.2 Netherlands

The cod avoidance measures were sent to IMARES for an *ex-ante* evaluation of their expected effectiveness in relation to the objectives (i.e. reduce CPUE and stay below 5% bycatch of cod). It was argued by IMARES that it was rather difficult to be conclusive on separate measures. A monitoring programme is in place since the measures were in place. IMARES concluded in 2013 that the objectives were met. It is still not sure though, which measure was most effective.

4.4.3 Denmark

Around half of Danish cod catches are now taken under the pilot Catch Quota Management schemes, where participating vessels are granted additional cod quota against an obligation to report all cod catches in their logbooks (Fully Documented Fisheries, FDF). The accuracy of these logbooks declarations is controlled by Electronic Monitoring using CCTV cameras and trawl sensors. Analyses of the data collected under this scheme are still ongoing, but results have consistently shown obvious changes in discarding patterns between the FDF vessels and the non-FDF fisheries in the North Sea and in the Skagerrak. Estimated discards ratios in FDF have dropped to much lower levels than in the non-FDF fisheries, and smaller cod are also landed by those vessels indicating that highgrading has reduced. CCTV monitoring has shown to be an effective and cost-efficient tool for controlling the accuracy of reported cod discards in logbooks, allowing those data to be considered as a reliable source of information on discards values alongside observers sampling programmes.

4.5 New technical measures, trials and other developments

Table 4.5-1
New technical measures, trials and other developments

Member State	New measures and trials
Denmark and Sweden	Focus on Skagerrak. Since February 1st, 2013 the mandatory mesh width is increased from 90 to 120 mm, mandatory use of sorting grids in fisheries on Pandalus shrimp (19 mm grid) and Nephrops fisheries (35 mm grid).
England	Mainly effort driven measures. Fishers can choose from different packages (e.g. Eliminator trawl with large meshes), earning a pay back with a certain number of days. There have been several trials of grids and variants in Nephrops fisheries (e.g. English net-grid).
France	Measures and trials predominantly outside North Sea. In the NS: several trials with mesh width and sorting grids (project 'Selecfish' being the last one).
Germany	Use of Swedish grid in Nephrops fisheries (effort driven). Plaice fisheries: intention to use TR1 120 mm, but unfavourable CPUE conversion rate and possible obligation to have observers on board keeps fishermen from changing from TR2 (80 mm) to TR1 (120 mm), even though their actual catches of cod are low.
Belgium	Since June 2013 the mesh sizes in the back of the beam trawl gear should be in all areas at least 300 mm instead of the mandatory 180 mm. A sieve net in Crangon (brown) shrimp fisheries with TR3 gear is mandatory. Fishing with electric pulse is not allowed, except for 2 pulse licences for trials in the shrimp fishery.
Netherlands	Cod avoidance measures are continued, trials with CCTV expanded. Since July a pilot in pelagic fisheries with escape panels, sorting grid, mesh width, a fish pulp installation, CCTV and observers on board (runs until December).

4.6 Other possible measures

4.6.1 Quota management

Quota management measures will in most member states be necessary to facilitate the utilisation of quotas under a discard ban. They can be an important tool to avoid unwanted bycatches or to allow these to be landed, for example via a national reserve or pooled quotas.

Swapping efforts should be enhanced. Member States should try to co-operate more intensively and to avoid that the 'price' for swaps will go up.

There is a general concern about the interspecies flexibility, how it will work in practice and its potential adverse effects on the stocks. But on the other hand this instrument might offer an important corrective to permit the continuation of fishing activities that would otherwise have to cease.

A brief description of how quotas are managed nationally is included in Annex 1.

4.6.2 Spatial measures

Spatial measures (real time closures, seasonal closures, permanent closures) may be helpful in cases where aggregations of juvenile or spawning fish occur. Potentially also as a tool to avoid catching undersized fish, and therefore these measures will be of benefit in the implementation of the landing obligation. A system of EU-Norway real time closures is in place and the United Kingdom and the Netherlands have joint national monthly LPUE closures to protect cod. Sweden and Denmark have since 2009 introduced nationally a closed area for the protection of cod in Kattegat. In parts of the area certain selective gear are allowed during parts of the year. In the preparation of this Discard Atlas, there was a discussion if, in the light of results-based management, the governments should impose closures or leave the decision up to the industries. This would also have implications for the information-base on where and when aggregations of fish occur and who would need to collect and interpret the information.

4.6.3 Discarding of species with high survival

To avoid an adverse effect of the landing obligation if large numbers of juveniles that would have otherwise survived the discarding are kept onboard and die, it was argued to allow the discarding of species with high survival rates. This may help to improve stock status and to avoid the closure of fisheries if quotas for these species are exhausted. However, it is difficult to prove in a scientifically sound way whether and under which circumstances species have high survival rates. Many factors influence survival rates including the type of gear, haul duration and temperature. Scientific data on survival rates are scarce as experiments are costly. In addition, the control of the discard ban at sea becomes more difficult if discarding is allowed for some species. Nevertheless, some more robust and up-to-date estimates are needed to decide whether for example elasmobranchs or robust flatfish species are potential candidates for an exemption to avoid unnecessary negative effects of a discard ban on stocks and fisheries.

5 Discussion

In designing discard plans, and associated relevant measures to minimise discards as well as rules of control and enforcement, objectives of the landing obligation should be considered to design a satisfactory management system. Discard plans could generally follow the same strategy as the multi-annual plans but they are only valid for three years. Because multi-annual plans are set up per fishery, it would make sense to have a fishery-based discard plan as well. However, it should be realized that the distinction into different fisheries also poses substantial challenges, because it is hard to define what constitutes a fishery.

A key factor in this context is the level of compliance, and the link to the level of detail of technical regulations required to achieve an effective landing obligation. In the reform of the CFP it was called for a change to a results-based management, incentivising good fishing practices. Within a results-based management system authorities establish the overarching objectives and quality standards for the marine environment while fishers have flexibility concerning the operational means to achieve those targets, provided that they take responsibility to account for the catch under landing obligation.

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Annex 1 Quota management around the North Sea

Denmark
Most of the important species in Denmark are managed by tradable vessel shares. The demersal species cod, sole, plaice, Norway lobster, saithe, haddock, pandalus, hake, turbot, monkfish and salmon are managed by Vessel Quota Shares (VQS). Herring, mackerel, sandeel, sprat, boarfish, horse mackerel, blue whiting, and Norway pout are managed by Individually Transferable Quotas (ITQ). The difference between VQS and ITQ's are mainly that it is easier to split up and sell ITQ's than VQS's. A small part of the quota is reserved for less active vessels, which have no tradable vessel shares. For most of the quotas managed by tradable vessel shares, a reserve is managed nationally in a 'Fish Fund'. Quotas in the Fish fund can be used for a number of purposes, such as swapping of quota with other member states, allocation for young fishermen wanting to establish themselves, extra allocations for coastal fisheries, or reserves for unavoidable bycatches or reserves to avoid overfishing. There also exists a system managed by the fishermen where vessels pool their quotas, so that they can lease quotas from each other, thereby minimizing discards. A few species are managed by a non-tradable license system. This includes oysters, mussels and brown shrimps.

United Kingdom
UK Administrations (England, Scotland, Wales and Northern Ireland) each have a share of the UKs quota. UK government ultimately has a responsibility for ensuring quota limits are not exceeded.
The UK quota management system works by reference to Fixed Quota Allocations (FQA) units. FQA units represent a share of quota allocated to UK vessels (based on a track record of fishing activity in a historic period) that are attached to vessel licences. These shares do not reflect a fixed permanent entitlement to quota (such as with an ITQ) beyond each year in question. Administrations determine how these shares are distributed to vessels they license.
Broadly, the UK fishing fleet is divided into three main groups for purposes of quota allocation:
1. The 'sector', made up of vessels (mainly over 10m in length) that are members of one of the 24 Producer Organizations in the UK.
2. The 'non sector', made up of vessels over 10m in length not on membership of a PO.
3. The 'under 10s', vessels of 10m and under in length not in membership of a PO.

Annual quota allocations are based on total number of units held by the vessels in membership of each group outlined above. Working with UK authorities to a set of agreed UK and national Quota Management rules, it is for each PO to decide how best to allocate quota to its members. Most UK POs operate under individual quota (IQ) systems, whereby members expect to fish against the level of quota obtained by the PO through the FQA units associated with the vessel's licence. Quotas can be leased in or out to other fishermen, and swaps are facilitated between POs and the other two groups (non-sector and under 10s) in addition to international swaps between Member States. However, some POs operate a pool type arrangement allowing all members equal access to quota through the use of maximum catch rates.
The 'non-sector' and 'under 10s' operate under a pool of FQAs which are managed directly by UK authorities. Catch limits limit the catches of vessels operating at the upper ends of fishing activity, with the majority of vessels involved in each fishery not being impacted by the limits. More information can be obtained from: http://www.marinemanagement.org.uk/fisheries/management/quotas.htm.

France
The French State administration has the responsibility to allocate the quota and to ensure quota limits are not exceeded. The French fishing fleet is divided between:
- the vessels that are members of a PO
- the vessels that are not members of a PO

The French quota management system works by reference to Fixed Quota Allocations (FQA) units. FQA units represent a share of quota allocated to vessels, based on a track record of fishing activity in a historic period. These shares do not reflect a fixed permanent entitlement to quota (such as with an ITQ). Annual quota allocations between the PO and the vessels not on membership of the PO are based on the FQA. It is then to each PO to decide how best to allocate quota to its members. Swaps are facilitated between POs in addition to international swaps between Member States.

Germany
In Germany, fishing concessions are allocated individually to vessels of fishermen or producer organisations for main stocks: Area 4: COD, POK, PLE, ANF, pelagic stocks (mainly high-seas fleet), NEP for directed fishery (partly). Area 3A: COD, HAD, PLE, SOL, NEP for directed fisheries. Catches/by-catches of other stocks are deducted from national quotas/reserves. Allocation of fishing concessions follows an 'internal relative stability'. Quota entitlements are transferable, but a permanent transfer is only possible in connection with the respective vessels.

Belgium
Belgium knows a collective quota allocation system. The regional authorities describe with a ministerial decree the quota allocations. The Quota Commission (from the PO) gives advice to the authorities in this respect. For the most important stocks (i.e. sole and plaice) an allocation is made for the great fleet segment GFS (engine power above 221 Kw) and for the small fleet segment SFS (engine power under 221 Kw) in function of the engine power of the vessel, as X kg per Kw installed engine power. The allocation is done for a certain period of time (6 months, 4 months, 2 months for the GFS, and 10 months, 2 months for the SFS). After each period the quota left are redistributed. For the species in bycatch, day limits are defined as X kg per equivalent day presence in an area. Again the allocation is different for GFS and SFS. For the smaller vessels part of the coastal fleet segment, another quota allocation scheme is in force. With the exception of the species under management or recovery plan, they do not have quota limitations to respect. For the species under management plans the day limits in force for the SFS, are doubled.

Netherlands
In the Netherlands in general two systems are in place. First is the individual transferable quota for 8 species: cod, whiting, plaice, sole, mackerel, horse mackerel, herring and greater silver smelt, in western waters and North Sea (ITQ for mackerel and silver smelt stock outside North Sea). It is not possible for a vessel to have only an ITQ for plaice without sole. The same applies to the ITQ's for cod and whiting (unavoidable by-catches). The sale of ITQ's can only take place with the approval of the ministry. Not all of the entire quotas are converted into ITQ's. From each quota's so-called 'national reserve' is held back as a buffer for possible small quota overruns and for swaps to compensate the overruns. In addition to the ITQ system there are two kinds of by-catch regulations in place for vessels without ITQ's for certain species. Members of a Producer Organisation (PO) are obliged to transfer their ITQ's and their monthly by-catch quantities to the PO and to commit themselves to the joint fishing plan and other rules. In principle the members maintain the right to use their own ITQ's and by-catch quantities, but are also allowed to lease quota to or from other members. The lease of ITQ's (whole of partial) between the members of the same PO is only recorded by the PO and not by the ministry. This is in contrast to the exchange of quantities between the PO's. A PO can only transfer an amount of fish of a particular species to another PO, if the quota of the receiving PO of that species has not been exceeded. When the quota of a PO of particular species is fully fished, fishing for that species is prohibited for the members of that PO. The second system is for non-ITQ stocks. In principle these quota are available for every vessel with a fishing licence, but there are special rules for hake and haddock.

Sweden
In Sweden an ITQ-system is in place for the main pelagic species: herring, sprat, mackerel, blue whiting and sandeel. National authority (SwAM) handles allocation and transfers. Catches of other stocks are deducted from national quota. Weekly rations for Norway lobster, cod, haddock, saithe, plaice and mackerel, and monthly rations for *Pandalus*. Levels of rations depend on area and gear category. Move-on provision if overshoot of weekly/monthly quantity. Overshoots should be landed (in order not to contradict the high-grading ban), however a fee corresponding to 80% of landed value may be administered.

Annex 2 Differences between ICES and STECF discard raising for the North Sea

The ICES WGNSSK/MIXFISH data call approach (which is about to be extended to other ICES areas and working groups) was initiated after that the MIXFISH group unsuccessfully tried to use the STECF data for their own purposes back in 2008-2009. The sum of catch and age distribution in the STECF data did not match sufficiently well the ICES stock level estimates, which prevented relevant analyses of partial F to be performed.

In 2013, ICES WGMIXFISH started a more precise comparison of the metrics coming from STECF and from ICES WGNSSK/WGMIXFISH for the North Sea stocks (ICES 2013b). The totals landed and effort employed by directly comparable categories should be the same between datasets, and indeed WGMIXFISH concluded that the issues were not important, although they might still occur due to differences in segmentation. But as expected, the largest differences between the data sets were found in the discard estimates (after raising).

Discard data is only sampled for a fraction of national fleets. The way the discard data is raised within a nation can be affected by the grouping of vessels implied by a fleet specific data call. Additionally, once the 'raw' data is supplied a working group has choices whether to assign (raise) a discard ratio (and associated discards) to unsampled fleets and if so how. Assignment process for WGMIXFISH and STECF is different, as described below.

Differences could then result from different rules for assigning discards to metiers where discard data is missing in the working groups but it could also be an effect of countries submitting different discard estimates to various working groups.

Differences in the data call
STECF effort data call request data at a scale with is lower than what is usually sampled by national institutes. The information is requested at a finer breakdown of mesh size, vessel length, specific condition than the DCF métiers.

On this consideration, the WGNSSK/MIXFISH data call proceeded from a bottom-up ad-hoc approach where the individual institutes indicated their actual sampling strata, which often spawn over several closely related DCF level 6 metiers (e.g. OTB_DEF_70-99_0_0 and OTB_CRU_70-99_0_0, or OTB_DEF_100-119_0_0 and OTB_DEF_>=120_0_0). These actual strata ('supra métiers') have formed the basis of the data call, allowing for both metiers which area largely common to all countries, and also to country-specific strata (for ex OTB_CRU_70-99_2_35).

For the North Sea (area 4), there is comparatively 3 to 5 times more strata for a country to fill in the STECF data call than in the ICES WGNSSK/WGMIXFISH data call.

Raising procedures
The principles for raising information (both discards ratio and age distribution) from sampled to unsampled strata differ between the two procedures.

In the STECF database, the raising is entirely automatic, applying fixed procedures that have been unchanged for many years now. The raising is done at the lowest stratum level, i.e. area*quarter*gear*mesh size, where a country's landings without discards (and/or age information) is raised by available discards ratio from other countries within the same stratum. If there are no sampled strata available, then no raising is performed. This method is therefore fully objective and quick, but bears some risk for artefact raising, where irrelevant or inconsistent discards ratio are used

equally (for example if a country has closed a fishery in 4th quarter by quota exhaustion, higher discards ratio may apply to other countries which haven't been in the same situation).
In the ICES InterCatch database as used by the WGNSSK/WGMIXFISH for the North Sea, the raising is entirely manual and requires expert judgement. In 2013, a number of tools have been developed and applied to the 2012 data in order to screen and visualize the data available and help taking informed decision. Discards ratio by metier and country are plotted. The ICES WGs applies consensus guidelines, with the basic principle that no unsampled metier should be left without a discards estimate. This implies that if there are no sampled strata directly related to raise from, then a decision can be made to choose any other strata, or the average across all strata. and procedures have been developed in InterCatch in order to group sampled and unsampled strata respectively, allowing quicker and more efficient data work This procedure avoids pitfalls of using irrelevant strata for raising métiers, and can better involve expert knowledge; but compared to STECF, this procedure is more demanding in time and expertise, is more subjective and more likely to evolve from year together with increased knowledge of the stock coordinator.
As both procedures bears advantages and disadvantages as explained above it cannot be said that one method can be considered more or less appropriate than the other.

Discards information by fleet for the main North Sea demersal stocks
The overall consistency at the stock level as shown in the analyses above can nevertheless hide major disparities when breaking down at the fleet-country level. A brief illustration of this is given below with the example of the 2012 whiting catch data in area 4:

ICES INTERCATCH			
Gear	**2012 Landings**	**2012 Discards**	**2012 Discard Ratio**
BEAM	6	29	0.83
BT1	1	0	0.33
BT2	33	1372	0.98
GN1	7	7	0.49
GT1	3	2	0.40
LL1	2	1	0.33
other	279	140	0.33
OTTER	294	146	0.33
TR1	7925	837	0.10
TR2	3815	3223	0.46
Total	**12365**	**5757**	**0.32**

STECF			
Gear	**2012 Landings**	**2012Discards**	**2012Discard Ratio**
BEAM	8	20	0.71
BT1	1		0.00
BT2	280	1657	0.86
DEM_SEINE	39		0.00
DREDGE	0		0.00
GN1	2	207	0.99
GT1	1	9	0.86
LL1	0		0.00
none	0		0.00
OTTER	58	1425	0.96
PEL_SEINE	1	0	0.07
PEL_TRAWL	339		0.00
POTS	0		0.00
TR1	7805	713	0.08
TR2	3474	4448	0.56
TR3	74		0.00
Total	**12083**	**8477**	**0.41**

The total landings for the entire area is consistent, and the absolute difference in the estimated overall discards rate lies within 10%. Yet, the breakdown between gears differ, both with regards to landings and to discards (nb:in this example the InterCatch DCF métiers have been allocated to the equivalent STECF categories in the best way for comparison purpose). But ultimately, the overall picture is globally coherent in terms of the scale of discards ratio for the main gears (TR1-TR2, which are likely to be sampled, while discards and discards rate estimates are obviously more uncertain for the less important (and thus less sampled) gears for this stock

The best way to reduce uncertainty linked to the raising method is to reduce the amount of landings that are not sampled for discards information.

The ICES WGNSSK 2013 (ICES 2013c) has produced a range of plots illustrating the importance of sampled vs. unsampled strata:

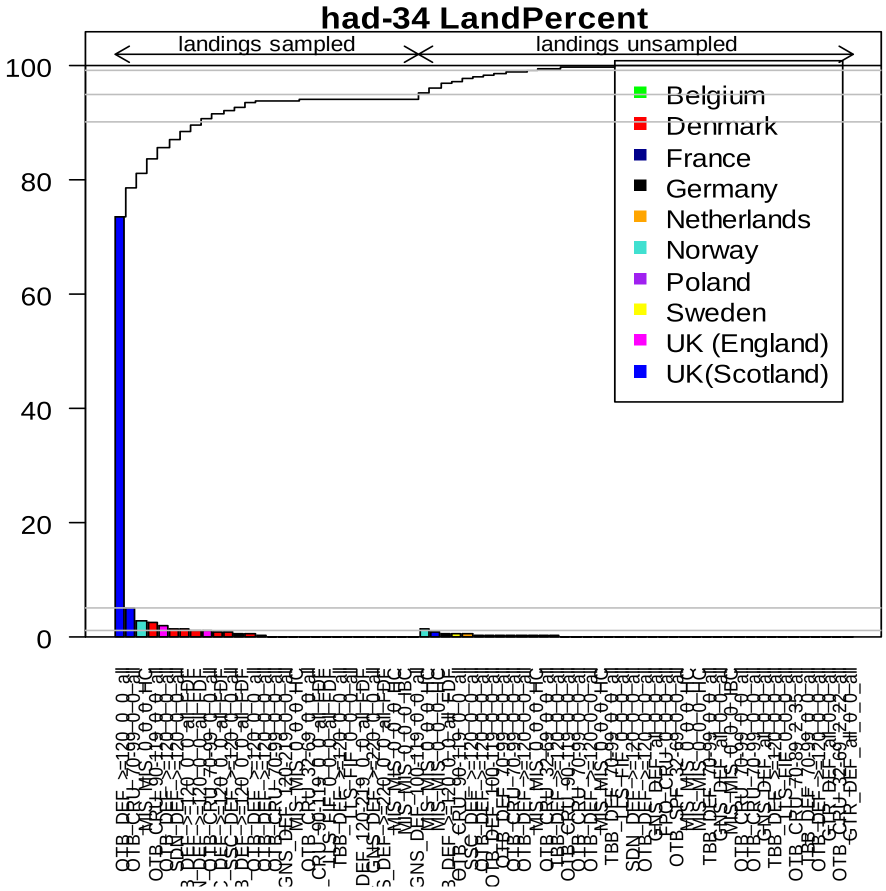

Figure 1 *Sampled vs. unsampled landings strata for 2012 haddock in North Sea and Skagerrak (source: ICES WGNSSK 2013). The first group of bars shows landings (in % of total landings) for strata by metier (legend) and country (colour) that have some discards information attached. The second group of bars illustrates the unsampled strata. The black line is the cumulative proportion, with grey lines showing the 90, 95 and 100% of total landings. For this stock, almost 95% of landings have discard information attached.*

The analysis as above has shown that for most of the main assessed stocks in the North Sea, landings are well covered by discards samplings, with fairly high landings proportions : above 80% for cod and whiting, and up to 95% for saithe, haddock or plaice in Skagerrak, but 70% for plaice in the English Channel.

Similarly, the STECF database now includes a quality control code (A, B or C) indicating the % of landings covered with discards information.

Such diagnostics are considered a very useful summary of the information available, and should hopefully be expanded to other stocks from other areas and ICES working groups and the use of InterCatch generalized (or replaced by the regional Data Bases when these get fully operational).
A high % coverage involving the DCF métiers gives confidence that discrepancies between ICES and STECF discards estimates may not be large, as only marginal strata will have to be raised by one or another method. They also provide information to Member states wanting to develop discards atlas on which information is directly reliable as coming from the Member states own discards sampling program. The remaining part of métiers and fisheries not nationally covered cannot be expected to have a fully reliable and robust discards estimate, which ever source is used.

Annex 3 Detailed landing and discard tables by species, country and gear

The main part of the information on landings and discards is presented in section 3 of the report. In that section, the requirement was that the data-tables would fit on one page. That meant that combinations of factors could not be shown. In this annex, the requirement to data-tables on one page is left. This makes it possible to show the combination of area, species, country and gear. The information is derived from the same data source as section 3 and also has the same caveats with regards to quality and coverage. Note that the information is only presented for those combinations where the estimated average catch 2010-2012 is larger than 50 tonnes.

Table A.3.1

North Sea || demersal fisheries: landings and discards per species and year and area (tonnes). Table sorted in descending order on average catch 2010-2012.

Only country and gear combination where average 2010-2012 catch larger than 50 t.

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Plaice	PLE	NLD	BT2	23104	21007	48%	24174	19235	44%	23398	28421	55%	23559	22888	46446	49%
Plaice	PLE	NLD	TR2	1556	333	18%	1520	22789	94%	1449	999	41%	1508	8040	9549	84%
Plaice	PLE	NLD	TR1	1672	2	0%	2361	36	2%	3523	2283	39%	2519	774	3292	23%
Plaice	PLE	NLD	BT1	580		0%	627		0%	3118		0%	1442	0	1442	0%
Plaice	PLE	NLD	BEAM	71	0	0%	35	0	0%	28	999	97%	45	333	378	88%
Plaice	PLE	NLD	OTTER	213		0%	6	0	0%	90	0	0%	103	0	103	0%
Plaice	PLE	ENG	BT2	7352	1943	21%	7493	95	1%	7565	124	2%	7470	721	8191	9%
Plaice	PLE	ENG	TR1	2376	211	8%	2924	296	9%	4042	765	16%	3114	424	3538	12%
Plaice	PLE	ENG	TR2	1097	318	22%	1234	1044	46%	1105	533	33%	1145	631	1777	36%
Plaice	PLE	ENG	BT1	539		0%	561		0%	1321		0%	807	0	807	0%
Plaice	PLE	DNK	TR1	6051	8	0%	7949	73	1%	8340	294	3%	7446	125	7571	2%
Plaice	PLE	DNK	GT1	618	1495	71%	1008	2	0%	1883	7	0%	1170	501	1671	30%
Plaice	PLE	DNK	GN1	1564	0	0%	1419	2	0%	905	3	0%	1296	2	1298	0%
Plaice	PLE	DNK	BT1	922		0%	1122		0%	944		0%	996	0	996	0%
Plaice	PLE	DNK	TR2	356	62	15%	311	426	58%	218	114	34%	295	200	496	40%
Plaice	PLE	DNK	BEAM	0	22	100%	0	135	100%	0	171	100%	0	109	109	100%
Plaice	PLE	DEU	TR2	1394	297	18%	1529	18005	92%	1368	684	33%	1430	6328	7759	82%
Plaice	PLE	DEU	BT2	1507	2139	59%	1479	853	37%	1450	1209	45%	1479	1400	2879	49%
Plaice	PLE	DEU	TR1	789	2	0%	784	74	9%	1003	158	14%	859	78	937	8%
Plaice	PLE	BEL	BT2	2215	1025	32%	2267	931	29%	1601	1184	43%	2028	1047	3074	34%
Plaice	PLE	BEL	BEAM	9	0	0%	15	0	0%	19	8118	100%	14	2706	2720	99%
Plaice	PLE	BEL	BT1	948		0%	1635		0%	2492		0%	1691	0	1691	0%
Plaice	PLE	BEL	TR2	216	43	16%	321	2874	90%	584	306	34%	373	1074	1448	74%
Plaice	PLE	BEL	TR1	172	0	0%	259	4	2%	322	62	16%	251	22	273	8%
Plaice	PLE	SCO	TR1	2690	269	9%	2967	260	8%	2563	520	17%	2740	350	3089	11%
Plaice	PLE	SCO	BT2	429	520	55%			0%	80	78	49%	170	199	369	54%
Plaice	PLE	SCO	TR2	218	52	19%	255	131	34%	188	85	31%	221	89	310	29%
Plaice	PLE	FRA	TR2	105	26	20%	108	666	86%	46	27	37%	87	240	326	73%
Plaice	PLE	FRA	GT1	58	314	84%	144	3	2%	106	1	1%	103	106	209	51%
Plaice	PLE	FRA	BT2	20	25	55%	55	35	39%	43	54	56%	39	38	78	49%
Plaice Total				58840	30110	34%	64564	67968	51%	69796	47198	40%	64400	48425	112825	43%
Dab	DAB	NLD	BT2	3461	30071	90%	3456	46142	93%	2664	17987	87%	3194	31400	34594	91%
Dab	DAB	NLD	TR2	568	8857	94%	436	34141	99%	430	5511	93%	478	16170	16648	97%
Dab	DAB	NLD	TR1	717	463	39%	605	253	30%	632	4229	87%	651	1649	2300	72%
Dab	DAB	NLD	BEAM	155	0	0%	78	0	0%	89	1084	92%	107	361	469	77%
Dab	DAB	NLD	GT1	10	199	95%	5	4	47%	20	9	32%	12	71	83	86%

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Dab	DAB	NLD	BT1	32		0%	25	54	68%	111		0%	56	18	74	24%
Dab	DAB	DEU	BT2	126	4858	97%	98	2231	96%	113	5291	98%	112	4127	4239	97%
Dab	DAB	DEU	TR2	108	1225	92%	121	7956	99%	66	1163	95%	98	3448	3546	97%
Dab	DAB	DEU	TR1	110	91	45%	82	78	49%	53	88	63%	82	86	167	51%
Dab	DAB	FRA	TR2	106	1598	94%	138	10488	99%	49	1055	96%	98	4380	4478	98%
Dab	DAB	FRA	GT1	13	645	98%	35	17	32%	36	10	22%	28	224	252	89%
Dab	DAB	BEL	TR2	37	577	94%	36	2891	99%	75	2038	96%	49	1835	1885	97%
Dab	DAB	BEL	BEAM	67	0	0%	26	0	0%	88	1201	93%	60	400	460	87%
Dab	DAB	BEL	BT2	160	229	59%	92	158	63%	75	242	76%	109	210	319	66%
Dab	DAB	BEL	TR1	20	13	39%	32	18	36%	131	646	83%	61	226	287	79%
Dab	DAB	BEL	BT1	33		0%	48	105	68%	80		0%	54	35	89	40%
Dab	DAB	DNK	GT1	22	1951	99%	32	5	13%	64	13	16%	39	656	696	94%
Dab	DAB	DNK	TR1	365	234	39%	476	162	25%	258	246	49%	367	214	581	37%
Dab	DAB	DNK	TR2	19	243	93%	8	610	99%	4	688	99%	11	513	524	98%
Dab	DAB	DNK	BEAM	0	85	100%	0	228	100%	0	114	100%	0	143	143	100%
Dab	DAB	DNK	GN1	97		0%	74	18	20%	53	15	22%	75	11	86	13%
Dab	DAB	ENG	TR1	76	22	22%	135	232	63%	161	924	85%	124	393	517	76%
Dab	DAB	ENG	BT2	357	178	33%	272	11	4%	313	31	9%	314	73	387	19%
Dab	DAB	ENG	TR2	56	179	76%	66	185	74%	32	56	63%	51	140	191	73%
Dab	DAB	SCO	TR1	177	35	16%	144	193	57%	114	1204	91%	145	477	622	77%
Dab	DAB	SCO	BT2	25	189	88%			0%	1	21	94%	9	70	79	89%
Dab Total				6919	51943	88%	6521	106179	94%	5712	43867	88%	6384	67330	73714	91%
Saithe	POK	DEU	TR1	11070	399	3%	9323	298	3%	7858	3	0%	9417	233	9650	2%
Saithe	POK	SCO	TR1	7635	1366	15%	6312	1736	22%	5307	4088	44%	6418	2397	8815	27%
Saithe	POK	SCO	TR2	201	106	35%	217	815	79%	141	33	19%	186	318	504	63%
Saithe	POK	FRA	TR1	5344	4	0%	7736	5	0%	12442	0	0%	8507	3	8510	0%
Saithe	POK	DNK	TR1	4785	34	1%	5130	3	0%	4192	54	1%	4703	30	4733	1%
Saithe	POK	ENG	TR1	4096	239	6%	3735	488	12%	2250	1344	37%	3360	690	4050	17%
Saithe	POK	SWE	TR1	794	3	0%	780	1	0%	868	10	1%	814	5	819	1%
Saithe Total				33925	2150	6%	33233	3345	9%	33057	5532	14%	33405	3676	37081	10%
Haddock	HAD	SCO	TR1	20256	3345	14%	19181	3414	15%	23611	1210	5%	21016	2656	23672	11%
Haddock	HAD	SCO	TR2	2335	4841	67%	1876	4678	71%	1665	1981	54%	1959	3833	5792	66%
Haddock	HAD	SCO	OTTER	14		0%	39		0%	129	34	21%	61	11	72	16%
Haddock	HAD	ENG	TR1	1541	128	8%	1481	216	13%	1096	18	2%	1373	121	1494	8%
Haddock	HAD	ENG	TR2	211	35	14%	218	221	50%	228	20	8%	219	92	311	30%
Haddock	HAD	DNK	TR1	660	87	12%	667	70	9%	988	221	18%	772	126	898	14%
Haddock	HAD	FRA	TR2	132	2	2%	1538	3	0%	64	7	10%	578	4	582	1%
Haddock	HAD	FRA	TR1	72	0	0%	54	19	26%	120	0	0%	82	6	88	7%
Haddock	HAD	DEU	TR1	646	34	5%	565	139	20%	488	53	10%	566	75	641	12%
Haddock	HAD	NIR	TR1	385	57	13%	328	83	20%	307	3	1%	340	48	388	12%
Haddock	HAD	NIR	TR2	91	135	60%	59	139	70%	32	1	4%	61	92	152	60%

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Haddock	HAD	NLD	TR1	36	3	8%	64	5	7%	173	34	17%	91	14	105	13%
Haddock	HAD	SWE	TR1	74	6	8%	106	17	14%	81	15	16%	87	13	100	13%
Haddock Total				26454	8674	25%	26177	9001	26%	28982	3598	11%	27204	7091	34296	21%
Cod	COD	SCO	TR1	11114	2952	21%	9855	1338	12%	10234	2216	18%	10401	2169	12570	17%
Cod	COD	SCO	TR2	418	979	70%	237	912	79%	174	996	85%	276	962	1239	78%
Cod	COD	DNK	TR1	3478	333	9%	3110	82	3%	3379	304	8%	3322	240	3562	7%
Cod	COD	DNK	GN1	1931	10	0%	1705	98	5%	1381	51	4%	1672	53	1725	3%
Cod	COD	DNK	GT1	101	0	0%	68	7	9%	123	6	5%	97	4	102	4%
Cod	COD	DNK	LL1	124		0%	57	0	1%	0	0	3%	60	0	61	0%
Cod	COD	DEU	TR1	2357	146	6%	1871	156	8%	1925	123	6%	2051	142	2192	6%
Cod	COD	DEU	GN1	341	2	1%	257	9	3%	145	6	4%	248	6	253	2%
Cod	COD	DEU	TR2	93	40	30%	51	42	45%	39	8	17%	61	30	90	33%
Cod	COD	DEU	BT2	78	10	11%	35	2	5%	27	10	28%	47	7	54	14%
Cod	COD	NLD	BT2	1371	183	12%	1041	86	8%	813	118	13%	1075	129	1204	11%
Cod	COD	NLD	TR1	807	79	9%	622	21	3%	813	62	7%	747	54	801	7%
Cod	COD	NLD	TR2	198	52	21%	174	91	34%	138	46	25%	170	63	233	27%
Cod	COD	ENG	TR1	1360	56	4%	1299	61	5%	874	12	1%	1178	43	1221	4%
Cod	COD	ENG	GN1	255	2	1%	204	4	2%	207	1	0%	222	2	224	1%
Cod	COD	ENG	TR2	149	57	28%	110	159	59%	97	39	29%	118	85	204	42%
Cod	COD	ENG	BT2	80	3	3%	50	0	0%	35	1	2%	55	1	56	2%
Cod	COD	BEL	BT1	236		0%	356		0%	621		0%	405	0	405	0%
Cod	COD	BEL	BT2	251	69	21%	178	10	5%	136	9	6%	188	29	218	13%
Cod	COD	BEL	TR2	57	15	21%	63	40	38%	54	8	12%	58	21	79	26%
Cod	COD	FRA	TR2	287	84	23%	422	178	30%	124	18	13%	278	93	371	25%
Cod	COD	FRA	TR1	30	1	4%	128	15	11%	89	0	0%	82	5	88	6%
Cod	COD	FRA	GT1	42	0	0%	49	5	9%	59	4	6%	50	3	53	5%
Cod	COD	SWE	TR1	225	17	7%	211	7	3%	309	23	7%	248	16	264	6%
Cod	COD	SWE	LL1	125		0%	93	1	1%	137	0	0%	119	0	119	0%
Cod Total				25510	5089	17%	22244	3323	13%	21932	4061	16%	23229	4158	27386	15%
Whiting	WHG	SCO	TR1	5266	2323	31%	5875	831	12%	7225	543	7%	6122	1232	7354	17%
Whiting	WHG	SCO	TR2	1251	2742	69%	1621	2723	63%	1401	1353	49%	1424	2273	3697	61%
Whiting	WHG	FRA	TR2	2195	3158	59%	9223	5482	37%	1475	2460	63%	4298	3700	7998	46%
Whiting	WHG	NLD	BT2	297	2442	89%	336	668	67%	248	1463	86%	294	1524	1818	84%
Whiting	WHG	NLD	TR2	191	342	64%	124	107	46%	142	305	68%	152	251	404	62%
Whiting	WHG	NLD	TR1	72	113	61%	57	15	21%	56	53	49%	62	60	122	49%
Whiting	WHG	NLD	GN1			0%	1	0	0%	1	199	100%	1	66	67	99%
Whiting	WHG	ENG	TR2	419	239	36%	322	290	47%	387	283	42%	376	271	646	42%
Whiting	WHG	ENG	TR1	426	180	30%	620	121	16%	370	85	19%	472	128	601	21%
Whiting	WHG	DNK	OTTER	0		0%	0	0	7%	19	1424	99%	6	475	481	99%
Whiting	WHG	DNK	TR1	120	130	52%	107	2	2%	94	23	20%	107	52	159	33%
Whiting	WHG	DNK	PEL_TRAWL	33		0%	19		0%	311		0%	121	0	121	0%

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Whiting	WHG	DNK	BEAM	0	57	100%	0	100	100%	0	20	100%	0	59	59	100%
Whiting	WHG	DEU	TR2	97	198	67%	46	13	23%	6	6	50%	50	73	122	59%
Whiting	WHG	DEU	BT2	15	158	91%	20	132	87%	2	17	92%	13	102	115	89%
Whiting	WHG	DEU	TR1	35	48	58%	41	40	49%	17	7	29%	31	32	62	50%
Whiting	WHG	BEL	BT2	83	77	48%	46	114	71%	23	166	88%	51	119	170	70%
Whiting	WHG	NIR	TR2	46	53	53%	62	97	61%	43	26	38%	50	59	109	54%
Whiting Total				10546	12258	54%	18519	10735	37%	11819	8433	42%	13628	10475	24104	43%
Norway lobster	NEP	SCO	TR2	15230	0	0%	10764		0%	7741		0%	11245	0	11245	0%
Norway lobster	NEP	SCO	TR1	482	18	4%	587	0	0%	668		0%	579	6	585	1%
Norway lobster	NEP	NLD	TR2	612	74	11%	939	367	28%	968	800	45%	840	414	1253	33%
Norway lobster	NEP	NLD	BT2	58		0%	64		0%	29	80	73%	50	27	77	35%
Norway lobster	NEP	ENG	TR2	1369	0	0%	1125		0%	1112		0%	1202	0	1202	0%
Norway lobster	NEP	ENG	TR1	108	3	3%	128	0	0%	27		0%	88	1	89	1%
Norway lobster	NEP	DNK	TR2	290	37	11%	487	181	27%	470	328	41%	415	182	597	30%
Norway lobster	NEP	DNK	TR1	307	96	24%	337	1	0%	249	79	24%	298	59	356	16%
Norway lobster	NEP	DEU	TR2	367	41	10%	535	200	27%	370	282	43%	424	174	599	29%
Norway lobster	NEP	NIR	TR2	645	0	0%	388		0%	302		0%	445	0	445	0%
Norway lobster	NEP	BEL	TR2	102	12	11%	275	108	28%	352	299	46%	243	140	383	37%
Norway lobster Total				19569	280	1%	15630	858	5%	12287	1867	13%	15829	1002	16831	6%
Sole	SOL	NLD	BT2	8919	1308	13%	7767	997	11%	8560	1783	17%	8415	1362	9778	14%
Sole	SOL	NLD	GN1	165		0%	153	0	0%	220	0	0%	179	0	179	0%
Sole	SOL	NLD	BEAM	15	0	0%	9	0	0%	13	294	96%	12	98	110	89%
Sole	SOL	BEL	BT2	1074	126	11%	731	191	21%	501	101	17%	769	140	908	15%
Sole	SOL	BEL	TR2	118	0	0%	88	0	0%	55	13	19%	87	4	91	5%
Sole	SOL	BEL	BEAM	7	0	0%	5	0	0%	7	171	96%	6	57	63	90%
Sole	SOL	ENG	BT2	561	15	3%	353	5	1%	262	3	1%	392	7	400	2%
Sole	SOL	ENG	TR2	47	1	3%	65	1	1%	43	1	2%	52	1	53	2%
Sole	SOL	DEU	BT2	349	25	7%	177	28	14%	259	19	7%	262	24	286	9%
Sole	SOL	DEU	GN1	151		0%	126	0	0%	160	0	0%	146	0	146	0%
Sole	SOL	FRA	GT1	223	8	4%	440	0	0%	509	3	1%	391	4	395	1%
Sole	SOL	DNK	GN1	366		0%	307	0	0%	382	0	0%	352	0	352	0%
Sole Total				11996	1484	11%	10222	1221	11%	10971	2389	18%	11063	1698	12761	13%
Hake	HKE	SCO	TR1	1728	593	26%	2155	75	3%	2652	2138	45%	2178	935	3113	30%
Hake	HKE	SCO	LL1	1131		0%	727	0	0%	427	0	0%	762	0	762	0%
Hake	HKE	SCO	TR2	82	1	1%	70	0	0%	31	58	65%	61	20	81	25%
Hake	HKE	DNK	TR1	1419	533	27%	1387	468	25%	1637	260	14%	1481	420	1901	22%
Hake	HKE	DNK	GN1	406		0%	378	0	0%	423	0	0%	403	0	403	0%
Hake	HKE	DEU	TR1	255	43	14%	273	1553	85%	370	42	10%	299	546	845	65%
Hake	HKE	FRA	TR1	237	7	3%	390	45	10%	470	3	1%	366	18	384	5%
Hake	HKE	FRA	LL1	93		0%	40	0	0%	73	0	0%	68	0	68	0%
Hake	HKE	ENG	TR1	121	30	20%	156	5	3%	124	143	54%	134	59	193	31%

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Hake	HKE	SWE	TR1	26	9	25%	49	64	57%	30	5	14%	35	26	61	42%
Hake Total				5498	1215	18%	5625	2210	28%	6236	2648	30%	5786	2024	7811	26%
Anglerfish	ANF	SCO	TR1	3878		0%	4143		0%	3044		0%	3688	0	3688	0%
Anglerfish	ANF	SCO	GN1	846		0%	1078	0	0%	1080	0	0%	1001	0	1001	0%
Anglerfish	ANF	SCO	TR2	1139		0%	862		0%	572		0%	858	0	858	0%
Anglerfish	ANF	DNK	TR1	1309	6	0%	1144	1	0%	1201	9	1%	1218	5	1223	0%
Anglerfish	ANF	DNK	GN1	39		0%	90	0	0%	84	0	0%	71	0	71	0%
Anglerfish	ANF	ENG	GN1	249		0%	246	0	0%	190	0	0%	229	0	229	0%
Anglerfish	ANF	ENG	TR1	133		0%	140		0%	70		0%	114	0	114	0%
Anglerfish	ANF	ENG	TR2	57		0%	60		0%	37		0%	51	0	51	0%
Anglerfish	ANF	DEU	GN1	207		0%	105	0	0%	260	0	0%	191	0	191	0%
Anglerfish	ANF	BEL	BT1	68		0%	85	0	0%	117		0%	90	0	90	0%
Anglerfish Total				7924	6	0%	7954	1	0%	6654	9	0%	7511	5	7516	0%
Ling	LIN	SCO	TR1	1643	3455	68%	1792	158	8%	1780	114	6%	1739	1242	2981	42%
Ling	LIN	SCO	LL1	124		0%	91	0	0%	88	0	0%	101	0	101	0%
Ling	LIN	SCO	TR2	114	1	1%	73		0%	48	0	0%	78	1	79	1%
Ling	LIN	SCO	GN1	49	1	2%	54	0	0%	64	1	1%	56	1	56	1%
Ling	LIN	DNK	TR1	436	0	0%	547	3	1%	424	0	0%	469	1	470	0%
Ling	LIN	ENG	TR1	113	397	78%	118	6	5%	79	8	9%	103	137	240	57%
Ling	LIN	DEU	TR1	44	15	25%	66	126	66%	62	2	3%	58	48	105	45%
Ling	LIN	FRA	TR1	49	0	0%	87	1	1%	107	0	0%	81	1	81	1%
Ling Total				2572	3869	60%	2828	294	9%	2653	125	5%	2684	1429	4113	35%
Lemon sole	LEM	NLD	BT2	165	213	56%	315	270	46%	295	938	76%	258	474	732	65%
Lemon sole	LEM	NLD	TR1	98	3	3%	247	8	3%	204	78	28%	183	30	213	14%
Lemon sole	LEM	NLD	TR2	37	4	10%	31	47	60%	28	11	27%	32	21	53	39%
Lemon sole	LEM	DNK	TR1	740	27	4%	916	22	2%	934	7	1%	864	19	882	2%
Lemon sole	LEM	SCO	TR1	343	6	2%	407	21	5%	379	37	9%	376	21	398	5%
Lemon sole	LEM	SCO	TR2	206	34	14%	240	26	10%	158	54	26%	201	38	239	16%
Lemon sole	LEM	ENG	TR1	133	2	2%	200	8	4%	204	21	9%	179	10	190	6%
Lemon sole	LEM	ENG	BT2	107	6	5%	129	1	0%	103	1	1%	113	2	115	2%
Lemon sole	LEM	ENG	TR2	75	13	15%	104	14	12%	91	28	24%	90	18	108	17%
Lemon sole	LEM	BEL	BT1	187		0%	260	10	4%	317		0%	255	3	258	1%
Lemon sole	LEM	BEL	BT2	92	38	29%	103	41	28%	69	101	59%	88	60	148	40%
Lemon sole	LEM	DEU	BT2	4	124	97%	9	70	89%	8	18	70%	7	71	77	91%
Lemon sole	LEM	DEU	TR1	59	2	4%	47	59	56%	35	5	12%	47	22	69	32%
Lemon sole Total				2248	473	17%	3006	596	17%	2824	1297	31%	2693	789	3481	23%
Turbot	TUR	NLD	BT2	1038	2	0%	1335	48	3%	1462	101	6%	1278	50	1329	4%
Turbot	TUR	NLD	TR2	67	0	0%	82	0	0%	98	0	0%	82	0	82	0%
Turbot	TUR	NLD	TR1	41	0	0%	51	0	0%	77	0	0%	56	0	56	0%
Turbot	TUR	DNK	GN1	240	0	0%	299	3	1%	236	10	4%	259	4	263	2%
Turbot	TUR	DNK	TR1	167	0	0%	177	1	0%	165	0	0%	170	0	170	0%

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Turbot	TUR	ENG	BT2	180	0	0%	155	0	0%	136	0	0%	157	0	157	0%
Turbot	TUR	ENG	TR1	49	0	0%	60	0	0%	65	0	0%	58	0	58	0%
Turbot	TUR	DEU	BT2	92	0	0%	62	2	3%	81	1	1%	78	1	79	2%
Turbot	TUR	DEU	TR2	71	0	0%	65	0	0%	71	0	0%	69	0	69	0%
Turbot	TUR	BEL	BT2	76	0	0%	69	3	3%	51	4	7%	65	2	68	3%
Turbot	TUR	SCO	TR1	68	0	0%	76	0	0%	58	0	0%	67	0	67	0%
Turbot Total				2089	3	0%	2430	57	2%	2500	116	4%	2340	59	2398	2%
Megrims	LEZ	SCO	TR1	1335		0%	1309		0%	1333		0%	1325	0	1325	0%
Megrims Total				1335		0%	1309		0%	1333		0%	1325	0	1325	0%
Pollack	POL	SCO	TR1	343	1	0%	310	0	0%	385		0%	346	0	346	0%
Pollack	POL	DEU	TR1	118	292	71%	58	0	0%	85	1	1%	87	98	184	53%
Pollack	POL	ENG	TR1	178	0	0%	166	0	0%	38	0	0%	127	0	127	0%
Pollack	POL	FRA	TR1	37	248	87%	2	0	0%	2		0%	14	83	96	86%
Pollack	POL	DNK	TR1	92	0	0%	64	0	0%	90	1	2%	82	0	82	1%
Pollack Total				769	541	41%	600	1	0%	599	3	0%	656	181	837	22%
Northern prawn	PRA	DNK	OTTER	110		0%	258		0%	163	1	1%	177	0	178	0%
Northern prawn	PRA	SWE	OTTER	141		0%	143		0%	123	1	1%	136	0	136	0%
Northern prawn Total				251		0%	402		0%	286	2	1%	313	1	314	0%
Greenland halibut	GHL	FRA	TR1	95	0	0%	54	0	1%	57		0%	69	0	69	0%
Greenland halibut	GHL	SCO	TR1	71		0%	47		0%	56		0%	58	0	58	0%
Greenland halibut Total				166	0	0%	102	0	0%	114		0%	127	0	127	0%
Brill	BLL	BEL	BT2	85	0	0%	68	5	6%	50	2	4%	68	2	70	3%
Brill Total				85	0	0%	68	5	6%	50	2	4%	68	2	70	3%
Tusk	USK	SCO	TR1	71		0%	73		0%	65		0%	70	0	70	0%
Tusk Total				71		0%	73		0%	65		0%	70	0	70	0%
Grand Total				**216766**	**118097**	**35%**	**221505**	**205792**	**48%**	**217870**	**121148**	**36%**	**218714**	**148346**	**367059**	**40%**

Table A.3.2

North Sea || industrial and pelagic fisheries: landings and discards per species and year and area (tonnes).

Table sorted in descending order on average catch 2010-2012. Only country and gear combination where average 2010-2012 catch larger than 50 t.

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Sandeel	SAN	DNK	OTTER	189882	0	0%	165330	0	0%	44427	0	0%	133213	0	133213	0%
Sandeel	SAN	DNK	PEL_TRAWL	15970		0%	19003		0%	3830		0%	12935	0	12935	0%
Sandeel	SAN	DNK	TR3	360		0%	146		0%	1546		0%	684	0	684	0%
Sandeel	SAN	DNK	none	44		0%	1518		0%	59		0%	541	0	541	0%
Sandeel	SAN	SWE	OTTER	32021	0	0%	32690	0	0%	5652	0	0%	23454	0	23454	0%
Sandeel	SAN	DEU	OTTER	9395	0	0%	8094	0	0%	1706	0	0%	6398	0	6398	0%
Sandeel	SAN	DEU	PEL_TRAWL	3380		0%	1695		0%			0%	1692	0	1692	0%
Sandeel	SAN	SCO	OTTER	3966	0	0%	6102	0	0%			0%	3356	0	3356	0%
Sandeel	SAN	LTU	OTTER	600	0	0%	2295	0	0%			0%	965	0	965	0%
Sandeel	SAN	NLD	PEL_TRAWL			0%			0%	312		0%	104	0	104	0%
Sandeel Total				255618	0	0%	236875	0	0%	57532	0	0%	183342	0	183342	0%
Herring	HER	DNK	PEL_TRAWL	24476		0%	29823		0%	79845	486	1%	44715	162	44877	0%
Herring	HER	DNK	OTTER	9595		0%	13954		0%	17849	98	1%	13800	33	13832	0%
Herring	HER	DNK	TR3			0%			0%	2020		0%	673	0	673	0%
Herring	HER	DNK	none			0%	1135		0%	759		0%	631	0	631	0%
Herring	HER	DNK	PEL_SEINE	816		0%	25		0%	985		0%	609	0	609	0%
Herring	HER	NLD	PEL_TRAWL	19047		0%	24629		0%	58439	383	1%	34038	128	34166	0%
Herring	HER	SCO	PEL_TRAWL	10862		0%	14752		0%	32692	120	0%	19436	40	19476	0%
Herring	HER	SCO	OTTER	297		0%	1275		0%	946	0	0%	839	0	839	0%
Herring	HER	ENG	PEL_TRAWL	8957		0%	9303		0%	16539	61	0%	11600	20	11620	0%
Herring	HER	SWE	PEL_SEINE	3405		0%	5611		0%	7340		0%	5452	0	5452	0%
Herring	HER	SWE	PEL_TRAWL	990		0%	2625		0%	6752	99	1%	3456	33	3489	1%
Herring	HER	DEU	PEL_TRAWL	1080		0%	4318		0%	17704	20	0%	7701	7	7707	0%
Herring	HER	DEU	OTTER	1420		0%			0%			0%	473	0	473	0%
Herring	HER	FRA	PEL_TRAWL	167		0%	5221		0%	15462	60	0%	6950	20	6970	0%
Herring	HER	FRA	TR2	351		0%	198		0%	259	0	0%	270	0	270	0%
Herring	HER	NIR	PEL_TRAWL	3354		0%	2657		0%	5567	27	0%	3859	9	3868	0%
Herring Total				84818		0%	115526		0%	263157	1355	1%	154500	452	154952	0%
Mackerel	MAC	SCO	PEL_TRAWL	41761		0%	51475		0%	55975	4124	7%	49737	1375	51112	3%
Mackerel	MAC	SCO	PEL_SEINE			0%	1968		0%	718		0%	896	0	896	0%
Mackerel	MAC	SCO	OTTER	1820		0%	770		0%	57	0	0%	883	0	883	0%
Mackerel	MAC	SCO	TR1	8	771	99%	39	20	34%	45	21	32%	31	271	301	90%
Mackerel	MAC	DNK	PEL_TRAWL	13552		0%	10285		0%	19629	1117	5%	14488	372	14860	3%
Mackerel	MAC	DNK	PEL_SEINE	24105		0%	10150		0%	2702		0%	12319	0	12319	0%
Mackerel	MAC	DNK	OTTER	2719		0%	55		0%	57	0	0%	944	0	944	0%
Mackerel	MAC	DNK	LL1	288		0%	227		0%	390		0%	302	0	302	0%
Mackerel	MAC	IRL	PEL_TRAWL	14639		0%	15961		0%	20426	269	1%	17009	90	17098	1%
Mackerel	MAC	IRL	OTTER			0%	1395		0%			0%	465	0	465	0%
Mackerel	MAC	ENG	PEL_TRAWL	3618		0%	6995		0%	10971	183	2%	7194	61	7255	1%

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Mackerel	MAC	ENG	OTTER			0%	2188		0%			0%	729	0	729	0%
Mackerel	MAC	ENG	TR1	4	196	98%	15	1	4%	11	3	19%	10	66	77	87%
Mackerel	MAC	NLD	PEL_TRAWL	898		0%	9779		0%	5648	604	10%	5442	201	5643	4%
Mackerel	MAC	NLD	TR1	53	193	78%	74	1499	95%	207	278	57%	111	657	768	86%
Mackerel	MAC	NLD	TR2	235	0	0%	226	0	0%	248	28	10%	236	9	246	4%
Mackerel	MAC	NIR	PEL_TRAWL	3476		0%	6398		0%	6429	628	9%	5434	209	5644	4%
Mackerel	MAC	NIR	PEL_SEINE	1025		0%			0%			0%	342	0	342	0%
Mackerel	MAC	NIR	OTTER	212		0%			0%			0%	71	0	71	0%
Mackerel	MAC	DEU	PEL_TRAWL	2495		0%	5282		0%	4474	56	1%	4083	19	4102	0%
Mackerel	MAC	DEU	TR1	7	10	59%	5	129	96%	6	8	58%	6	49	55	89%
Mackerel	MAC	SWE	PEL_SEINE	2560		0%	2551		0%	3090		0%	2734	0	2734	0%
Mackerel	MAC	SWE	PEL_TRAWL	595		0%	420		0%	1180	1147	49%	732	382	1114	34%
Mackerel	MAC	FRA	PEL_TRAWL	5		0%	31		0%	4815	78	2%	1617	26	1643	2%
Mackerel	MAC	FRA	TR2	798	0	0%	917	0	0%	986	27	3%	900	9	909	1%
Mackerel Total				114873	1170	1%	127206	1648	1%	138064	8570	6%	126714	3796	130510	3%
Sprat	SPR	DNK	PEL_TRAWL	104101		0%	102177		0%	53089		0%	86456	0	86456	0%
Sprat	SPR	DNK	TR3	23035		0%	16625		0%	13865		0%	17842	0	17842	0%
Sprat	SPR	DNK	none	936		0%			0%	129		0%	355	0	355	0%
Sprat	SPR	DNK	OTTER	77		0%	65		0%	192	0	0%	111	0	111	0%
Sprat	SPR	NLD	PEL_TRAWL	1720		0%	5288		0%	3667		0%	3558	0	3558	0%
Sprat	SPR	DEU	PEL_TRAWL	2925		0%	3226		0%	471		0%	2207	0	2207	0%
Sprat	SPR	SWE	PEL_TRAWL	1200		0%	1240		0%	2223		0%	1554	0	1554	0%
Sprat	SPR	SCO	PEL_TRAWL	781		0%	1946		0%	651		0%	1126	0	1126	0%
Sprat	SPR	SCO	OTTER			0%	305		0%			0%	102	0	102	0%
Sprat	SPR	SCO	TR3	294		0%			0%			0%	98	0	98	0%
Sprat	SPR	ENG	PEL_TRAWL	707		0%	326		0%	142		0%	392	0	392	0%
Sprat	SPR	NIR	PEL_TRAWL			0%	540		0%			0%	180	0	180	0%
Sprat Total				135777		0%	131739		0%	74428	0	0%	113981	0	113981	0%
Norway pout	NOP	DNK	TR3	50778		0%	3862		0%	73		0%	18238	0	18238	0%
Norway pout	NOP	DNK	PEL_TRAWL	20276		0%	181		0%	128		0%	6862	0	6862	0%
Norway pout	NOP	DNK	OTTER	207		0%	22		0%	15	5	25%	81	2	83	2%
Norway pout Total				71261		0%	4066		0%	217	5	2%	25181	2	25183	0%
Horse mackerels	JAX	NLD	TR1	72	28428	100%	108	1998	95%	212	0	0%	131	10142	10273	99%
Horse mackerels	JAX	NLD	PEL_TRAWL	2351		0%	1990		0%	280	0	0%	1540	0	1540	0%
Horse mackerels	JAX	NLD	TR2	172	0	0%	282	330	54%	426	0	0%	293	110	403	27%
Horse mackerels	JAX	NLD	BT2	10	198	95%	11		0%	7		0%	9	66	75	88%
Horse mackerels	JAX	SCO	PEL_TRAWL	646		0%	145		0%	154	0	0%	315	0	315	0%
Horse mackerels	JAX	DEU	PEL_TRAWL	238		0%	96		0%	584	0	0%	306	0	306	0%
Horse mackerels	JAX	IRL	PEL_TRAWL	14		0%	757		0%	25	0	0%	265	0	265	0%
Horse mackerels	JAX	NIR	PEL_TRAWL			0%	36		0%	469	0	0%	168	0	168	0%
Horse mackerels Total				3503	28626	89%	3425	2328	40%	2157	0	0%	3028	10318	13346	77%

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Atlantic redfishes	RED	FRA	TR1	203	2357	92%	155	260	63%	187		0%	181	872	1054	83%
Atlantic redfishes	RED	SCO	TR1	227		0%	98	0	0%	105	0	0%	143	0	143	0%
Atlantic redfishes Total				430	2357	85%	253	260	51%	292	0	0%	325	872	1197	73%
Boarfishes	BOR	SCO	OTTER			0%			0%	1745		0%	582	0	582	0%
Boarfishes Total						0%			0%	1745		0%	582	0	582	0%
Blue whiting	WHB	DNK	PEL_TRAWL	81		0%	90		0%	125	0	0%	98	0	98	0%
Blue whiting	WHB	NLD	PEL_TRAWL			0%	1		0%	150	31	17%	50	10	61	17%
Blue whiting Total				81		0%	91		0%	275	31	10%	149	10	159	6%
Grand Total				**666360**	**32153**	**5%**	**619180**	**4237**	**1%**	**537867**	**9962**	**2%**	**607802**	**15450**	**623253**	**2%**

Table A.3.3

Skagerrak || demersal fisheries: landings and discards per species and year and area (tonnes). Table sorted in descending order on average catch 2010-2012.

Only country and gear combination where average 2010-2012 catch larger than 50 t.

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Plaice	PLE	DNK	TR1	5388	540	9%	6511	817	11%	6617	1050	14%	6172	802	6974	12%
Plaice	PLE	DNK	TR2	562	38	6%	883	85	9%	844	121	13%	763	81	844	10%
Plaice	PLE	DNK	GN1	227	3	1%	517	7	1%	266	16	6%	337	9	346	3%
Plaice	PLE	DNK	BT1	174		0%	204		0%	432		0%	270	0	270	0%
Plaice	PLE	DNK	GT1	162	2	1%	233	0	0%	152	5	3%	183	2	185	1%
Plaice	PLE	NLD	BT2	567		0%	4		0%			0%	190	0	190	0%
Plaice	PLE	NLD	BT1	540		0%	1		0%			0%	180	0	180	0%
Plaice	PLE	NLD	TR1	395	44	10%			0%			0%	132	15	146	10%
Plaice	PLE	SWE	TR2	109	91	45%	152	79	34%	137	42	24%	133	71	203	35%
Plaice Total				8124	717	8%	8506	988	10%	8448	1234	13%	8359	980	9339	10%
Cod	COD	DNK	TR2	984	962	49%	984	1370	58%	1033	1121	52%	1000	1151	2152	54%
Cod	COD	DNK	TR1	1157	512	31%	1329	385	22%	1720	331	16%	1402	409	1811	23%
Cod	COD	DNK	GN1	749	15	2%	664	13	2%	605	10	2%	673	13	686	2%
Cod	COD	DNK	OTTER	56	24	30%	48	5	10%	70	3	4%	58	11	69	16%
Cod	COD	DNK	GT1	54	2	3%	48	1	3%	56	1	2%	53	1	54	3%
Cod	COD	SWE	TR2	213	126	37%	261	87	25%	233	222	49%	235	145	380	38%
Cod	COD	SWE	OTTER	169	13	7%	148	58	28%	136	56	29%	151	42	193	22%
Cod	COD	DEU	TR1	55	25	31%	59	11	16%	449	35	7%	188	24	211	11%
Cod Total				3437	1680	33%	3542	1931	35%	4302	1780	29%	3760	1797	5557	32%
Norway lobster	NEP	DNK	TR2	1860	1300	41%	1791	1060	37%	1505	942	39%	1719	1101	2819	39%
Norway lobster	NEP	DNK	TR1	105	247	70%	24	118	83%	12	124	91%	47	163	210	78%
Norway lobster	NEP	SWE	TR2	514	390	43%	390	351	47%	535	618	54%	480	453	933	49%
Norway lobster	NEP	SWE	POTS	135		0%	92		0%	177		0%	135	0	135	0%
Norway lobster Total				2614	1936	43%	2296	1529	40%	2230	1684	43%	2380	1716	4096	42%
Saithe	POK	DNK	TR2	2538	79	3%	1681	298	15%	1250	41	3%	1823	140	1963	7%
Saithe	POK	DNK	TR1	1096	20	2%	198	47	19%	229	9	4%	508	25	533	5%
Saithe	POK	DNK	OTTER	191	18	8%	150	5	3%	150	2	2%	163	8	172	5%
Saithe	POK	SWE	OTTER	333	351	51%	347	18	5%	254	1	1%	311	124	435	28%
Saithe	POK	SWE	TR2	311	94	23%	109	0	0%	92	59	39%	171	51	222	23%
Saithe	POK	DEU	TR1	375	6	1%	700	35	5%	489	18	4%	521	19	541	4%
Saithe	POK	DEU	PEL_TRAWL			0%	236		0%	54		0%	96	0	96	0%
Saithe Total				4842	568	11%	3421	403	11%	2518	131	5%	3594	368	3961	9%
Haddock	HAD	DNK	TR1	916	215	19%	1726	324	16%	1667	156	9%	1436	232	1668	14%
Haddock	HAD	DNK	TR2	290	311	52%	501	882	64%	820	517	39%	537	570	1107	51%
Haddock	HAD	SWE	TR2	92	174	66%	119	20	14%	145	47	24%	119	80	199	40%
Haddock	HAD	SWE	OTTER	11	18	63%	16	94	86%	52	11	18%	26	41	67	61%
Haddock	HAD	DEU	TR1	67	13	17%	103	12	10%	309	19	6%	159	15	174	8%
Haddock Total				1375	733	35%	2464	1331	35%	2993	750	20%	2278	938	3215	29%
Northern prawn	PRA	SWE	OTTER	1475	58	4%	1486	167	10%	1287	268	17%	1416	164	1581	10%

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Northern prawn	PRA	DNK	OTTER	1119	58	5%	1163	104	8%	1097	137	11%	1127	99	1226	8%
Northern prawn	PRA	DNK	none	3		0%	105		0%	129		0%	79	0	79	0%
Northern prawn Total				2598	115	4%	2754	271	9%	2514	405	14%	2622	264	2886	9%
Dab	DAB	DNK	TR1	301	142	32%	411	588	59%	437	410	48%	383	380	763	50%
Dab	DAB	DNK	TR2	39	46	54%	60	33	36%	134	97	42%	78	59	137	43%
Dab	DAB	SWE	TR2	1	43	97%	1	51	98%	1	68	99%	1	54	55	98%
Dab Total				341	231	40%	472	672	59%	572	574	50%	462	493	954	52%
Hake	HKE	DNK	TR2	189	67	26%	267	16	6%	203	79	28%	220	54	274	20%
Hake	HKE	DNK	TR1	96	19	17%	131	3	2%	124	45	27%	117	22	139	16%
Hake Total				285	86	23%	398	19	5%	327	124	27%	336	76	413	18%
Lemon sole	LEM	DNK	TR1	189	30	14%	140	12	8%	291	25	8%	207	22	229	10%
Lemon sole	LEM	DNK	TR2	51	12	19%	75	8	9%	155	14	9%	94	12	105	11%
Lemon sole Total				240	42	15%	215	20	9%	446	39	8%	301	34	334	10%
Whiting	WHG	DNK	TR2	25	215	90%	28	213	88%	22	101	82%	25	176	201	88%
Whiting	WHG	SWE	TR2	17	88	84%	9	22	72%	6	18	74%	11	43	54	80%
Whiting Total				42	303	88%	37	235	87%	28	119	81%	36	219	255	86%
Anglerfish	ANF	DNK	TR2	175	0	0%	194	0	0%	203	0	0%	191	0	191	0%
Anglerfish	ANF	DNK	TR1	69	0	0%	41	0	0%	40	0	0%	50	0	50	0%
Anglerfish Total				244	1	0%	236	0	0%	242	1	0%	241	0	241	0%
Roundnose grenadier	RNG	DNK	TR2	0	0	77%	0	395	100%	0	0	53%	0	132	132	100%
Roundnose grenadier Total				0	0	77%	0	395	100%	0	0	53%	0	132	132	100%
Pollack	POL	DNK	GN1	150	0	0%	81	2	3%	84	0	0%	105	1	106	1%
Pollack Total				150	0	0%	81	2	3%	84	0	0%	105	1	106	1%
Ling	LIN	DNK	TR2	33	45	58%	48	0	0%	52	3	6%	45	16	61	27%
Ling Total				33	45	58%	48	0	0%	52	3	6%	45	16	61	27%
Turbot	TUR	DNK	TR1	24	0	0%	33	1	4%	110	1	1%	56	1	56	1%
Turbot Total				24	0	0%	33	1	4%	110	1	1%	56	1	56	1%
Grand Total				**24349**	**6458**	**21%**	**24503**	**7799**	**24%**	**24868**	**6845**	**22%**	**24573**	**7034**	**31608**	**22%**

Table A.3.4

Skagerrak || industrial and pelagic fisheries: landings and discards per species and year and area (tonnes). Table sorted in descending order on average catch 2010-2012. Only country and gear combination where average 2010-2012 catch larger than 50 t.

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Herring	HER	SWE	PEL_TRAWL	15556		0%	6646	0	0%	12239		0%	11480	0	11480	0%
Herring	HER	SWE	PEL_SEINE	1844		0%	2711		0%	3610		0%	2722	0	2722	0%
Herring	HER	SWE	OTTER	0	8	97%	0	318	100%	135	1	1%	45	109	154	71%
Herring	HER	DEU	OTTER	160	13173	99%			0%			0%	53	4391	4444	99%
Herring	HER	DEU	PEL_TRAWL			0%	54	0	0%	670		0%	241	0	241	0%
Herring	HER	DNK	PEL_TRAWL	3291		0%	2415	0	0%	1610		0%	2438	0	2438	0%
Herring	HER	LTU	OTTER	485	0	0%			0%			0%	162	0	162	0%
Herring Total				21336	13181	38%	11827	318	3%	18263	1	0%	17142	4500	21642	21%
Sandeel	SAN	DNK	OTTER	7775		0%			0%	1232		0%	3002	0	3002	0%
Sandeel	SAN	DNK	PEL_TRAWL	1322		0%			0%	185		0%	502	0	502	0%
Sandeel	SAN	SWE	OTTER	720		0%			0%			0%	240	0	240	0%
Sandeel Total				9817		0%			0%	1416		0%	3744	0	3744	0%
Sprat	SPR	DNK	PEL_TRAWL	2522		0%	2605		0%	80		0%	1736	0	1736	0%
Sprat	SPR	DNK	TR3	426		0%	78		0%	8		0%	171	0	171	0%
Sprat	SPR	SWE	PEL_SEINE	1129		0%	1750		0%	1218		0%	1366	0	1366	0%
Sprat	SPR	DEU	PEL_TRAWL	315		0%			0%			0%	105	0	105	0%
Sprat Total				4393		0%	4433		0%	1305		0%	3377	0	3377	0%
Norway pout	NOP	DNK	OTTER	0	296	100%	0	43	100%	19	55	74%	6	132	138	95%
Norway pout	NOP	DNK	PEL_TRAWL	51		0%	2		0%	99		0%	51	0	51	0%
Norway pout	NOP	SWE	OTTER			0%	0	390	100%	0	96	100%	0	162	162	100%
Norway pout Total				51	296	85%	2	434	100%	118	151	56%	57	294	351	84%
Mackerel	MAC	SWE	GN1	65	0	0%	79	139	64%	82	21	21%	75	54	129	42%
Mackerel Total				65	0	0%	79	139	64%	82	21	21%	75	54	129	42%
Blue whiting	WHB	SWE	OTTER	0	223	100%	1	38	98%	2	118	99%	1	126	127	99%
Blue whiting Total				0	223	100%	1	38	98%	2	118	99%	1	126	127	99%
Grand Total				**35662**	**13700**	**28%**	**16342**	**928**	**5%**	**21187**	**292**	**1%**	**24397**	**4973**	**29370**	**17%**

Table A.3.5

Eastern Channel || demersal fisheries: landings and discards per species and year and area (tonnes). Table sorted in descending order on average catch 2010-2012. Only country and gear combination where average 2010-2012 catch larger than 50 t.

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Whiting	WHG	FRA	TR2	4729		0%	5571		0%	2465	34	1%	4255	11	4266	0%
Whiting	WHG	FRA	PEL_TRAWL	44	279	86%	24		0%	71		0%	46	93	139	67%
Whiting	WHG	NLD	TR2	257		0%	322		0%	750		0%	443	0	443	0%
Whiting	WHG	ENG	TR2	128	112	46%	116	13	10%	196	525	73%	147	216	363	60%
Whiting	WHG	SCO	TR2	93	80	46%	132	8	6%	47	358	88%	91	149	239	62%
Whiting	WHG	BEL	BT2	67	22	25%	58	12	17%	47	28	38%	57	21	78	27%
Whiting Total				5319	493	8%	6222	33	1%	3576	945	21%	5039	490	5529	9%
Plaice	PLE	FRA	TR2	923		0%	1075		0%	784	8	1%	927	3	930	0%
Plaice	PLE	FRA	GT1	173	85	33%	363	36	9%	336	30	8%	291	50	341	15%
Plaice	PLE	FRA	BT2	203	46	19%	242	94	28%	255	3	1%	233	48	281	17%
Plaice	PLE	FRA	TR1	4	213	98%	9	2	22%	5		0%	6	72	78	93%
Plaice	PLE	BEL	BT2	1098	280	20%	1042	406	28%	979	7	1%	1040	231	1271	18%
Plaice	PLE	BEL	TR1	0	161	100%	0	0	49%	0		0%	0	54	54	99%
Plaice	PLE	ENG	BT2	215	13	6%	168	32	16%	215	9	4%	199	18	217	8%
Plaice	PLE	NLD	TR2	55		0%	62		0%	57		0%	58	0	58	0%
Plaice Total				2671	799	23%	2962	571	16%	2631	57	2%	2754	476	3230	15%
Sole	SOL	FRA	GT1	585	17	3%	1166	13	1%	1271	2	0%	1007	11	1018	1%
Sole	SOL	FRA	TR2	360		0%	444		0%	416	0	0%	407	0	407	0%
Sole	SOL	FRA	BT2	186	16	8%	182	10	5%	199	0	0%	189	9	198	5%
Sole	SOL	BEL	BT2	1254	119	9%	1168	66	5%	887	0	0%	1103	62	1165	5%
Sole	SOL	ENG	BT2	146	3	2%	95	2	2%	107	0	0%	116	2	118	2%
Sole Total				2532	155	6%	3054	92	3%	2881	2	0%	2822	83	2905	3%
Dab	DAB	FRA	TR2	601		0%	749		0%	559	30	5%	636	10	646	2%
Dab	DAB	FRA	GT1	52	1514	97%	97	78	45%	110		0%	86	531	617	86%
Dab	DAB	BEL	BT2	146	83	36%	154	139	47%	96	147	60%	132	123	255	48%
Dab	DAB	NLD	TR2	88		0%	141		0%	169		0%	133	0	133	0%
Dab	DAB	ENG	TR2	25	30	55%	27	59	69%	43	44	51%	32	45	76	59%
Dab	DAB	SCO	TR2	11	10	46%	33	70	68%	14	37	72%	19	39	58	67%
Dab Total				923	1638	64%	1201	347	22%	991	258	21%	1038	748	1786	42%
Cod	COD	FRA	TR2	664		0%	631		0%	496		0%	597	0	597	0%
Cod	COD	FRA	GT1	151	4	3%	139	392	74%	133	19	13%	141	139	280	50%
Cod	COD	NLD	TR2	41		0%	63		0%	48		0%	51	0	51	0%
Cod Total				856	4	0%	833	392	32%	678	19	3%	789	139	927	15%
Lemon sole	LEM	BEL	BT2	98	13	12%	145	45	24%	160	83	34%	135	47	182	26%
Lemon sole	LEM	FRA	TR2	43		0%	196		0%	107	0	0%	115	0	115	0%
Lemon sole Total				141	13	8%	341	45	12%	267	83	24%	250	47	297	16%
Turbot	TUR	BEL	BT2	99	0	0%	119	1	1%	109	1	1%	109	1	109	1%
Turbot	TUR	FRA	GT1	27	35	56%	47		0%	52	0	0%	42	12	53	22%
Turbot Total				126	35	21%	166	1	1%	160	1	1%	151	12	163	7%

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Pollack	POL	FRA	TR2	116		0%	158		0%	84		0%	119	0	119	0%
Pollack Total				116		0%	158		0%	84		0%	119	0	119	0%
Brill	BLL	BEL	BT2	132	0	0%	119	2	1%	100	1	1%	117	1	118	1%
Brill Total				132	0	0%	119	2	1%	100	1	1%	117	1	118	1%
Anglerfish	ANF	BEL	BT2	125	17	12%	92	6	7%	56	17	24%	91	14	105	13%
Anglerfish Total				125	17	12%	92	6	7%	56	17	24%	91	14	105	13%
Grand Total				**12941**	**3154**	**20%**	**15147**	**1489**	**9%**	**11423**	**1384**	**11%**	**13170**	**2009**	**15179**	**13%**

Table A.3.6

Eastern Channel || pelagic fisheries: landings and discards per species and year and area (tonnes). Table sorted in descending order on average catch 2010-2012. Only country and gear combination where average 2010-2012 catch larger than 50 t.

SPEC_NAME	SPECIES	COUNTRY	REG_GEAR	2010 Landing	2010 Discard	2010 %DR	2011 Landing	2011 Discard	2011 %DR	2012 Landing	2012 Discard	2012 %DR	Avg 2010-2012 Landing	Avg 2010-2012 Discard	Avg 2010-2012 Catch	Avg 2010-2012 %DR
Herring	HER	NLD	PEL_TRAWL	9955	19	0%	9724	91	1%	13296	606	4%	10992	239	11230	2%
Herring	HER	DEU	PEL_TRAWL	5171	10	0%	4984	50	1%	7265	0	0%	5807	20	5827	0%
Herring	HER	FRA	PEL_TRAWL	1219	3	0%	844	6	1%	8925	255	3%	3663	88	3751	2%
Herring	HER	FRA	TR2	575		0%	653		0%	692		0%	640	0	640	0%
Herring	HER	ENG	PEL_TRAWL	1727	3	0%	32	0	1%	3836	123	3%	1865	42	1907	2%
Herring	HER	ENG	OTTER			0%	2029		0%			0%	676	0	676	0%
Herring	HER	DNK	PEL_TRAWL			0%			0%	325	10	3%	108	3	112	3%
Herring Total				18648	35	0%	18266	148	1%	34339	994	3%	23751	392	24143	2%
Horse mackerels	JAX	NLD	PEL_TRAWL	15612	0	0%	13873	110	1%	12264	43	0%	13916	51	13967	0%
Horse mackerels	JAX	NLD	TR2	110		0%	168		0%	324		0%	201	0	201	0%
Horse mackerels	JAX	DEU	PEL_TRAWL	3557	0	0%	3366	1	0%	4865	22	0%	3929	8	3937	0%
Horse mackerels	JAX	ENG	PEL_TRAWL	1869	0	0%	1668	17	1%	877	2	0%	1472	6	1478	0%
Horse mackerels	JAX	DNK	PEL_TRAWL			0%	89	0	0%	1060	3	0%	383	1	384	0%
Horse mackerels Total				21148	0	0%	19164	127	1%	19390	71	0%	19900	66	19966	0%
Mackerel	MAC	FRA	PEL_TRAWL	1347	30134	96%	1806	1048	37%	2230	1966	47%	1794	11049	12844	86%
Mackerel	MAC	FRA	TR2	2388		0%	4425		0%	2338	0	0%	3050	0	3050	0%
Mackerel	MAC	FRA	OTTER	116		0%	1292		0%	93		0%	500	0	500	0%
Mackerel	MAC	NLD	PEL_TRAWL	37	494	93%	22	16	42%	39	6	13%	33	172	205	84%
Mackerel	MAC	NLD	TR2	58		0%	50		0%	136		0%	81	0	81	0%
Mackerel	MAC	ENG	PEL_TRAWL	5	271	98%	8	4	32%			0%	4	91	96	95%
Mackerel Total				3950	30898	89%	7603	1068	12%	4836	1972	29%	5463	11313	16776	67%
Grand Total				**43746**	**30933**	**41%**	**45033**	**1343**	**3%**	**58565**	**3037**	**5%**	**49114**	**11771**	**60885**	**19%**

IMARES Wageningen UR
T +31 (0)317 48 09 00
E imares@wur.nl
www.imares.nl

Visitorsadress
- Haringkade 1, 1976 CP IJmuiden
- Korringaweg 5, 4401 NT Yerseke
- Ambachtsweg 8A, 1785 AJ Den Helder
- Bevesierweg 4, Gebouw MML – Schiereiland Fort Harssens, 1781 CA Den Helder
- Landsdiep 4, 1797 SZ ‘t Horntje, Texel

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- To conduct research with the aim of acquiring knowledge and offering advice on the sustainable management and use of marine and coastal areas.
- IMARES is an independent, leading scientific research institute

IMARES Wageningen UR is part of the international knowledge organisation Wageningen UR (University & Research centre). Within Wageningen UR, nine specialised research institutes of the DLO Foundation have joined forces with Wageningen University to help answer the most important questions in the domain of healthy food and living environment.

To explore the potential of nature to improve the quality of life

IMARES Wageningen UR
T +31 (0)317 48 09 00
E imares@wur.nl
www.imares.nl

Visitorsadress

- Haringkade 1, 1976 CP IJmuiden
- Korringaweg 5, 4401 NT Yerseke
- Ambachtsweg 8A, 1785 AJ Den Helder
- Bevesierweg 4, Gebouw MML - Schiereiland Fort Harssens, 1781 CA Den Helder
- Landsdiep 4, 1797 SZ 't Horntje, Texel

IMARES (Institute for Marine Resources and Ecosystem Studies) is the Netherlands research institute established to provide the scientific support that is essential for developing policies and innovation in respect of the marine environment, fishery activities, aquaculture and the maritime sector.

The IMARES vision

'To explore the potential of marine nature to improve the quality of life'

The IMARES mission

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