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Discard sampling of Dutch bottom-trawl and seine fisheries in 2012

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Summary

In the European Union, the collection of discard data is enforced through the Data Collection Regulation Framework (DCF) of the European Commission (EC). In 2009, revisions to the DCF (2008/949/EG), required member states to increase sampling intensity. To meet this requirement within an affordable budget, the Institute for Marine Resources and Ecosystem Studies (IMARES) set up a collaborative project between the Dutch fishing industry and the research institute to recruit a 'reference fleet' of vessel owners willing to participate in a self-sampling programme and where the fisher's retained fractions of their discards during some trips. These samples were then purchased off them. This report summarizes data from the discard monitoring programme of Dutch demersal fisheries operating in the North Sea (ICES subarea IV).

In the self-sampling programme in 2012, trips were pre-determined from a reference fleet of 23 participating vessels. In total, 159 trips were sampled, of which 17 trips (11%) were considered invalid due to missing or incomplete information. During the 142 valid self-sampling trips 279 hauls were sampled, typically two hauls per trip. While the majority of samples were taken from beam-trawl vessels with mesh sizes ranging between 70 and 99 mm targeting flatfish, data were collected from nine other metiers as well. These included beam trawls with larger mesh sizes otter trawls (with different target species assemblages) and seines.

The majority of discards comprised of benthic (invertebrate) species such as common starfish (*Asteria rubens*); sand star (*Astropecten irregularis*); swimming crab (*Liocarcinus holsatus*); and serpent star (*Ophiura ophiura*). Most frequently discarded fish species of no commercial value included: dragonet (*Callionymus lyra*); grey gurnard (*Eutrigla gurnardus*); scaldfish (*Arnoglossus laterna*); lemon sole (*Microstomus kitt*); and solenette (*Buglossidium luteum)*. Among marketable fish, common dab (*Limanda limanda*) and European plaice (*Pleuronectes platessa*) were the most frequently discarded species.

Samenvatting

In het kader van de EU Data Collectie Verordening is iedere lidstaat verplicht gegevens te verzamelen van vangst die niet wordt aangevoerd – zogenaamde "discards" – in de belangrijkste commerciële visserijen. In 2009 is een herziening van de DCF (2008/949/EG) doorgevoerd, waarna lidstaten werden verzocht hun bemonsteringsprogramma te intensiveren met als doel i) het precisieniveau van discardsschattingen te verbeteren en ii) het aantal bemonsterde vlootsegmenten te laten toenemen. Om binnen het beschikbare budget aan deze eis te kunnen voldoen werkt IMARES (Institute for Marine Resources and Ecosystem Studies) nauw samen met de visserijsector bij het verzamelen van discardsgegevens. Door middel van intensieve samenwerking met een 'referentievloot', bestaande uit een groep Nederlandse commerciële vissers die zich willen inzetten voor het onderzoek, is het huidige zelfbemonsteringsprogramma tot stand gekomen. Dit rapport vat de resultaten van het discards monitoringprogramma van de Nederlandse demersale vloot opererend in de Noordzee (ICES Subgebied IV) samen.

In het zelfbemonsteringsprogramma wordt van te voren aangegeven wanneer een schip uit de referentie vloot een monster meeneemt. In totaal zijn in 2012 tijdens 159 reizen monsters door de vissers meegenomen, waarvan de data van 17 reizen (11%) helaas uitgesloten moesten worden van verdere ananlyse vanwege ontbrekende of foutieve informatie. Tijdens de overige 142 reizen zijn 279 trekken correct bemonsterd.

Hoewel in het zelfbemonsteringsprogramma het merendeel van de bemonstering is uitgevoerd aan boord van boomkorschepen met maaswijdte 70 tot 99 mm, zijn in het programma ook gegevens verzameld van acht andere vlootsegmenten met variërende maaswijdtes tussen de 70 en 99 mm, 100 en 119 mm en >120 mm en met verschillende doelsoortensamenstelling (Noorse kreeft en/of demersale vis).

Het merendeel van discards bestaat uit benthische invertebraten (benthos), zoals zeesterren (*Asteria rubens*), kamsterren (*Astropecten irregularis*), slangsterren (*Ophiura ophiura*) en zwemkrabben (*Liocarcinus holsatus*). Frequent gediscarde vissoorten zonder commerciële waarde, zijn: pitvis (*Callionymus lyra*); grauwe poon (*Eutrigla gurnardus*); schurftvis (*Arnoglossus laterna*); tongschar (*Microstomus kitt*); en dwergtong (*Buglossidium luteum*). Frequent gediscarde vissoorten met commerciële waarde, zijn schar (*Limanda limanda*) en schol (*Pleuronectes platessa*).

1 Introduction

Discarding of unwanted organisms is to a great extent an inevitable consequence of commercial fishing. It is considered to be a waste of valuable natural resources. Potentially, unaccounted mortalities may impact adversely on life histories of an individual or entire populations (e.g. review by Broadhurst et al., 2006). Economic and/or regulatory pressures, however, commonly force fishers to discard parts of their catch, but without keeping records of it as to why catches were discarded nor how much. Not knowing how much was discarded may, in turn, affect stock assessments. If these assessments are based on landings only and do not incorporate the proportion of fish that dies as a consequence of being discarded, total fishing mortality is underestimated. With the aim to integrate estimates of discards into single-species stock assessments, at-sea monitoring programmes are required to provide accurate discard estimates by species within acceptable precision limits. These estimates may also become important for the allowance of catch quotas under an European landing obligation and discard ban from 2015 onwards (EEC, 2011; Uhlmann et al. 2013)

In the European Union (EU), the collection of discard data is enforced through the Data Collection Framework (DCF). In the Netherlands a cost-effective, so-called self-sampling programme is implemented for demersal fisheries in the North Sea, where the majority of their effort, landings and value is generated. Fishers themselves retain discarded fractions of their discarded catches on board their vessels during a number of fishing trips throughout the year. These are bagged, sealed and brought back to shore and purchased off them. For each sampled haul, information on the volume of the catch, environmental (e.g. wind direction and speed, latitude and longitude position, and water depth) and operational characteristics (e.g. start and end time of setting the net, gear type, and mesh size) was recorded. Discard samples from the self-sampling programme are returned to the laboratory to determine species composition (identified to species level for all species, including invertebrates), size and age structure of a subsample. Since 2011, self-sampled discard data have been so far integrated in the stock assessment for North Sea plaice. Throughout the year, observers accompany approximately 10 separate self-sampling trips to independently sample discard fractions using a slightly different methodology. These samples are used as a measure of deviation between observer and self-sampling techniques and to detect any source of bias (see Appendix D).

In Dutch bottom-trawl and seine fisheries in 2012, discard data were collected from 10 commercial 'métiers' which were defined based on gear type, target species assemblage, and mesh size characteristics in the DCF (EU Council Regulation 409/2009; Table 1). These métiers were from three fleet segments: beam and otter trawlers and Scottish seiners with either 70-99, 100-119 or ≥120 mm codend meshes targeting predominantly European plaice (*Pleuronectes platessa*), common sole (*Solea solea*), and/or crustaceans (i.e. Norway lobster, *Nephrops norwegicus*, hereafter termed *Nephrops*; Table 1).

The present study provides a summary of the data collected during the self-sampling programme in 2012. Sampling effort and discard data such as landed/discarded numbers and weights were presented as detailed as possible on the trip level (Appendices C-E) and subsequently grouped by relevant strata (métier and quarter). Together with appropriate raising metrics (e.g. the proportion of sampled and total fishing duration per trip), standardized discard rates (i.e. numbers/weights per hour of fishing) were calculated. This research is part of the strategic research program WOT "*Wettelijke onderzoekstaken*" which is funded by the Dutch Ministry of Economic Affairs, and was done by IMARES.

2 Methods

2.1 Discard self-sampling programme

2.1.1 Vessel selection and sampling allocation

A 'reference fleet' of 23 vessels with protocol-instructed fishers collected discard samples according to a predefined schedule during their regular commercial operations throughout the year. Within the Dutch beam-trawl métier (TBB_DEF), a distinct national métier was created which is not reflected within the DCF métier classification. It is based on the engine's horse power and geographical distribution, due to regulations allowing only vessels with engines <300hp (so called "Eurocutters") to fish in a restricted fishing zone ("plaice box") and the Dutch 12-mile Exclusive Economic Zone. To reflect this distributional difference of the fleet which also has implications on their discarding pattern, in the following analysis, summaries of the discard data were presented separately for Eurocutters (termed TBB_DEF_70-99mm_≤300hp) and the remaining part of the beam-trawl fleet (termed TBB_DEF_70-99mm_>300hp; Table 1).

Sampling was carried out on board vessels from nine different métiers: beam trawlers (with 70-99, 100-119, and ≥120 mm meshes); Scottish seiners (100-119, and ≥120 mm); otter trawlers (70-99 targeting either fish or mixed crustaceans and fish; 100-119 mm targeting fish; ≥120 mm targeting fish); and Eurocutters (i.e. beam trawlers with 70-99 mm targeting fish). Prior to sampling, fishers were provided with all necessary equipment (labels, plastic sampling bags, sealing cable ties, and sampling sheets) and written instructions. Scottish seiners were sampled for the first time in 2011. Their fishing operation differs to other demersal trawls in that long ropes are attached to the net doors deploying them in a semi-circle. The ropes close by pulling the net back towards the vessel.

Since mid-2011, on between 8 and 11 self-sampling trips (arbitrarly spread over different vessels and métiers) per year, an observer will go onboard to measure independently discard quantities. These "matched" or "co-sampled" trips are necessary to evaluate how much variation is introduced by sampling discards via two slightly different methods.

2.1.2 Sampling and data collection procedures

Operational and biological data were collected at the time of each gear deployment ('haul') during a particular fishing trip. With each haul the following information was registered: vessel position (at start and end); haul duration; weather conditions; and the volumes of catches and landings. The total volume of discards of each sampled haul was derived by subtracting the total landings, which was recorded in a logbook, from the total catch volume which was estimated by the skipper/crew. On each of the two sampled trawls per trip, the crew retained a sub-sample of discards which comprised a fixed amount of two boxes of discards (one box equals approx. 40 kg). These boxes were filled by scooping discards randomly at regular intervals from the processing conveyor belt. The sub-samples were collected in large plastic bags which were then sealed off by cable ties, labelled and cool-stored until the vessel returned to port. Discard samples were collected back on land by IMARES research staff and returned to the laboratory for analysis. No samples of the retained part of the catch were collected. All species of discards within each sub-sample were registered and identified, whereby numbers-at-length were recorded for all fish species of discards and also *Nephrops* in the sub-sample (Table 2); and numbers without length measurements were recorded for all non-fish species. Data management software was used to enter and subsequently audit all data before the data were stored in a centralised database. An overview of vessel selection, sampling design and data collection procedures is provided in an overview (Appendix E).

2.2 Raising procedures

Whenever a fraction of discards were sampled, a sub-sampling factor was used to expand measured observations from a sample to haul level. This sub-sampling factor is the ratio between the estimated total and sub-sampled volumes of discards.

In the next step, existing species-specific length-weight relationships were used to convert numbers-at-length also into weight-at-length. These were then standardized into discards per unit effort ('DPUE'; hereafter termed 'discard rates') rates by dividing them by the deployment duration (i.e. fishing time). To raise numbers from the haul to the trip level, over all measured hauls numbers and weights of haul-raised discarded fish are summed per length class. Then, the total duration of all hauls (including unsampled ones) is added up from sampled trips. The discarded numbers and weights are then multiplied by the ratio of total fishing divided by the sampled fishing duration to derive the total numbers and weights per trip. In the following step, the above trip-level estimates are raised to fleet level by the proportion of total over sampled fishing effort (in horsepower * days at sea).

These effort estimators were calculated matching the stratification of the discard data that were provided in response to the ICES WGMIXFISH and STECF data call. For this, metiers were merged to create the following gear and mesh size groupings: 'TBB_70-99mm'; TBB_100-119mm; 'OTB/OTT_70-99mm'; 'OTB/OTT_100-119mm'; and 'SSC_100-119mm' and 'SSC_>120mm'. These are the same main gear groups which match with the sampling programme: beam-, otter trawlers, and Scottish seiners. For the beam trawlers, a distinction between Eurokotters and vessels with larger engine capacity was not made here, because this only exists at a national level. The merging of all otter-trawl fleet segments into a single métier was justified to avoid any post-stratification based on catch composition (depending on the amount of *Nephrops* landings) and to reflect the fact that many vessels switch regularly between different mesh sizes.

2.2.1 Raising Disclaimer

Some of the main end users of the discard monitoring data are expert working groups of STECF (EWG) and ICES assessment working groups (AWG). The requirements of their respective calls for data, such as units and stratification levels, differ, which eventually can lead to diverging and inconsistent estimates due to differences in ratio estimators (ICES, 2013). The STECF data call asks for data aggregated over different, higher-resoluted metiers than the ICES AWG (i.e. WGMIXFISH). This can lead to inconsistent outcomes, due to the ratio estimation technique that is used to extrapolate from the sampled to the total population.

2.3 Fleet effort

Fleet effort data used for Figure 1 was obtained through queries of the IMARES fishing effort database using the statistical software package R (R Development Core Team, 2005). The complete query is listed in Appendix A. To calculate of total fishing effort for TBB_DEF_70-99mm_≤300hp vessels required that explicitly effort of vessels with 300 or less horse power (hp) were included (221kw = 300hp, conversion: 1.36).

3 Results and discussion

3.1 Sampling effort and coverage

A total of 142 trips and 279 hauls were correctly self-sampled in 2012 (Table 3). Sampling effort was proportional to the effort of the fleet for the most-intensely sampled métiers (Figure 1a). For seine and otter fisheries which were monitored less frequently, sampled operations were located also in areas with little fishing effort (Figure 1b and c). All trips were assigned to their respective métiers after their completion, based on gear type, mesh size, and target species assemblage criteria. For example, if *Nephrops* landings from otter-trawl gears (OTB/OTT) exceeded 30%, these were subsequently classified as otter trawls targeting a mixed assemblage of crustaceans and demersal fish (MCD) as opposed to demersal fish (DEF). Notably, on a single occasion an otter trawler using a mesh size ≥120mm was monitored, which effectively introduced an additional metier to the list of sampled metiers (Table 1). Due to the low sampling intensity (n=1), comparisons with results of averages from other métiers are meaningless and were therefore omitted from the data summary tables (Tables 5-7). Sampling coverage levels of up to 6% were achieved for several métiers (i.e. OTB/OTT_DEF_100-119mm and SSC_DEF_≥120mm; Table 4). Due to its fleet size and their large number of days spent at sea, the beam trawlers with large engines and 70-99 mm mesh sizes (TBB_DEF_70-99mm_>300hp) continued to receive comparatively little observer coverage of approx. 2% (Table 4).

Self-sampling has greatly improved both the spatial and temporal spread of sampling. However, costs, time and effort to collate, process, and analyse samples increased compared to the smaller-scale observer sampling programme. Although an increase of sampling effort will most likely improve precision levels of discard estimates, it does not necessarily improve their accuracy. Precision levels of species-specific discard estimates as required under DCF targets, were calculated in another project, and will be reported elsewhere.

Implicit to any robust sampling design and raising procedure are assumptions associated with the representativeness of the sampled population (Cotter and Pilling, 2007). However, thus far, it has not been confirmed whether the selection of vessels in the self-sampling programme represents the overall population of active vessels with respect of their overall discarding patterns, landings profile, and temporal distribution of fishing effort. In particular within sampled beam-trawl métiers, a variety of conventional and innovative fishing gears were used (Figure 2a) . The latter group included three >300 hp beam-trawl vessels with sumwing, and two with an electric pulse trawl gear. Thus, the population of sampled vessels reflected to some extent the true gear-type composition in the beam-trawl fleet: a majority of vessels with conventional gears and a smaller but increasing number of vessels with modified gears (IMARES, unpubl. data; Figure 2b).

3.2 Numbers and weights of discarded and/or landed species (trip level)

Discards comprised both benthic and fish species in all sampled métiers, whereby on average the numbers discarded per hour of benthic species exceeded that of discarded fish (Tables 5 and 7). In all métiers, some of the most frequently discarded benthic species include: common starfish (*Asterias rubens*); sand star (*Astropecten irregularis*); swimming crab (*Liocarcinus holsatus*); and serpent star (*Ophiura ophiura*; Table 7a,c). Most frequently discarded fish species of no commercial value include: dragonet (*Callionymus lyra*); grey gurnard (*Eutrigla gurnardus*); scaldfish (*Arnoglossus laterna*); and solenette (*Buglossidium luteum*; Table 7b,d). Among the less-abundant and vulnerable elasmobranch species, the lesser-spotted dogfish (*Scyliorhinus canicula*); and starry ray (*Amblyraja radiata*) were occasionally registered within a

discard sample. Among marketable species, dab (fisheries unions-agreed minimum landing size=23 cm), followed by plaice (legal minimum landing size, MLS=27 cm) were among the most-commonly discarded species both in numbers and weights (Table 5). Other commonly-discarded species included: sole (MLS=24 cm), whiting (MLS=27 cm), and *Nephrops* (in OTB/OTT metiers), whereas less frequently caught and thus discarded fish species included brill, turbot, and cod (MLS=35 cm; Tables 5,6). In the length-frequency distributions, few plaice and sole above MLS were found within the discard samples (Fig. 3b,c), as opposed to cod and whiting which were also discarded regularly above marketable sizes (Fig. 3d,e); possibly due to quota caps. Above-MLS sized cod were discarded in particular in 100mm otter trawls in 2012 (second panel from the bottom right, Fig. 3d). The majority of discarded *Nephrops* were above MLS (2.5 cm carapax length; Fig. 3f).

Distinct catch patterns were evident for the different métiers. Table 5 shows average discard rates (in numbers and weight per hour) by metier for a selection of commercially-important species. Large-powered beam trawlers (TBB_DEF_70-99mm_>300hp) which target plaice and sole exhibit the highest discard rates of these species compared with other metiers. Some of the lowest rates were observed among the larger-meshed (100-119mm) segments of beam trawlers and Scottish seiners. But, as mentioned above (results, 'vessel selection and sampling allocation'), discard rates expressed as numbers/weights per hour for Scottish seiners may be misleading due to the different nature of their operation. However, their average towing durations are similar to bottom trawls (approx. 120 min).

For the last ten years, no remarkable/clear temporal trends in percentage discard rates of plaice are evident (Table 8). Overall, 49% of the plaice catch was being discarded by weight in 2012 (Table 8). For sole, the proportion of discards in relation to landings was similar to previous years, i.e. 17% by weights (Table 8). In the first two quarters of the year, discard rates of plaice were the highest for large-powered beam trawlers (70-99mm; Table 6b); without considering the time series of other years, a seasonal trend was not clearly evident in discard nor landings rates by any other metier (Table 6a,b). Discard rates of plaice in the TBB_DEF_100mm segment dropped in the second quarter (Table 6b).

For the small-powered beam trawlers (Eurocutters; TBB_DEF_70-99mm_≤300hp), which target plaice and sole, discard rates of plaice were higher compared with some of the previous years, but still lower in comparison with their large-powered counterparts (Table 5 and see also Helmond et al., 2011). The large-meshed beam trawlers (TBB_DEF_100-119mm) target mainly plaice with comparatively lower discard rates for many species compared with some of the other beam-trawl metiers (Table 5). Discard rates of dab were variable and decreased compared to last year (Table 5, Helmond et al., 2011).

The *Nephrops* fishery (OTB/OTT_MCD_70-99mm) targets *Nephrops*, but also lands plaice which occasionally makes up a greater proportion of the landings than *Nephrops*, which will give such a trip a metier classification accordingly (OTB/OTT_DEF_70-99mm). Otter-trawl fishery for demersal fish targeting plaice, has increased rates of *Nephrops* and whiting discards than the beam-trawl métiers. The large-mesh otter-trawl fishery (OTB/OTT_DEF_100-119mm) targets plaice and together with the large-mesh beam-trawl and Scottish seine fleet showed the highest landings rates for plaice, but with higher discard rate than these other two fleets (Table 5).

For all métiers, the majority of discards were comprised by benthic species, which clearly reflects the nature of bottom-trawl fisheries (Bergmann et al., 2002; Borges et al.,2005). The majority of discards were small fish caught under the MLS. Thus, logically discard rates are lower in métiers with larger-meshed gears (>100 mm). However, this difference may also (partly) be attributed to the use of large-meshed gears in the northern North Sea, where, for example, juvenile plaice is less abundant (Keeken et al., 2007; Poos et al., 2013). The method

of collecting a fraction of discards relies on a random selection of species and sizes spread over the full length of the sorting process. Given the fixed volume size of the sample per haul (max. two boxes, or 80 kg) it may be that rarer species are missed when the sample is taken.

Overall, discard and landing rates (in numbers and weights per hour) appear relatively stable over time although no detailed statistical analyses were carried out to confirm any trends among discard estimates of the available time series. This is at least the case for marketable and benthic species). However, the fact that this years (2012) observations were located within the ranges measured in previous years where métier-specific data were available (Table 8; Helmond and Overzee, 2010; Helmond et al., 2011) may be testimony to the quality and integrity of self-sampled data in comparison with traditional observer sampling.

For all, but the large-mesh otter trawlers weights of discarded fish and benthic invertebrates were greater than 50% of the total catch weight (Figure 4). Discarded fish were classified as either: plaice; dab; other flatfish (scaldfish, solenette, brill, flounder, lemon sole, long rough dab, megrim, Norwegian topknot, thickback sole, turbot, and witch); demersal roundfish (hooknose, lesser weaver, tub gurnard, lumpsucker), roundfish (cod, seabass, herring, whiting, mackerel, horse mackerel), sharks; and rays. In proportion to the catch, discards comprised the largest part for Eurokotters (Figure 4A).

3.3 Numbers and weights of discarded and/or landed species (fleet level)

Table 9 provides fleet-level raised discard and landings weights (in tonnes) for fish species included under the STECF data call. Based on the raised discard data provided to the STECF in 2013 (see Table 9), it was estimated that approximately 55 thousand tonnes (excl. invertebrates) were discarded by Dutch demersal fisheries in 2012; predominately by beam trawlers (45 thousand t), followed by otter trawlers (10 thousand t) and seiners (400 t). In total, it was estimated that annually between 800-950 thousand tonnes are being discarded by all active fisheries in the North Sea; which equates to 1/3 of the weight of total landings and 1/10 of biomass (Catchpole et al., 2005). The most discarded species were plaice, dab and sole. For plaice, the amount of landings was almost of the same order of magnitude than for the discards (Table 9).

Discard estimates are sensitive to small changes in the expansion or raising factor for discards (ratio between total and sampled fishing effort), a small change in these depending on which trips were included in either, can result in different estimated weight totals. In the discard monitoring programme, sampling effort is allocated in proportion to the total number of fishing days at sea for each metier. Following this rule, beam trawlers receive the most sampling. The number of beam trawlers with subtype gear within the fleet of vessels selected for the monitoring represents in proportion also the number of vessels with subtypes found within the total population of vessels in the TBB fleet. But still, sampling effort is low compared to the total fishing effort. Sampling effort is also not balanced, some metiers (i.e. TBB) receive more sampling than others. That means that if numbers are raised from trip to fleet level based on the ratio between total and sampled fishing effort extrapolations are made from possibly only very few observed trips. For example, if these few observations were made in an area which was different to where most of the unobserved fishing took place, extrapolations may be over- or underestimating discards.

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Tables

Table 1. List of Dutch bottom-trawl and seine métiers operating in the North Sea which are sampled for discards. These were classified according to European Union (EU) definitions (EU Council Regulation 409/2009) requiring information about gear type (i.e. demersal beam – TBB; otter trawl - OTB/OTT; and Scottish seine – SSC; level 4), target species assemblage (i.e. demersal fish - DEF, mixed crustaceans and demersal fish – MCD; level 5), and mesh size ranges (in mm; level 6).

	Level 4	**Level 5**	**Level 6**
	Gear type	**Target assemblage**	**Mesh size**
1	TBB (>300 hp)	DEF	70-99
2	TBB (≤300 hp)*	DEF	70-99
3	TBB	DEF	100-119
4	TBB	DEF	≥120
5	SSC	DEF	100-119
6	SSC	DEF	≥120
7	OTB/OTT**	MCD	70-99
8	OTB/OTT**	DEF	70-99
9	OTB/OTT**	DEF	100-119
10	OTB/OTT**	DEF	≥120

* Note that the TBB métier is further subdivided on a national level in the Netherlands based on engine size (horse power, hp): vessels with ≤ 300hp engine power are so called "Eurocutters".

** Otter and pair trawl gear type names were used together in the metier name (OTB/OTT), because in a logbook OTT gears can also be listed as OTB .

Table 2. Self-sampling methodology to sample total catch, discards and landings.

Method		Self sampling
SAMPLING		2 hauls/trip
TOTAL CATCH		
	Estimate: total catch volume	Onboard (all hauls)
DISCARDS		
	Collect: discard subsample	2 boxes onboard
	Sorting: discards by species	Laboratory
	Measuring: fish by species	Laboratory
	Counting: Invertebrates by species	Laboratory
	Sampling: Otoliths from discards	Laboratory
LANDINGS		
	Collect: landings subsample	None
	Measuring: fish by species	None
	Estimate: total landings	Onboard (all hauls)
OPERATIONAL/ENVIRONMENTAL PARAMETERS		
	Position of hauls, duration, weather, etc.	Onboard (all hauls)

Table 3. Summary of the total number of valid self-sampled trips per métier between 2009 and 2012.

Prog	Métier	2009	2010	2011	2012
self	TBB_DEF_70-99mm_>300hp	40	66	67	61
self	TBB_DEF_70-99mm_≤300hp	2	21	18	20
self	TBB_DEF_100-119mm	10	12	5	16
self	TBB_DEF__>=120mm	0	0	1	0
self	SSC_DEF_100-119mm	0	0	1	5
self	SSC_DEF_>=120mm	0	0	4	3
self	OTB/OTT_MCD_70-99mm	4	6	13	15
self	OTB/OTT_DEF_70-99mm	4	18	9	14
self	OTB/OTT_DEF_100-119mm	3	9	10	7
self	OTB/OTT_DEF_>=120mm	0	0	0	1
	Total	63	132	128	142

Table 4. Sampling and fleet effort, and sampling coverage (% days at sea, D.A.S) per self-sampled métier operating in the North Sea.

Métier	Year	Sampling effort D.A.S.	Fleet effort D.A.S	Sampling coverage (%) D.A.S
TBB_DEF_70-99mm_>300hp	2012	262	13450	2.0
	2011	283	16078	1.8
	2010	314	15743	2.0
	2009	191	15527	1.2
TBB_DEF_70-99mm_≤300hp	2012	89	3318	2.7
	2011	73	4030	1.8
	2010	76	3560	2.1
	2009	14	4268	0.3
TBB_DEF_100-119mm	2012	68	1216	5.6
	2011	18	502	3.6
	2010	51	455	11.2
	2009	48	529	9.1
TBB_DEF_≥120mm	2012	0	602	0.0
	2011	4	201	2.0
	2010	n/a	n/a	n/a
	2009	n/a	n/a	n/a
SSC_DEF_100-119mm	2012	19	430	4.4
	2011	3	372	0.8
	2010	n/a	n/a	n/a
	2009	n/a	n/a	n/a
SSC_DEF_≥120mm	2012	12	201	5.9
	2011	11	220	5.0
	2010	n/a	n/a	n/a
	2009	n/a	n/a	n/a
OTB/OTT_MCD_70-99mm	2012	62	1468	4.2
	2011	57	1345	4.2
	2010	32	1379	2.3
	2009	19	1240	1.5
OTB/OTT_DEF_70-99mm	2012	66	1162	5.7
	2011	44	1330	3.3
	2010	90	1766	5.1
	2009	23	1443	1.6
OTB/OTT_DEF_100-119mm	2012	28	1026	2.7
	2011	48	678	7.1
	2010	90	1766	5.1
	2009	19	1010	1.9
Total	2009-12	2114	96315	2.2

Table 5. Average weights (Wt; in kg) and numbers (Nb) per hour of discarded (Dis) and landed (Lan) commercially-important target species: dab (DAB), plaice (PLE), sole, (SOL), brill (BLL), turbot (TUR), cod, whiting (WHG) and Norway lobster (NEP) by métier in 2012. Nm, not measured (i.e. missing sufficient lengths measurements for discards of *Nephrops*, NEP, to apply length-weight keys). N, number of sampled trips.

	Métier	N	Dis DAB	Lan DAB	Dis PLE	Lan PLE	Dis SOL	Lan SOL	Dis BLL	Lan BLL	Dis TUR	Lan TUR	Dis COD	Lan COD	Dis WHG	Lan WHG	Dis NEP	Lan NEP
Wt	TBB_DEF_70-99mm_>300hp	61	63	8	87	90	6	29	0	3	0	5	1	3	6	2	0	1
	TBB_DEF_70-99mm_<=300h	20	52	11	39	7	7	14	0	1	1	1	0	3	<1	0	0	10
	TBB_DEF_100-119mm	16	27	19	53	332	0	1	0	2	0	9	0	2	0	0	0	1
	SSC_DEF_100-119mm	5	23	132	4	53	0	0	0	3	0	14	<1	48	0	0	0	0
	SSC_DEF_>=120mm	3	7	77	2	84	0	0	0	0	0	0	<1	214	7	0	0	0
	OTB/OTT_MCD_70-99mm	15	64	2	42	20	0	0	0	1	0	3	1	1	3	1	17	28
	OTB/OTT_DEF_70-99mm	14	36	6	52	54	0	6	0	2	0	2	0	4	3	2	9	14
	OTB/OTT_DEF_100-119mm	7	17	12	69	263	0	0	0	0	0	6	1	3	0	1	0	2
Nb	TBB_DEF_70-99mm_>300hp	61	1106	Nm	934	Nm	72	Nm	0	Nm	1	Nm	2	Nm	73	Nm	10	Nm
	TBB_DEF_70-99mm_<=300h	20	915	Nm	712	Nm	110	Nm	3	Nm	5	Nm	0	Nm	6	Nm	14	Nm
	TBB_DEF_100-119mm	16	310	Nm	410	Nm	1	Nm	0	Nm	0	Nm	0	Nm	1	Nm	1	Nm
	SSC_DEF_100-119mm	5	236	Nm	30	Nm	0	Nm	0	Nm	0	Nm	1	Nm	1	Nm	0	Nm
	SSC_DEF_>=120mm	3	56	Nm	17	Nm	0	Nm	0	Nm	0	Nm	2	Nm	46	Nm	0	Nm
	OTB/OTT_MCD_70-99mm	15	874	Nm	363	Nm	1	Nm	0	Nm	0	Nm	6	Nm	32	Nm	613	Nm
	OTB/OTT_DEF_70-99mm	14	505	Nm	492	Nm	4	Nm	0	Nm	0	Nm	2	Nm	27	Nm	442	Nm
	OTB/OTT_DEF_100-119mm	7	134	Nm	453	Nm	0	Nm	0	Nm	0	Nm	2	Nm	0	Nm	1	Nm

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Table 6a. Average weights (kg) per hour of discarded (Dis) and landed (Lan) commercially-important target species: dab (DAB), plaice (PLE), sole, (SOL), brill (BLL), turbot (TUR), cod, whiting (WHG) and Norway lobster (NEP) by métier and quarter (Q) in 2012. Nm, not measured (i.e. missing sufficient lengths measurements for discards of *Nephrops*, NEP, to apply length-weight keys).

Métier	Q	N	Dis DAB	Lan DAB	Dis PLE	Lan PLE	Dis SOL	Lan SOL	Dis BLL	Lan BLL	Dis TUR	Lan TUR	Dis COD	Lan COD	Dis WHG	Lan WHG	Dis NEP	Lan NEP
TBB_DEF_70-99mm_>300hp	1	13	56	10	74	104	2	21	0	3	0	4	0	5	7	3		1
TBB_DEF_70-99mm_>300hp	2	14	60	10	83	81	5	26	0	2	0	3	1	2	6	2	0	0
TBB_DEF_70-99mm_>300hp	3	16	80	7	98	83	6	31	0	2	0	5	0	1	3	0		1
TBB_DEF_70-99mm_>300hp	4	18	56	4	91	93	11	35	0	4	0	9	1	1	9	0		
TBB_DEF_70-99mm_<=300h	1	4	49	11	18	12	2	7	0	1	0	1	0	3	1	0		17
TBB_DEF_70-99mm_<=300h	2	7	38	19	19	8	6	13	1	1	1	1	0	3	0	0		2
TBB_DEF_70-99mm_<=300h	3	6	43	3	71	4	13	16	0	0	2	0	0	6	0		0	
TBB_DEF_70-99mm_<=300h	4	3	110	3	48	4	3	19	0		1		0		0		0	
TBB_DEF_100-119mm	1	4	24	7	80	236	0	1	0	0	0	3	1	2	0			1
TBB_DEF_100-119mm	2	9	20	7	38	279	0	1	0	4	0	11	0		0		0	
TBB_DEF_100-119mm	3	3	53	101	61	620	0		0		0	18	0		0		0	
SSC_DEF_100-119mm	2	3	30	29	4	38	0	0	0	3	0	14	0	54	0		0	
SSC_DEF_100-119mm	4	2	13	441	6	69	0		0		0		0	42	0			
SSC_DEF_>=120mm	3	3	7	77	2	84	0		0		0		0	214	7		0	
OTB/OTT_MCD_70-99mm	2	6	36	1	46	17	0	0	0	1	0	3	1	2	4	1		22
OTB/OTT_MCD_70-99mm	3	8	92	3	43	20	0	0	0	1	0	2	2	1	1			32
OTB/OTT_MCD_70-99mm	4	1	4	1	10	33	0	1	0	2	0	3	0	2	6	0		25
OTB/OTT_DEF_70-99mm	1	6	39	9	44	36	1	10	0	2	0	1	0	4	4	3		14
OTB/OTT_DEF_70-99mm	2	5	38	3	77	66	0	0	0	0	0	2	1	4	2	3		14
OTB/OTT_DEF_70-99mm	3	1	68	2	56	60	0	0	0	2	0	4	0		0			23
OTB/OTT_DEF_70-99mm	4	2	2	0	13	76	0	3	0	1	0	3	0	3	2	0		12
OTB/OTT_DEF_100-119mm	2	4	15	15	57	209	0		0	0	0	5	1	3	0	1		2
OTB/OTT_DEF_100-119mm	3	3	19	8	84	334	0		0	1	0	7	0	2	0			

Table 6b. Average numbers per hour of discarded (Dis) and landed (Lan) commercially-important target species: dab (DAB), plaice (PLE), sole, (SOL), brill (BLL), turbot (TUR), cod, whiting (WHG) and Norway lobster (NEP) by métier and quarter (Q) in 2012. Nm, not measured (i.e. missing sufficient lengths measurements for
12 discards of *Nephrops*, NEP, to apply length-weight keys).

Métier	Q	N	Dis DAB	Lan DAB	Dis PLE	Lan PLE	Dis SOL	Lan SOL	Dis BLL	Lan BLL	Dis TUR	Lan TUR	Dis COD	Lan COD	Dis WHG	Lan WHG	Dis NEP	Lan NEP
TBB_DEF_70-99mm_>300hp	1	13	956	Nm	962	Nm	31	Nm	1	Nm	1	Nm	3	Nm	87	Nm	3	Nm
TBB_DEF_70-99mm_>300hp	2	14	1074	Nm	1059	Nm	59	Nm	0	Nm	1	Nm	4	Nm	73	Nm	0	Nm
TBB_DEF_70-99mm_>300hp	3	16	1366	Nm	950	Nm	60	Nm	0	Nm	2	Nm	1	Nm	27	Nm	18	Nm
TBB_DEF_70-99mm_>300hp	4	18	1006	Nm	804	Nm	121	Nm	0	Nm	0	Nm	1	Nm	105	Nm	16	Nm
TBB_DEF_70-99mm_<=300h	1	4	804	Nm	245	Nm	31	Nm	1	Nm	0	Nm	0	Nm	14	Nm	67	Nm
TBB_DEF_70-99mm_<=300h	2	7	582	Nm	282	Nm	97	Nm	9	Nm	3	Nm	0	Nm	5	Nm	2	Nm
TBB_DEF_70-99mm_<=300h	3	6	881	Nm	1316	Nm	205	Nm	0	Nm	10	Nm	0	Nm	4	Nm	0	Nm
TBB_DEF_70-99mm_<=300h	4	3	1911	Nm	1130	Nm	53	Nm	0	Nm	4	Nm	0	Nm	0	Nm	0	Nm
TBB_DEF_100-119mm	1	4	278	Nm	621	Nm	1	Nm	0	Nm	0	Nm	2	Nm	1	Nm	3	Nm
TBB_DEF_100-119mm	2	9	231	Nm	315	Nm	1	Nm	0	Nm	0	Nm	0	Nm	1	Nm	0	Nm
TBB_DEF_100-119mm	3	3	588	Nm	413	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
SSC_DEF_100-119mm	2	3	315	Nm	28	Nm	0	Nm	0	Nm	0	Nm	1	Nm	2	Nm	0	Nm
SSC_DEF_100-119mm	4	2	118	Nm	34	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	1	Nm
SSC_DEF_>=120mm	3	3	56	Nm	17	Nm	0	Nm	0	Nm	0	Nm	2	Nm	46	Nm	0	Nm
OTB/OTT_MCD_70-99mm	2	6	598	Nm	406	Nm	0	Nm	0	Nm	1	Nm	6	Nm	43	Nm	524	Nm
OTB/OTT_MCD_70-99mm	3	8	1181	Nm	368	Nm	2	Nm	0	Nm	0	Nm	7	Nm	15	Nm	562	Nm
OTB/OTT_MCD_70-99mm	4	1	65	Nm	58	Nm	0	Nm	0	Nm	0	Nm	0	Nm	105	Nm	1561	Nm
OTB/OTT_DEF_70-99mm	1	6	561	Nm	513	Nm	9	Nm	0	Nm	0	Nm	2	Nm	32	Nm	361	Nm
OTB/OTT_DEF_70-99mm	2	5	572	Nm	627	Nm	1	Nm	0	Nm	0	Nm	2	Nm	21	Nm	329	Nm
OTB/OTT_DEF_70-99mm	3	1	790	Nm	479	Nm	2	Nm	0	Nm	0	Nm	0	Nm	3	Nm	60	Nm
OTB/OTT_DEF_70-99mm	4	2	29	Nm	98	Nm	0	Nm	0	Nm	0	Nm	0	Nm	37	Nm	1155	Nm
OTB/OTT_DEF_100-119mm	2	4	145	Nm	395	Nm	0	Nm	0	Nm	0	Nm	3	Nm	1	Nm	1	Nm
OTB/OTT_DEF_100-119mm	3	3	119	Nm	531	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	1	Nm

Table 7a. Average numbers per hour of discarded benthic species in Dutch bottom beam-trawl (TBB) and Scottish seine (SSC) fisheries targeting demersal fish (DEF) in the North Sea in 2012.

Métier Mesh size Species	TBB_DEF 70-99	TBB_DEF* 70-99	TBB_DEF 100-119	SSC_DEF 100-119	SSC_DEF >120
Abra alba	0	3	0	0	0
Acanthocardia echinata	39	0	8	0	0
Aequipecten opercularis	49	<1	<1	0	3
Alcyonidium diaphanum	4	<1	3	0	0
Alcyonium digitatum	66	0	3	2	189
Anthozoa	4	3	<1	7	0
Aphrodita aculeata	103	4	83	0	4
Arctica islandica	8	0	5	0	3
Ascidiacea	0	0	0	0	0
Ascidiella aspersa	0	0	0	0	0
Ascidiella scabra	13	0	0	0	0
Asterias rubens	1053	2764	211	9	1
Astropecten irregularis	6286	6	1234	<1	0
Atelecyclus rotundatus	<1	0	0	<1	0
Buccinum undatum	44	<1	28	<1	5
Cancer pagurus	6	6	6	2	4
Carcinus maenas	<1	19	0	0	0
Cephalopoda	0	0	<1	0	0
Chamelea gallina	<1	189	<1	0	0
Ciona intestinalis	<1	1	0	12	0
Colus gracilis	<1	0	0	0	0
Colus islandicus	0	0	0	0	0
Common mussel	6	1	0	0	0
Common shrimp	52	206	0	0	0
Corystes cassivelaunus	136	41	63	<1	0
Crepidula fornicata	1	0	0	0	0
Donax vittatus	<1	14	0	0	0
Dosima fascicularis	0	0	1	0	0
Dosinia exoleta	1	0	<1	0	0
Dosinia sp.	0	3	0	0	0
Echinidae	28	0	<1	0	0
Echinocardium cordatum	846	134	13	<1	0
Echinocardium sp.	0	0	0	0	0
Echiurus echiurus	0	0	0	0	0
Ectopleura larynx	6	2	0	0	0
Ensis sp.	<1	0	<1	0	0
Euspira pulchella	29	142	2	0	0
Flustra foliacea	1	<1	4	2	0
Gari fervensis	<1	0	<1	0	0
Geryon tridens	0	0	0	0	0

Goneplax rhomboides	29	<1	0	0	0
Halichondria panicea	124	0	11	0	0
Hyas sp.	4	0	0	0	0
Laevicardium crassum	<1	0	<1	0	0
Liocarcinus depurator	120	92	4	1	0
Liocarcinus holsatus	761	2251	58	2	0
Liocarcinus marmoreus	42	4	0	0	0
Liocarcinus navigator	0	<1	0	0	0
Liocarcinus pusillus	3	22	0	0	7
Lithodes maja	0	0	0	<1	0
Loligo forbesi	<1	0	<1	0	0
Loligo sp.	<1	0	<1	0	0
Loligo subulata	2	3	0	12	0
Loligo vulgaris	<1	0	0	0	4
Luidia sarsi	1	0	0	0	0
Luidia sp.	0	0	<1	0	0
Lutraria lutraria	0	3	0	0	0
Macropodia rostrata	<1	0	0	0	0
Mactra corallina	12	1	3	0	0
Mactra sp.	<1	0	0	0	0
Marthasterias glacialis	0	0	0	<1	0
Modiolus modiolus	0	0	0	0	0
Mya sp.	0	0	0	0	0
Mya truncata	<1	0	<1	0	0
Nassarius incrassatus	0	16	0	0	0
Nassarius reticlatus	<1	549	0	0	0
Necora puber	21	1	0	0	0
Nemertesia antennina	<1	0	0	0	0
Nemertesia sp.	2	0	0	0	0
Neptunea antiqua	3	0	3	<1	5
Nereis sp.	0	0	0	0	0
Octopus vulgaris	0	0	0	0	0
Ophiothrix fragilis	102	0	14	0	0
Ophiura albida	63	1243	0	0	0
Ophiura ophiura	1249	10206	26	0	0
Pagurus bernhardus	287	818	88	4	4
Pagurus sp.	0	0	29	0	0
Palliolum tigerinum	0	0	0	0	2
Pecten maximus	<1	0	<1	0	0
Pilumnus hirtellus	0	0	<1	0	0
Pisidia longicornis	<1	0	<1	0	0
Psammechinus miliaris	285	21	<1	7	<1
Rossia macrosoma	<1	0	0	0	0
Scalibregma inflatum	5	<1	1	0	<1

Scaphander lignarius	<1	0	2	0	0
Scrobicularia plana	<1	<1	0	0	0
Sepia officinalis	2	2	0	0	0
Sepia sp.	<1	0	0	0	0
Sepiola sp.	<1	0	0	0	0
Sipunculidae	<1	0	0	0	0
Solen marginatus	1	43	<1	<1	0
Spatangus purpureus	7	0	<1	0	0
Spisula elliptica	<1	0	1	0	0
Spisula solida	<1	0	0	0	0
Spisula sp.	7	169	<1	0	0
Troschelia berniciensis	1	0	0	0	0
Turritella communis	<1	0	0	0	0
Venerupis corrugata	<1	0	0	0	0

*≤300 hp segment

Table 7b. Average numbers per hour of discarded non-target fish species in Dutch bottom beam-trawl (TBB) and Scottish seine (SSC) fisheries targeting demersal fish (DEF) in the North Sea in 2012.

Métier Mesh size Species	TBB_DEF 70-99	TBB_DEF* 70-99	TBB_DEF 100-119	SSC_DEF 100-119	SSC_DEF >120
Ammodytes sp.	18	25	21	<1	0
Anglerfish	<1	0	0	1	<1
Argentina	0	0	0	0	0
Bib	14	2	0	0	0
Blonde ray	<1	<1	0	0	0
Bull-rout	14	51	3	<1	0
Cuckoo ray	0	0	0	13	0
Dragonet	60	52	6	<1	0
Five-bearded rockling	<1	0	0	0	0
Flounder	10	27	1	3	0
Four-bearded rockling	9	1	0	0	0
Garfish	<1	0	0	0	0
Greater pipefish	0	11	0	0	0
Greater sand-eel	8	12	1	0	0
Greater weever	<1	0	0	0	0
Grey gurnard	41	24	30	317	307
Haddock	0	0	<1	3	29
Hake	0	0	0	6	7
Herring	7	2	<1	<1	3
Hooknose	19	22	2	<1	0
Horse mackerel	3	0	0	31	<1
John Dory	<1	0	0	0	0
Lemon sole	53	4	15	7	4
Lesser sand-eel	0	0	0	0	0
Lesser spotted dogfish	12	1	0	1	0
Lesser weever	25	5	1	2	0
Ling	<1	0	<1	0	<1
Long rough dab	3	2	3	4	10
Lumpsucker	<1	0	<1	0	0
Mackerel	0	0	<1	3	0
Mustelus sp.	1	0	0	1	0
Norway pout	0	0	0	0	47
Norwegian topknot	1	0	0	0	0
Pollack	0	0	0	<1	27
Pomatoschistus sp.	4	36	0	0	0
Poor cod	4	0	0	1	0
Raja sp.	<1	0	0	0	0
Red gurnard	5	0	0	0	0
Reticulated dragonet	2	9	0	0	0

Roker	3	0	3	0	0
Sand goby	<1	0	0	0	0
Scaldfish	104	170	7	<1	1
Sea bass	<1	0	0	0	0
Sea scorpion	<1	7	0	0	0
Sea-snail	<1	0	0	0	0
Smoothhound	<1	0	0	0	0
Snake blenny	0	0	0	0	0
Snake pipefish	0	<1	0	0	0
Solenette	81	134	10	0	0
Spotted ray	5	1	<1	1	0
Sprat	1	<1	0	0	0
Spurdog	0	0	0	1	0
Starry ray	1	0	3	7	21
Striped red mullet	1	13	0	0	0
Thickback sole	1	<1	0	0	0
Tub gurnard	22	17	<1	42	0
Twaite shad	0	0	0	0	0
Witch	0	0	<1	<1	0

*≤300 hp segment

Table 7c. Average numbers per hour of discarded benthic species in Dutch bottom otter-trawl (OTB) fisheries targeting mixed crustaceans and fish (MCD) and demersal fish (DEF) in the North Sea in 2012.

Métier Mesh size Species	OTB_MCD 70-99	OTB_DEF 70-99	OTB_DEF 100-119
Abra alba	0	0	0
Acanthocardia echinata	<1	1	<1
Aequipecten opercularis	<1	1	<1
Alcyonidium diaphanum	2	<1	23
Alcyonium digitatum	2	3	4
Anthozoa	<1	<1	<1
Aphrodita aculeata	71	33	6
Arctica islandica	1	<1	<1
Ascidiacea	0	0	0
Ascidiella aspersa	0	0	0
Ascidiella scabra	0	0	0
Asterias rubens	189	139	15
Astropecten irregularis	30	23	4
Atelecyclus rotundatus	0	0	0
Buccinum undatum	5	8	7
Cancer pagurus	9	2	<1
Carcinus maenas	<1	0	0
Cephalopoda	0	0	0
Chamelea gallina	<1	0	0
Ciona intestinalis	0	0	0
Colus gracilis	<1	<1	0
Colus islandicus	0	<1	0
Common mussel	0	2	<1
Common shrimp	0	3	0
Corystes cassivelaunus	8	3	2
Crepidula fornicata	0	<1	0
Donax vittatus	0	0	0
Dosima fascicularis	0	0	0
Dosinia exoleta	0	0	0
Dosinia sp.	0	0	0
Echinidae	0	0	0
Echinocardium cordatum	6	10	0
Echinocardium sp.	0	0	0
Echiurus echiurus	<1	0	0
Ectopleura larynx	0	<1	0
Ensis sp.	0	0	0
Euspira pulchella	0	0	0
Flustra foliacea	<1	1	0
Gari fervensis	0	0	<1

Geryon tridens	2	0	0
Goneplax rhomboides	10	7	0
Halichondria panicea	5	8	12
Hyas sp.	<1	<1	0
Laevicardium crassum	0	<1	0
Liocarcinus depurator	96	90	<1
Liocarcinus holsatus	54	157	1
Liocarcinus marmoreus	0	7	0
Liocarcinus navigator	0	0	0
Liocarcinus pusillus	0	0	0
Lithodes maja	<1	<1	0
Loligo forbesi	<1	<1	0
Loligo sp.	0	0	0
Loligo subulata	3	0	0
Loligo vulgaris	<1	<1	0
Luidia sarsi	0	<1	0
Luidia sp.	0	0	0
Lutraria lutraria	0	0	0
Macropodia rostrata	0	0	0
Mactra corallina	0	0	0
Mactra sp.	0	0	0
Marthasterias glacialis	0	0	0
Modiolus modiolus	0	0	0
Mya sp.	<1	0	0
Mya truncata	<1	<1	<1
Nassarius incrassatus	0	0	0
Nassarius reticlatus	0	0	0
Necora puber	<1	<1	0
Nemertesia antennina	0	0	0
Nemertesia sp.	0	0	0
Neptunea antiqua	5	5	6
Nereis sp.	0	0	<1
Octopus vulgaris	0	0	<1
Ophiothrix fragilis	2	3	10
Ophiura albida	14	<1	<1
Ophiura ophiura	<1	89	<1
Pagurus bernhardus	58	67	9
Pagurus sp.	0	0	0
Palliolum tigerinum	0	0	0
Pecten maximus	0	0	<1
Pilumnus hirtellus	0	0	0
Pisidia longicornis	<1	<1	0
Psammechinus miliaris	<1	2	<1
Rossia macrosoma	2	0	0

Scalibregma inflatum	<1	<1	0
Scaphander lignarius	0	0	0
Scrobicularia plana	0	0	0
Sepia officinalis	<1	0	0
Sepia sp.	0	0	0
Sepiola sp.	0	<1	0
Sipunculidae	0	0	0
Solen marginatus	0	0	<1
Spatangus purpureus	0	0	0
Spisula elliptica	0	0	0
Spisula solida	0	0	0
Spisula sp.	<1	<1	0
Troschelia berniciensis	0	0	0
Turritella communis	0	0	0
Venerupis corrugata	0	0	0

Table 7d. Average numbers per hour of discarded non-target fish species in Dutch bottom otter-trawl (OTB) fisheries targeting mixed crustaceans and fish (MCD) and demersal fish (DEF) in the North Sea in 2012.

Métier Mesh size Species	OTB_MCD 70-99	OTB_DEF 70-99	OTB_DEF 100-119
Ammodytes sp.	<1	1	<1
Anglerfish	0	0	0
Argentina	0	0	0
Bib	0	<1	0
Blonde ray	0	<1	0
Bull-rout	5	6	<1
Cuckoo ray	0	0	0
Dragonet	15	4	<1
Five-bearded rockling	0	0	0
Flounder	<1	4	<1
Four-bearded rockling	5	3	0
Garfish	0	0	0
Greater pipefish	0	0	0
Greater sand-eel	0	1	0
Greater weever	0	0	0
Grey gurnard	110	75	12
Haddock	1	1	<1
Hake	0	<1	0
Herring	0	2	0
Hooknose	<1	1	<1
Horse mackerel	<1	0	1
John Dory	0	0	0
Lemon sole	12	8	13
Lesser sand-eel	0	0	0
Lesser spotted dogfish	2	<1	<1
Lesser weever	0	1	0
Ling	0	0	0
Long rough dab	25	15	5
Lumpsucker	0	0	<1
Mackerel	1	0	2
Mustelus sp.	<1	0	<1
Norway pout	0	0	0
Norwegian topknot	<1	1	0
Pollack	0	0	0
Pomatoschistus sp.	<1	<1	0
Poor cod	<1	0	0
Raja sp.	0	0	0

Red gurnard	<1	0	0
Reticulated dragonet	<1	<1	0
Roker	0	2	0
Sand goby	0	0	0
Scaldfish	8	12	0
Sea bass	0	0	0
Sea scorpion	0	0	0
Sea-snail	0	0	0
Smoothhound	0	0	0
Snake blenny	0	<1	0
Snake pipefish	0	0	0
Solenette	4	3	<1
Spotted ray	<1	1	0
Sprat	0	0	0
Spurdog	0	0	0
Starry ray	6	3	15
Striped red mullet	1	0	0
Thickback sole	0	0	0
Tub gurnard	3	1	1
Twaite shad	0	<1	0
Witch	1	1	<1

Table 8. Average weights (kg) and numbers per hour of landed (L) and discarded (D) plaice (PLE) and sole (SOL, top) and dab (DAB) and whiting (WHG, bottom) in the North Sea beam-trawl fisheries (TBB_DEF_70-99mm_>300hp) between 1976 and 2012. Nm, not measured; n/a, not available.

				PLE						SOL			
Year /		Numbers			Weight			Numbers			Weight		
Period	N trips	L	D	%D	L	D	%D	L	D	%D	L	D	%D
1976-1979	21	253	185	42%	108	28	20%	116	8	6%	32	1	4%
1980-1983	24	309	418	57%	99	51	34%	85	24	22%	19	3	15%
1989-1990	6	392	330	46%	104	46	30%	286	83	22%	48	12	20%
1999	3	145	181	55%	42	18	29%	112	16	13%	32	2	5%
2000	12	194	601	76%	50	47	48%	90	25	22%	22	2	10%
2001	4	364	1184	76%	84	89	51%	82	17	17%	17	1	6%
2002	6	263	868	77%	69	71	51%	126	38	23%	18	3	13%
2003	9	196	945	83%	52	70	57%	95	32	25%	20	3	14%
2004	8	158	792	83%	42	57	57%	175	69	28%	31	7	17%
2005	8	143	710	83%	47	51	52%	99	29	23%	20	2	11%
2006	9	166	997	86%	57	67	54%	64	26	29%	16	2	13%
2007	10	214	700	77%	67	57	46%	94	27	23%	22	2	10%
2008	10	169	902	84%	61	69	53%	95	16	16%	23	1	6%
2009	48	189	917	83%	61	76	55%	113	34	23%	25	3	11%
2010	74	201	872	81%	82	68	45%	132	42	24%	22	4	14%
2011	67	Nm	921	n/a	72	85	54%	Nm	50	n/a	23	5	18%
2012	61	Nm	934	n/a	90	87	49%	Nm	72	n/a	29	6	17%

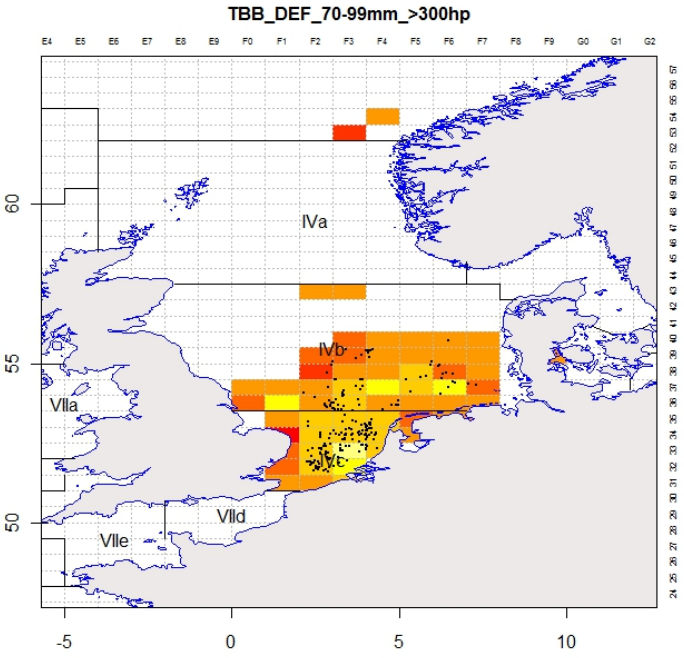
				DAB						WHG			
Year /		Numbers			Weight			Numbers			Weight		
Period	N trips	L	D	%D	L	D	%D	L	D	%D	L	D	%D
1976-1979	21	12	917	99%	4	65	95%	10	34	78%	3	5	62%
1980-1983	24	31	796	96%	7	60	90%	21	89	81%	5	11	69%
1989-1990	6	15	2147	99%	2	123	98%	5	122	96%	1	17	95%
1999	3	112	1411	93%	13	106	89%	Nm	77	n/a	<1	10	93%
2000	12	28	951	97%	6	49	89%	Nm	117	n/a	2	9	85%
2001	4	125	2268	95%	12	97	89%	Nm	69	n/a	1	9	86%
2002	6	92	934	91%	11	57	84%	14	104	88%	1	7	85%
2003	9	60	1166	95%	8	64	89%	2	40	96%	<1	3	86%
2004	8	54	1037	95%	7	51	87%	0	46	100%	<1	2	92%
2005	8	25	492	95%	6	52	90%	3	18	85%	<1	2	85%
2006	9	46	2335	98%	9	79	90%	Nm	36	n/a	<1	3	74%
2007	10	81	1196	94%	12	62	83%	0	10	100%	<1	3	87%
2008	10	51	905	95%	8	49	87%	0	15	100%	<1	3	93%
2009	48	31	1221	98%	33	62	65%	Nm	58	n/a	<1	5	89%
2010	74	48	1178	96%	10	65	87%	Nm	70	n/a	1	5	82%
2011	67	Nm	1350	n/a	12	74	86%	Nm	54	n/a	3	4	57%
2012	61	Nm	1106	n/a	8	63	89%	Nm	73	n/a	2	6	75%

Table 9. Estimated totals of discard and landings weights (in tonnes) per metier for species requested under the STECF data call in 2013 (species list based on Appendix 7 of Council Regulation No. 2298/2003). Weights were raised from trip to fleet level based on the ratio between total and sampled fishing effort. It should thus be noted that extrapolations were made from possibly only very few observed trips.

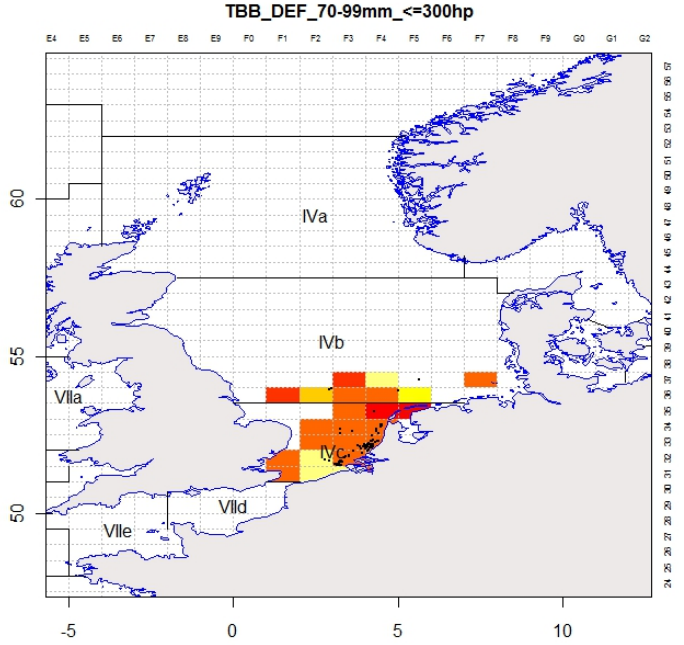
		TBB_70-99mm		TBB_100-119mm		OTB/OTT_70-99mm		OTB/OTT_100-119mm		SSC_DEF_100-119mm		SSC_DEF_>=120mm			
Common name	ICES Code	Dis	Lan	Dis	Lan	Dis	Lan	Dis	Lan	Dis	Lan	Dis	Lan	Total Discards	Total landings
Sea bass	BSS	17.4	79.0	0	0	0	6.8	0	<1	0	3.3	0	0	17.4	89.1
Cod	COD	113.1	799.9	0	13.1	52.1	106.2	2.6	60.4	<1	115.3	1.2	998.0	169	2092.9
Dab	DAB	16330.9	2454.7	227.8	213.1	3420.2	99.0	66.0	137.1	134.2	723.2	24.4	113.0	20203.5	3740.1
Spurdog	DGS	0	<1	0	<1	0	0	0	<1	1.6	<1	0	0	1.6	1.1
Haddock	HAD	0	<1	0	0	4.5	3.3	<1	19.3	2.4	65.7	32.3	206.1	39.2	294.4
Hake	HKE	0	<1	0	2.8	<1	16.4	0	8.9	6.0	8.0	25.9	34.0	31.9	70.1
Lemon sole	LEM	753.1	221.2	8.5	73.5	67.8	20.8	6.5	179.1	1.8	9.3	1.9	20.0	839.6	523.9
Ling	LIN	<1	0	0	<1	0	<1	0	<1	0	<1	2.1	<1	2.1	0.5
Mackerel	MAC	0	<1	<1	0	2.0	113.6	1.6	<1	2.8	198.3	0	2.0	6.4	313.9
Norway lobster	NEP	79.9	29.1	0	<1	830.0	1003.6	0.3	12.2	<1	0	0	0	910.3	1044.9
Plaice	PLE	20473.9	17959.6	512.3	5447.4	2434.4	1463.3	275.6	3124.1	16.4	561.3	9.9	338.0	23722.5	28893.7
Pollack	POL	0	<1	0	0	0	0	0	<1	<1	<1	20.7	1.0	20.7	1.5
Sole	SOL	1775.2	8546.6	1.0	25.9	8.2	15.4	0	<1	0	0	0	<1	1784.4	8587.9
Turbot	TUR	92.2	1369.3	1.3	94.1	1.8	102.7	0	80.2	0	5.7	0	3.0	95.3	1655
Whiting	WHG	1460.0	248.4	<1	<1	125.6	80.3	<1	10.3	<1	38.8	21.9	3.0	1607.5	380.8

Figures

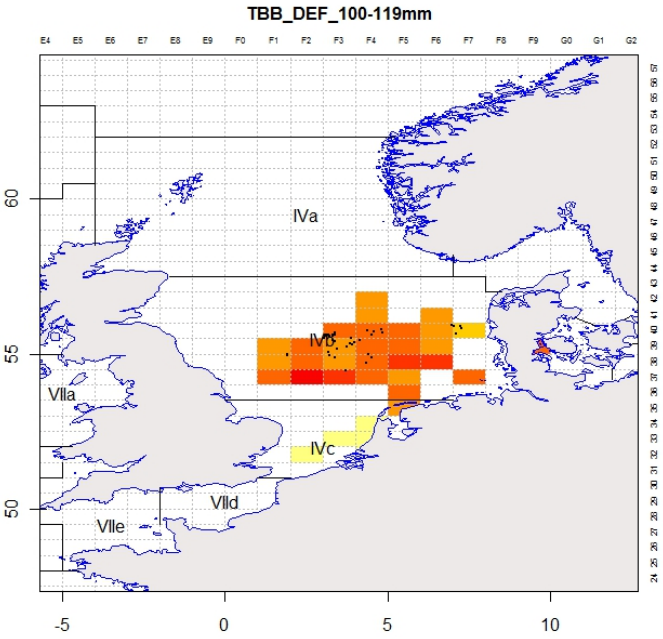
A)


TBB_DEF_70-99mm_>300hp
E4 E5 E6 E7 E8 E9 F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 G0 G1 G2
IVa
IVb
IVc
VIIa
VIId
VIIe
60
55
50
-5
0
5
10

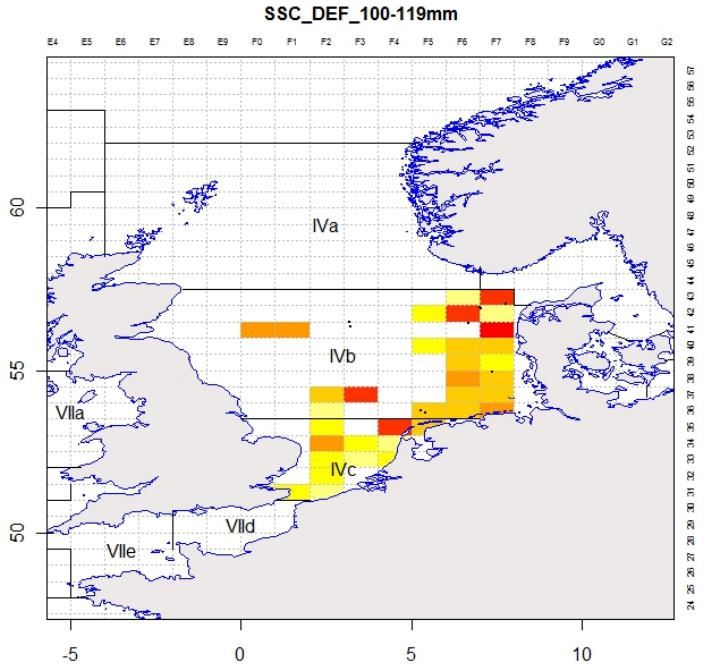
B)


TBB_DEF_70-99mm_<=300hp
E4 E5 E6 E7 E8 E9 F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 G0 G1 G2
IVa
IVb
IVc
VIIa
VIId
VIIe
60
55
50
-5
0
5
10

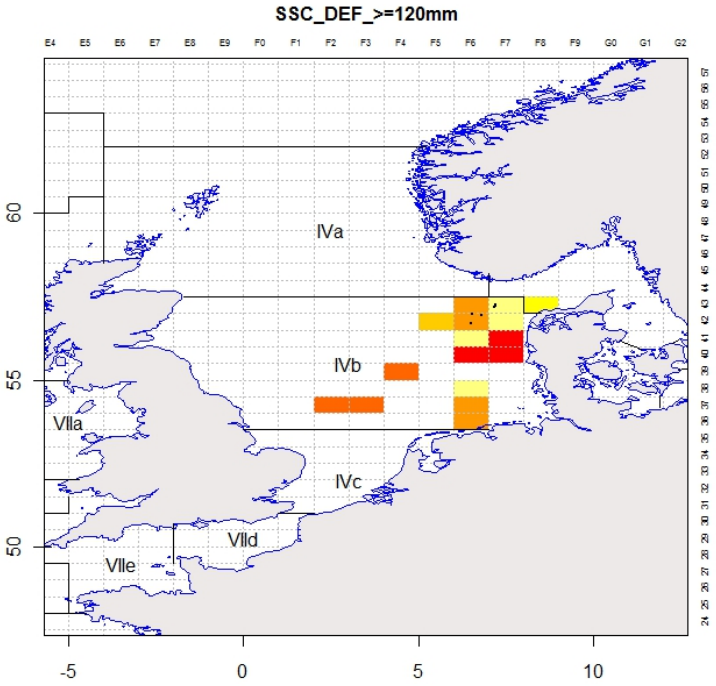
C)


TBB_DEF_100-119mm
E4 E5 E6 E7 E8 E9 F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 G0 G1 G2
60
55
50
IVa
IVb
IVc
VIIa
VIId
VIIe
-5
0
5
10

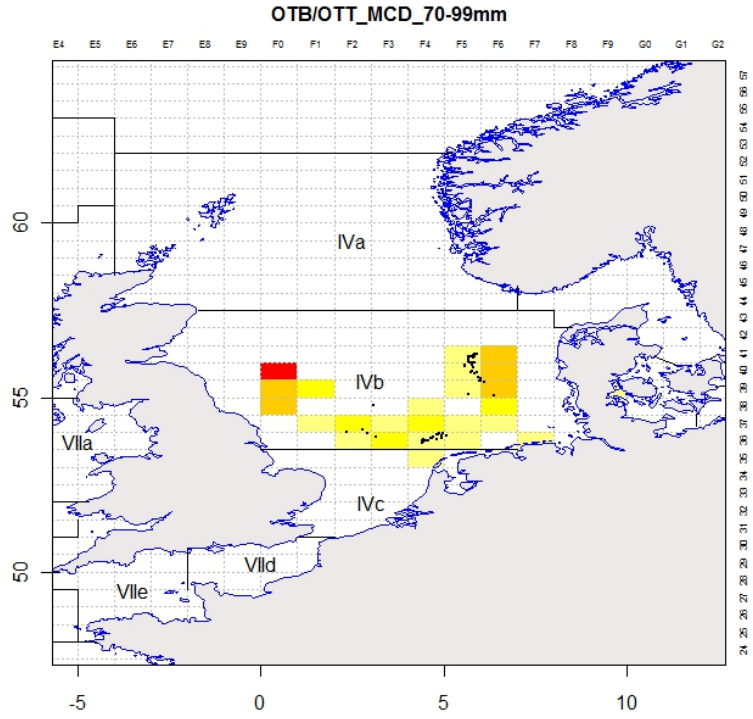
D)


SSC_DEF_100-119mm
IVa
IVb
VIIa
IVc
VIId
VIIe
60
55
50
-5
0
5
10

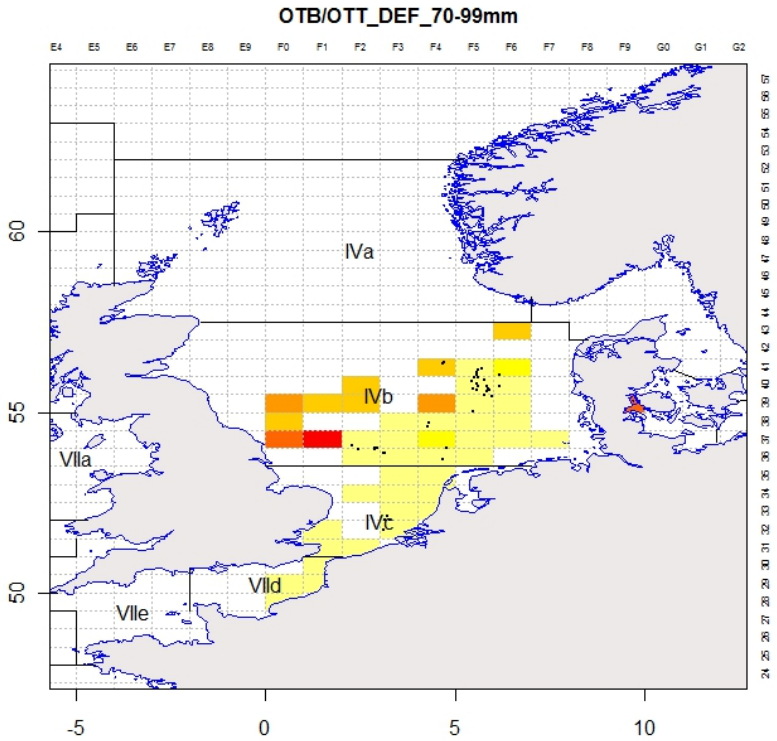
E)


SSC_DEF_>=120mm
IVa
IVb
VIIa
IVc
VIId
VIIe
60
55
50
-5
0
5
10

F)


OTB/OTT_MCD_70-99mm
E4 E5 E6 E7 E8 E9 F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 G0 G1 G2
60
55
50
IVa
IVb
IVc
VIIa
VIId
VIIe
-5
0
5
10

G)


OTB/OTT_DEF_70-99mm
E4 E5 E6 E7 E8 E9 F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 G0 G1 G2
60
55
50
IVa
IVb
IVc
VIIa
VIId
VIIe
-5
0
5
10

H)

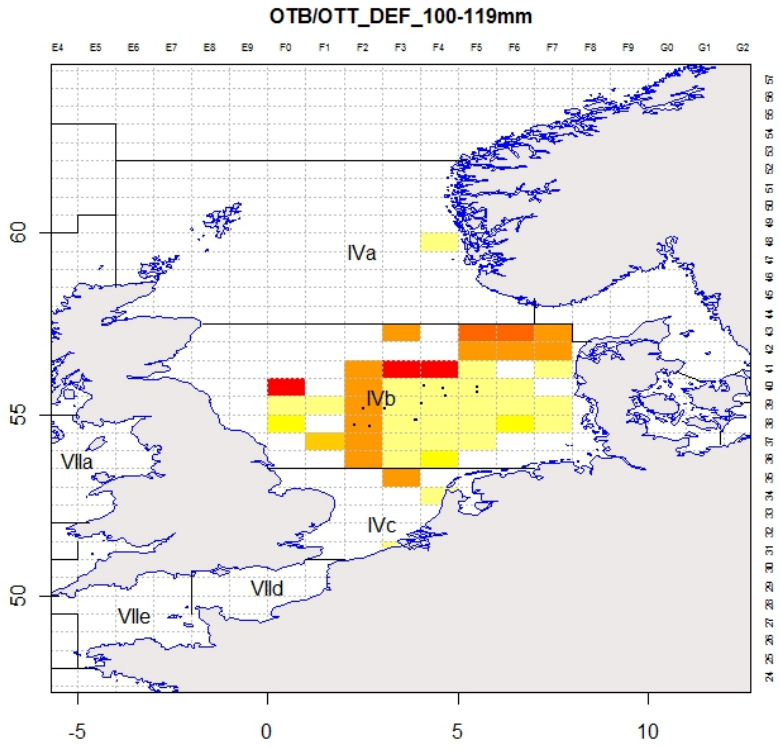
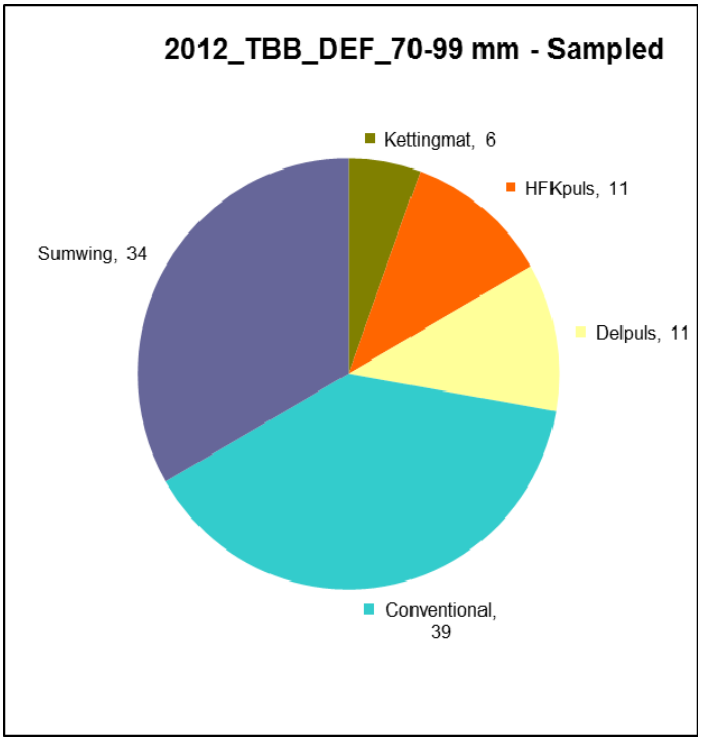


Figure 1. Distribution of total effort (in kw*days at sea, shaded colours – 'heat maps' indicate relative differences in effort per ICES rectangle; darker shades indicate higher intensity of fishing effort) and positions of sampled trawls (black dots) of A) beam trawlers with 70-99 mm mesh and horse power >300; B) beam trawlers 70-99 mm mesh and horse power <300; C) beam trawlers with 100-119 mm mesh; D) Scottish seiners with 100-119 mm mesh; E) Scottish seiners with >120 mm mesh; F) otter trawlers with 70-99 mm mesh targeting Nephrops; G) otter trawlers with 70-99 mm mesh targeting demersal fish; H) otter trawlers with 100-119 mm mesh in 2013.

A)



B)

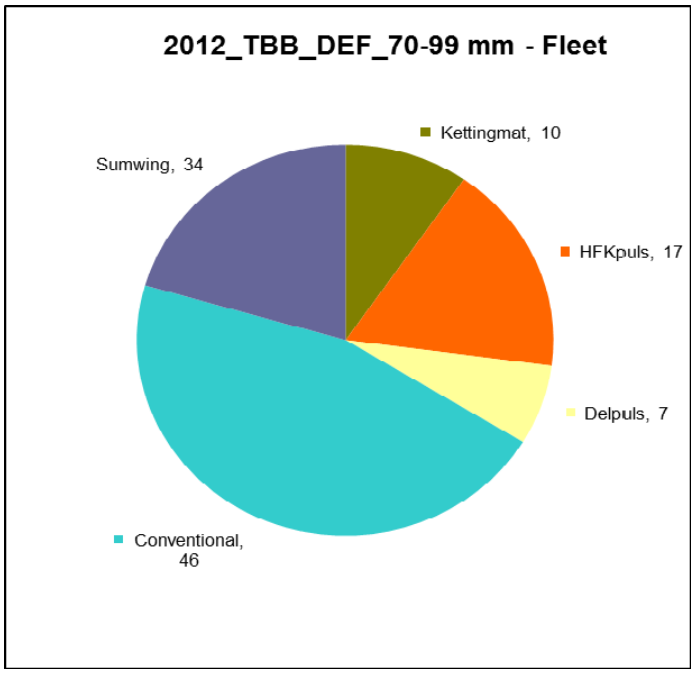
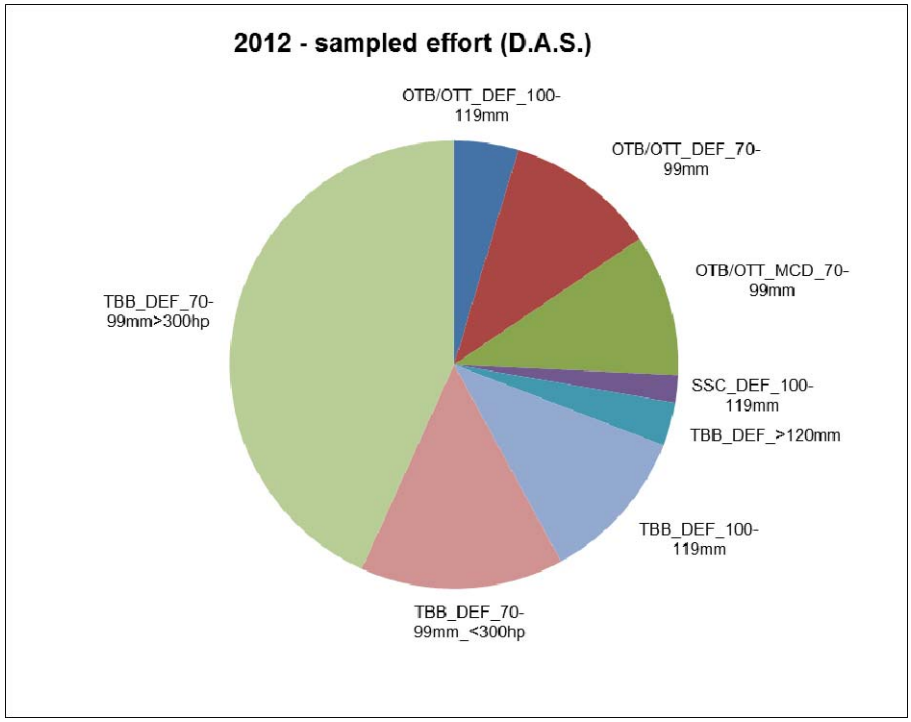


Figure 2. A) composition of sampled beam trawl gear subtypes (i.e. sumwings, chain mats/'kettingmat'; HFK- and Delpuls manufactured electric trawl gears) in relation to conventional configurations. B) composition of subtypes in relation to conventional gears in the Dutch beam-trawl fleet.



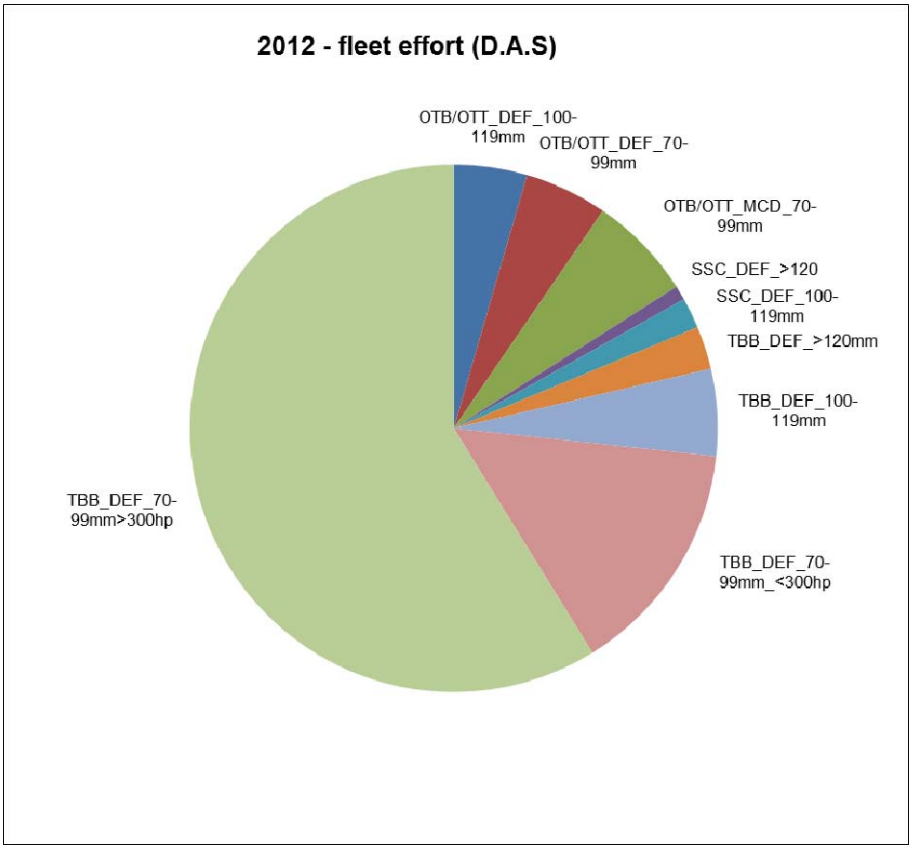


Figure 3. Composition of total fleet and sampled effort per métier in days at sea (D.A.S.).

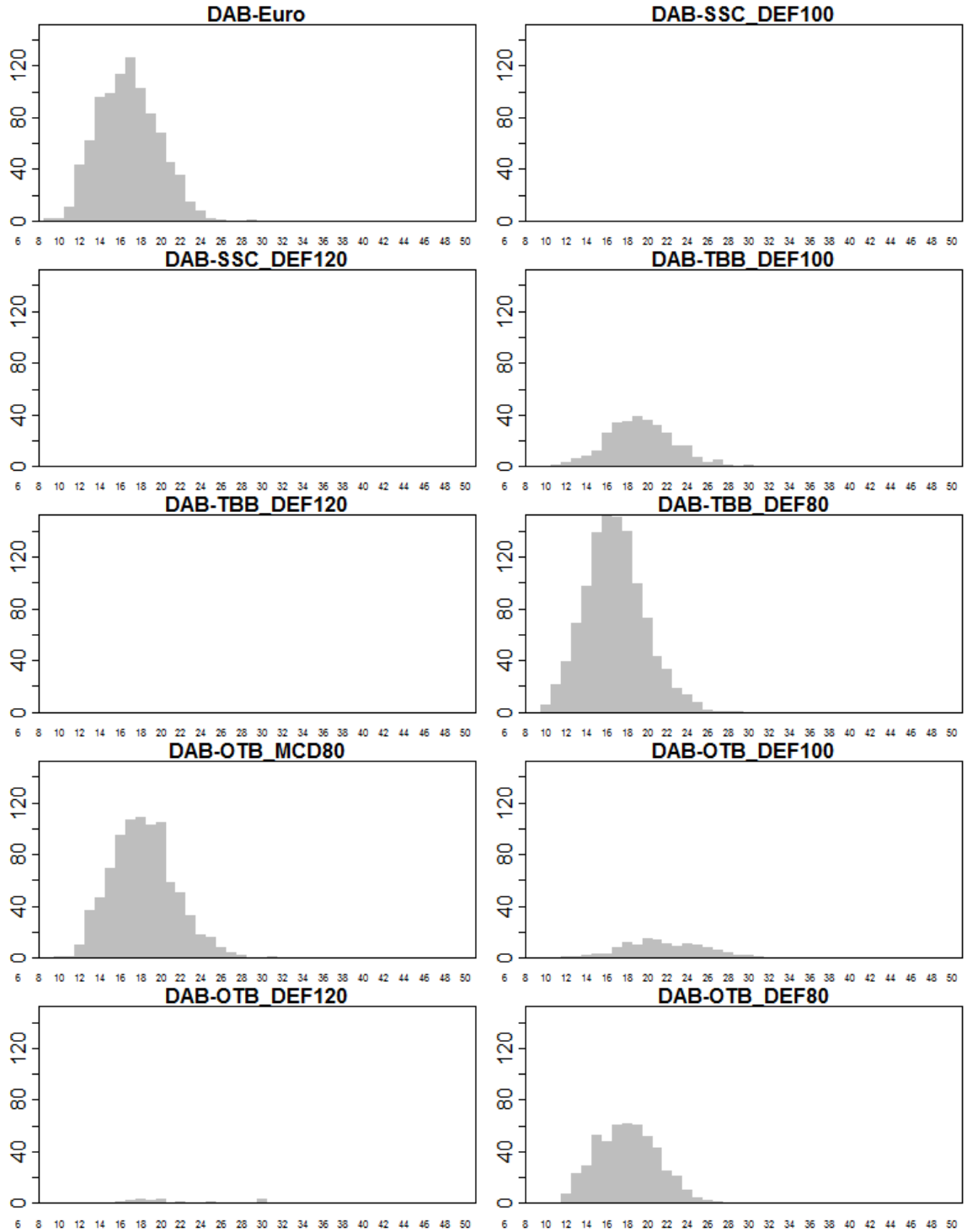


Figure 4a. Length frequency distribution of the average number per hour of discarded dab (minimum landing size=none) for each of the relevant métiers in 2012. Refer to Table 3 for métier names.

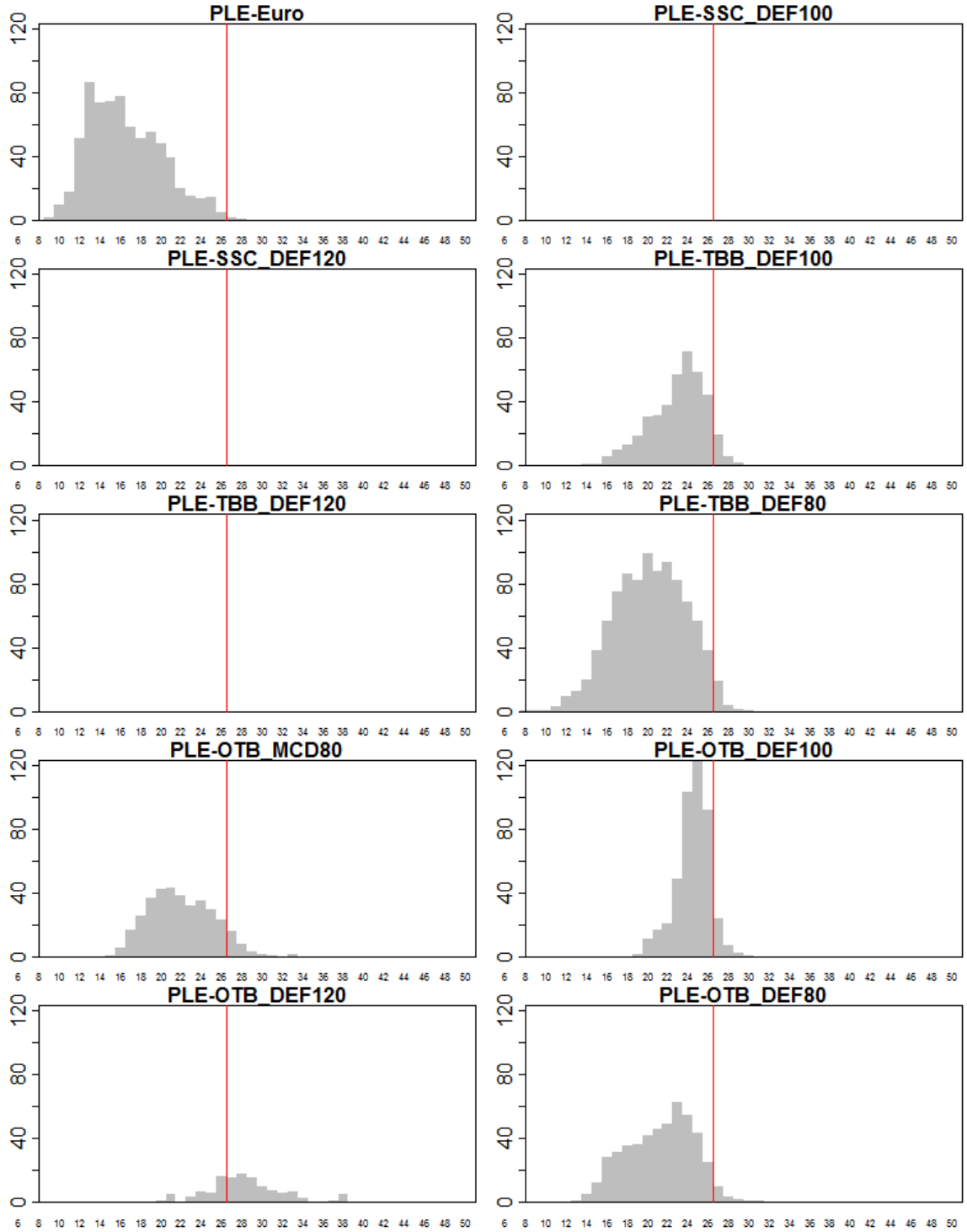


Figure 4b. Length frequency distribution of the average number per hour of discarded plaice (red line indicates minimum landing size=27cm; ICES code= "PLE") for each of the relevant métiers in 2012. Refer to Table 3 for métier names.

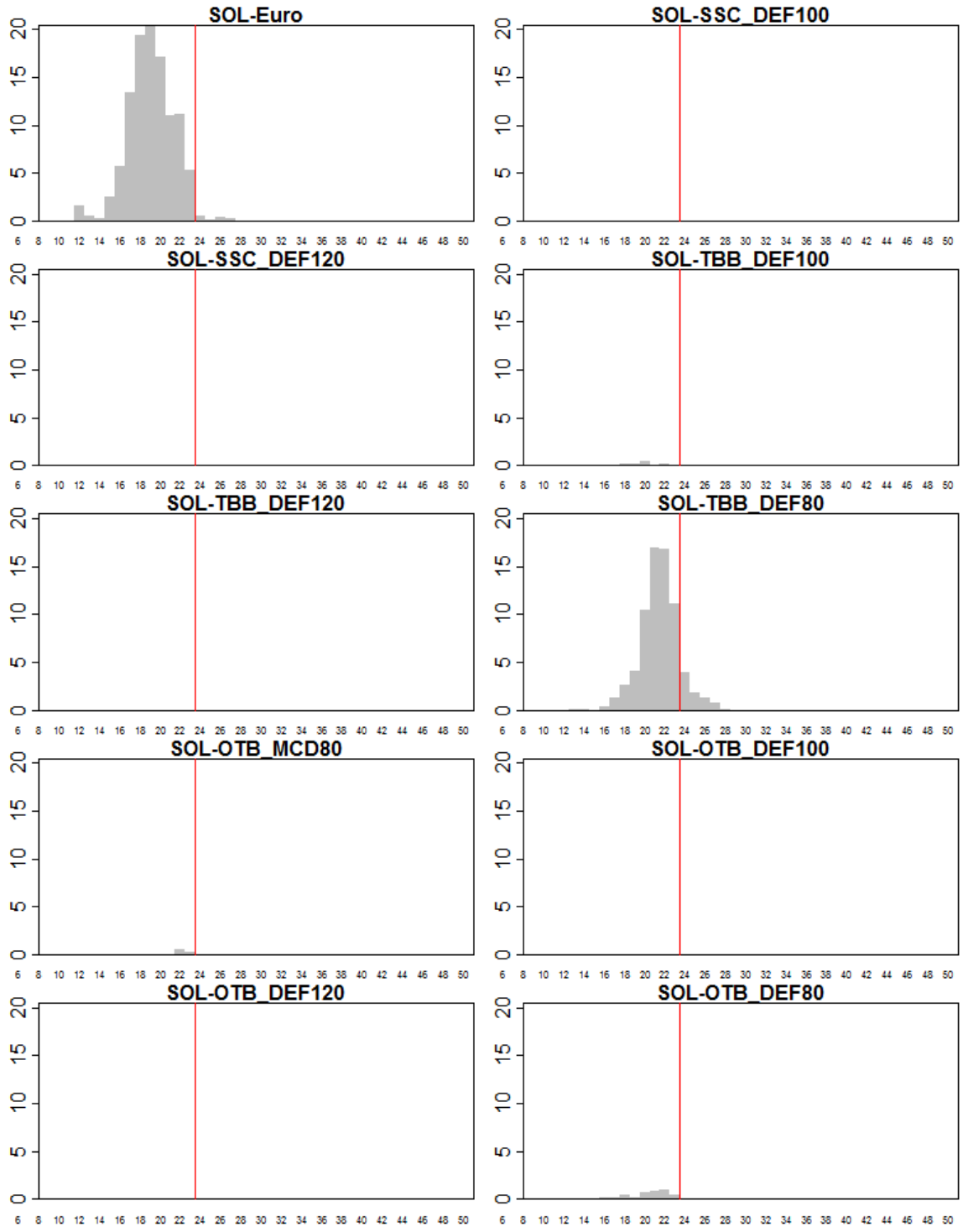


Figure 4c. Length frequency distribution of the average number per hour of discarded sole (red line indicates minimum landing size= 24cm; ICES code= "SOL") for each of the relevant métiers in 2012. Refer to Table 3 for métier names.

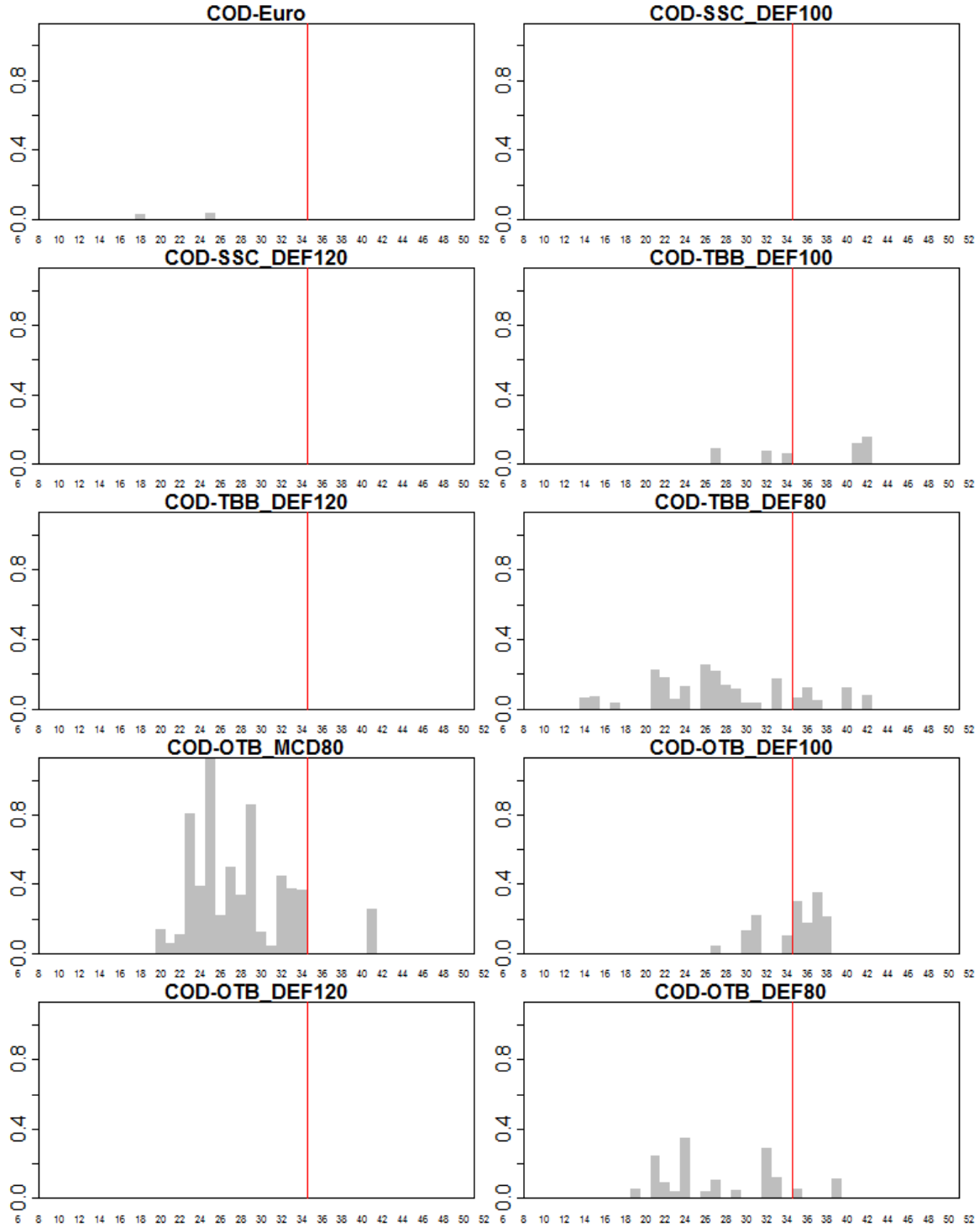


Figure 4d. Length frequency distribution of the average number per hour of discarded cod (red line indicates minimum landing size=35 cm; ICES code= "COD") for each of the relevant métiers in 2012. Refer to Table 3 for métier names.

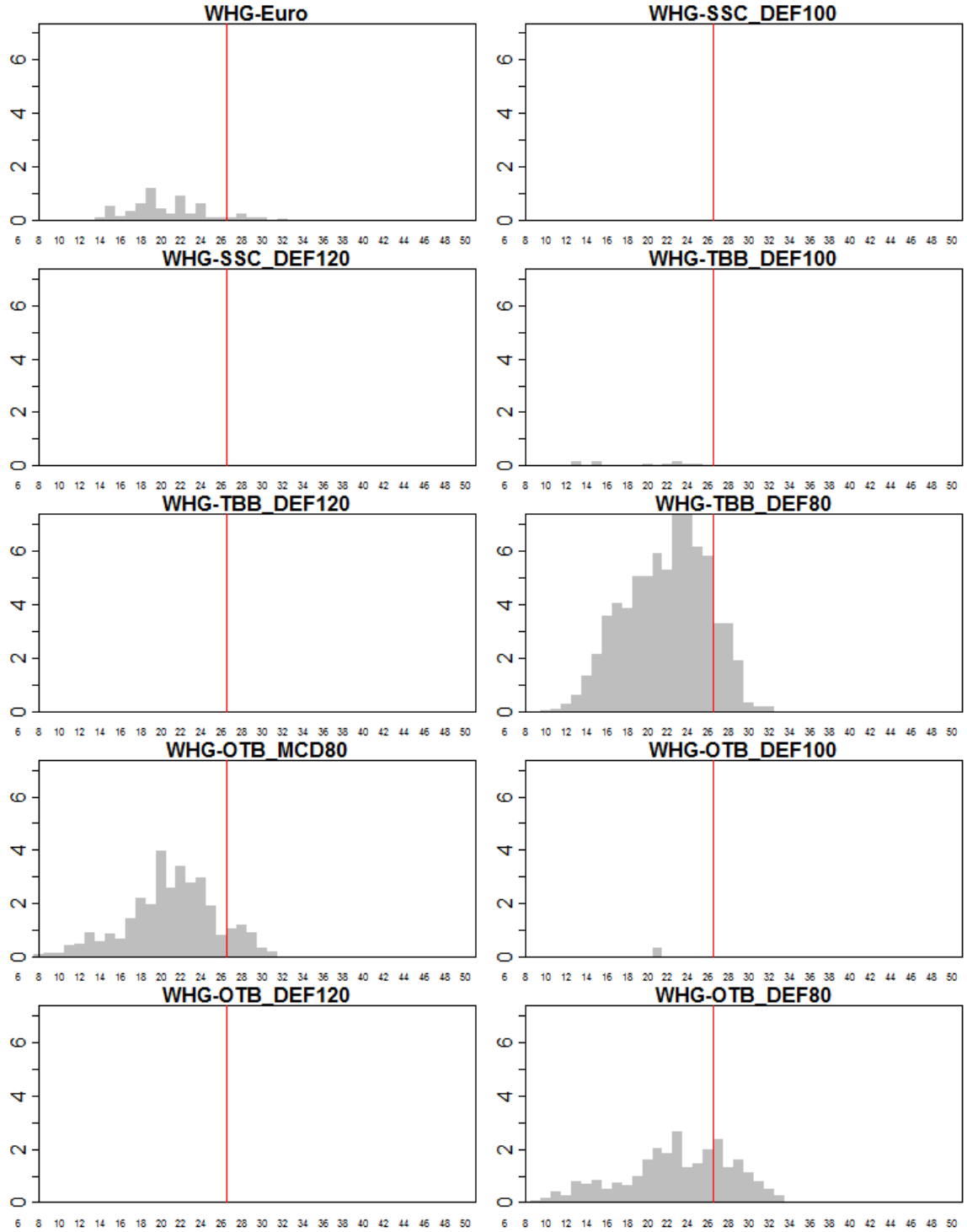


Figure 4e. Length frequency distribution of the average number per hour of discarded whiting (red line indicates minimum landing size=27 cm; ICES code= "WHG") for each of the relevant métiers in 2012. Refer to Table 3 for métier names.

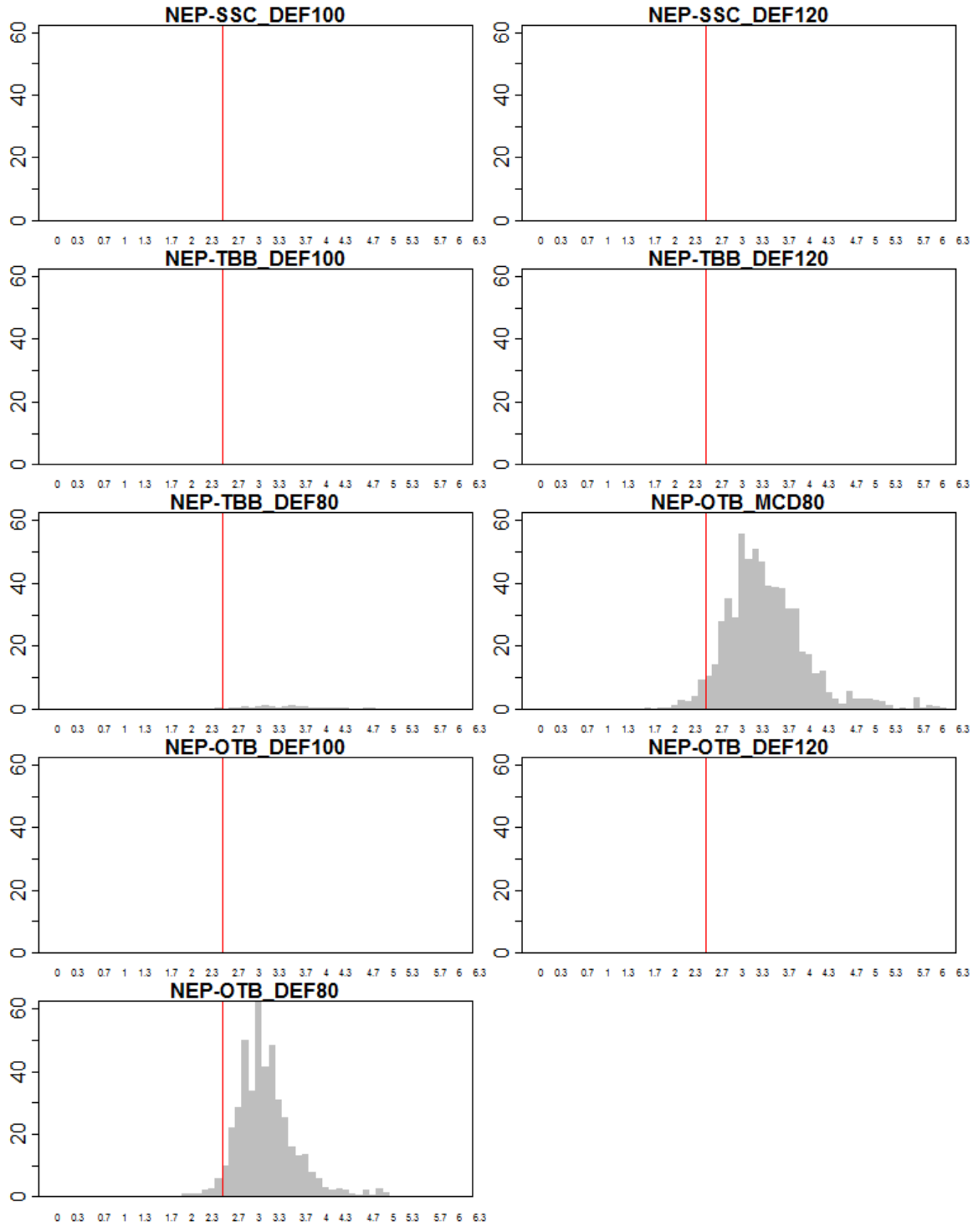
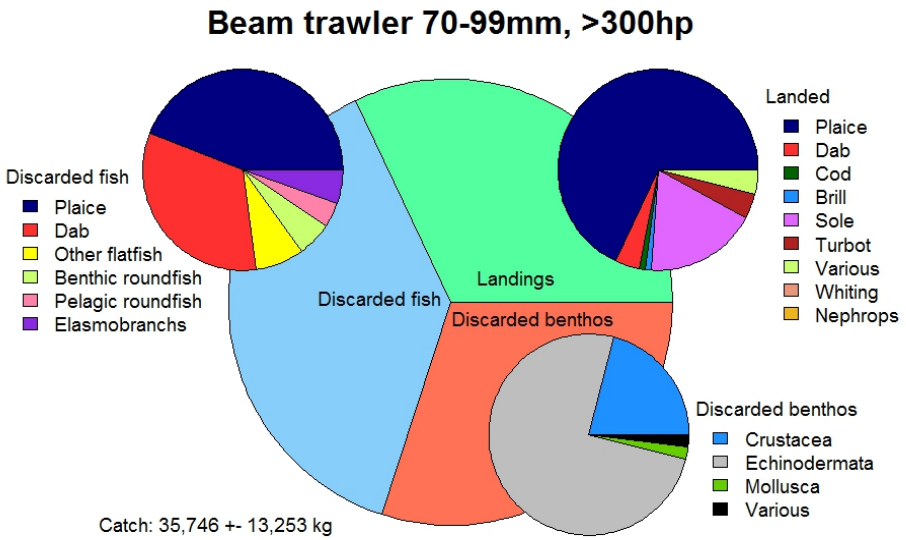
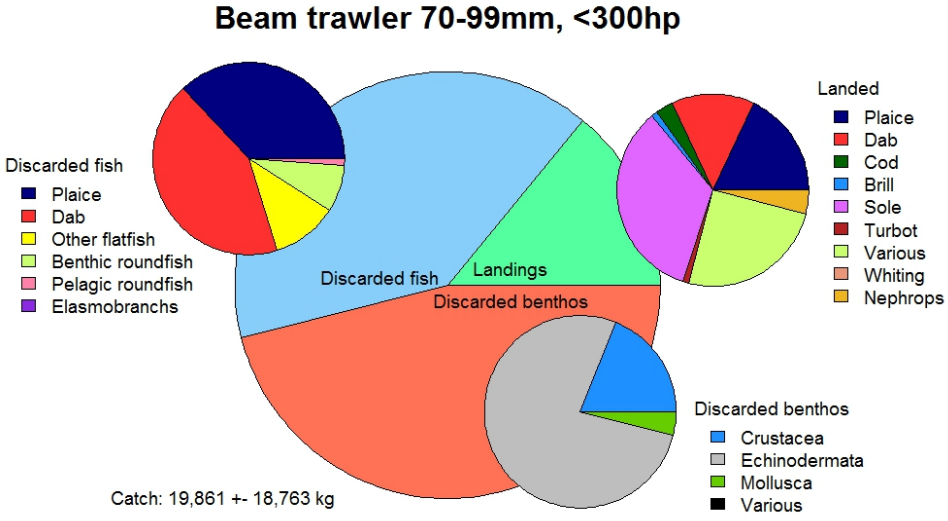


Figure 4f. Carapax length frequency distribution of the average number per hour of discarded Norway lobster (red line indicates minimum landing size=2.5 cm; ICES code: "NEP") for each of the relevant métiers in 2012. Refer to Table 3 for métier names.

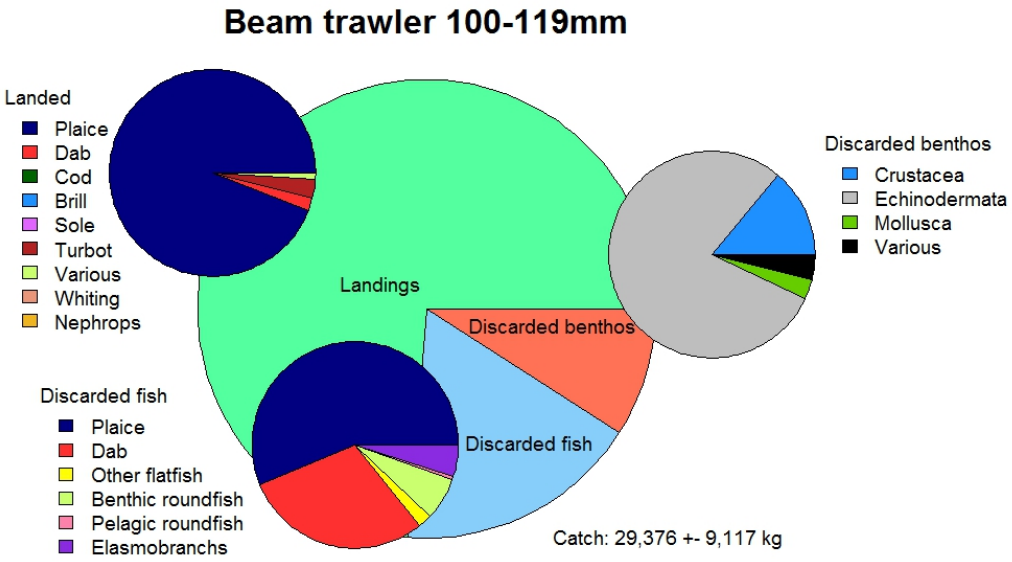
A)


Beam trawler 70-99mm, >300hp
Discarded fish
Plaice
Dab
Other flatfish
Benthic roundfish
Pelagic roundfish
Elasmobranchs
Discarded fish
Landings
Discarded benthos
Landed
Plaice
Dab
Cod
Brill
Sole
Turbot
Various
Whiting
Nephrops
Discarded benthos
Crustacea
Echinodermata
Mollusca
Various
Catch: 35,746 +- 13,253 kg

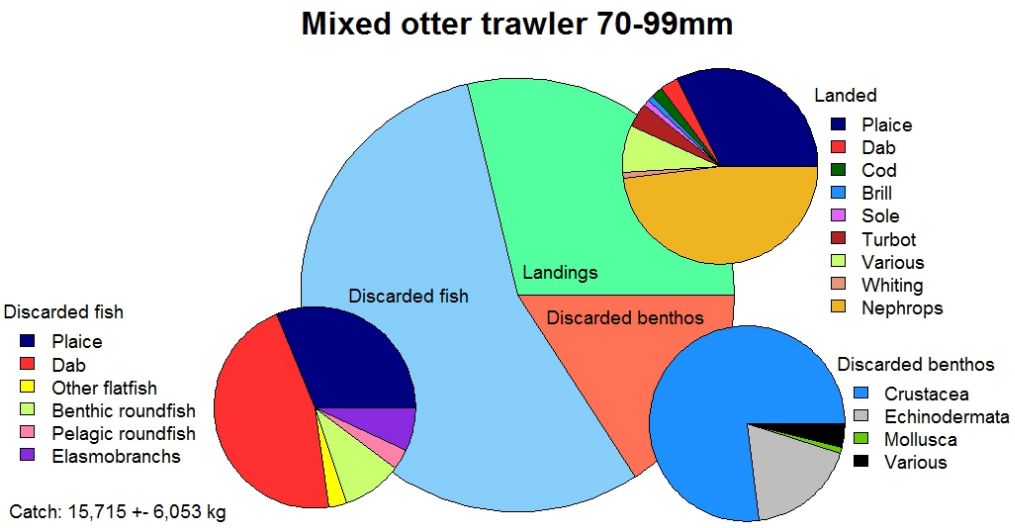
B)


Beam trawler 70-99mm, <300hp
Discarded fish
Plaice
Dab
Other flatfish
Benthic roundfish
Pelagic roundfish
Elasmobranchs
Discarded fish
Landings
Discarded benthos
Landed
Plaice
Dab
Cod
Brill
Sole
Turbot
Various
Whiting
Nephrops
Discarded benthos
Crustacea
Echinodermata
Mollusca
Various
Catch: 19,861 +- 18,763 kg

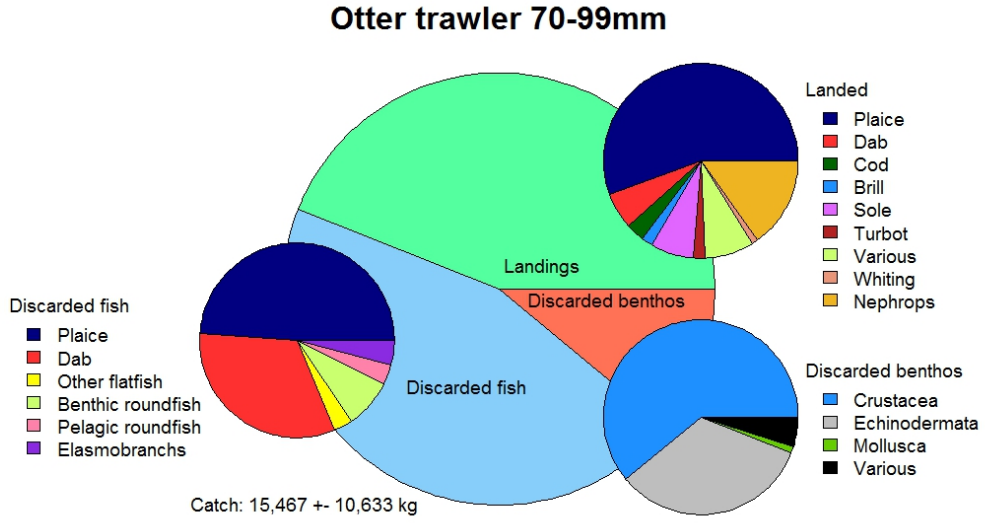
C)


Beam trawler 100-119mm
Landed
Plaice
Dab
Cod
Brill
Sole
Turbot
Various
Whiting
Nephrops
Landings
Discarded benthos
Discarded fish
Discarded benthos
Crustacea
Echinodermata
Mollusca
Various
Discarded fish
Plaice
Dab
Other flatfish
Benthic roundfish
Pelagic roundfish
Elasmobranchs
Catch: 29,376 +- 9,117 kg

D)


Mixed otter trawler 70-99mm
Landed
Plaice
Dab
Cod
Brill
Sole
Turbot
Various
Whiting
Nephrops
Landings
Discarded fish
Discarded benthos
Discarded fish
Plaice
Dab
Other flatfish
Benthic roundfish
Pelagic roundfish
Elasmobranchs
Discarded benthos
Crustacea
Echinodermata
Mollusca
Various
Catch: 15,715 +- 6,053 kg

E)


Otter trawler 70-99mm
Landed
Plaice
Dab
Cod
Brill
Sole
Turbot
Various
Whiting
Nephrops
Landings
Discarded benthos
Discarded fish
Plaice
Dab
Other flatfish
Benthic roundfish
Pelagic roundfish
Elasmobranchs
Discarded fish
Discarded benthos
Crustacea
Echinodermata
Mollusca
Various
Catch: 15,467 +- 10,633 kg

F)

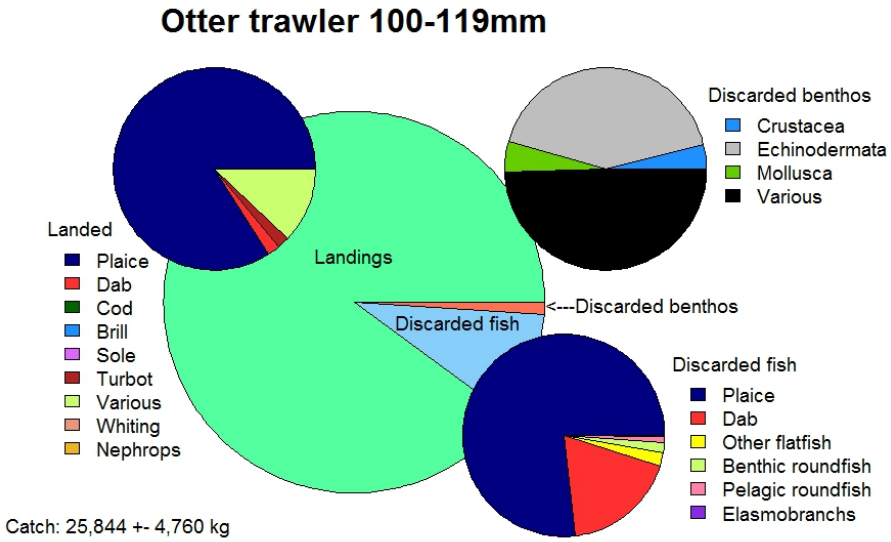


Figure 5. Pie charts of the proportional distribution of quantities of landings, discarded fish and benthic, invertebrate species for A) beam trawlers (70-99 mm mesh size, <300 horse power – 'Eurokotters'); B) beam trawlers (70-99 mm, ≥ 300 hp); C) beam trawlers (100-119 mm mesh size); D) otter trawlers for Nephrops (70-99 mm); E) otter trawlers targeting demersal fish (70-99 mm); and F) otter trawlers for demersal fish with larger mesh sizes (100-119 mm). It should be noted that in the current monitoring protocol, debris is not accounted for (weighed) separately and so, the parts of the main pies here which specify benthos should be read as 'benthos and debris together'. This results in an overpresentation of benthos discards in these figures, which thus should only be regarded as generally indicative of catch compositions. The further separation of composition of benthos discards by species classes is based on observed ratios of numbers (counts) of individuals; i.e. differences in size/weight are not accounted for.

Appendix A:

Query used in the statistical software package R to obtain métier-specific subsets of data:

```
dis_TBB_DEF80 <- eflalo.11[eflalo.11$VE_FLT %in% c('TBB_DEF_70-89_0_0', 'TBB_DEF_70-99_0_0',
'TBB_DEF_90-119_0_0') & eflalo.11$LE_SUBDIV %in% c('IVc', 'IVb'),];

dis_TBB_DEF100 <- eflalo.11[eflalo.11$VE_FLT %in% c('TBB_DEF_100-119_0_0') &
eflalo.11$LE_SUBDIV %in% c('IVc', 'IVb'),]

dis_SSC_DEF120 <- eflalo.11 [eflalo.11$VE_FLT %in% c('SSC_DEF_>=120_0_0') &
eflalo.11$LE_SUBDIV %in% c('VIId', 'VIIe','IVc', 'IVb'),];

dis_SSC_DEF100 <- eflalo.11 [eflalo.11$VE_FLT %in% c('SSC_DEF_100-119_0_0') &
eflalo.11$LE_SUBDIV %in% c('VIId', 'VIIe','IVc', 'IVb'),];

dis_OTB_MCD_80 <- eflalo.11[eflalo.11$VE_FLT %in% c('OTB_MCD_70-99_0_0', 'OTT_MCD_70-
99_0_0') & eflalo.11$LE_SUBDIV %in% c('IVc', 'IVb'),]

dis_OTB_DEF_80 <- eflalo.11[eflalo.11$VE_FLT %in% c('OTB_DEF_70-99_0_0', 'OTT_DEF_70-99_0_0',
'OTB_DEF_90-119_0_0') & eflalo.11$LE_SUBDIV %in% c('IVc', 'IVb'),]

dis_OTB_DEF_100 <- eflalo.11[eflalo.11$VE_FLT %in% c('OTB_DEF_100-119_0_0', 'OTT_DEF_100-
119_0_0') & eflalo.11$LE_SUBDIV %in% c('IVc', 'IVb'),]
```

Appendix B:

Table 9a. Fishing and sampling effort of self-sampled trips (by TBB_DEF and SSC_DEF métier) in 2012. For each trip ID, the quarter of observation (Q), the total number of hauls (Hauls), the total number of fishing hours (Fish_h), the hours of sampling for landings (Lan_h) and discards (Dis_h) is given. Blank cells, no landings were measured.

TripID	Métier	Q	Hauls	Fish_h	Lan_h	Dis_h
606	TBB_DEF_70-99mm_>300hp	1	47	81		4
607	TBB_DEF_70-99mm_>300hp	1	44	81		4
608	TBB_DEF_70-99mm_>300hp	1	38	76		4
610	TBB_DEF_70-99mm_>300hp	1	37	75		3
619	TBB_DEF_70-99mm_>300hp	1	43	76		4
620	TBB_DEF_70-99mm_>300hp	1	37	85		4
621	TBB_DEF_70-99mm_>300hp	1	42	83		4
622	TBB_DEF_70-99mm_>300hp	1	33	75		4
627	TBB_DEF_70-99mm_>300hp	2	46	78		3
629	TBB_DEF_70-99mm_>300hp	2	46	82		4
630	TBB_DEF_70-99mm_>300hp	2	47	85		4
631	TBB_DEF_70-99mm_>300hp	2	46	83		4
632	TBB_DEF_70-99mm_>300hp	2	41	76		4
633	TBB_DEF_70-99mm_>300hp	2	44	76		4
634	TBB_DEF_70-99mm_>300hp	2	36	75		4
637	TBB_DEF_70-99mm_>300hp	2	37	72		4
638	TBB_DEF_70-99mm_>300hp	2	32	67		4
640	TBB_DEF_70-99mm_>300hp	2	43	83		4
653	TBB_DEF_70-99mm_>300hp	2	44	89		4
654	TBB_DEF_70-99mm_>300hp	2	46	78		4
659	TBB_DEF_70-99mm_>300hp	3	48	87		5
660	TBB_DEF_70-99mm_>300hp	3	45	81		4
661	TBB_DEF_70-99mm_>300hp	3	48	95		3
662	TBB_DEF_70-99mm_>300hp	3	45	78		3
663	TBB_DEF_70-99mm_>300hp	3	44	78		4
664	TBB_DEF_70-99mm_>300hp	3	42	70		3
668	TBB_DEF_70-99mm_>300hp	3	33	69		4
669	TBB_DEF_70-99mm_>300hp	3	38	71		4
670	TBB_DEF_70-99mm_>300hp	3	33	64		4
678	TBB_DEF_70-99mm_>300hp	3	45	76		3
679	TBB_DEF_70-99mm_>300hp	3	35	63		4
688	TBB_DEF_70-99mm_>300hp	1	47	82		4
689	TBB_DEF_70-99mm_>300hp	3	46	83		4
698	TBB_DEF_70-99mm_>300hp	1	40	92		5
703.2	TBB_DEF_70-99mm_>300hp	1	65	137		4

705.2	TBB_DEF_70-99mm_>300hp	1	52	70		2
710.2	TBB_DEF_70-99mm_>300hp	4	39	81		4
712.2	TBB_DEF_70-99mm_>300hp	4	39	71		4
713	TBB_DEF_70-99mm_>300hp	1	46	82		4
714	TBB_DEF_70-99mm_>300hp	4	44	82		4
715	TBB_DEF_70-99mm_>300hp	4	44	79		4
716	TBB_DEF_70-99mm_>300hp	4	48	82		3
717	TBB_DEF_70-99mm_>300hp	4	44	78		3
718	TBB_DEF_70-99mm_>300hp	3	41	71		3
719	TBB_DEF_70-99mm_>300hp	4	42	75		3
720	TBB_DEF_70-99mm_>300hp	4	42	75		3
723	TBB_DEF_70-99mm_>300hp	4	21	49		5
724	TBB_DEF_70-99mm_>300hp	4	32	73		5
729	TBB_DEF_70-99mm_>300hp	4	35	78		5
732	TBB_DEF_70-99mm_>300hp	3	39	64		3
733	TBB_DEF_70-99mm_>300hp	4	43	74		4
734	TBB_DEF_70-99mm_>300hp	4	45	73		4
746	TBB_DEF_70-99mm_>300hp	4	34	75		5
747	TBB_DEF_70-99mm_>300hp	4	39	92		5
749	TBB_DEF_70-99mm_>300hp	4	37	68		4
750	TBB_DEF_70-99mm_>300hp	2	26	61		5
751	TBB_DEF_70-99mm_>300hp	2	27	64		5
752	TBB_DEF_70-99mm_>300hp	3	34	62		4
753	TBB_DEF_70-99mm_>300hp	3	25	60		5
755	TBB_DEF_70-99mm_>300hp	4	31	73		5
758	TBB_DEF_70-99mm_>300hp	4	39	85		5
609	TBB_DEF_70-99mm_<=300h	1	12	92		13
614	TBB_DEF_70-99mm_<=300h	1	37	84		5
615	TBB_DEF_70-99mm_<=300h	1	38	87		5
618	TBB_DEF_70-99mm_<=300h	1	65	86		3
635	TBB_DEF_70-99mm_<=300h	2	14	30		4
646	TBB_DEF_70-99mm_<=300h	2	47	78		5
650	TBB_DEF_70-99mm_<=300h	2	50	65		3
651	TBB_DEF_70-99mm_<=300h	2	63	90		3
652	TBB_DEF_70-99mm_<=300h	2	50	106		3
673	TBB_DEF_70-99mm_<=300h	3	46	83		3
676	TBB_DEF_70-99mm_<=300h	3	53	79		3
677	TBB_DEF_70-99mm_<=300h	3	48	90		4
686	TBB_DEF_70-99mm_<=300h	3	42	54		1
687	TBB_DEF_70-99mm_<=300h	3	43	67		3
709.2	TBB_DEF_70-99mm_<=300h	3	35	70		4
726	TBB_DEF_70-99mm_<=300h	2	23	36		3
730	TBB_DEF_70-99mm_<=300h	4	58	82		3
731	TBB_DEF_70-99mm_<=300h	4	50	88		4
754	TBB_DEF_70-99mm_<=300h	2	10	42		10
763	TBB_DEF_70-99mm_<=300h	4	19	33		4

611	TBB DEF 100-119mm	1	14	61		9
612	TBB_DEF_100-119mm	1	12	50		8
623	TBB_DEF_100-119mm	1	44	72		3
657	TBB_DEF_100-119mm	2	34	74		4
684	TBB_DEF_100-119mm	3	27	58		5
685	TBB_DEF_100-119mm	3	17	30		3
696	TBB_DEF_100-119mm	2	36	73		4
697	TBB_DEF_100-119mm	2	28	64		4
699	TBB_DEF_100-119mm	2	38	78		5
708.2	TBB_DEF_100-119mm	2	22	47		4
743	TBB_DEF_100-119mm	2	48	99		4
744	TBB_DEF_100-119mm	2	32	68		5
745	TBB_DEF_100-119mm	2	35	75		5
748	TBB_DEF_100-119mm	1	45	70		3
756	TBB_DEF_100-119mm	2	29	68		5
757	TBB_DEF_100-119mm	3	21	61		6
738	SSC_DEF_100-119mm	2	31	54		4
739	SSC_DEF_100-119mm	2	19	35		4
741	SSC_DEF_100-119mm	4	16	32		4
742	SSC_DEF_100-119mm	4	17	36		4
764	SSC_DEF_100-119mm	2	24	74		2
682	SSC_DEF_>=120mm	3	25	49		3
683	SSC_DEF_>=120mm	3	22	41		4
740	SSC_DEF_>=120mm	3	19	39		4

Table 9b. Fishing and sampling effort of self-sampled trips (by OTB/OTT métier) in 2012. For each trip ID, the quarter of observation (Q), the total number of hauls (Hauls), the total number of fishing hours (Fish_h), the hours of sampling for landings (Lan_h) and discards (Dis_h). Blank cells, no landings were measured.

TripID	Métier	Q	Hauls	Fish_h	Lan_h	Dis_h
636	OTB/OTT_MCD_70-99mm	2	15	77		10
644	OTB/OTT_MCD_70-99mm	2	6	30		8
656	OTB/OTT_MCD_70-99mm	2	15	70		9
665	OTB/OTT_MCD_70-99mm	3	12	65		11
666	OTB/OTT_MCD_70-99mm	3	12	68		11
671	OTB/OTT_MCD_70-99mm	3	10	54		11
680	OTB/OTT_MCD_70-99mm	3	16	75		10
681	OTB/OTT_MCD_70-99mm	3	16	66		9
700	OTB/OTT_MCD_70-99mm	2	16	95		15
704.2	OTB/OTT_MCD_70-99mm	3	26	121		11
706.2	OTB/OTT_MCD_70-99mm	3	12	72		12
722	OTB/OTT_MCD_70-99mm	3	14	85		12
759	OTB/OTT_MCD_70-99mm	2	13	72		11
761	OTB/OTT_MCD_70-99mm	4	12	77		12
762	OTB/OTT_MCD_70-99mm	2	9	58		15
616	OTB/OTT_DEF_70-99mm	1	35	77		4
617	OTB/OTT_DEF_70-99mm	1	38	84		5
624	OTB/OTT_DEF_70-99mm	1	21	119		11
626	OTB/OTT_DEF_70-99mm	1	16	109		12
641	OTB/OTT_DEF_70-99mm	2	6	21		7
655	OTB/OTT_DEF_70-99mm	2	15	67		9
701	OTB/OTT_DEF_70-99mm	1	19	122		13
702	OTB/OTT_DEF_70-99mm	2	8	55		14
707.2	OTB/OTT_DEF_70-99mm	2	14	69		11
725	OTB/OTT_DEF_70-99mm	3	20	98		9
735	OTB/OTT_DEF_70-99mm	1	16	83		10
736	OTB/OTT_DEF_70-99mm	2	16	68		9
737	OTB/OTT_DEF_70-99mm	4	13	73		14
760	OTB/OTT_DEF_70-99mm	4	13	78		12
643	OTB/OTT_DEF_100-119mm	2	14	57		9
647	OTB/OTT_DEF_100-119mm	2	15	59		7
648	OTB/OTT_DEF_100-119mm	2	14	55		7
649	OTB/OTT_DEF_100-119mm	2	17	65		3
674	OTB/OTT_DEF_100-119mm	3	14	55		4
675	OTB/OTT_DEF_100-119mm	3	14	56		8
728	OTB/OTT_DEF_100-119mm	3	16	63		7

Table 10a. Average weights (kg) per hour of discarded (Dis) and landed (Lan) dab (DAB), plaice (PLE), sole, (SOL), brill (BLL), turbot (TUR), cod, whiting (WHG) and Norway lobster (NEP) for each self-sampled trip in the demersal beam-trawl and Scottish seine métiers (TBB_DEF and SCC_DEF) in 2012.

TripID	Métier	Q	Dis DAB	Lan DAB	Dis PLE	Lan PLE	Dis SOL	Lan SOL	Dis BLL	Lan BLL	Dis TUR	Lan TUR	Dis COD	Lan COD	Dis WHG	Lan WHG	Dis NEP	Lan NEP
606	TBB_DEF_70-99mm_>300hp	1	11	0	15	80	1	20	0	4	0	0	0	8	3	1	0	0
607	TBB_DEF_70-99mm_>300hp	1	26	10	18	52	4	26	0	5	0	2	0	1	3	0	0	0
608	TBB_DEF_70-99mm_>300hp	1	98	5	101	21	5	48	0	4	1	2	3	4	50	5	0	0
610	TBB_DEF_70-99mm_>300hp	1	56	5	64	28	5	29	0	1	0	2	0	0	3	0	0	0
619	TBB_DEF_70-99mm_>300hp	1	59	9	167	171	3	15	0	4	1	6	1	7	2	0	1	0
620	TBB_DEF_70-99mm_>300hp	1	87	0	63	176	2	12	0	0	0	7	0	0	1	0	0	0
621	TBB_DEF_70-99mm_>300hp	1	126	0	97	149	1	5	0	0	0	15	0	0	0	0	0	0
622	TBB_DEF_70-99mm_>300hp	1	46	40	11	139	4	24	0	0	0	4	0	5	3	0	0	1
627	TBB_DEF_70-99mm_>300hp	2	6	0	11	27	2	19	0	2	0	1	1	7	6	0	0	0
629	TBB_DEF_70-99mm_>300hp	2	73	21	58	48	5	20	0	1	0	3	1	0	1	0	0	0
630	TBB_DEF_70-99mm_>300hp	2	95	11	117	24	15	26	0	2	0	2	0	0	3	0	0	0
631	TBB_DEF_70-99mm_>300hp	2	55	7	75	30	11	24	0	2	0	3	0	1	10	1	0	0
632	TBB_DEF_70-99mm_>300hp	2	64	3	118	23	3	38	1	0	0	0	6	0	24	1	0	0
633	TBB_DEF_70-99mm_>300hp	2	61	11	136	25	7	50	0	1	1	1	1	0	35	2	0	0
634	TBB_DEF_70-99mm_>300hp	2	81	3	195	39	7	37	0	3	0	4	3	0	0	0	0	0
637	TBB_DEF_70-99mm_>300hp	2	106	12	51	21	1	30	0	1	0	1	0	0	0	0	0	0
638	TBB_DEF_70-99mm_>300hp	2	17	5	28	22	2	20	0	2	0	4	0	0	0	0	0	0
640	TBB_DEF_70-99mm_>300hp	2	11	4	41	63	0	14	0	3	0	4	0	0	1	0	0	0
653	TBB_DEF_70-99mm_>300hp	2	108	5	157	51	3	18	0	2	0	4	0	0	7	0	0	0
654	TBB_DEF_70-99mm_>300hp	2	127	11	144	50	9	17	0	2	1	5	0	0	1	0	0	0
659	TBB_DEF_70-99mm_>300hp	3	37	8	55	37	4	19	0	3	0	5	0	0	1	0	0	0
660	TBB_DEF_70-99mm_>300hp	3	37	15	33	57	2	34	0	2	0	6	0	0	0	0	0	0

661	TBB_DEF_70-99mm_>300hp	3	56	6	40	36	1	28	0	3	0	3	0	1	4	0	0	0
662	TBB_DEF_70-99mm_>300hp	3	56	16	170	50	15	29	0	3	0	6	0	0	3	0	0	0
663	TBB_DEF_70-99mm_>300hp	3	160	6	218	61	3	54	0	4	0	3	0	0	0	0	0	0
664	TBB_DEF_70-99mm_>300hp	3	89	7	356	50	21	52	0	0	0	0	7	0	12	0	0	0
668	TBB_DEF_70-99mm_>300hp	3	48	3	27	79	0	18	0	2	0	3	0	0	2	0	1	0
669	TBB_DEF_70-99mm_>300hp	3	20	5	25	19	1	20	1	0	0	5	0	0	0	0	0	0
670	TBB_DEF_70-99mm_>300hp	3	82	3	75	48	8	46	0	3	5	8	0	0	0	0	0	0
678	TBB_DEF_70-99mm_>300hp	3	158	6	123	29	11	26	0	3	1	9	0	0	1	0	0	0
679	TBB_DEF_70-99mm_>300hp	3	64	2	30	180	0	16	0	3	0	5	0	2	2	0	8	1
688	TBB_DEF_70-99mm_>300hp	1	38	10	144	40	4	29	2	5	0	2	0	0	28	3	0	0
689	TBB_DEF_70-99mm_>300hp	3	96	8	127	31	14	17	0	2	0	3	0	0	0	0	0	0
698	TBB_DEF_70-99mm_>300hp	1	11	13	33	226	0	12	0	3	0	3	0	0	1	0	0	0
703.2	TBB_DEF_70-99mm_>300hp	1	47	5	45	25	1	12	1	2	0	2	0	4	0	0	0	0
705.2	TBB_DEF_70-99mm_>300hp	1	121	8	199	177	1	21	0	1	0	2	0	1	1	0	0	0
710.2	TBB_DEF_70-99mm_>300hp	4	116	0	160	124	4	18	0	1	0	20	0	0	8	0	1	0
712.2	TBB_DEF_70-99mm_>300hp	4	31	0	219	49	26	56	0	4	0	3	9	0	31	0	0	0
713	TBB_DEF_70-99mm_>300hp	1	1	0	6	62	1	21	0	5	0	1	0	9	0	0	0	0
714	TBB_DEF_70-99mm_>300hp	4	21	0	98	50	14	30	0	0	0	0	0	0	1	0	0	0
715	TBB_DEF_70-99mm_>300hp	4	5	0	26	50	6	37	0	0	0	0	0	0	5	0	0	0
716	TBB_DEF_70-99mm_>300hp	4	11	0	110	107	8	28	0	2	0	0	0	0	7	0	0	0
717	TBB_DEF_70-99mm_>300hp	4	30	7	92	63	12	31	0	3	0	5	0	0	1	0	0	0
718	TBB_DEF_70-99mm_>300hp	3	144	3	144	57	8	51	0	1	0	1	0	0	17	0	0	0
719	TBB_DEF_70-99mm_>300hp	4	119	1	163	34	42	61	0	4	0	3	0	0	65	0	0	0
720	TBB_DEF_70-99mm_>300hp	4	26	0	98	30	60	68	0	1	0	1	0	0	12	0	0	0
723	TBB_DEF_70-99mm_>300hp	4	73	4	34	104	1	40	0	2	0	3	0	0	1	0	0	0
724	TBB_DEF_70-99mm_>300hp	4	42	2	57	33	2	27	0	3	0	9	0	0	1	0	0	0
729	TBB_DEF_70-99mm_>300hp	4	68	5	249	68	13	30	0	4	0	2	0	1	6	0	0	0

732	TBB_DEF_70-99mm_>300hp	3	100	0	82	168	0	21	0	1	0	1	0	1	2	0	0	0
733	TBB_DEF_70-99mm_>300hp	4	66	0	86	60	6	33	0	2	0	18	0	0	0	0	0	0
734	TBB_DEF_70-99mm_>300hp	4	66	0	78	103	4	37	0	4	0	10	0	2	18	0	5	0
746	TBB_DEF_70-99mm_>300hp	4	224	0	58	48	9	37	0	0	0	5	0	0	7	0	0	0
747	TBB_DEF_70-99mm_>300hp	4	50	0	13	133	0	21	0	0	0	19	0	0	0	0	1	0
749	TBB_DEF_70-99mm_>300hp	4	12	6	18	112	0	27	0	6	0	21	0	0	1	0	0	0
750	TBB_DEF_70-99mm_>300hp	2	31	8	15	333	0	0	0	0	0	2	0	0	0	0	0	0
751	TBB_DEF_70-99mm_>300hp	2	12	24	12	378	0	0	0	0	0	2	0	0	0	0	0	0
752	TBB_DEF_70-99mm_>300hp	3	48	7	18	366	0	11	0	0	0	3	1	0	0	0	0	0
753	TBB_DEF_70-99mm_>300hp	3	92	13	43	67	3	46	0	0	0	12	0	0	0	0	0	0
755	TBB_DEF_70-99mm_>300hp	4	17	6	58	211	0	36	0	0	0	6	0	2	1	0	0	0
758	TBB_DEF_70-99mm_>300hp	4	30	0	24	290	0	6	0	13	0	13	0	0	0	0	0	0
609	TBB_DEF_70-99mm_<=300h	1	12	1	6	12	0	1	0	0	0	0	0	5	4	0	5	17
614	TBB_DEF_70-99mm_<=300h	1	5	3	27	23	1	3	0	1	0	0	0	2	0	0	0	0
615	TBB_DEF_70-99mm_<=300h	1	32	12	14	8	1	6	0	1	0	0	0	0	0	0	0	0
618	TBB_DEF_70-99mm_<=300h	1	146	29	26	3	7	20	0	0	0	2	0	0	1	0	0	0
635	TBB_DEF_70-99mm_<=300h	2	21	76	17	2	0	1	0	1	0	0	0	8	1	0	0	0
646	TBB_DEF_70-99mm_<=300h	2	15	13	7	5	2	15	0	1	0	1	0	0	0	0	0	0
650	TBB_DEF_70-99mm_<=300h	2	97	10	24	2	30	24	4	0	6	1	0	0	0	0	0	0
651	TBB_DEF_70-99mm_<=300h	2	102	7	48	6	10	21	0	0	0	1	0	0	1	0	0	0
652	TBB_DEF_70-99mm_<=300h	2	13	13	2	7	1	20	0	0	0	0	0	0	0	0	0	0
673	TBB_DEF_70-99mm_<=300h	3	13	2	50	5	4	13	0	0	0	0	0	0	0	0	0	0
676	TBB_DEF_70-99mm_<=300h	3	35	4	77	2	50	17	0	0	5	1	0	0	0	0	0	0
677	TBB_DEF_70-99mm_<=300h	3	3	3	5	2	0	18	0	0	0	0	0	0	0	0	0	0
686	TBB_DEF_70-99mm_<=300h	3	155	0	109	4	18	23	0	0	3	0	0	0	1	0	0	0
687	TBB_DEF_70-99mm_<=300h	3	35	0	108	3	2	16	0	0	2	0	0	6	0	0	0	0
709.2	TBB_DEF_70-99mm_<=300h	3	16	2	75	9	4	10	0	1	0	1	0	0	0	0	0	0

726	TBB_DEF_70-99mm_<=300h	2	5	9	4	8	0	12	0	1	0	1	0	0	0	0	0	0
730	TBB_DEF_70-99mm_<=300h	4	105	4	53	2	4	23	0	0	3	0	0	0	0	0	0	0
731	TBB_DEF_70-99mm_<=300h	4	5	3	6	0	0	20	0	0	0	0	0	0	0	0	0	0
754	TBB_DEF_70-99mm_<=300h	2	13	6	33	24	0	0	0	0	0	3	0	2	0	0	0	2
763	TBB_DEF_70-99mm_<=300h	4	221	3	84	7	5	14	0	0	0	0	0	0	0	0	0	0
611	TBB_DEF_100-119mm	1	16	4	168	210	0	0	0	0	0	0	4	2	0	0	0	0
612	TBB_DEF_100-119mm	1	18	8	35	46	0	0	0	0	0	1	0	0	0	0	0	1
623	TBB_DEF_100-119mm	1	38	0	75	385	0	0	0	0	0	8	0	0	0	0	0	0
657	TBB_DEF_100-119mm	2	5	5	17	246	0	0	0	0	0	4	0	0	0	0	0	0
684	TBB_DEF_100-119mm	3	12	0	92	379	0	0	0	0	0	18	0	0	0	0	0	0
685	TBB_DEF_100-119mm	3	124	101	43	918	0	0	0	0	0	0	0	0	0	0	0	0
696	TBB_DEF_100-119mm	2	21	16	29	325	0	0	0	0	0	2	0	0	0	0	0	0
697	TBB_DEF_100-119mm	2	2	7	8	324	0	0	0	0	0	2	0	0	0	0	0	0
699	TBB_DEF_100-119mm	2	12	0	32	351	0	0	0	4	0	4	0	0	0	0	0	0
708.2	TBB_DEF_100-119mm	2	13	0	51	426	0	0	0	7	0	7	0	0	1	0	0	0
743	TBB_DEF_100-119mm	2	30	1	44	211	0	1	0	0	0	25	0	0	0	0	0	0
744	TBB_DEF_100-119mm	2	33	0	56	144	0	0	0	0	0	26	0	0	0	0	0	0
745	TBB_DEF_100-119mm	2	43	0	58	173	0	0	0	0	1	20	0	0	0	0	0	0
748	TBB_DEF_100-119mm	1	22	9	44	302	0	1	0	0	0	3	0	0	0	0	0	0
756	TBB_DEF_100-119mm	2	21	0	50	312	0	0	0	5	0	5	0	0	0	0	0	0
757	TBB_DEF_100-119mm	3	23	0	48	563	0	0	0	0	0	0	0	0	0	0	0	0
738	SSC_DEF_100-119mm	2	20	12	7	10	0	0	0	3	0	14	0	6	0	0	0	0
739	SSC_DEF_100-119mm	2	2	32	1	65	0	0	0	0	0	0	0	102	0	0	0	0
741	SSC_DEF_100-119mm	4	21	441	4	111	0	0	0	0	0	0	0	82	0	0	0	0
742	SSC_DEF_100-119mm	4	5	0	7	27	0	0	0	0	0	0	0	2	0	0	0	0
764	SSC_DEF_100-119mm	2	68	43	3	0	0	0	0	0	0	0	0	0	0	0	0	0

682	SSC_DEF_>=120mm	3	6	164	7	148	0	0	0	0	0	0	0	37	0	0	0	0
683	SSC_DEF_>=120mm	3	7	2	1	28	0	0	0	0	0	0	1	188	1	0	0	0
740	SSC_DEF_>=120mm	3	7	63	0	75	0	0	0	0	0	0	0	417	19	0	0	0

Table 10b. Weights (kg) per hour of discarded (Dis) and landed (Lan) dab (DAB), plaice (PLE), sole, (SOL), brill (BLL), turbot (TUR), cod, whiting (WHG) and Norway lobster (NEP) for each self-sampled trip in the demersal otter-trawl métiers (OTB/OTT) in 2011.

TripID	Métier	Q	Dis DAB	Lan DAB	Dis PLE	Lan PLE	Dis SOL	Lan SOL	Dis BLL	Lan BLL	Dis TUR	Lan TUR	Dis COD	Lan COD	Dis WHG	Lan WHG	Dis NEP	Lan NEP
636	OTB/OTT_MCD_70-99mm	2	15	2	16	30	0	0	0	0	0	3	0	1	0	0	12	27
644	OTB/OTT_MCD_70-99mm	2	109	1	82	25	0	0	0	1	1	5	6	3	9	0	9	26
656	OTB/OTT_MCD_70-99mm	2	36	1	56	14	0	0	0	1	0	6	1	1	3	0	4	20
665	OTB/OTT_MCD_70-99mm	3	37	6	22	11	0	0	0	0	0	1	0	0	0	0	1	30
666	OTB/OTT_MCD_70-99mm	3	23	3	30	7	0	0	0	0	0	2	0	0	0	0	11	14
671	OTB/OTT_MCD_70-99mm	3	125	1	58	19	0	0	0	0	0	2	11	1	3	0	62	29
680	OTB/OTT_MCD_70-99mm	3	122	4	51	20	0	0	0	0	0	2	0	1	2	0	24	36
681	OTB/OTT_MCD_70-99mm	3	284	0	121	23	1	1	0	3	0	5	0	0	1	0	37	58
700	OTB/OTT_MCD_70-99mm	2	12	0	57	14	0	0	0	1	0	1	0	1	8	3	8	17
704.2	OTB/OTT_MCD_70-99mm	3	98	3	22	20	0	0	0	1	0	2	3	1	3	0	11	38
706.2	OTB/OTT_MCD_70-99mm	3	40	3	23	29	0	0	0	1	0	2	0	0	1	0	0	22
722	OTB/OTT_MCD_70-99mm	3	10	2	21	31	0	0	0	0	0	1	0	2	0	0	2	30
759	OTB/OTT_MCD_70-99mm	2	40	0	62	7	0	1	0	1	0	5	0	0	2	0	24	24
761	OTB/OTT_MCD_70-99mm	4	4	1	10	33	0	1	0	2	0	3	0	2	6	0	28	25
762	OTB/OTT_MCD_70-99mm	2	7	0	2	10	0	0	0	0	0	1	0	4	2	0	16	18
616	OTB/OTT_DEF_70-99mm	1	80	21	85	71	1	25	0	4	0	2	0	6	1	0	0	0
617	OTB/OTT_DEF_70-99mm	1	71	25	32	23	2	32	0	8	0	3	0	0	0	0	0	0
624	OTB/OTT_DEF_70-99mm	1	34	2	27	34	0	0	0	0	0	0	1	3	1	0	3	12
626	OTB/OTT_DEF_70-99mm	1	8	0	35	12	0	1	0	0	0	0	0	2	11	5	4	16

641	OTB/OTT_DEF_70-99mm	2	19	6	90	134	0	0	0	0	0	2	2	0	0	0	0	12
655	OTB/OTT_DEF_70-99mm	2	89	3	121	72	0	0	0	0	0	2	0	1	3	0	5	6
701	OTB/OTT_DEF_70-99mm	1	18	3	32	26	0	1	0	0	0	1	0	7	10	4	35	15
702	OTB/OTT_DEF_70-99mm	2	15	1	25	20	0	0	0	0	0	1	0	7	4	5	12	11
707.2	OTB/OTT_DEF_70-99mm	2	36	0	68	39	0	0	0	0	0	3	0	0	2	0	4	19
725	OTB/OTT_DEF_70-99mm	3	68	2	56	60	0	0	0	2	0	4	0	0	0	0	2	23
735	OTB/OTT_DEF_70-99mm	1	24	5	54	53	0	0	0	0	0	1	1	4	0	0	2	11
736	OTB/OTT_DEF_70-99mm	2	32	2	80	64	0	0	0	0	0	4	1	2	1	0	20	22
737	OTB/OTT_DEF_70-99mm	4	4	0	24	98	0	2	0	1	0	4	0	0	0	0	0	1
760	OTB/OTT_DEF_70-99mm	4	0	0	3	54	0	4	0	2	0	3	0	5	4	0	46	22
643	OTB/OTT_DEF_100-119mm	2	37	3	134	90	0	0	0	0	0	5	4	3	0	0	0	2
647	OTB/OTT_DEF_100-119mm	2	10	20	35	210	0	0	0	0	0	4	0	1	0	0	0	0
648	OTB/OTT_DEF_100-119mm	2	3	18	25	281	0	0	0	0	0	4	0	5	0	1	0	0
649	OTB/OTT_DEF_100-119mm	2	8	17	35	255	0	0	0	0	0	6	0	0	0	0	0	0
674	OTB/OTT_DEF_100-119mm	3	39	11	129	366	0	0	0	1	0	8	0	2	0	0	0	0
675	OTB/OTT_DEF_100-119mm	3	3	5	46	289	0	0	0	0	0	5	0	2	0	0	0	0
728	OTB/OTT_DEF_100-119mm	3	15	7	78	348	0	0	0	0	0	9	0	0	0	0	0	0

Table 11a. Numbers per hour of discarded (Dis) and landed (Lan) dab (DAB), plaice (PLE), sole, (SOL), brill (BLL), turbot (TUR), cod, whiting (WHG) and Norway lobster (NEP) for each self-sampled trip in the demersal beam-trawl and Scottish seine métiers (TBB_DEF and SCC_DEF) in 2012. Nm, no landings were measured.

TripID	Métier	Q	Dis DAB	Lan DAB	Dis PLE	Lan PLE	Dis SOL	Lan SOL	Dis BLL	Lan BLL	Dis TUR	Lan TUR	Dis COD	Lan COD	Dis WHG	Lan WHG	Dis NEP	Lan NEP
606	TBB_DEF_70-99mm_>300hp	1	201	Nm	258	Nm	11	Nm	0	Nm	0	Nm	0	Nm	24	Nm	0	Nm
607	TBB_DEF_70-99mm_>300hp	1	510	Nm	327	Nm	51	Nm	0	Nm	0	Nm	0	Nm	27	Nm	0	Nm
608	TBB_DEF_70-99mm_>300hp	1	1288	Nm	1235	Nm	67	Nm	0	Nm	3	Nm	19	Nm	556	Nm	0	Nm
610	TBB_DEF_70-99mm_>300hp	1	1040	Nm	820	Nm	52	Nm	0	Nm	0	Nm	3	Nm	52	Nm	0	Nm
619	TBB_DEF_70-99mm_>300hp	1	863	Nm	2019	Nm	42	Nm	0	Nm	9	Nm	9	Nm	34	Nm	13	Nm
620	TBB_DEF_70-99mm_>300hp	1	1709	Nm	943	Nm	28	Nm	0	Nm	0	Nm	0	Nm	28	Nm	8	Nm
621	TBB_DEF_70-99mm_>300hp	1	1992	Nm	1276	Nm	20	Nm	0	Nm	0	Nm	0	Nm	0	Nm	9	Nm
622	TBB_DEF_70-99mm_>300hp	1	1077	Nm	301	Nm	58	Nm	0	Nm	0	Nm	5	Nm	61	Nm	4	Nm
688	TBB_DEF_70-99mm_>300hp	1	753	Nm	2210	Nm	43	Nm	9	Nm	0	Nm	0	Nm	314	Nm	0	Nm
698	TBB_DEF_70-99mm_>300hp	1	251	Nm	495	Nm	6	Nm	0	Nm	0	Nm	2	Nm	14	Nm	8	Nm
703.2	TBB_DEF_70-99mm_>300hp	1	698	Nm	542	Nm	8	Nm	7	Nm	2	Nm	0	Nm	6	Nm	0	Nm
705.2	TBB_DEF_70-99mm_>300hp	1	2037	Nm	2018	Nm	6	Nm	0	Nm	0	Nm	0	Nm	6	Nm	0	Nm
713	TBB_DEF_70-99mm_>300hp	1	17	Nm	68	Nm	15	Nm	0	Nm	0	Nm	0	Nm	6	Nm	0	Nm
627	TBB_DEF_70-99mm_>300hp	2	88	Nm	112	Nm	26	Nm	0	Nm	0	Nm	3	Nm	53	Nm	0	Nm
629	TBB_DEF_70-99mm_>300hp	2	1141	Nm	701	Nm	51	Nm	0	Nm	0	Nm	3	Nm	7	Nm	0	Nm
630	TBB_DEF_70-99mm_>300hp	2	1768	Nm	2359	Nm	215	Nm	0	Nm	0	Nm	0	Nm	49	Nm	0	Nm
631	TBB_DEF_70-99mm_>300hp	2	1005	Nm	1005	Nm	130	Nm	0	Nm	0	Nm	0	Nm	139	Nm	0	Nm
632	TBB_DEF_70-99mm_>300hp	2	977	Nm	1295	Nm	38	Nm	4	Nm	0	Nm	25	Nm	268	Nm	0	Nm
633	TBB_DEF_70-99mm_>300hp	2	1138	Nm	1602	Nm	85	Nm	0	Nm	8	Nm	5	Nm	361	Nm	0	Nm
634	TBB_DEF_70-99mm_>300hp	2	1347	Nm	1749	Nm	81	Nm	0	Nm	0	Nm	13	Nm	6	Nm	0	Nm
637	TBB_DEF_70-99mm_>300hp	2	1825	Nm	656	Nm	17	Nm	0	Nm	0	Nm	0	Nm	9	Nm	0	Nm

638	TBB_DEF_70-99mm_>300hp	2	281	Nm	371	Nm	18	Nm	0	Nm	0	Nm	0	Nm	4	Nm	0	Nm
640	TBB_DEF_70-99mm_>300hp	2	160	Nm	493	Nm	2	Nm	0	Nm	1	Nm	0	Nm	13	Nm	0	Nm
653	TBB_DEF_70-99mm_>300hp	2	2253	Nm	2223	Nm	42	Nm	0	Nm	0	Nm	0	Nm	102	Nm	0	Nm
654	TBB_DEF_70-99mm_>300hp	2	2441	Nm	1959	Nm	119	Nm	0	Nm	5	Nm	0	Nm	11	Nm	0	Nm
750	TBB_DEF_70-99mm_>300hp	2	464	Nm	171	Nm	2	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
751	TBB_DEF_70-99mm_>300hp	2	143	Nm	132	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
659	TBB_DEF_70-99mm_>300hp	3	614	Nm	624	Nm	38	Nm	0	Nm	0	Nm	0	Nm	13	Nm	0	Nm
660	TBB_DEF_70-99mm_>300hp	3	572	Nm	337	Nm	24	Nm	0	Nm	0	Nm	0	Nm	6	Nm	0	Nm
661	TBB_DEF_70-99mm_>300hp	3	980	Nm	404	Nm	10	Nm	0	Nm	0	Nm	0	Nm	52	Nm	0	Nm
662	TBB_DEF_70-99mm_>300hp	3	985	Nm	1586	Nm	151	Nm	0	Nm	0	Nm	0	Nm	23	Nm	0	Nm
663	TBB_DEF_70-99mm_>300hp	3	2061	Nm	1797	Nm	28	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
664	TBB_DEF_70-99mm_>300hp	3	1071	Nm	2760	Nm	213	Nm	0	Nm	0	Nm	20	Nm	99	Nm	0	Nm
668	TBB_DEF_70-99mm_>300hp	3	1103	Nm	279	Nm	4	Nm	0	Nm	0	Nm	0	Nm	30	Nm	19	Nm
669	TBB_DEF_70-99mm_>300hp	3	327	Nm	331	Nm	15	Nm	4	Nm	2	Nm	0	Nm	1	Nm	0	Nm
670	TBB_DEF_70-99mm_>300hp	3	1630	Nm	967	Nm	80	Nm	0	Nm	24	Nm	0	Nm	5	Nm	0	Nm
678	TBB_DEF_70-99mm_>300hp	3	3077	Nm	1715	Nm	127	Nm	0	Nm	7	Nm	0	Nm	8	Nm	0	Nm
679	TBB_DEF_70-99mm_>300hp	3	1229	Nm	213	Nm	0	Nm	0	Nm	0	Nm	0	Nm	24	Nm	273	Nm
689	TBB_DEF_70-99mm_>300hp	3	1654	Nm	1528	Nm	145	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
718	TBB_DEF_70-99mm_>300hp	3	2004	Nm	1218	Nm	101	Nm	0	Nm	0	Nm	0	Nm	136	Nm	0	Nm
732	TBB_DEF_70-99mm_>300hp	3	1932	Nm	612	Nm	0	Nm	0	Nm	0	Nm	0	Nm	28	Nm	0	Nm
752	TBB_DEF_70-99mm_>300hp	3	767	Nm	179	Nm	0	Nm	0	Nm	0	Nm	3	Nm	0	Nm	0	Nm
753	TBB_DEF_70-99mm_>300hp	3	1846	Nm	644	Nm	31	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
710.2	TBB_DEF_70-99mm_>300hp	4	2408	Nm	1627	Nm	33	Nm	0	Nm	0	Nm	0	Nm	181	Nm	21	Nm
712.2	TBB_DEF_70-99mm_>300hp	4	383	Nm	1610	Nm	274	Nm	0	Nm	0	Nm	13	Nm	314	Nm	0	Nm
714	TBB_DEF_70-99mm_>300hp	4	269	Nm	905	Nm	139	Nm	0	Nm	0	Nm	0	Nm	15	Nm	0	Nm
715	TBB_DEF_70-99mm_>300hp	4	77	Nm	244	Nm	53	Nm	0	Nm	0	Nm	0	Nm	70	Nm	0	Nm
716	TBB_DEF_70-99mm_>300hp	4	139	Nm	881	Nm	74	Nm	0	Nm	0	Nm	4	Nm	105	Nm	0	Nm

717	TBB_DEF_70-99mm_>300hp	4	467	Nm	907	Nm	125	Nm	0	Nm	0	Nm	0	Nm	8	Nm	0	Nm
719	TBB_DEF_70-99mm_>300hp	4	1692	Nm	1180	Nm	423	Nm	0	Nm	0	Nm	0	Nm	524	Nm	0	Nm
720	TBB_DEF_70-99mm_>300hp	4	371	Nm	737	Nm	665	Nm	0	Nm	0	Nm	0	Nm	109	Nm	0	Nm
723	TBB_DEF_70-99mm_>300hp	4	1625	Nm	293	Nm	5	Nm	0	Nm	0	Nm	0	Nm	13	Nm	0	Nm
724	TBB_DEF_70-99mm_>300hp	4	844	Nm	505	Nm	17	Nm	0	Nm	0	Nm	0	Nm	24	Nm	2	Nm
729	TBB_DEF_70-99mm_>300hp	4	818	Nm	2185	Nm	142	Nm	0	Nm	0	Nm	5	Nm	77	Nm	0	Nm
733	TBB_DEF_70-99mm_>300hp	4	1562	Nm	819	Nm	63	Nm	0	Nm	0	Nm	0	Nm	13	Nm	0	Nm
734	TBB_DEF_70-99mm_>300hp	4	1238	Nm	751	Nm	40	Nm	0	Nm	0	Nm	0	Nm	293	Nm	233	Nm
746	TBB_DEF_70-99mm_>300hp	4	4035	Nm	734	Nm	105	Nm	0	Nm	0	Nm	0	Nm	101	Nm	0	Nm
747	TBB_DEF_70-99mm_>300hp	4	1196	Nm	183	Nm	6	Nm	0	Nm	0	Nm	0	Nm	12	Nm	33	Nm
749	TBB_DEF_70-99mm_>300hp	4	245	Nm	185	Nm	4	Nm	0	Nm	0	Nm	0	Nm	22	Nm	7	Nm
755	TBB_DEF_70-99mm_>300hp	4	329	Nm	549	Nm	5	Nm	0	Nm	0	Nm	0	Nm	9	Nm	0	Nm
758	TBB_DEF_70-99mm_>300hp	4	419	Nm	167	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
609	TBB_DEF_70-99mm_<=300h	1	208	Nm	61	Nm	0	Nm	0	Nm	0	Nm	1	Nm	36	Nm	267	Nm
614	TBB_DEF_70-99mm_<=300h	1	64	Nm	275	Nm	6	Nm	0	Nm	0	Nm	0	Nm	3	Nm	0	Nm
615	TBB_DEF_70-99mm_<=300h	1	551	Nm	215	Nm	11	Nm	2	Nm	1	Nm	0	Nm	3	Nm	0	Nm
618	TBB_DEF_70-99mm_<=300h	1	2392	Nm	427	Nm	108	Nm	0	Nm	0	Nm	0	Nm	13	Nm	0	Nm
635	TBB_DEF_70-99mm_<=300h	2	294	Nm	290	Nm	10	Nm	0	Nm	0	Nm	0	Nm	14	Nm	0	Nm
646	TBB_DEF_70-99mm_<=300h	2	249	Nm	125	Nm	24	Nm	1	Nm	0	Nm	0	Nm	4	Nm	0	Nm
650	TBB_DEF_70-99mm_<=300h	2	1781	Nm	396	Nm	473	Nm	56	Nm	22	Nm	0	Nm	0	Nm	0	Nm
651	TBB_DEF_70-99mm_<=300h	2	1376	Nm	733	Nm	156	Nm	0	Nm	0	Nm	0	Nm	14	Nm	0	Nm
652	TBB_DEF_70-99mm_<=300h	2	128	Nm	24	Nm	12	Nm	2	Nm	1	Nm	1	Nm	1	Nm	0	Nm
726	TBB_DEF_70-99mm_<=300h	2	86	Nm	66	Nm	6	Nm	1	Nm	0	Nm	0	Nm	0	Nm	0	Nm
754	TBB_DEF_70-99mm_<=300h	2	159	Nm	339	Nm	0	Nm	0	Nm	1	Nm	0	Nm	4	Nm	13	Nm
673	TBB_DEF_70-99mm_<=300h	3	214	Nm	689	Nm	55	Nm	0	Nm	2	Nm	0	Nm	0	Nm	0	Nm
676	TBB_DEF_70-99mm_<=300h	3	622	Nm	1360	Nm	820	Nm	0	Nm	26	Nm	0	Nm	10	Nm	0	Nm

677	TBB_DEF_70-99mm_<=300h	3	38	Nm	70	Nm	6	Nm	2	Nm	0	Nm	0	Nm	0	Nm	0	Nm
686	TBB_DEF_70-99mm_<=300h	3	3498	Nm	1803	Nm	267	Nm	0	Nm	13	Nm	0	Nm	13	Nm	0	Nm
687	TBB_DEF_70-99mm_<=300h	3	681	Nm	2969	Nm	38	Nm	0	Nm	15	Nm	0	Nm	0	Nm	0	Nm
709.2	TBB_DEF_70-99mm_<=300h	3	229	Nm	1003	Nm	45	Nm	0	Nm	3	Nm	0	Nm	4	Nm	0	Nm
730	TBB_DEF_70-99mm_<=300h	4	1639	Nm	900	Nm	57	Nm	0	Nm	12	Nm	0	Nm	0	Nm	0	Nm
731	TBB_DEF_70-99mm_<=300h	4	66	Nm	111	Nm	3	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
763	TBB_DEF_70-99mm_<=300h	4	4027	Nm	2378	Nm	99	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
611	TBB_DEF_100-119mm	1	117	Nm	1147	Nm	0	Nm	0	Nm	0	Nm	7	Nm	2	Nm	10	Nm
612	TBB_DEF_100-119mm	1	184	Nm	271	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
623	TBB_DEF_100-119mm	1	515	Nm	704	Nm	3	Nm	0	Nm	0	Nm	0	Nm	3	Nm	0	Nm
748	TBB_DEF_100-119mm	1	296	Nm	364	Nm	2	Nm	0	Nm	0	Nm	1	Nm	0	Nm	0	Nm
657	TBB_DEF_100-119mm	2	60	Nm	132	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
696	TBB_DEF_100-119mm	2	218	Nm	235	Nm	0	Nm	0	Nm	0	Nm	0	Nm	1	Nm	0	Nm
697	TBB_DEF_100-119mm	2	15	Nm	66	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
699	TBB_DEF_100-119mm	2	151	Nm	246	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
708.2	TBB_DEF_100-119mm	2	184	Nm	410	Nm	0	Nm	0	Nm	0	Nm	0	Nm	6	Nm	0	Nm
743	TBB_DEF_100-119mm	2	302	Nm	444	Nm	4	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
744	TBB_DEF_100-119mm	2	405	Nm	436	Nm	2	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
745	TBB_DEF_100-119mm	2	460	Nm	452	Nm	3	Nm	0	Nm	4	Nm	0	Nm	0	Nm	0	Nm
756	TBB_DEF_100-119mm	2	283	Nm	414	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
684	TBB_DEF_100-119mm	3	149	Nm	661	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
685	TBB_DEF_100-119mm	3	1408	Nm	284	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
757	TBB_DEF_100-119mm	3	208	Nm	293	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
738	SSC_DEF_100-119mm	2	203	Nm	53	Nm	0	Nm	0	Nm	0	Nm	0	Nm	6	Nm	0	Nm
739	SSC_DEF_100-119mm	2	14	Nm	8	Nm	0	Nm	0	Nm	0	Nm	3	Nm	1	Nm	0	Nm
764	SSC_DEF_100-119mm	2	729	Nm	22	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm

741	SSC_DEF_100-119mm	4	171	Nm	26	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
742	SSC_DEF_100-119mm	4	64	Nm	42	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	2	Nm
682	SSC_DEF_>=120mm	3	47	Nm	47	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm
683	SSC_DEF_>=120mm	3	71	Nm	4	Nm	0	Nm	0	Nm	0	Nm	5	Nm	8	Nm	0	Nm
740	SSC_DEF_>=120mm	3	50	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	128	Nm	0	Nm

Table 11b. Numbers per hour of discarded (Dis) and landed (Lan) dab (DAB), plaice (PLE), sole, (SOL), brill (BLL), turbot (TUR), cod, whiting (WHG) and Norway lobster (NEP) for each self-sampled trip in the demersal otter-trawl métiers (OTB/OTT) in 2012. Nm, no landings were measured.

TripID	Métier	Q	Dis DAB	Lan DAB	Dis PLE	Lan PLE	Dis SOL	Lan SOL	Dis BLL	Lan BLL	Dis TUR	Lan TUR	Dis COD	Lan COD	Dis WHG	Lan WHG	Dis NEP
636	OTB/OTT_MCD_70-99mm	2	222	Nm	143	Nm	0	Nm	0	Nm	0	Nm	1	Nm	5	Nm	496
644	OTB/OTT_MCD_70-99mm	2	1800	Nm	688	Nm	0	Nm	0	Nm	4	Nm	28	Nm	94	Nm	308
656	OTB/OTT_MCD_70-99mm	2	474	Nm	479	Nm	0	Nm	0	Nm	0	Nm	3	Nm	29	Nm	128
700	OTB/OTT_MCD_70-99mm	2	147	Nm	486	Nm	0	Nm	0	Nm	0	Nm	0	Nm	73	Nm	483
759	OTB/OTT_MCD_70-99mm	2	761	Nm	621	Nm	0	Nm	0	Nm	0	Nm	3	Nm	28	Nm	914
762	OTB/OTT_MCD_70-99mm	2	186	Nm	21	Nm	0	Nm	0	Nm	0	Nm	0	Nm	28	Nm	812
665	OTB/OTT_MCD_70-99mm	3	541	Nm	172	Nm	0	Nm	0	Nm	0	Nm	0	Nm	3	Nm	35
666	OTB/OTT_MCD_70-99mm	3	311	Nm	236	Nm	0	Nm	0	Nm	1	Nm	0	Nm	4	Nm	324
671	OTB/OTT_MCD_70-99mm	3	1698	Nm	446	Nm	0	Nm	0	Nm	0	Nm	46	Nm	30	Nm	1572
680	OTB/OTT_MCD_70-99mm	3	1276	Nm	406	Nm	0	Nm	0	Nm	0	Nm	3	Nm	21	Nm	929
681	OTB/OTT_MCD_70-99mm	3	3754	Nm	1159	Nm	13	Nm	0	Nm	0	Nm	0	Nm	20	Nm	1188
704.2	OTB/OTT_MCD_70-99mm	3	1037	Nm	170	Nm	0	Nm	0	Nm	0	Nm	8	Nm	28	Nm	364
706.2	OTB/OTT_MCD_70-99mm	3	687	Nm	185	Nm	0	Nm	0	Nm	0	Nm	0	Nm	10	Nm	10
722	OTB/OTT_MCD_70-99mm	3	147	Nm	169	Nm	0	Nm	0	Nm	0	Nm	1	Nm	2	Nm	71
761	OTB/OTT_MCD_70-99mm	4	65	Nm	58	Nm	0	Nm	0	Nm	0	Nm	0	Nm	105	Nm	1561
616	OTB/OTT_DEF_70-99mm	1	1210	Nm	1284	Nm	17	Nm	0	Nm	0	Nm	0	Nm	12	Nm	0
617	OTB/OTT_DEF_70-99mm	1	1100	Nm	476	Nm	33	Nm	2	Nm	0	Nm	0	Nm	7	Nm	0
624	OTB/OTT_DEF_70-99mm	1	407	Nm	238	Nm	2	Nm	0	Nm	0	Nm	7	Nm	5	Nm	111
626	OTB/OTT_DEF_70-99mm	1	127	Nm	278	Nm	0	Nm	0	Nm	0	Nm	0	Nm	79	Nm	208
701	OTB/OTT_DEF_70-99mm	1	239	Nm	309	Nm	0	Nm	0	Nm	0	Nm	3	Nm	90	Nm	1758
735	OTB/OTT_DEF_70-99mm	1	281	Nm	494	Nm	0	Nm	0	Nm	0	Nm	4	Nm	1	Nm	91
641	OTB/OTT_DEF_70-99mm	2	184	Nm	644	Nm	0	Nm	0	Nm	0	Nm	4	Nm	0	Nm	0

655	OTB/OTT_DEF_70-99mm	2	1302	Nm	1093	Nm	3	Nm	0	Nm	0	Nm	0	Nm	27	Nm	177
702	OTB/OTT_DEF_70-99mm	2	305	Nm	259	Nm	0	Nm	0	Nm	0	Nm	0	Nm	42	Nm	658
707.2	OTB/OTT_DEF_70-99mm	2	552	Nm	526	Nm	0	Nm	0	Nm	2	Nm	0	Nm	24	Nm	142
736	OTB/OTT_DEF_70-99mm	2	519	Nm	612	Nm	0	Nm	0	Nm	0	Nm	4	Nm	12	Nm	671
725	OTB/OTT_DEF_70-99mm	3	790	Nm	479	Nm	2	Nm	0	Nm	0	Nm	0	Nm	3	Nm	60
737	OTB/OTT_DEF_70-99mm	4	55	Nm	182	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	4
760	OTB/OTT_DEF_70-99mm	4	4	Nm	14	Nm	0	Nm	0	Nm	0	Nm	0	Nm	75	Nm	2306
643	OTB/OTT_DEF_100-119mm	2	429	Nm	978	Nm	0	Nm	0	Nm	0	Nm	9	Nm	2	Nm	2
647	OTB/OTT_DEF_100-119mm	2	84	Nm	231	Nm	0	Nm	0	Nm	0	Nm	1	Nm	0	Nm	0
648	OTB/OTT_DEF_100-119mm	2	23	Nm	151	Nm	0	Nm	0	Nm	0	Nm	1	Nm	0	Nm	0
649	OTB/OTT_DEF_100-119mm	2	46	Nm	218	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0
674	OTB/OTT_DEF_100-119mm	3	221	Nm	788	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0
675	OTB/OTT_DEF_100-119mm	3	38	Nm	298	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	4
728	OTB/OTT_DEF_100-119mm	3	99	Nm	507	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0

Appendix C:

Table 12a. Standard deviations of the weights (kg) per hour of discarded (Dis) and landed (Lan) commercially-important target species: dab (DAB), plaice (PLE), sole, (SOL), brill (BLL), turbot (TUR), cod, whiting (WHG) and Norway lobster (NEP) by métier in 2012. n/a, not applicable.

Metier	Dis DAB	Lan DAB	Dis PLE	Lan PLE	Dis SOL	Lan SOL	Dis BLL	Lan BLL	Dis TUR	Lan TUR	Dis COD	Lan COD	Dis WHG	Lan WHG	Dis NEP	Lan NEP
TBB_DEF_70-99mm_>300hp	46	7	71	86	10	14	0	2	1	5	2	3	12	1	n/a	0
TBB_DEF_70-99mm_<=300h	63	17	35	7	12	8	1	0	2	1	0	3	1	0	n/a	11
TBB_DEF_100-119mm	28	33	37	199	0	0	0	3	0	9	1	n/a	0	n/a	n/a	n/a
SSC_DEF_100-119mm	27	207	2	45	0	n/a	0	n/a	0	n/a	0	52	0	n/a	n/a	n/a
SSC_DEF_>=120mm	1	82	4	60	0	n/a	0	n/a	0	n/a	1	191	11	n/a	0	n/a
OTB/OTT_MCD_70-99mm	75	2	32	9	0	0	0	1	0	2	3	1	3	1	n/a	11
OTB/OTT_DEF_70-99mm	29	8	33	33	1	11	0	3	0	1	1	2	4	3	n/a	7
OTB/OTT_DEF_100-119mm	15	7	46	93	0	n/a	0	0	0	2	2	1	0	n/a	n/a	n/a
TBB_DEF_70-99mm_>300hp	46	7	71	86	10	14	0	2	1	5	2	3	12	1	n/a	0

Table 12b. Standard deviations of the numbers per hour of discarded (Dis) and landed (Lan) commercially-important target species: dab (DAB), plaice (PLE), sole, (SOL), brill (BLL), turbot (TUR), cod, whiting (WHG) and Norway lobster (NEP) by métier in 2012. Nm, no landings were measured. n/a, not applicable.

Metier	Dis DAB	Lan DAB	Dis PLE	Lan PLE	Dis SOL	Lan SOL	Dis BLL	Lan BLL	Dis TUR	Lan TUR	Dis COD	Lan COD	Dis WHG	Lan WHG	Dis NEP	Lan NEP
TBB_DEF_70-99mm_>300hp	812	Nm	696	Nm	108	Nm	2	Nm	4	Nm	5	Nm	122	Nm	46	Nm
TBB_DEF_70-99mm_<=300h	1185	Nm	826	Nm	203	Nm	12	Nm	8	Nm	0	Nm	9	Nm	60	Nm
TBB_DEF_100-119mm	323	Nm	258	Nm	1	Nm	0	Nm	1	Nm	2	Nm	2	Nm	2	Nm
SSC_DEF_100-119mm	286	Nm	18	Nm	0	Nm	0	Nm	0	Nm	1	Nm	3	Nm	1	Nm
SSC_DEF_>=120mm	13	Nm	26	Nm	0	Nm	0	Nm	0	Nm	3	Nm	72	Nm	0	Nm
OTB/OTT_MCD_70-99mm	973	Nm	300	Nm	3	Nm	0	Nm	1	Nm	13	Nm	33	Nm	526	Nm
OTB/OTT_DEF_70-99mm	433	Nm	345	Nm	9	Nm	1	Nm	0	Nm	2	Nm	32	Nm	717	Nm
OTB/OTT_DEF_100-119mm	146	Nm	319	Nm	0	Nm	0	Nm	0	Nm	3	Nm	1	Nm	2	Nm
TBB_DEF_70-99mm_>300hp	812	Nm	696	Nm	108	Nm	2	Nm	4	Nm	5	Nm	122	Nm	46	Nm

Table 13a. Standard deviations of the weights (kg) per hour of discarded (Dis) and landed (Lan) commercially-important target species: dab (DAB), plaice (PLE), sole, (SOL), brill (BLL), turbot (TUR), cod, whiting (WHG) and Norway lobster (NEP) by métier and quarter (Q) in 2012. n/a, not applicable.

Metier	Q	N	Dis DAB	Lan DAB	Dis PLE	Lan PLE	Dis SOL	Lan SOL	Dis BLL	Lan BLL	Dis TUR	Lan TUR	Dis COD	Lan COD	Dis WHG	Lan WHG	Dis NEP	Lan NEP
TBB_DEF_70-99mm_>300hp	1		41	11	63	72	2	11	0	2	0	4	1	3	15	2	n/a	n/a
TBB_DEF_70-99mm_>300hp	2		40	7	61	118	5	11	0	1	0	1	2	3	11	0	0	n/a
TBB_DEF_70-99mm_>300hp	3		43	4	91	88	6	15	0	1	1	3	2	1	5	0	n/a	n/a
TBB_DEF_70-99mm_>300hp	4		54	2	68	67	16	15	0	3	0	7	2	1	16	n/a	n/a	n/a
TBB_DEF_70-99mm_<=300h	1		66	13	10	9	3	9	0	1	0	1	0	2	2	n/a	n/a	n/a
TBB_DEF_70-99mm_<=300h	2		42	25	17	8	11	10	2	0	2	1	0	4	0	n/a	n/a	n/a
TBB_DEF_70-99mm_<=300h	3		56	1	39	3	19	4	0	0	2	0	0	n/a	0	n/a	0	n/a
TBB_DEF_70-99mm_<=300h	4		108	1	39	3	3	5	0	n/a	1	n/a	0	n/a	0	n/a	0	n/a
TBB_DEF_100-119mm	1		10	2	61	145	0	n/a	0	0	0	3	2	n/a	0	n/a	n/a	n/a
TBB_DEF_100-119mm	2		14	6	18	92	0	n/a	0	3	0	10	0	n/a	0	n/a	0	n/a
TBB_DEF_100-119mm	3		62	n/a	27	274	0	n/a	0	n/a	0	n/a	0	n/a	0	n/a	0	n/a
SSC_DEF_100-119mm	2		34	16	3	39	0	n/a	0	n/a	0	n/a	0	68	0	n/a	0	n/a
SSC_DEF_100-119mm	4		11	n/a	2	59	0	n/a	0	n/a	0	n/a	0	56	0	n/a	n/a	n/a
SSC_DEF_>=120mm	3		1	82	4	60	0	n/a	0	n/a	0	n/a	1	191	11	n/a	0	n/a
OTB/OTT_MCD_70-99mm	2		38	1	30	9	0	0	0	0	1	2	3	1	4	2	n/a	4
OTB/OTT_MCD_70-99mm	3		89	2	34	8	0	0	0	1	0	1	4	1	1	n/a	n/a	13
OTB/OTT_MCD_70-99mm	4		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
OTB/OTT_DEF_70-99mm	1		30	11	22	22	1	15	0	3	0	1	0	2	5	3	n/a	3
OTB/OTT_DEF_70-99mm	2		30	2	35	44	0	0	0	0	0	1	1	3	2	4	n/a	6
OTB/OTT_DEF_70-99mm	3		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
OTB/OTT_DEF_70-99mm	4		3	n/a	15	31	0	1	0	0	0	1	0	3	3	n/a	n/a	15
OTB/OTT_DEF_100-119mm	2		15	8	51	85	0	n/a	0	0	0	1	2	2	0	n/a	n/a	n/a
OTB/OTT_DEF_100-119mm	3		19	3	42	41	0	n/a	0	n/a	0	2	0	0	0	n/a	n/a	n/a

Table 13b. Standard deviations of the numbers per hour of discarded (Dis) and landed (Lan) commercially-important target species: dab (DAB), plaice (PLE), sole, (SOL), brill (BLL), turbot (TUR), cod, whiting (WHG) and Norway lobster (NEP) by métier and quarter (Q) in 2012. Nm, no landings were measured; n/a, not applicable.

Metier	Q	N	Dis DAB	Lan DAB	Dis PLE	Lan PLE	Dis SOL	Lan SOL	Dis BLL	Lan BLL	Dis TUR	Lan TUR	Dis COD	Lan COD	Dis WHG	Lan WHG	Dis NEP	Lan NEP
TBB_DEF_70-99mm_>300hp	1		658	Nm	737	Nm	22	Nm	3	Nm	2	Nm	163	Nm	5	Nm	5	658
TBB_DEF_70-99mm_>300hp	2		788	Nm	800	Nm	62	Nm	1	Nm	2	Nm	112	Nm	7	Nm	0	788
TBB_DEF_70-99mm_>300hp	3		713	Nm	746	Nm	67	Nm	1	Nm	6	Nm	39	Nm	5	Nm	68	713
TBB_DEF_70-99mm_>300hp	4		1002	Nm	559	Nm	174	Nm	0	Nm	0	Nm	141	Nm	3	Nm	55	1002
TBB_DEF_70-99mm_<=300h	1		1079	Nm	151	Nm	51	Nm	1	Nm	0	Nm	16	Nm	0	Nm	134	1079
TBB_DEF_70-99mm_<=300h	2		694	Nm	244	Nm	175	Nm	21	Nm	8	Nm	6	Nm	0	Nm	5	694
TBB_DEF_70-99mm_<=300h	3		1307	Nm	1002	Nm	316	Nm	1	Nm	10	Nm	6	Nm	0	Nm	0	1307
TBB_DEF_70-99mm_<=300h	4		1994	Nm	1151	Nm	48	Nm	0	Nm	7	Nm	0	Nm	0	Nm	0	1994
TBB_DEF_100-119mm	1		174	Nm	397	Nm	1	Nm	0	Nm	0	Nm	1	Nm	3	Nm	5	174
TBB_DEF_100-119mm	2		148	Nm	148	Nm	2	Nm	0	Nm	1	Nm	2	Nm	0	Nm	0	148
TBB_DEF_100-119mm	3		711	Nm	215	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	711
SSC_DEF_100-119mm	2		371	Nm	23	Nm	0	Nm	0	Nm	0	Nm	3	Nm	2	Nm	0	371
SSC_DEF_100-119mm	4		75	Nm	12	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	1	75
SSC_DEF_>=120mm	3		13	Nm	26	Nm	0	Nm	0	Nm	0	Nm	72	Nm	3	Nm	0	n/a
OTB/OTT_MCD_70-99mm	2		633	Nm	266	Nm	0	Nm	0	Nm	2	Nm	34	Nm	11	Nm	297	633
OTB/OTT_MCD_70-99mm	3		1159	Nm	339	Nm	4	Nm	0	Nm	0	Nm	11	Nm	16	Nm	594	1159
OTB/OTT_MCD_70-99mm	4		n/a	Nm	n/a	Nm	n/a	Nm	n/a	Nm	n/a	Nm	n/a	Nm	n/a	Nm	n/a	n/a
OTB/OTT_DEF_70-99mm	1		470	Nm	392	Nm	14	Nm	1	Nm	0	Nm	41	Nm	3	Nm	689	470
OTB/OTT_DEF_70-99mm	2		435	Nm	301	Nm	1	Nm	0	Nm	1	Nm	16	Nm	2	Nm	313	435
OTB/OTT_DEF_70-99mm	3		n/a	Nm	n/a	Nm	n/a	Nm	n/a	Nm	n/a	Nm	n/a	Nm	n/a	Nm	n/a	n/a
OTB/OTT_DEF_70-99mm	4		36	Nm	119	Nm	0	Nm	0	Nm	0	Nm	52	Nm	0	Nm	1627	36
OTB/OTT_DEF_100-119mm	2		190	Nm	391	Nm	0	Nm	0	Nm	0	Nm	1	Nm	4	Nm	1	190
OTB/OTT_DEF_100-119mm	3		93	Nm	246	Nm	0	Nm	0	Nm	0	Nm	0	Nm	0	Nm	2	93

Appendix D:

Uhlmann, S. S., Helmond, A. T. M. v. Double Dutch: detecting bias in observer- and self-sampling surveys of commercial beam-trawl discards in The Netherlands. Manuscript submitted to 'Fisheries Research'.

ABSTRACT

To detect and subsequently minimise bias in discard assessments, an evaluation of the representativeness, and thus quality of at-sea sampling was done for two discard monitoring programmes of Dutch commercial beam-trawlers in the North Sea. We describe how well sampled trawls, trips and vessels represent their respective total populations on spatial, temporal and biological scales for two independent programmes: observer and self-sampling. During a sub-sample of commercial and independent trips, a fraction of discards were retained by either an observer or crew member ('self-sampling') and analysed for species, length and age compositions between 2009 and 2011. Compared with self-sampling, observer sampling clustered in the Southern North Sea. In both programmes, sampling frequency was low at night, and on certain weekdays. Observers tended to overestimate total catch volumes, and seemed to underestimate numbers of benthic invertebrate discards. Using this protocol as a template to identify and reduce bias in at-sea monitoring schemes will be a useful tool to eventually improve the accuracy of observations.

Keywords: Data quality; demersal trawl fisheries; North Sea; participatory research

Appendix E:

Overview of sampling approach and design

Table Appendix E.1. Sampling Approach and Modifications (SAM) of the observer monitoring programme of Dutch demersal fisheries following a template by Cotter and Pilling (2007).

Feature	**Description**
Customer requirements: Formerly required *For WKNSSK* - Numbers-at-length and numbers-at-age discarded and retained of plaice and sole raised to fleet level by quarter and ICES Division; *for STCF*: Since mid-2011, trips are monitored as independent comparisons with self-sampled trips, as co-sampled/matched trips. Due to their sporadic and stratified nature (only a very limited number of monitored trips per gear segment), these data are currently not provided to the customers as raised outputs anymore. *Modifications*: Since mid-2011, co-sampled or matched trips are being organized where an observer joins a self-sampling vessel. At least the two hauls from the self-sampling are also sampled by the observer. These matched trips are done, to compare estimates of landings and discards with those of self-sampling which is also done during these trips. *Resources and constraints:* One sea-going observer, trip coordinator, data manager, data analyst, project manager. Fisheries for sampling are selected based on a combination of ranking highest in effort, landings value, and landings quantity (DCF criteria). *Variables and covariates to be measured:* numbers-at-length discarded and retained. Otoliths are sampled from 5 fish (e.g. plaice, sole, dab, whiting, and cod) per length class per trip (and according to the protocol also per ICES Division; although this is rarely checked onboard; fish are collected typically during the second half of a trip, fish are collected over a number of hauls, records are kept of how many fish per length class were sampled to keep track of how many are still needed to meet the target of 5 fish per length class). *Raising:* from sample to haul – based on the proportion of the total discard/landings volume over the sampled volume; from haul to trip – based on the proportion of total fishing time (sum of all deployment durations of a trip) over the sampled fishing time (sum of sampled deployment durations); actually haul level-raised numbers-at-length are divided by the duration of the sampled haul to derive the number per hour at length, per length class these are summed over all sampled hauls and divided by the total deployment durations of the trip; from trip to fleet – based on the proportion of total fishing effort per day expressed in kw days at sea over the sampled effort.	

Table Appendix E.2. Sampling Approach and Modifications (SAM) in the self-sampling monitoring programme of Dutch demersal fisheries; following a template by Cotter and Pilling (2007).

Feature	**Description**
Customer requirements: For WKNSSK - Numbers-at-length and numbers-at-age discarded and retained of plaice and sole raised to fleet level by quarter and ICES Division; *for STCF*:	
Resources and constraints: One sea-going observer, trip coordinator, data manager, data analyst, project manager. Fisheries for sampling are selected based on a combination of ranking highest in effort, landings value, and landings quantity (DCF criteria). Out of their population of active vessels, those are selected to participate in the self-sampling fleet based on their gear and mesh size and gear type category. Vessels are then selected for sampling based on a pre-determined planning schedule to coordinate the pick-up of discard samples that are brought back to shore. This plan takes into account the type of fishery, the target number of trips, and, if known, the anticipated port of landing the catch. However, due to seasonal dynamics, this schedule may change on short notice. Samples from between 4 to 5 different trips are typically collected in any one week of the year. Thereby, adaptions are necessary due to short-term changes in fishing and landing patterns depending on weather, technical, market and any other condition which may influence an individual fishers choice on where to land his catch.	
Variables and covariates to be measured: numbers-at-length discarded and retained. Otoliths are sampled from 3 fish (e.g. plaice, sole, dab, whiting, and cod) per length class on post-determined trips. Per quarter and métier, two unique vessel-trips are being sampled; thereby electric fishing by pulse trawlers with either small or large engine sizes are considered different metiers.	
Raising: from sample to haul – based on the proportion of the total discard/landings volume over the sampled volume; from haul to trip – based on the proportion of total fishing time (sum of all deployment durations of a trip) over the sampled fishing time (sum of sampled deployment durations); actually haul level-raised numbers-at-length are divided by the duration of the sampled haul to derive the number per hour at length, per length class these are summed over all sampled hauls and divided by the total deployment durations of the trip; from trip to fleet – based on the proportion of total fishing effort per day expressed in kw days at sea over the sampled effort.	
Sampling design and frame: A fixed and pre-defined number of 25 vessels participating in a reference fleet. This is max. number of vessels from which samples can be processed within available manpower and budget. A number of key metiers are annually selected for discard monitoring based on their combined ranking in terms of retrospective effort, amount of landings and their value from the year before. For each of these metiers, vessels are selected for monitoring which are representative[1] of the respective population of vessel. Among the segment of beam trawlers with >300 hp (the demersal metier with most fishing effort in the Netherlands) the selection of a pre-determined and arbitrary sample size of 10 participating vessels that join the so-called self-sampling reference fleet reflects the relative proportion of gear subtypes throughout this segment ('Groot') of the fleet.	

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