

Stichting Wageningen Research Centre for Fisheries Research (CVO)

Discard self-sampling of the Dutch bottom-trawl fisheries in 2023

N. Afranewaa, K. Bleeker, M. Dammers, J. van der Pool & H. van Overzee

CVO report: 25.013

Commissioned by:
Dr. Robbert-Jan Schaap
Ministerie van Landbouw, Visserij, Voedselzekerheid en Natuur
Directie VenGW
Postbus 20401
2500 EK Den Haag

Project number: 4311213052
BAS code: WOT-05-001-004

Publication date: May 14th 2025

Stichting Wageningen Research
Centre for Fisheries Research (CVO)
P.O. Box 68
1970 AB IJmuiden
Phone. +31 (0)317-487418

Visitor address:
Haringkade 1
1976 CP IJmuiden



**Co-funded by
the European Union**

This research is conducted as part of the statutory task programme "fisheries research" and subsidised by the Dutch Ministry of Agriculture, Fisheries, Food Security and Nature and co-funded by the European Commission.

DOI: <https://doi.org/10.18174/693231>

© 2025 CVO

The Stichting Wageningen Research-Centre for Fisheries Research is registered in the Chamber of commerce in Gelderland nr. 09098104

This report was prepared at the request of the client above and is his property. All rights reserved. No part of this report may appear and/or published, photocopied or otherwise used without the written consent of the client.

CVO rapport ENG V12

Table of Contents

Table of Contents.....	3
Summary	4
Samenvatting.....	5
1 Introduction	6
1.1 Background.....	6
1.2 Quality assurance	6
2 Methods	7
2.1 Discard self-sampling programme	7
2.1.1 Reference fleet	7
2.1.2 Sampling and data collection procedures.....	7
2.1.3 Metier classification	7
2.2 Raising procedures.....	8
2.3 Fleet effort.....	8
3 Results.....	9
3.1 Data collection.....	9
3.2 Data selection	9
3.3 TBB_DEF_70-99_G300hp.....	9
3.4 TBB_DEF_70-99_S300hp.....	10
3.5 TBB_DEF_100-119.....	10
3.6 TBB_DEF_>=120.....	10
3.7 OTB_DEF_32-69	10
3.8 OTB_CRU_70-99.....	11
3.9 OTB_MCD_70-99	11
3.10 OTB_DEF_70-99	11
3.11 OTB_DEF_100-119.....	11
4 Discussion	13
Acknowledgements	15
References.....	16
Tables and Figures	18
Justification.....	44

Summary

In the European Union the collection and management of fisheries data is regulated through the Data Collection Framework (DCF) of the European Commission (EC). Within this context, Wageningen Marine Research (WMR) coordinates a discard monitoring programme in collaboration with the Dutch demersal fishing industry. A reference fleet of vessels of which the owners are willing to participate in a self-sampling programme, was recruited in 2009 and has been extended and updated regularly. Annually approximately 160 trips need to be sampled by the reference fleet. Fishermen within the reference fleet are requested to collect discard samples of two hauls according to a definite annual sampling plan. To avoid any potential bias in trip selection and to conform to the statistical sound principles as defined in the DCF recast, from 2018 onwards the trips are randomly divided over the reference fleet and any refusals are recorded. After the discard samples are brought to shore, WMR collects and analyses these samples. This report summarizes data that has been collected within this self-sampling monitoring programme in 2023.

In 2023, the reference fleet consisted of 22 commercial vessels, of which, in the end, 19 participated in the self-sampling. In total, 132 trips were sampled following the protocol in 2023. All sampled trips were assigned to their respective metiers post sampling, based on gear type, mesh size and species composition of the catch. Eight different metiers were assigned: beam trawlers with 80 mm mesh size (engine power > 300 hp and engine power ≤ 300 hp), 100-119 mm mesh size and ≥120 mm mesh size, and otter trawlers with 32-69 mm mesh size (targeting cephalopods), 70-99 mm mesh size (targeting Norway lobster or mixed crustaceans and demersal species) and 100-119 mm mesh size.

Observed discard patterns are quite similar between all metiers; dab and undersized plaice are the most frequently discarded fish species. Most of the benthic, non-fish, discards consisted of echinoderms and crustaceans. To monitor annual discard percentages, it is essential that the sampled trips follow the distribution of the fleet both in space and time; a mismatch between sampling and the distribution of the fleet could introduce a possible bias in the discard estimate. The results show that the sampling effort of the most intensely sampled metiers (i.e. TBB_DEF_70-99, OTB_CRU-70-99) indeed represents the fleet through space and time. However, for the less frequently sampled metiers this is not always the case.

An important element in the reform of the Common Fisheries Policy (CFP) 2014-2020 is the obligation to land all catches, i.e. a discard ban. Under this landing obligation, all discards of quota-regulated species have to be landed. For the demersal fisheries the landing obligation has been phased in over a number of years (starting in 2016 and full implementation in January 2019). However, discarding continues under various forms of exemptions on the regulations, e.g., high survivability, *de minimis*, prohibited species, making a discards monitoring programme necessary. From 2016 onwards, monitoring of the catch fraction *Below Minimum Size* (BMS) has been included in the sampling protocol of the discards monitoring programme. Similar to previous years, BMS has been observed and registered sporadically during the self-sampling trips in 2023.

Samenvatting

In de Europese Unie wordt het verzamelen en beheren van visserijgegevens gereguleerd door middel van de Data Collectie Verordening (DCF) van de Europese Commissie (EC). Binnen deze regulatie, coördineert Wageningen Marine Research (WMR) een discards zelfbemonsteringsprogramma in samenwerking met de Nederlandse demersale visserij. In dit project wordt gebruik gemaakt van een 'referentie vloot', bestaande uit een groep Nederlandse commerciële vissers die zich willen inzetten voor het onderzoek. Deze referentievloot is in 2009 opgezet en is sindsdien uitgebreid en regelmatig gedeeltelijk vernieuwd. Jaarlijks moeten in totaal ongeveer 160 trips door de referentievloot bemonsterd worden. De vissers van de referentievloot wordt gevraagd om voor specifieke visreizen, die aan het begin van het jaar zijn vastgesteld, een deel van de discards (d.w.z. de vangst die anders overboord zou zijn gegaan) van twee vistrekken aan boord te houden. Om een mogelijk vertekend beeld in de verzamelde gegevens te voorkomen, worden vanaf 2018 de bemonsterde reizen willekeurig over de referentievloot verdeeld, zoals verzocht in de herziene versie van de DCF. De monsters met bijbehorende gegevens over de totale vangst per trek, visserij-inspanning en vispositie worden aangeleverd en aan WMR overgedragen. WMR zorgt voor de verdere verwerking van de monsters. Voorliggend rapport presenteert de resultaten van het zelfbemonsteringsproject van de Nederlandse demersale vloot opererend in de Noordzee (ICES deelgebied IV) in 2023.

In 2022 bestond de referentievloot uit 22 schepen waarvan uiteindelijk 19 schepen hebben deelgenomen aan de zelfbemonstering. In totaal zijn 132 visreizen in 2023 op de juiste manier volgens het protocol bemonsterd. Op basis van vistuig, maaswijdte en soortensamenstelling van de vangst zijn alle bemonsterde visreizen naderhand aan een metier toegekend. In 2023 zijn acht verschillende metiers bemonsterd: boomkorschepen vissend met 70-99 mm maaswijdte (waarbij onderscheid gemaakt wordt tussen Eurokotters (d.w.z. vissend met een motorvermogen ≤ 300 pk) en grote kotters (d.w.z. vissend met een motorvermogen > 300 pk)), 100-119 mm maaswijdte en ≥ 120 mm maaswijdte, en otter trawlers vissend met 32-69 mm maaswijdte (vissend op cephalopoden), 70-99 mm maaswijdte (waarbij gericht op Noorse kreeft, of demersale vis en Noorse kreeft gevangen wordt) en 100-119 mm maaswijdte.

De waargenomen patronen in de discards zijn vergelijkbaar tussen de verschillende metiers; schar en ondermaatse schol zijn de meest voorkomende soorten in de visdiscards. De meerderheid van de benthos discards bestond uit stekelhuidigen (verschillende zeestersoorten) en kreeftachtigen (zoals zwemkrabben en Noorse kreeft). Om jaarlijkse discardsschattingen van de Nederlandse demersale vloot te bepalen, is het essentieel dat de bemonstering de vloot representeert in ruimte en tijd; een mismatch tussen de verspreiding van de bemonstering en de vloot kan tot een vertekend beeld van de discardsschattingen leiden. De resultaten laten zien dat de bemonsteringsinspanning van de meest bemonsterde metier (d.w.z. boomkor metier gericht op tong en de ottertrawl metier gericht op Noorse kreeft) de vloot volgt in de ruimte en tijd. Voor de minder intensief bemonsterde metiers is dit echter niet altijd het geval.

Een belangrijk element in de herziening van het Gemeenschappelijk visserijbeleid (GVB) 2014-2020 is de verplichting om alle vangsten aan land te brengen. Onder deze aanlandplicht moeten alle discards van commerciële soorten die gereguleerd worden door quota aangeleverd worden. Binnen de demersale visserij is de aanlandplicht tussen 1 januari 2016 en 1 januari 2019 ingevoerd. Het is duidelijk dat onder de aanlandplicht waarbinnen discards, vanwege verschillende uitzonderingen (hoge overleving, *de minimis*, soorten met een vangstverbod), tot op zekere hoogte zal blijven bestaan, een discards monitoringsprogramma nodig blijft. Sinds 2016 is de monitoring van de vangstfractie *Below Minimum Size* (BMS) opgenomen in het bemonsteringsprotocol van de zelfbemonstering. Net als in voorgaande jaren is BMS alleen sporadisch waargenomen in de zelfbemonsteringsreizen in 2023.

1 Introduction

1.1 Background

Discarding unwanted organisms in European fisheries is unavoidable in mixed fisheries (Kelleher, 2005; Catchpole et al., 2008; Feekings et al., 2012; Uhlmann et al., 2014). Reasons for discarding could be economic (if there is no commercial value for the species caught) or because of regulatory measures (such as minimum landing size or catch limits (quota)) (Catchpole et al., 2005; Rochet and Trenkel, 2005; Poos et al. 2010; Suuronen & Gilman, 2020). Keeping records of discarded quantities is needed for scientific stock assessments and advice on quota, discard recording enables more accurate estimates of total fishing mortality.

Box 1: Data Collection Framework (DCF)

In the European Union (EU) the collection and management of fisheries data is enforced through the Data Collection Framework (DCF) of the European Commission (EC) (EU 2017/1004, EU 2021/1167, EU 2021/1168). The DCF states which information should be collected, managed and made available by the Member States (MS) for scientific advice regarding the Common Fisheries Policy (CFP). For this purpose all MS are obliged to submit a work plan for data collection in the fisheries and aquaculture sectors on a multiannual basis.

The collection of discard data is enforced through the EC DCF (Box 1). The DCF requires the implementation of at-sea monitoring programmes, which should deliver valid estimates of discards for each type of fishery, temporal period and area. To comply with this ruling, an observer programme with scientifically-trained observers has been in place since 2000, for which annually 6-18 active demersal fishing trips have been monitored. In 2009, revisions to the DCF required member states to increase sampling intensity to i) improve the precision of their estimates and (ii) the number of sampled fishing fleets (metiers). In foresight of the expenses involved, an affordable self-sampling programme commenced in the Netherlands for the Dutch demersal active fisheries in the North Sea in 2009. Within this programme, discard data are collected for Dutch bottom-trawl fisheries for a number of metiers, which are defined in the DCF based on gear type, target species assemblage, and mesh characteristics. To verify the accuracy and objectivity of self-sampling, every year, 10 observer trips are carried out on board of fishing vessels that participate in the programme. In addition, the observer trips have proven to be of importance for training crew members in sampling of discards. Also, the observer trips are appreciated by members of the reference fleet, as it bridges the gap between scientists and crew. The data from these observer trips are solely used for verification and, therefore, excluded from this report.

The aim of this report is to present an overview of the data that has been collected within the Dutch self-sampling programme of bottom-trawl fisheries in 2023. The data is used for further analyses within different projects, including stock assessment working groups (ICES, 2023).

1.2 Quality assurance

CVO is certified to ISO 9001:2015 (certificate number: 268632-2018-AQ-NLD-RvA). This certificate is valid until December 15th, 2027. The certification was issued by DNV Business Assurance B.V

2 Methods

2.1 Discard self-sampling programme

2.1.1 Reference fleet

A reference fleet with protocol-instructed fishers collected discard samples according to a predefined schedule during their regular commercial operations. The participants in the reference fleet are recruited by actively approaching vessels and through the fishers organisations while taking the composition of the entire Dutch demersal active fleet, based on gear, mesh size and landing harbour, into account. Prior to sampling, fishers were provided with all necessary equipment (labels, plastic sampling bags, sealing cable ties, markers, and sampling sheets) and written instructions. Additionally, WMR staff visited the crew in port regularly to evaluate and, when necessary, to reinstruct the sampling protocol. The fishermen receive a fixed compensation for each trip they have sampled. While the project commenced in 2023 with a reference fleet consisting of 22 commercial vessels, in the end 19 vessels did indeed participate in the self-sampling.

2.1.2 Sampling and data collection procedures

Approximately 160 trips are planned to be sampled annually. These trips were randomly divided over the reference fleet. Any deviations from the random division of the preselected trips were recorded. Deviations were caused for several reasons, e.g. by bad weather, bad timing (i.e. vessel already out to sea), skipper not present, fishing for shrimp, etc.

Operational and catch data are collected each time the fishing gear is deployed (each 'haul') during a fishing trip. With each haul the following information was registered: vessel position (at start and end); haul duration; depth; weather conditions; and the volumes of total catches and landings. The total volume of discards of each haul was calculated by subtracting the retained amount of catch, the landings, which was recorded by the fishermen, from the total catch which was estimated by the skipper/crew. Within a trip, a sample consisting of two boxes of discards (one box equals approx. 40 kg), was taken by the crew from two separate hauls. This resulted in a total of approx. 160 kg of discards per trip. These boxes were filled by scooping discards at regular intervals from the end of the catch processing conveyer belt. Crew members collected the discard samples while other crew members sorted the commercial catch. The discard samples were stored in large plastic bags, which were sealed off using a cable tie, labelled and cool-stored until the vessel returns to the port. Back at port, the discard samples were collected by WMR staff and taken to the laboratory for analysis.

Numbers at length were recorded for all fish species, Norway lobster (*Nephrops norvegicus*, hereafter termed *Nephrops*) and edible crab (*Cancer pagurus*). Numbers without length measurements were recorded for all remaining (benthos) species. Standard data management software was used to enter and subsequently audit all data before the data were stored in the centralised WMR Frisbe database.

2.1.3 Metier classification

All sampled trips were assigned to their respective metiers based on level 6 for the metier classification as defined by the European Union (EU) decision (2016/1251, Table 2) after the trip was executed (Table 1).

Within the Dutch beam trawl metier (TBB_DEF 70-99 mm), a distinction is made based on the vessel's engine power. Due to national regulations, only vessels with an engine power of ≤ 300 hp (so called "Eurocutters") are allowed to fish in a marine protected area ("plaice box") and the Dutch 12-mile zone.

To reflect this spatial difference of the fleet -which also has implications on their discarding pattern- in the following analysis, summaries of the discard data are presented separately for Eurocutters (termed TBB_DEF_70-99mm_S300hp) and the remaining part of the beam trawl fleet (termed TBB_DEF_70-99mm_G300hp; Table 1). The total number of samples per metier depends on the fleet composition of the reference fleet.

2.2 Raising procedures

See Figure 1 for a flow-chart of the raising procedure. Numbers (at length) were registered for all (fish) species for each sample. The numbers (at length) in the samples were multiplied with the volume ratio between discard sample and total discards to estimate total numbers (at length) within each haul. Whenever a species was very abundant within the sample, a sub-sample of this species was counted. When subsampling was conducted, the numbers (at length) were multiplied with the sub-sample fraction to estimate total numbers (at length) within the sample.

Next, length/weight-relationships¹ were applied to convert numbers at length to weight for all fish species. Both numbers (fish and benthos) and weights (fish) for the two sampled hauls in each trip were summed. These numbers and weights were then standardized into discards per unit effort rates (expressed in number/hour and kg/hour) by dividing them by the deployment duration (i.e. fishing time). Total numbers and weights per fishing trip were calculated by multiplying the standardized rates with the total duration of all hauls together. It is assumed that the species composition in the sampled hauls is representative of the sampled trip and have similar variance.

2.3 Fleet effort

The fleet effort was calculated using the WMR VISSTAT database containing the official Dutch logbook information. In this database, the date and time of port departure and arrival, and other vessel characteristics (such as gear type, engine power, mesh size) are registered for all Dutch fishing vessels over 12 metres. Time between departure and arrival was multiplied by the engine power of each vessel, resulting in a measure of fishing effort expressed as kWdays. The ratio between fleet effort and sampling effort (i.e. the fishing effort of the sampled trips expressed as kWdays) has been used as an auxiliary variable to estimate total discards by species for the Dutch demersal fleet by metier. Since 2011, total discard data from the reference fleet have been used in several ICES Working Groups for the assessment of stocks in the North Sea, such as plaice, cod, sole, whiting, turbot, brill and *Nephrops* (ICES, 2023). Furthermore, the data is also requested by the STECF Expert Working Group on Fisheries Dependent Information (STECF, 2023).

The fleet effort by ICES rectangle, metier and quarter has been extracted from the WMR VISSTAT database and plotted together with the sampled trawls to visually inspect the overlap between the sampled trips and the fleet in time and space.

¹ The L/W relationships for plaice (*Pleuronectus platessa*), sole (*Solea solea*), turbot (*Scophthalmus maximus*), brill (*Scophthalmus rhombus*) and thickbacksole (*Microchirus variegatus*) are based on WMR data. For all other species, these relations are based on literature.

3 Results

3.1 Data collection

At the beginning of 2023, it was not clear whether all vessels in the reference fleet would participate in sampling due to the decommissioning scheme of the Dutch North Sea demersal fisheries. As a result, permits allowing vessels to keep discard samples on board were requested and consequently granted later than normal. Delayed permits in combination with numerous vessels participating in the reference fleet not fishing for longer periods of the year due to bad weather resulted in the planned number of 160 trips not being reached in 2023. In total, 132 trips were successfully sampled in 2023.

3.2 Data selection

Trips not sampled according to the sampling protocol and/or trips for which essential information was missing were considered invalid and excluded from the analysis. This resulted in 128 valid trips out of 132. All sampled trips (Table 2b) were assigned to their respective metiers post-sampling, based on gear type, mesh size and species composition. Sampling was conducted on board of vessels from eight different metiers; beam trawlers with 80 mm mesh size (engine power > 300 hp and engine power ≤ 300 hp), 100-119 and ≥120 mm mesh size, and otter trawlers with 32-69 mm mesh size (cephalopod fisheries), 70-99 mm mesh size (targeting *Nephrops* or mixed crustaceans and demersal species) and 100-119 mm mesh size. It should be noted that for some metiers the results are based on a small number of trips (Table 2b). These results can therefore only be used as an indication for discard patterns, and not as exact estimates.

A visual inspection on whether the collected sampled trips follow the distribution of the fleet through space and time gave a first indication on representativeness of the sampled data for the entire fleet. The results show that sampling effort of the most-intensely sampled metiers (i.e. TBB_DEF_70-99, OTB_CRU_70-99) indeed follows the fleet through space and time. However, for the less frequently sampled metiers this is not always the case; for example for OTB_DEF_100-119 in quarter 3 (Figure 3).

3.3 TBB_DEF_70-99_G300hp

The large (>300 hp, often >35m LOA) beam trawlers, make up the majority of the Dutch demersal fishing fleet effort, with a total fleet effort of 10065542 kWdays in 2023 (Table 2a, figure 2). 55 trips were sampled for this metier, which corresponds with a sampling coverage of 3.7% (Tables 2b, 3). Sampling was highest in quarter 4 (Table 2b). Figure 3 shows the distribution of total fleet effort by year and corresponding positions of sampled trawls.

Sole (*Solea solea*) and plaice (*Pleuronectes platessa*) are the most abundant species in the landings. Turbot (*Scophthalmus maximus*), brill (*Scophthalmus rhombus*) and dab (*Limanda limanda*), and various other species make up the rest of the landings (Table 4).

Plaice and dab are the most frequently discarded fish species within this fleet (Tables 4,5,8). Plaice is discarded because it is undersized (Figure 4) and dab is discarded because of its low commercial value. Since 2018, an increase in the estimated discard percentage of plaice is visible (Table 10a) which is caused by a decline in plaice landings in this time period.

Most other fish species that are discarded include the benthic-pelagic oriented species whiting (*Merlangius merlangus*) for which no individual quota is available for the demersal fleet (Table 8). Also smaller flatfishes (e.g. scaldfish (*Arnoglossus laterna*), solenette (*Buglossidium luteum*) and other demersal species (e.g. common dragonet (*Callionymus lyra*), grey gurnard (*Eutrigla gurnardus*) are encountered frequently in the discards (Table

8). The majority of the benthos discards consisted of echinoderm (sea potato (*Echinocardium cordatum*), sand sea star (*Astropecten irregularis*), serpent star (*Ophiura ophiura*), common starfish (*Asterias rubens*)) and crustaceans (green sea urchin (*Psammechinus miliaris*), swimming crab (*Liocarcinus* sp.)) (Table 9).

3.4 TBB_DEF_70-99_S300hp

Eurocutters (<300hp) are allowed to fish in the Dutch 12-mile zone and the plaice box (Beare et al., 2013). This is reflected in the distribution of the fleet effort and the sampling locations (Figure 3). The target species may differ in time and between vessels.

Nine trips were sampled in 2023 for this metier, which corresponds with a sampling coverage of 3.4% (Tables 2b, 3). Plaice and sole are the most frequently observed landed species (Table 4). Turbot, brill and dab make up the rest of the landings. Dab and undersized plaice are the most frequently observed discarded species (Tables 4, 5, 8, Figure 4). Most other discarded fish species include whiting, scaldfish, solenette and common dragonet (Table 8). The three most abundant observed discarded benthic species include green sea urchin, serpent star and sand sea star (Table 9).

3.5 TBB_DEF_100-119

The large beam trawlers (>300 hp) fishing with a mesh size of 100-119mm target plaice in the Northern North Sea (Figure 3). The large mesh sized beam trawler metier is a seasonal fishery, with highest fleet effort in quarter 2 (Table 2a, Figure 2). As sampling was only conducted in quarter 2 with a total of eight sampled trips, representing a sampling coverage of 7.1 % (Tables 2b, 3), the presented information for this metier is, therefore, only indicative.

Plaice is the most frequently observed landed species (Table 4). Undersized plaice and dab are the most frequently observed discard fish species (Tables 4, 5, 8 and Figure 4). However, the observed discard estimate for plaice is lower than the small mesh sized beam trawlers; 41% of plaice catch discarded in TBB_DEF_100-119 vs. 81% of plaice catch discarded in TBB_DEF_70-99_G300hp and 94% plaice catch discarded in TBB_DEF_70-99_S300hp (Table 4). The observed discarded benthic species are dominated by sand sea star, followed by masked crab (*Corystes cassivelaunus*), flying crab (*Liocarcinus holsatus*) and common starfish (Table 9).

3.6 TBB_DEF_>=120

The fleet effort of the large beam trawlers (>300hp) with fishing with a mesh size of 120mm has increased substantially since 2011. TBB_DEF_>=120 is a seasonal fishery, with peaking fleet effort in spring and summer (quarters 2 and 3) (Table 2a, Figure 2). The majority of the effort is concentrated in the Northern North Sea (Figure 3). In winter, effort is reduced (Table 2a). A single trip was sampled for this metier in quarters 2, which represents a sampling coverage of 1.1% (Tables 2b, 3). The presented information for this metier is, therefore, only indicative.

Plaice is the most frequently observed landed species within this metier (Table 4). Dab and undersized plaice are the most frequently observed discarded fish species (Tables 4, 5, 8, Figure 4). The observed benthos discard numbers within this metier are substantially lower than in most other sampled metiers, with discarded benthic species largely dominated by common starfish and sand sea star (Table 9).

3.7 OTB_DEF_32-69

The ottertrawl fishery targeting cephalopods is an upcoming fishery, with peaking fleet effort in quarter 1 (Table 2a, Figure 2). The effort is concentrated in the Southern North Sea (Figure 3). Six trips were sampled for this metier in quarters 1 and 4, representing a sampling coverage of 2.9% (Tables 2b, 3).

This metier is predominantly targeting cephalopods. The most frequently observed landed species are whiting and European squid (Table 4). Whiting-pout (*Trisopterus luscus*), whiting and herring (*Clupea harengus*) were the most frequently observed discarded fish species (Tables 4, 5, 8). Benthic species were observed in low numbers in comparison with the other sampled metiers (Table 9). This could be caused by different factors, such as the fishing area, specificities of the net, and/or haul duration.

3.8 OTB_CRU_70-99

Even though otter trawlers fishing with small mesh size (OTB_70-99) operate with similar gear, the target species may differ. To discriminate between the different fisheries, the metiers are classified (post-sampling) based on landing data per trip. If *Nephrops* from otter-trawl gears (OTB/OTT) composes more than 30% of the landings in a trip, this trip is classified as a crustacean (OTB_CRU) targeting metier. If *Nephrops* composes less than 30% and > 0% of landings in a trip, the trip is classified as a mixed crustacean and demersal fish (OTB_MCD) targeting metier. If no *Nephrops* is landed, the trip is classified as a demersal fish (OTB_DEF) targeting metier. It should be noted that this results in a knowledge discrepancy of the initial purpose of the fishing trip (which is probably linked to fishing location), as an unsuccessful trip for *Nephrops* will be classified as OTB_MCD or OTB_DEF and the other way round.

Nephrops occur in specific habitats, which to some extent is reflected in the distribution of the total effort of this metier (Figure 3). OTB_CRU_70-99 shows a peak in the fleet effort in Q2 and Q3 (Table 2a, Figure 2). Nineteen trips were sampled for this metier, representing a sampling coverage of 5.9% (Tables 2b, 3).

This metier lands most *Nephrops* of the sampled demersal metiers (Table 4). Plaice also comprised a large part of the landings (Table 4). Turbot and various other species make up the rest of the landings (Table 4). Dab and undersized plaice are the most frequently discarded fish species, followed by whiting and grey gurnard (Tables 4, 5, 8, Figure 4). Sand sea star, *Nephrops*, common starfish and sea potato belong to the most frequently discarded benthic species (Table 9).

3.9 OTB_MCD_70-99

OTB_MCD_70-99 shows a peak in fleet effort in Q2 (Table 2a, Figure 2). The distribution of the total effort of this metier is similar to that of OTB_CRU_70-99 (Figure 3). Twenty trips were sampled for this metier, resulting in a sampling coverage of 15.1% (Tables 2b, 3). Plaice is the most frequently landed species within this metier, followed by *Nephrops* (Table 4). Turbot, brill and dab and various other species make up the rest of the landings (Table 4). Dab and undersized plaice are the most frequently discarded fish species (Tables 4, 5, 8, Figure 4). The common starfish and sand sea star are the most frequently discarded benthic species (Table 9).

3.10 OTB_DEF_70-99

OTB_DEF_70-99 shows a peak in fleet effort in Q4 (Table 2a, Figure 2). Four trips were sampled for this metier, resulting in a sampling coverage of 5.6% (Tables 2b, 3). Whiting and plaice are the most frequently landed species within this metier (Table 4). Horse mackerel (*Trachurus trachurus*) and undersized plaice are the most frequently discarded fish species (Tables 4, 5, 8 and Figure 4). Common starfish and sand sea star are the most frequently discarded benthic species. (Table 9).

3.11 OTB_DEF_100-119

OTB_DEF_100-119 fleet effort peaks in Q2 (Table 2a, Figure 2). Six trips were sampled for this metier, resulting in a sampling coverage of 3.03% (Tables 2b, 3). This metier targets plaice, at the Dogger Bank (Table 4, Figure 3), resulting in plaice being the most frequently landed species within this metier (Table 4). Turbot was also landed frequently within this metier (Table 4) Dab is the most frequently discarded fish species, followed by

undersized plaice and grey gurnard (Tables 4, 5, 8 and Figure 4). Common starfish is the most frequently discarded benthic species. The observed benthos discards numbers within this metier are substantially lower than observed in most other sampled metiers (Table 9).

4 Discussion

Dab and undersized plaice are the most commonly discarded species for most sampled bottom trawling metiers. The benthic, non-fish, discards within the beam trawl and otter trawl metiers predominantly consisted of echinoderms and crustaceans.

At the beginning of 2023, it was uncertain whether all vessels recruited for the reference fleet could indeed participate in sampling due to the decommissioning scheme of the Dutch North Sea demersal fisheries, a scheme aimed at reducing fishing capacity. The scheme led to some vessels exiting the fishery and raised concerns on whether selected vessels would still be available for data collection. As a result, permits allowing sampling were requested and consequently granted later than normal. Adverse weather further worsened the situation, as many vessels participating in the reference fleet were unable to fish for extended periods throughout the year. The combination of the delayed permits and prolonged non-fishing periods for reference fleet vessels due to bad weather resulted in the planned target number of 160 sampling trips not being reached in 2023.

Ten (10) observer trips (i.e. observer programme) were scheduled onboard fishing vessels participating in the self-sampling programme to ensure the accuracy and objectivity of the self-sampling programme. Previous analysis (2011-2018) found no significant differences in the catches (in numbers) of the more abundant species between observer and self-sampling programmes and there is no indication that fishing behaviour has changed (Van Overzee & Chen, 2023).

The flyshoot fishery has not been included in the reference fleet since 2017 (Verkempynck et al., 2018). Given that, the discard patterns of this fishery differs from the bottom-trawl fishery (Verkempynck et al., 2018), and it contributes to ~3-4% of the total Dutch demersal fleet effort (Van Overzee et al., 2019), efforts have been and will continue to be made to reintroduce this fishery in the monitoring programme. To support this, a consortium of WMR, Good Fish Foundation, and Cornelis Vrolijk/Jaczon conducted a monitoring project of the Dutch flyshoot fishery, carrying out observer trips between 2021-2023 to collect discard data and other information (Van der Pol et al., 2023). The results of this monitoring project provided insights into the fishery's discard patterns revealing that dab was amongst the most frequently discarded species. Overall discard percentages varied between ~45-50% indicating significant variability however, a more comprehensive data collection is required to fully understand the discard patterns for this fishery. Fortunately, from 2025 onwards, onboard observer trips on the flyshoot vessels are included within the Dutch discards monitoring programme.

The discard self-sampling programme uses a reference fleet which provides a practical and desirable alternative to the ideal where, all sampled trips should be randomly selected from the complete Dutch demersal fleet, and refusals of fishers to participate should be recorded such that, all trips of the fleet have the probability of being sampled (ICES, 2011). To ensure accuracy, the reference fleet should mirror the Dutch demersal active fleet with respect to their overall fishing effort. Figure 3 shows that sampling effort does not always follow fleet effort in time and space for the less frequently sampled metiers. To solve this issue, an increase in sampling intensity is needed, and, consequently, an extension of the reference fleet for these metiers would be necessary. Given that the data collection under the DCF is based on end-user needs (both in quantitative as qualitative aspects), the end-users play a critical role in shaping data collection efforts. Their input ensures that data is relevant, accurate and applicable to management. By aligning data collection with end user needs, the programme can be more efficient and targeted. As such, end users should, ideally in consultation with the data provider, determine where and when sampling intensity should be increased.

The landing obligation, fully implemented in 2019, still allows discarding under various exemptions (high survivability, *de minimis*, prohibited species) and, therefore, a discards monitoring programme remains necessary. Below Minimum Size (BMS) sampling has been included as a separate catch fraction in the sampling

protocol of the discards monitoring programme since 2016. However, due to irregular reporting of BMS by fishers, there is no complete overview of this catch fraction and, therefore, not reported here.

Acknowledgements

This report would not have been possible without the hard work by the many skippers and crew. For the species identification, otolith sampling and analysis at WMR, we thank our colleagues in Ijmuiden, Yerseke and Den Helder. The efforts by the companies Kaij and Van Malsen assisting with sample processing, species identification and measurements and data entry are also greatly appreciated.

References

- Beare, D., A.D. Rijnsdorp, M. Blaesberg, U. Damm, J. Egekvist, H. Fock, M. Kloppmann, C. Röckmann, A. Schroeder, T. Schulze, I. Tulp, C. Ulrich, R. van Hal, T. van Kooten, M. Verweij, 2013. Evaluating the effect of fishery closures: lessons learnt from the Plaice Box. *Journal of Sea Research* 84: 49-60.
- Catchpole, T.L., C.L.J. Frid and T.S. Gray, 2005. Discards in North Sea fisheries: causes, consequences and solutions. *Marine Policy*: 421-430.
- Catchpole, T.L., O. van Keeken, T. Gray and G.J. Piet, 2008. The discard problem – A comparative analysis of two fisheries: The English Nephrops fishery and the Dutch beam trawl fishery. *Ocean & Coastal Management* 51: 772-778.
- EU, 2017. Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008.
- EU, 2021. Commission Implementing Decision (EU) 2021/1167 of 27 April 2021 establishing the multiannual Union programme for the collection and management of biological, environmental, technical and socioeconomic data in the fisheries and aquaculture sectors from 2022.
- EU, 2021. Commission Implementing Decision (EU) 2021/1168 of 27 April 2021 establishing the list of mandatory research surveys at sea and thresholds as part of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors from 2022.
- Feeckings, J., V. Bartolino, N. Madsen and T. Catchpole, 2012. Fishery Discards: Factors affecting their variability within demersal trawl fishery. *PLoS One* 7(4): e36409. doi:10.1371/journal.pone.0036409.
- ICES, 2023. Working Group on Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). *ICES Scientific Reports* 5:39. 1256 pp. <http://doi.org/10.17895/ices.pub.22643143>.
- ICES, 2011. Report of the Workshop on Practical Implementation of Statistical Sound Catch Sampling Programs (WKPICS). *ICES Expert Group reports (until 2018)*. Report. <https://doi.org/10.17895/ices.pub.21286752.v1>.
- Kelleher, K., 2005. Discards in the world's marine fisheries: an update. *FAO Fisheries Technical Paper No. 470*. Food and Agriculture Organization of the United Nations, Rome, Italy
- Pol, L. van der, A.M. Winter, T. Bangma, J. Bleijenberg & A. Rademakers, 2023. Results of the flyshoot fishery sampling programme 2021-2023. *Wageningen Research Report C071/23*.
- Poos, J.J., F.J. Quirijns and A.D. Rijnsdorp, 2010. Spatial segregation among fishing vessels in a multispecies fishery. *ICES Journal of Marine Science*, 67: 155-164.
- Rochet, M.-J. and V.M. Trenkel, 2005. Factors for the variability of discards: assumptions and field evidence. *Canadian Journal of Fisheries and Aquatic Sciences*, 62(1): 224-235. <https://doi.org/10.1139/f04-185>.
- Scientific, Technical and Economic Committee for Fisheries (STECF) – Fisheries Dependent -Information – FDI (STECF-23-10), Motova-Surmava, A., Zanzi, A. and Hekim, Z. editor(s), Publications Office of the European Union, Luxembourg, 2023, JRC136194.

Suuronen, P. and E. Gilman, 2020. Monitoring and managing fisheries discards: new technologies and approaches. *Marine Policy* 116: 103554.

Uhlmann, S. S., A.T.M. van Helmond, E.K. Stefánsdóttir, S. Sigurðardóttir, J. Haralabous, J. Maria Bellido, A. Carbonell, T. Catchpole, D. Damalas, L. Fauconnet, J. Feekings, T. Garcia, N. Madsen, S. Mallold, S. Margeirsson, A. Palialexis, L. Readdy, J. Valeiras, V. Vassilopoulou & M-J. and Rochet, 2014. Discarded fish in European waters: general patterns and contrasts. – *ICES Journal of Marine Science*, 71: 1235–1245.

Van Overzee, H.M.J., M. Dammers and K. Bleeker, 2019. Discard self-sampling of Dutch bottom-trawl fisheries in 2017-2018. CVO Report 19.024, 56p.

Van Overzee, H. & C. Chen, 2024. Comparison observed discard rate in Dutch demersal observer and self-sampling programme. WD to "Benchmark workshop 1 on selected flatfish stocks (WKBFLATFISH1)"

Verkempynck, R., H. van Overzee and M. Dammers, 2018. Discard self-sampling of Dutch bottom-trawl and seine fisheries in 2014-2016. CVO Report 18.007, 102 pp.

Tables and Figures

Table 1: List of Dutch bottom-trawl metiers sampled in 2023. Note that not all metiers are sampled for discards each year. Classification according to European Union (EU) definitions (2019/910 Table 2) requiring information about gear type (i.e. demersal beamtrawl – TBB; otter trawl - OTB/OTT), 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 Gear type	Level 5 Target assemblage	Level 6 Mesh size
TBB (> 300 hp)*	DEF	70-99 **
TBB (≤ 300 hp)*	DEF	70-99 **
TBB	DEF	100-119
TBB	DEF	≥120
OTB***	DEF	32-69
OTB***	CRU	70-99
OTB***	DEF	70-99
OTB***	MCD	70-99
OTB***	DEF	100-119

* Note that the TBB metier 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".

** Note, that due to regulation vessels within this metier do not fish with a mesh size < 80 mm.

*** In this report, all OTB should be read as OTB/OTT/QUA, as in logbook in the Netherlands data bottom otter (OTB), otter twin trawl (OTT), and quadrig (QUA) gear can be used interchangeably.

Table 2a. Total effort by sampled metier (in kWdays) and quarter for the sampled metiers in **2023**.

Metier	2023				Total
	Q1	Q2	Q3	Q4	
OTB_CRU_70-99_0_0	34864	139681	255738	18567	448850
OTB_DEF_100-119_0_0	4487	121859	105641	32418	264404
OTB_DEF_32-69_0_0	192102	39710	8380	85323	325515
OTB_DEF_70-99_0_0	22770	26082	5503	103273	157628
OTB_MCD_70-99_0_0	31827	52168	22951	31226	138172
TBB_DEF_>=120_0_0	119467	338061	162134	12250	631912
TBB_DEF_100-119_0_0	93699	469099	122975		685773
TBB_DEF_70-99_0_0_G300hp	2942496	2032837	2424066	2666144	10065542
TBB_DEF_70-99_0_0_S300hp	37678	63074	50270	20923	171944
Total	3479388	3282571	3157657	2970124	12889741

Table 2b. Summary of the number of valid self-sampled trips per metier for **2023** by quarter.

Metier	2023				Total
	Q1	Q2	Q3	Q4	
OTB_CRU_70-99_0_0		11	7	1	19
OTB_DEF_100-119_0_0		5		1	6
OTB_DEF_32-69_0_0	1			5	6
OTB_DEF_70-99_0_0		1		3	4
OTB_MCD_70-99_0_0	3	5	2	10	20
TBB_DEF_>=120_0_0		1			1
TBB_DEF_100-119_0_0		8			8
TBB_DEF_70-99_0_0_G300hp	6	11	16	22	55
TBB_DEF_70-99_0_0_S300hp		1	4	4	9
Total	10	43	29	46	128

Table 3. Sampling and fleet effort (in kWdays) of sampled metiers, and sampling coverage (% of kWdays) per self-sampled metier for **2023**.

Metier	Sampling effort (kWdays)	Fleet effort (kWdays)	Sampling coverage kWdays (%)
OTB_CRU_70-99_0_0	26458	448850	5.89
OTB_DEF_100-119_0_0	8014	264404	3.03
OTB_DEF_32-69_0_0	9540	325515	2.93
OTB_DEF_70-99_0_0	8872	157628	5.63
OTB_MCD_70-99_0_0	20863	138172	15.1
TBB_DEF_>=120_0_0	6989	631912	1.11
TBB_DEF_100-119_0_0	48638	685773	7.09
TBB_DEF_70-99_0_0_G300hp	370828	10065542	3.68
TBB_DEF_70-99_0_0_S300hp	5862	171944	3.41

Table 4. Average weight (in kg) per hour of discarded (D) and landed (L) commercially-important target species and corresponding discards percentage (%D): brill (BLL), cod (COD), dab (DAB), *Nephrops* (NEP), plaice (PLE), sole (SOL), turbot (TUR), whiting (WHG), common cuttlefish (CTC), European squid (SQR), cephalopods (CEP), Loliginidae (SQU), European common squid (OUL) and Common squid nei (SQC), by metier for **2023**. N= number of sampled trips, na= not available (No length-weight key was used on CTC, SQR, CEP, SQU, OUL and SQC data).

Metier	N	BLL			COD			DAB			NEP			PLE		
		D	L	%D	D	L	%D	D	L	%D	D	L	%D	D	L	%D
OTB_CRU_70-99_0_0	19	0.08	0.7	10%	0.99	0.31	76%	60	0.62	99%	13.05	30.16	30%	57.33	12.45	82%
OTB_DEF_100-119_0_0	6	0.14	3.53	4%	2.88	0.52	85%	33.36	1.42	96%	0.12	1.81	6%	36.58	36.76	50%
OTB_DEF_32-69_0_0	6	0	0	0%	0	0	0%	1.87	0	100%	0	0	0%	0.46	0	100%
OTB_DEF_70-99_0_0	4	0.11	0.16	41%	0.23	0	100%	4.51	0	100%	0	0	0%	17.57	14.33	55%
OTB_MCD_70-99_0_0	20	0	1.06	0%	0.81	0.59	58%	41.07	1.64	96%	2.02	7.32	22%	54.6	27.09	67%
TBB_DEF_>=120_0_0	1	0	0	0%	0	0.47	0%	35.56	2.95	92%	0	0	0%	44.65	186.07	19%
TBB_DEF_100-119_0_0	8	0	0.4	0%	0	0	0%	43.02	0.93	98%	0	0	0%	101.61	114.92	47%
TBB_DEF_70-99_0_0_G300hp	55	0.11	2.24	5%	0.06	0.12	33%	51.77	1.45	97%	0.05	0.05	50%	99.07	23.13	81%
TBB_DEF_70-99_0_0_S300hp	9	0	1.61	0%	0.06	0	100%	183.36	0.86	100%	0.24	0	100%	360.2	24.5	94%

Table 4. Continued

Metier	N	SOL			TUR			WHG			CTC			SQR		
		D	L	%D	D	L	%D	D	L	%D	D	L	%D	D	L	%D
OTB_CRU_70-99_0_0	19	0	0.12	0%	0.2	2.85	7%	11.95	0.12	99%	0	0	0%	0	0	0%
OTB_DEF_100-119_0_0	6	0	0.34	0%	1.64	11.98	12%	1.34	0	100%	0	0	0%	0	0	0%
OTB_DEF_32-69_0_0	6	0	0	0%	0	0	0%	34.58	25.74	57%	0	0	0%	na	20.7	na
OTB_DEF_70-99_0_0	4	0	0	0%	1.43	2.24	39%	6.38	19.2	25%	0	0	0%	0	39.67	0%
OTB_MCD_70-99_0_0	20	0.02	0.37	5%	0.02	3.92	1%	14	0.54	96%	0	0	0%	0	0	0%
TBB_DEF_>=120_0_0	1	0	0	0%	0	2.7	0%	0.69	0	100%	0	0	0%	0	0	0%
TBB_DEF_100-119_0_0	8	0	0.01	0%	0	3.13	0%	0.23	0	100%	0	0	0%	0	0	0%
TBB_DEF_70-99_0_0_G300hp	55	1.54	21.55	7%	0.21	6.28	3%	13.71	0.06	100%	na	0	na	na	0	na
TBB_DEF_70-99_0_0_S300hp	9	6.29	15.64	29%	0.48	5.87	8%	53.05	0	100%	na	0	na	0	0	0%

Table 4. Continued

Metier	N	CEP			SQU			OUL			SQC		
		D	L	%D	D	L	%D	D	L	%D	D	L	%D
OTB_CRU_70-99_0_0	19	0	0	0%	0	0	0%	na	0	na	0	0	0%
OTB_DEF_100-119_0_0	6	0	0	0%	0	0	0%	0	0	0%	0	0	0%
OTB_DEF_32-69_0_0	6	0	8.46	0%	0	15.48	0%	na	0	na	na	0	na
OTB_DEF_70-99_0_0	4	0	0	0%	0	30.03	0%	0	0	0%	0	0	0%
OTB_MCD_70-99_0_0	20	0	0	0%	0	0	0%	na	0	na	0	0	0%
TBB_DEF_>=120_0_0	1	0	0	0%	0	0	0%	0	0	0%	0	0	0%
TBB_DEF_100-119_0_0	8	0	0	0%	0	0	0%	na	0	na	0	0	0%
TBB_DEF_70-99_0_0_G300hp	55	0	0	0%	0	0	0%	na	0	na	0	0	0%
TBB_DEF_70-99_0_0_S300hp	9	0	0	0%	0	0	0%	na	0	na	0	0	0%

Table 5. Average number per hour of discarded (commercially-important target species: brill (BLL), cod (COD), dab (DAB), *Nephrops* (NEP), plaice (PLE), sole (SOL), turbot (TUR), whiting (WHG), common cuttlefish (CTC), European squid (SQR), European common squid (OUL) and Common squid nei (SQC) by metier for **2023**. N= number of sampled trips.

Metier	N	BLL	COD	DAB	NEP	PLE	SOL	TUR	WHG	CTC	SQR	OUL	SQC
OTB_CRU_70-99_0_0	19	0.44	4.85	941.66	610.74	684.12	0	1.09	175.85	0	0	0.44	0
OTB_DEF_100-119_0_0	6	0.87	7.64	438.75	4.05	293.52	0	5.83	19.6	0	0	0	0
OTB_DEF_32-69_0_0	6	0	0	22.01	0.36	4.41	0	0	337.33	0	1	0.23	0.55
OTB_DEF_70-99_0_0	4	0.61	0.46	52.4	0	141.31	0	5.22	45.6	0	0	0	0
OTB_MCD_70-99_0_0	20	0	3.51	640.01	88.27	603.14	0.26	0.08	171.77	0	0	0.48	0
TBB_DEF_>=120_0_0	1	0	0	461.95	0	363.63	0	0	5.53	0	0	0	0
TBB_DEF_100-119_0_0	8	0	0	637.53	0	836.59	0	0	2.64	0	0	0.15	0
TBB_DEF_70-99_0_0_G300hp	55	0.53	0.27	1053.53	1.46	1423.87	18.7	1	179.22	1.24	0.18	0.91	0
TBB_DEF_70-99_0_0_S300hp	9	0	0.66	3318.54	6.51	4179.75	79.34	2.63	761.21	3.34	0	17.78	0

Table 6. Average weight (kg) per hour of discarded (Dis) and landed (Lan) commercially-important target species: brill (BLL), cod (COD), dab (DAB), *Nephrops* (NEP), plaice (PLE), sole (SOL), turbot (TUR), whiting (WHG), common cuttlefish (CTC), European squid (SQR), cephalopods (CEP), Loliginidae (SQU), European common squid (OUL) and Common squid nei (SQC), by metier for **2023**. N= number of sampled trips, na= not available (No length-weight key was used on CTC, SQR, CEP, SQU, OUL and SQC data).

Metier	Q	N	Dis BLL	Lan BLL	Dis COD	Lan COD	Dis DAB	Lan DAB	Dis NEP	Lan NEP	Dis PLE	Lan PLE	Dis SOL	Lan SOL	Dis TUR	Lan TUR	Dis WHG	Lan WHG
OTB_DEF_32-69_0_0	1	1	0	0	0	0	1.04	0	0	0	0.3	0	0	0	0	0	53.9	0
OTB_MCD_70-99_0_0	1	3	0	0.5	0.46	0.74	47.45	1.23	2.18	2.45	71.94	51.82	0	0.12	0	1.68	20.32	0.57
TBB_DEF_70-99_0_0_G300hp	1	6	0.47	0.99	0.04	0.29	78.24	1.15	0	0.05	184.4	6.5	2.98	25.74	0.22	3.38	13.3	0
OTB_CRU_70-99_0_0	2	11	0.02	0.54	1.51	0.41	34.74	0.34	17.94	28.8	68.28	12.88	0	0.05	0	3	18.59	0.06
OTB_DEF_100-119_0_0	2	5	0.17	2.72	3.46	0.63	37.5	1.51	0.14	2.17	38.21	37.67	0	0.41	1.95	11.9	1.61	0
OTB_DEF_70-99_0_0	2	1	0.46	0.65	0.9	0	17.41	0	0	0	58.56	56.62	0	0	5.73	8.97	0.31	0
OTB_MCD_70-99_0_0	2	5	0	1.52	0.56	0.17	56.4	2.94	2.94	7.26	67.24	28.98	0	0.33	0	7.33	14.63	0.22
TBB_DEF_>=120_0_0	2	1	0	0	0	0.47	35.56	2.95	0	0	44.65	186.1	0	0	0	2.7	0.69	0
TBB_DEF_100-119_0_0	2	8	0	0.4	0	0	43.02	0.93	0	0	101.6	114.9	0	0.01	0	3.13	0.23	0
TBB_DEF_70-99_0_0_G300hp	2	11	0.05	0.68	0	0.01	83.36	2.38	0	0	101.1	19.75	2.17	19.93	0	2.57	7.39	0
TBB_DEF_70-99_0_0_S300hp	2	1	0	1.74	0	0	328.6	2.73	0	0	381.5	22.74	2.95	13.74	0	6.42	0.81	0
OTB_CRU_70-99_0_0	3	7	0.19	1.03	0.17	0.12	107.6	1.12	7.23	34.1	47.25	11.79	0	0.24	0.56	2.9	2.55	0.16
OTB_MCD_70-99_0_0	3	16	0	1.63	0.34	0.12	68.8	1.7	3.48	16.4	56.46	30.06	0.16	0.32	0.11	4.05	7.6	0.11
TBB_DEF_70-99_0_0_G300hp	3	4	0.16	2.7	0	0.01	59.14	2.30	0.09	0.14	76.53	27.75	0.93	18.68	0.21	8.15	5.2	0
TBB_DEF_70-99_0_0_S300hp	3	7	0	1.28	0.13	0	203.9	0.93	0.4	0	387	17.19	3.02	9.61	0.69	4.03	11.22	0
OTB_CRU_70-99_0_0	4	1	0	0.09	0.94	0.41	4.52	0.16	0.07	17.6	7.43	12.43	0	0	0	0.78	4.74	0.29
OTB_DEF_100-119_0_0	4	1	0	0	0	0	12.69	0	0	0	28.41	0	0	0	0.07	0	0	0
OTB_DEF_32-69_0_0	4	5	0	0	0	0	2.04	0	0.01	0	0.49	0	0	0	0	0	30.71	30.89
OTB_DEF_70-99_0_0	4	3	0	0	0	0	0.21	0	0	0	3.91	0.23	0	0	0	0	8.4	51.21
OTB_MCD_70-99_0_0	4	10	0	0.89	1.14	0.86	25.94	1.11	1.22	7.01	42.7	18.13	0.02	0.48	0.01	2.86	13.07	0.68
TBB_DEF_70-99_0_0_G300hp	4	22	0	3.02	0.13	0.2	23.38	0.46	0.05	0	91.2	26	1.28	23.3	0.32	7.56	23.17	0.15
TBB_DEF_70-99_0_0_S300hp	4	4	0	1.92	0	0	126.6	0.32	0.14	0	328.1	32.24	10.4	22.14	0.38	7.57	107.94	0

Table 6 continued

Metier	Q	N	Dis CTC	Lan CTC	Dis SQR	Lan SQR	Dis CEP	Lan CEP	Dis SQU	Lan SQU	Dis OUL	Lan OUL	Dis SQC	Lan SQC
OTB_DEF_32-69_0_0	1	1	0	0	na	22.33	0	0	0	0	0	0	na	0
OTB_MCD_70-99_0_0	1	3	0	0	0	0	0	0	0	0	0	0	0	0
TBB_DEF_70-99_0_0_G300hp	1	6	na	0	0	0	0	0	0	0	na	0	0	0
OTB_CRU_70-99_0_0	2	10	0	0	0	0	0	0	0	0	na	0	0	0
OTB_DEF_100-119_0_0	2	5	0	0	0	0	0	0	0	0	0	0	0	0
OTB_DEF_70-99_0_0	2	3	0	0	0	0	0	0	0	0	0	0	0	0
OTB_MCD_70-99_0_0	2	4	0	0	0	0	0	0	0	0	0	0	0	0
TBB_DEF_>=120_0_0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
TBB_DEF_100-119_0_0	2	8	0	0	0	0	0	0	0	0	na	0	0	0
TBB_DEF_70-99_0_0_G300hp	2	11	na	0	0	0	0	0	0	0	na	0	0	0
TBB_DEF_70-99_0_0_S300hp	2	1	0	0	0	0	0	0	0	0	na	0	0	0
OTB_CRU_70-99_0_0	3	7	0	0	0	0	0	0	0	0	na	0	0	0
OTB_MCD_70-99_0_0	3	2	0	0	0	0	0	0	0	0	na	0	0	0
TBB_DEF_70-99_0_0_G300hp	3	16	0	0	0	0	0	0	0	0	na	0	0	0
TBB_DEF_70-99_0_0_S300hp	3	4	0	0	0	0	0	0	0	0	na	0	0	0
OTB_CRU_70-99_0_0	4	1	0	0	0	0	0	0	0	0	0	0	0	0
OTB_DEF_100-119_0_0	4	1	0	0	0	0	0	0	0	0	0	0	0	0
OTB_DEF_32-69_0_0	4	5	0	0	na	20.38	0	10.15	0	18.58	na	0	0	0
OTB_DEF_70-99_0_0	4	3	0	0	0	52.9	0	0	0	40.04	0	0	0	0
OTB_MCD_70-99_0_0	4	10	0	0	0	0	0	0	0	0	na	0	0	0
TBB_DEF_70-99_0_0_G300hp	4	22	na	0	na	0	0	0	0	0	na	0	0	0
TBB_DEF_70-99_0_0_S300hp	4	4	na	0	0	0	0	0	0	0	0	0	0	0

Table 7. Average number per hour of discarded (Dis) commercially-important target species: dab (DAB), plaice (PLE), sole (SOL), brill (BLL), turbot (TUR), cod (COD), whiting (WHG) and *Nephrops* (NEP) by metier and quarter (Q) in **2023**. N= number of sampled trips.

For cephalopods, common cuttlefish (CTC), European squid (SQR), European common squid (OUL), Common squid nei (SQC)

Metier	Q	N	BLL	COD	DAB	NEP	PLE	SOL	TUR	WHG	CTC	SQR	OUL	SQC
OTB_DEF_32-69_0_0	1	1	0	0	14.13	0	3.36	0	0	480.65	0	1.98	0	3.28
OTB_MCD_70-99_0_0	1	3	0	3.77	717.62	83.3	837.44	0	0	304.2	0	0	0	0
TBB_DEF_70-99_0_0_G300hp	1	6	2.5	0.28	1728.65	0	3495.28	33.19	0.73	156.23	1.73	0	0.72	0
OTB_CRU_70-99_0_0	2	11	0.11	7.46	592.61	854.16	828.57	0	0	274.64	0	0	0.54	0
OTB_DEF_100-119_0_0	2	5	1.04	9.17	504.01	4.86	308.95	0	6.95	23.52	0	0	0	0
OTB_DEF_70-99_0_0	2	1	2.42	1.85	202.15	0	445.6	0	20.89	2.42	0	0	0	0
OTB_MCD_70-99_0_0	2	5	0	3.57	1012.34	126.9	774.58	0	0	177.12	0	0	0	0
TBB_DEF_>=120_0_0	2	1	0	0	461.95	0	363.63	0	0	5.53	0	0	0	0
TBB_DEF_100-119_0_0	2	8	0	0	637.53	0	836.59	0	0	2.64	0	0	0.15	0
TBB_DEF_70-99_0_0_G300hp	2	11	0.27	0	1714.95	0	1469.75	25.63	0	87.65	0.21	0	2.4	0
TBB_DEF_70-99_0_0_S300hp	2	1	0	0	6627.03	0	4420.14	29.66	0	17.51	0	0	109.35	0
OTB_CRU_70-99_0_0	3	7	1.01	0.82	1616.15	314.7	545.5	0	2.95	38.38	0	0	0.42	0
OTB_MCD_70-99_0_0	3	2	0	1.19	822.65	154.11	652.13	1.88	0.63	126.63	0	0	4.17	0
TBB_DEF_70-99_0_0_G300hp	3	16	0.71	0	1157.27	1.89	1036.64	12.82	1.34	83.12	0	0	0.44	0
TBB_DEF_70-99_0_0_S300hp	3	4	0	1.49	3422.57	11.5	4434.49	35.83	4.26	229.79	0	0	12.67	0
OTB_CRU_70-99_0_0	4	1	0	4.34	59.76	5.3	65.55	0	0	51.57	0	0	0	0
OTB_DEF_100-119_0_0	4	1	0	0	112.41	0	216.4	0	0.26	0	0	0	0	0
OTB_DEF_32-69_0_0	4	5	0	0	23.59	0.43	4.62	0	0	308.67	0	0.81	0.28	0
OTB_DEF_70-99_0_0	4	3	0	0	2.49	0	39.88	0	0	59.99	0	0	0	0
OTB_MCD_70-99_0_0	4	10	0	3.86	394.04	57.28	437.33	0.14	0.04	138.4	0	0	0.12	0
TBB_DEF_70-99_0_0_G300hp	4	22	0	0.61	463.25	2.28	1117.62	15.56	1.32	301.16	2.53	0.46	0.56	0
TBB_DEF_70-99_0_0_S300hp	4	4	0	0	2387.39	3.16	3864.91	135.26	1.65	1478.56	7.51	0	0	0

Table 8. Average number of discarded fish species per hour in Dutch demersal fisheries by metier in **2023**.

Scientific name	OTB_CRU_70-99	OTB_DEF_100-119	OTB_DEF_32-69	OTB_DEF_70-99	OTB_MCD_70-99	TBB_DEF_>=120	TBB_DEF_100-119	TBB_DEF_70-99_G300hp	TBB_DEF_70-99_S300hp
<i>Agonus cataphractus</i>	0.37	0	0	0	1.72	3.1	1.45	2.68	11.78
<i>Alosa fallax</i>	0	0	0.11	0	0.1	0	0	0	0
<i>Amblyraja radiata</i>	0.56	0	0	0	0.57	1.62	2.3	0	0
<i>Ammodytes</i>	0	0	0	0	0	0	13.06	3.76	2.32
<i>Arnoglossus laterna</i>	10.27	3.01	0	0	26.72	0.52	39.94	110.36	468.99
<i>Belone belone</i>	0	0	0	0	0	0	0	0.09	0
<i>Buglossidium luteum</i>	8.74	1.39	0	0	6.69	0	133.3	57.77	250.79
<i>Callionymus lyra</i>	24.9	4.99	1.3	0	42.7	1.33	15.58	60.34	230.13
<i>Callionymus maculatus</i>	0	0	0	0	0	0	0	0.48	0
<i>Callionymus reticulatus</i>	0	0	0	0	0	0	0	0.57	0
<i>Chelidonichthys lucerna</i>	3.11	12.95	0.11	0.42	0.67	0	0	6.88	25.87
<i>Clupea harengus</i>	0.06	0	207.5	51.03	1.28	0	0	1.23	4.51
<i>Dicentrarchus labrax</i>	0	0	0.64	2	0	0	0	0.11	0
<i>Echiichthys vipera</i>	0	0	1.46	0	0	0	0	24.84	7.27
<i>Enchelyopus cimbrius</i>	1.8	0.05	0	0	0.37	0	0	1.74	5.18
<i>Engraulis encrasicolus</i>	0	0	0	0	0.06	0	0	0	0
<i>Eutrigla gurnardus</i>	88.49	101.92	1.8	26.57	85.24	8.99	45.91	31.48	122.95
<i>Gadus morhua</i>	4.85	7.64	0	0.46	3.51	0	0	0.27	0.66
<i>Glyptocephalus cynoglossus</i>	0.34	0	0	0	0.25	0	0	0	0
<i>Helicolenus dactylopterus</i>	0.02	0	0	0	0.07	0	0	0	0
<i>Hippoglossoides platessoides</i>	15	0	0.06	0	2.4	15.39	2.63	0	0.44
<i>Hyperoplus lanceolatus</i>	0.06	0	0	0	0	0	1.18	2.07	0
<i>Leucoraja naevus</i>	0	0	0	0.4	0.06	0	0	0	0
<i>Limanda limanda</i>	941.66	438.75	22.01	52.4	640.01	461.95	637.53	1053.53	3318.54
<i>Lophius piscatorius</i>	0.14	0.13	0	0	0.16	0	0.2	0	0
<i>Lumpenus lampretaeformis</i>	0	0	0	0	0.08	0	0	0	0
<i>Melanogrammus aeglefinus</i>	68.61	8.77	0.17	1.24	134.28	22.47	9.84	21.84	7.12
<i>Merlangius merlangus</i>	175.85	19.6	337.33	45.6	171.77	5.53	2.64	179.22	761.21

Table 8. Continued.

Scientific name	OTB_CRU_70-99	OTB_DEF_100-119	OTB_DEF_32-69	OTB_DEF_70-99	OTB_MCD_70-99	TBB_DEF_>=120	TBB_DEF_100-119	TBB_DEF_70-99_G300hp	TBB_DEF_70-99_S300hp
<i>Microstomus kitt</i>	7.04	1.39	0.05	5.29	4.64	17.39	39.29	4.55	3.61
<i>Mullus surmuletus</i>	1.68	0.39	1.75	0.36	1.97	0	0	2.74	11.35
<i>Mustelus</i>	0.07	1.4	0	1.67	0.02	0	0	0.27	0.09
<i>Mustelus asterias</i>	0	0	0	0	0.29	0	0	0	0
<i>Mustelus mustelus</i>	0.04	0.13	0	0	0	0	0	0	0.64
<i>Myoxocephalus scorpius</i>	0.5	0.45	0	0	0.49	0.52	0	1.69	0.11
<i>Pegusa lascaris</i>	0	0	0	0	0	0	0	0.08	0
<i>Phrynorhombus norvegicus</i>	0.77	0	0	0.53	0.49	0	0	0	0
<i>Platichthys flesus</i>	0	0	0	0	0	0	0	0.37	5.28
<i>Pleuronectes platessa</i>	684.12	293.52	4.41	141.31	603.14	363.63	836.59	1423.87	4179.75
<i>Pomatoschistus minutus</i>	0	0	0	0	0.06	0	0	0.27	1.64
<i>Pomatoschistus sp.</i>	0	0	0	0	0	0	0	0.14	0
<i>Raja brachyura</i>	0	0.5	0	1.12	0	0	0.17	0.6	0
<i>Raja clavata</i>	0.41	10.56	0	19.79	2.02	0	0	6.96	20.88
<i>Raja montagui</i>	0.46	5.45	0	10.66	0.69	0	0.5	3.53	5.87
<i>Sardina pilchardus</i>	0	0	0	5.74	0	0	0	0	0
<i>Scomber scombrus</i>	0.05	0	11.38	23.45	0	0	0	0	0
<i>Scophthalmus maximus</i>	1.09	5.83	0	5.22	0.08	0	0	1	2.63
<i>Scophthalmus rhombus</i>	0.44	0.87	0	0.61	0	0	0	0.53	0
<i>Scyliorhinus canicula</i>	2.08	14.76	0.7	18.24	4.74	0	0	7.59	16.66
<i>Solea solea</i>	0	0	0	0	0.26	0	0	18.7	79.34
<i>Sprattus sprattus</i>	0.34	0	0	0	0.06	0	0	0.59	2.17
<i>Squalus acanthias</i>	0.06	0.13	0	0	0.14	0	0	0.03	0.52
<i>Syngnathus</i>	0	0	0	0	0	0	0	0.04	0
<i>Syngnathus acus</i>	0	0	0	0	0	0	0	0.25	0.06
<i>Syngnathus rostellatus</i>	0	0	0	0	0	0	0	0	0.11
<i>Trachinus draco</i>	0	0	0	0	0	0	0	0.35	0
<i>Trachurus trachurus</i>	0	0	58.68	449.81	0	0	0	0.39	0

Table 8. Continued.

Scientific name	OTB_CRU_70-99	OTB_DEF_100-119	OTB_DEF_32-69	OTB_DEF_70-99	OTB_MCD_70-99	TBB_DEF_>=120	TBB_DEF_100-119	TBB_DEF_70-99_G300hp	TBB_DEF_70-99_S300hp
<i>Trisopterus esmarkii</i>	1.33	0	0.26	0	0.08	0	0	0.1	0
<i>Trisopterus luscus</i>	0.34	0.11	413.91	62.13	1.26	0	0	7.75	19.62
<i>Trisopterus minutus</i>	0.15	0.07	2.86	34.66	0.98	0	0	0.23	2.84
<i>Zeugopterus punctatus</i>	0	0	0.06	0	0	0	0	0	0
<i>Zeus faber</i>	0	0	0.16	0	0	0	0	0	0

Table 9. Average numbers per hour of discarded benthos species in Dutch demersal fisheries by metier in **2023**.

Scientific name	OTB_CRU_70-99	OTB_DEF_100-119	OTB_DEF_32-69	OTB_DEF_70-99	OTB_MCD_70-99	TBB_DEF_>=120	TBB_DEF_100-119	TBB_DEF_70-99_G300hp	TBB_DEF_70-99_S300hp
<i>Abra alba</i>	0	0	0	0	0	0	0	12.25	0.06
<i>Abra prismatica</i>	0	0	0	0	0.05	0	0	503.22	198.93
<i>Acanthocardia echinata</i>	0.19	0	0	0	0.51	3.46	44.68	109.28	393.49
<i>Adamsia palliata</i>	0	0	0	0	0	0	0	0.15	0
<i>Aequipecten opercularis</i>	0.05	0	0	0.4	0.06	8.9	6.89	0.88	20.62
<i>Alcyonidium diaphanum</i>	0	0	0	0.31	0	0	1.67	0.41	0
<i>Alcyonium digitatum</i>	0.06	0.63	0	0.63	0.37	0.52	1.97	1.56	1.18
<i>Alitta virens</i>	0	0	0	0	0.11	0	0.98	0.29	0
<i>Alloteuthis subulata</i>	0.44	0	0.23	0	0.48	0	0.15	0.91	17.78
<i>Anthozoa</i>	0.05	0	0	0	0.13	0	0	4.67	9.68
<i>Aphrodita aculeata</i>	79.04	35.04	0	1.74	101.15	55.63	57.27	139.57	190.05
<i>Aporrhais pespelecani</i>	0	0	0	0	0	0	0	0.09	0
<i>Arctica islandica</i>	0.25	0	0	0	0.25	2.43	1.84	1.52	1.18
<i>Asciidiella scabra</i>	0.02	0	0	0	0	0	0	0	0
<i>Asterias rubens</i>	518.66	776.67	0.32	16.54	656.73	152.22	223.15	1234.72	4594.3
<i>Astropecten irregularis</i>	641.07	55.77	0	6.47	336.6	73.86	13253.03	6118.93	12721.05
<i>Atelecyclus rotundatus</i>	0	0	0	0	0	0	0	0.03	1.71
<i>Atelecyclus undecimdentatus</i>	0	0	0	0	0	0	0	1.13	1.06
<i>Aurelia aurita</i>	0	0	0	0	0	0	0	0.06	0
<i>Balanidae</i>	0	0	0	0	0	0	0	0.05	0
<i>Buccinum undatum</i>	0.16	0	0.29	1.25	0.48	8.6	31.43	14.02	8.27
<i>Cancer pagurus</i>	2.98	2.09	0	0.46	0.78	1.84	2.15	2	1.91
<i>Carcinus maenas</i>	0	0	0	0	0	0	0	0	4.73
<i>Chamelea striatula</i>	0	0	0	0	0	0	0	3.22	3.46
<i>Chrysaora hysoscella</i>	0.28	0	0	0	0	0	0	0.15	0
<i>Corystes cassivelaunus</i>	5.38	15.19	0	0	5.7	15.03	976.19	262.85	2413.74
<i>Crangon crangon</i>	0	0	0	0	0.06	0	0	0.59	8.09
<i>Crepidula fornicata</i>	0.2	0.07	0	0.13	0.3	0	0	1.01	3.25

Table 9. Continued

Scientific name	OTB_CRU_70-99	OTB_DEF_100-119	OTB_DEF_32-69	OTB_DEF_70-99	OTB_MCD_70-99	TBB_DEF_>=120	TBB_DEF_100-119	TBB_DEF_70-99_G300hp	TBB_DEF_70-99_S300hp
<i>Cyanea lamarckii</i>	0	0	0	0	0	0	0	0.06	0
<i>Diogenes pugilator</i>	0	0	0	0	0	0	0	0.07	0.27
<i>Donax vittatus</i>	0	0	0	0	0	0	0	0.13	0
<i>Dosinia</i>	0	0	0	0	0	0	0	0.28	0
<i>Dosinia exoleta</i>	0	0	0	0	0	1.03	1.24	1.55	1.47
<i>Dromia personata</i>	0	0	0	0.07	0	0	0	0	0
<i>Echinocardium cordatum</i>	334.07	69.55	0	1.58	81.69	31.99	100.64	9061.66	6470.01
<i>Ectopleura larynx</i>	0	0	0	0	0	0	0.2	0	0
<i>Ensis</i>	0	0	0	0	0	0	0	0.05	0
<i>Eriocheir sinensis</i>	0	0	0	0	0	0	0	0	0.09
<i>Euspira catena</i>	0	0	0	0	0	0	10.11	4.97	39.43
<i>Euspira nitida</i>	0	0	0	0	0	0	0	0.16	0
<i>Flustra foliacea</i>	0	0	0	0.15	0	0	2.92	0.05	0
<i>Gari fervensis</i>	0	0	0	0	0	0	2.48	1.29	0.74
<i>Geryon trispinosus</i>	0.03	0	0	0	0	0	0	0	0
<i>Goneplax rhomboides</i>	19.59	0.7	0	0	18.99	0	0	247.83	1386.93
<i>Halecium halecinum</i>	0	0	0	0	0	0	0	0.04	0
<i>Halichondria bowerbanki</i>	0	0	0	0	0	0	0	0.06	0
<i>Halichondria panicea</i>	0.47	0	0	0	1.45	7.24	20.7	0.23	3.41
<i>Hemigrapsus</i>	0	0	0	0	0	0	0	0	0.06
<i>Holothuroidea</i>	0	0	0	0	0	0	0	0.04	0
<i>Hyas araneus</i>	0.56	0	0.11	0	0	0	0	0	0
<i>Hyas coarctatus</i>	0	0	0	0	0.18	2.43	0	0.03	0
<i>Idotea</i>	0	0	0	0	0	0	0	0.04	0
<i>Idotea balthica</i>	0	0	0	0	124.88	0	0	0.38	0
<i>Inachus</i>	0	0	0	0	0	0	0	0.09	0
<i>Inachus dorsettensis</i>	0	0	0	0	0	0	0	0.21	0
<i>Laevicardium crassum</i>	0	0	0	0	0	0	6.18	1.99	1.97

Table 9. Continued

Scientific name	OTB_CRU_70-99	OTB_DEF_100-119	OTB_DEF_32-69	OTB_DEF_70-99	OTB_MCD_70-99	TBB_DEF_>=120	TBB_DEF_100-119	TBB_DEF_70-99_G300hp	TBB_DEF_70-99_S300hp
<i>Liocarcinus depurator</i>	25.47	4.39	1.21	0	38.22	1.03	11.26	98.8	235.37
<i>Liocarcinus holsatus</i>	96.01	2.82	0.12	0.23	81.29	22.98	481.46	1068.17	4229.28
<i>Liocarcinus marmoreus</i>	0	0	0	0	0	0	0	5.5	0
<i>Liocarcinus navigator</i>	0	0	0	0	0	0	0	0	1.61
<i>Lithodes maja</i>	0.25	0	0	0.13	0	0	0.15	0	0
<i>Loligo</i>	0	0	0.55	0	0	0	0	0	0
<i>Loligo forbesii</i>	0.06	0	0.48	2.78	0.96	0	1.43	1.45	11.52
<i>Loligo vulgaris</i>	0	0	1	0	0	0	0	0.18	0
<i>Luidia ciliaris</i>	0	0	0	0	0	0	0.17	0	0
<i>Luidia sarsii</i>	0.4	0.86	0	0	14.52	0	13.78	32.95	0
<i>Lutraria lutraria</i>	0.1	0.71	0	0	0	0	0	0	0
<i>Macoma balthica</i>	1.44	0.33	0	0	0	0	0	82.37	0.9
<i>Macomangulus tenuis</i>	0	0	0	0	0	0	0	0.11	0
<i>Macropodia rostrata</i>	0	0	0	0	0	0	0	0.98	0
<i>Macropodia tenuirostris</i>	0	0	0	0	0.19	0	0	0.05	0
<i>Mactra stultorum</i>	0.12	0	0	0	0	0	35.39	48.79	147.62
<i>Maja squinado</i>	0	0	0	0	0	0	0	0.05	0
<i>Marthasterias glacialis</i>	0	0.04	0	0	0	0	0	0.06	0.7
<i>Metridium dianthus</i>	0.08	0	0	0	0	0	0	0	0
<i>Mya truncata</i>	0.22	0	0	0	0.14	0	0	0	0.66
<i>Mytilus edulis</i>	1.4	0	0	0	0.05	0	0.17	7.28	7.24
<i>Nassarius</i>	0	0	0	0	0	0	0	0.04	0.13
<i>Nassarius reticulatus</i>	0	0	0	0	0	0	0	0.86	13.85
<i>Necora puber</i>	0	0.68	1.17	0.5	0.11	0	0	1.77	8.8
<i>Nemertesia</i>	0	0	0	0.06	0	0	0	0.15	0
<i>Nemertesia antennina</i>	0	0	0	0	0	0	0	0.03	0
<i>Nephrops norvegicus</i>	610.74	4.05	0.36	0	88.27	0	0	1.46	6.51
<i>Neptunea antiqua</i>	0.06	0	0	0	0.52	58.18	21.54	0.03	0

Table 9. Continued

Scientific name	OTB_CRU_70-99	OTB_DEF_100-119	OTB_DEF_32-69	OTB_DEF_70-99	OTB_MCD_70-99	TBB_DEF_>=120	TBB_DEF_100-119	TBB_DEF_70-99_G300hp	TBB_DEF_70-99_S300hp
<i>Ophiothrix fragilis</i>	0.1	0	0	0	0.93	0	5.97	0	0
<i>Ophiura albida</i>	0	0	0	0	0	0	0	11.17	54.88
<i>Ophiura ophiura</i>	37.61	0.48	0	0	41.63	2.07	287.58	2149.43	25308.23
<i>Ostrea edulis</i>	0	0	0	0	0	0	0	0.02	0
<i>Pagurus bernhardus</i>	69.38	2.09	0	0.23	48.6	51.79	148.1	116.97	644.23
<i>Pagurus prideaux</i>	0	0	0.05	0	0	0	0	0.18	0
<i>Pecten maximus</i>	0	0	0	0	0	0	0.09	0	0
<i>Pinnotheres pisum</i>	0	0	0	0	0	0	0	0.05	0
<i>Pisidia longicornis</i>	0	0	0	0	0.01	0	0	0	0
<i>Portumnus latipes</i>	0	0	0	0	0	0	0	0	0.05
<i>Psammechinus miliaris</i>	72.51	0	0.79	1.51	11.18	0	0.82	1944.06	65822.38
<i>Rhizostoma pulmo</i>	0	0	0	0	0	0	0	0.25	0
<i>Sabellaria</i>	0	0	0	0	0	0	0	0.05	0
<i>Sabellaria alveolata</i>	0	0	0	0	0	0	0	0.18	2.16
<i>Scaphander lignarius</i>	0	0	0	0	0	0	13.93	0	0
<i>Scyphozoa</i>	0	0	0	0	0	0	0	0.15	0
<i>Sepia officinalis</i>	0	0	0	0	0	0	0	1.24	3.34
<i>Sepiola atlantica</i>	0	0	0	0	0	0	0	0.08	0
<i>Solen marginatus</i>	0	0	0	0	0	0	0.86	0.13	0.63
<i>Spisula elliptica</i>	0	0	0	0	0	0	0	0.15	0
<i>Spisula solida</i>	0	0	0	0	0	0	0	0.07	0.46
<i>Spisula subtruncata</i>	0	0	0	0	0	0	0.09	156.66	10.76
<i>Tritonia hombergii</i>	0	0	0.11	0	0	0	0	0	0
<i>Tubularia</i>	0	0	0	0	0	0	0	0.03	0
<i>Tubularia indivisa</i>	0	0	0	0	0	0	0	0.21	0
<i>Turritella communis</i>	3.36	0	0	0	0	0	0	0	0
<i>Upogebia deltaura</i>	0.08	0	0	0	0	0	0	0	0
<i>Venus</i>	0	0	0	0	0	0	0	0.03	0

Table 9. Continued

Scientific name	OTB_CRU_70-99	OTB_DEF_100-119	OTB_DEF_32-69	OTB_DEF_70-99	OTB_MCD_70-99	TBB_DEF_>=120	TBB_DEF_100-119	TBB_DEF_70-99_G300hp	TBB_DEF_70-99_S300hp
<i>Volutopsius norwegicus</i>	0	0	0	0	0	0	0.35	0	0

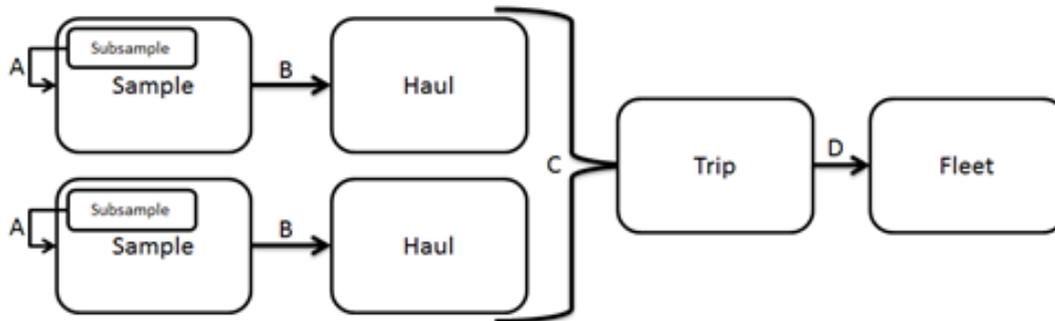
Table 10a. Average weights (kg) and numbers per hour of landed (L) and discarded (D) plaice (PLE) and sole (SOL) in the beam trawl fisheries (TBB_DEF_70-99_>221kW) between 1976 and 2022. Nm, not measured; n/a, not available. (Before 2009, data is based on observer trips. 2009 and onwards is based on self-sampling trips.)

Year/ Period	N trips	PLE Numbers			Weight			SOL Numbers			Weight		
		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%
2013	57	Nm	1189	n/a	81	106	57%	Nm	52	n/a	35	5	13%
2014	84	Nm	1191	n/a	81	104	56%	Nm	64	n/a	33	5	14%
2015	69	Nm	1057	n/a	65	95	59%	Nm	51	n/a	36	4	11%
2016	81	Nm	1061	n/a	74	99	57%	Nm	37	n/a	34	3	8%
2017	89	Nm	1035	n/a	65	92	59%	Nm	42	n/a	31	3	9%
2018	102	Nm	995	n/a	45	91	67%	Nm	35	n/a	25	3	11%
2019	91	Nm	953	n/a	34	75	69%	Nm	73	n/a	24	5	18%
2020	103	Nm	1097	n/a	25	87	78%	Nm	49	n/a	29	4	11%
2021	124	Nm	1228	n/a	26	109	81%	Nm	39	n/a	24	3	12%
2022	83	Nm	1645	n/a	21	120	85%	Nm	34	n/a	23	3	11%
2023	55	Nm	1424	n/a	23	99	81%	Nm	19	n/a	22	2	7%

Table 10b. Average weights (kg) and numbers per hour of landed (L) and discarded (D) dab (DAB) and whiting (WHG) in the beam trawl fisheries (TBB_DEF_70-99_>221kW) between 1976 and 2022. Nm, not measured; n/a, not available. (Before 2009, data is based on observer trips. 2009 and onwards is based on self-sampling trips.)

Year/ Period	N trips	DAB Numbers			Weight			WHG Numbers			Weight		
		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%
2013	57	Nm	1543	n/a	8	84	91%	Nm	42	n/a	1	3	75%
2014	84	Nm	1508	n/a	5	79	94%	Nm	79	n/a	1	4	88%
2015	69	Nm	1212	n/a	4	59	94%	Nm	73	n/a	<1	4	95%
2016	81	Nm	1481	n/a	7	73	92%	Nm	61	n/a	<1	4	90%
2017	89	Nm	814	n/a	2	42	95%	Nm	73	n/a	<1	5	92%
2018	102	Nm	783	n/a	3	47	94%	Nm	82	n/a	<1	7	99%
2019	91	Nm	733	n/a	2	40	96%	Nm	133	n/a	<1	8	100%
2020	103	Nm	1022	n/a	1	54	97%	Nm	114	n/a	<1	6	99%
2021	124	Nm	1352	n/a	2	71	97%	Nm	136	n/a	<1	9	100%
2022	83	Nm	1576	n/a	2	78	97%	Nm	157	n/a	<1	10	100%
2023	55	Nm	1054	n/a	2	52	97%	Nm	179	n/a	<1	14	100%

Figure 1. Flowchart of the raising process



A: *number in subsample * subsample fraction*

B: *number in sample * $\frac{\text{Volume of (total catch of haul - total landings in haul)}}{\text{volume of discards sample}}$*

C: *sum of numbers in both samples * $\frac{\text{Total duration all hauls of the trip}}{\text{Duration both sampled hauls}}$*

D: *number per trip * $\frac{\text{effort (kWDays) national fleet (per métier)}}{\text{effort (kWDays) sampled trips (per métier)}}$*

Figure 2. Effort of the Dutch Demersal fleet (in kW*days x 1000) in **2023** per quarter and metier

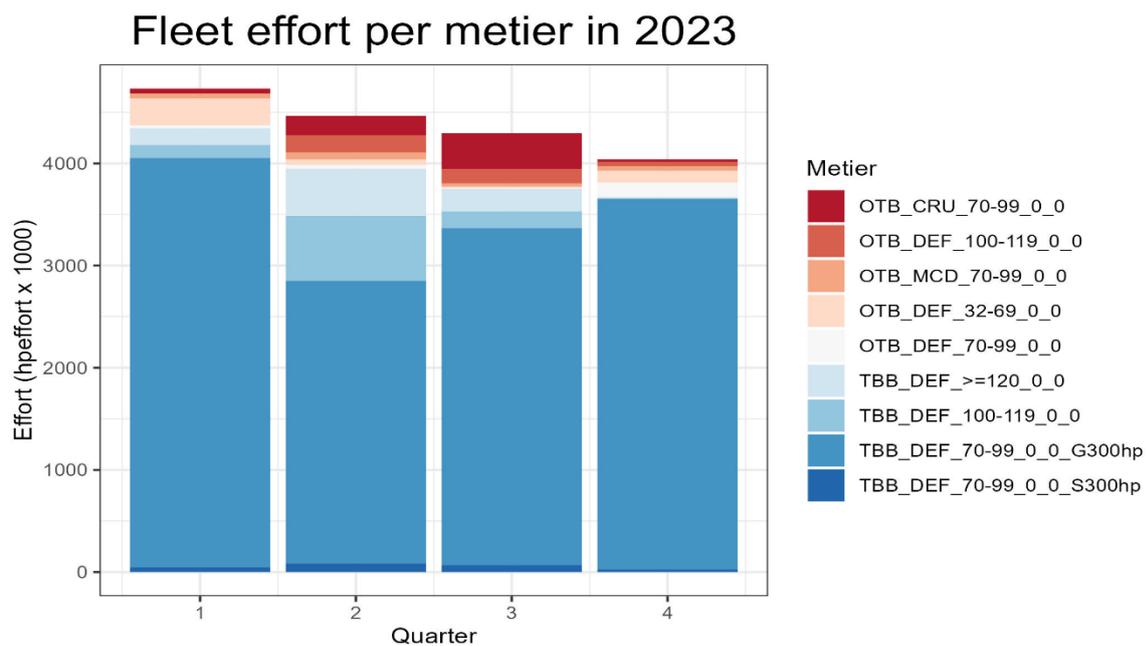


Figure 3. Distribution of total effort (expressed in number of trips at sea, shaded colours per ICES rectangle) and positions of sampled trawls (black dots) for the sampled demersal metiers in **2023** by quarter.

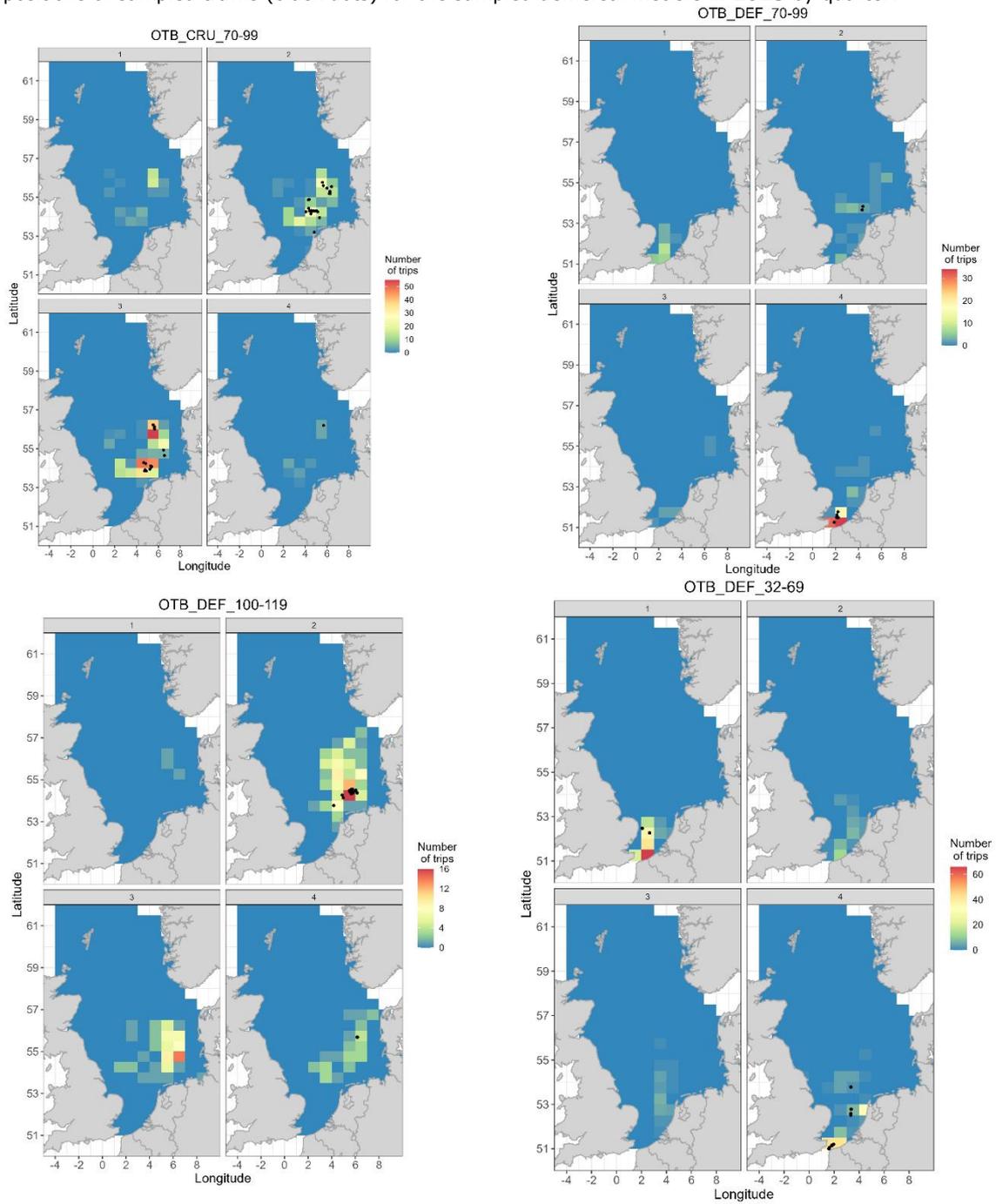


Figure 3. Continued.

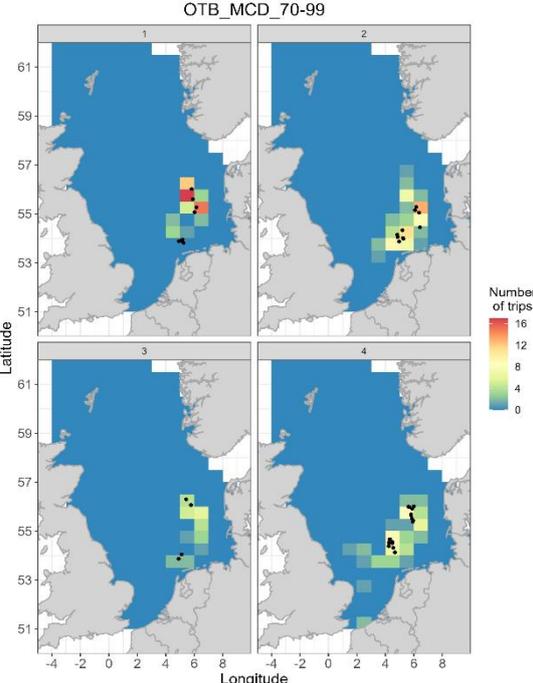
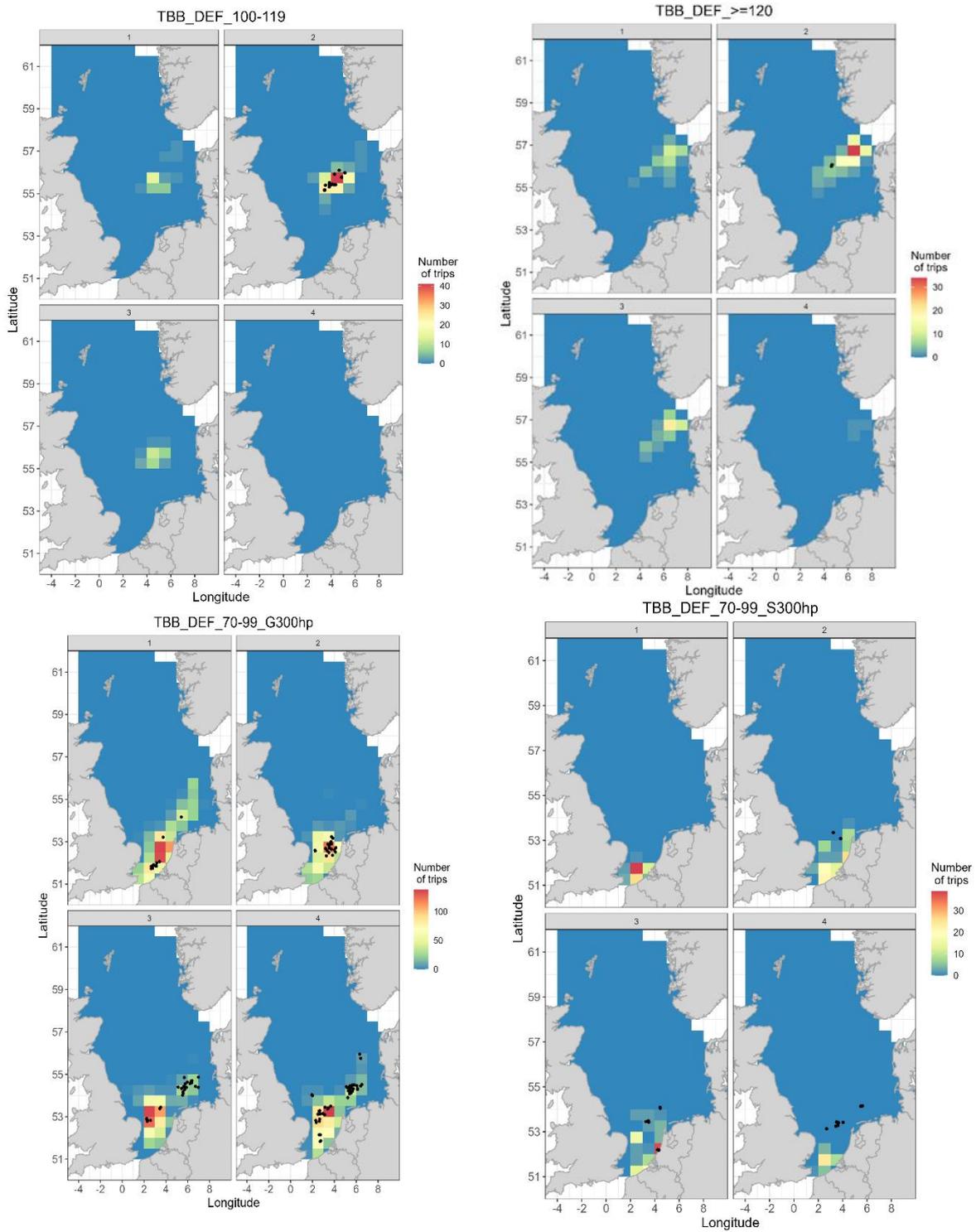


Figure 3. Continued.



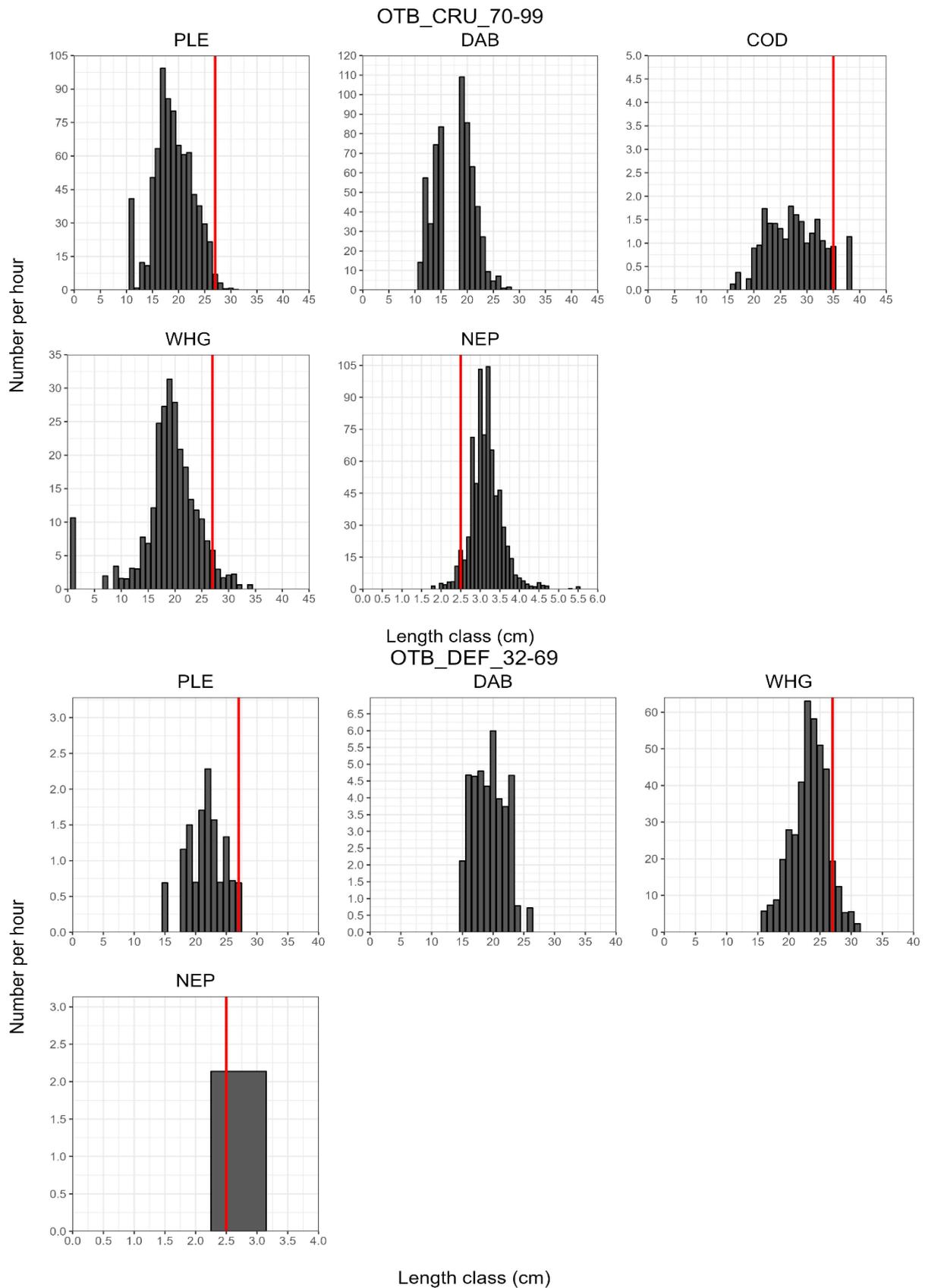


Figure 4. Number per hour discarded per length class (cm) for several discarded species for the sampled demersal meters in **2023** (red line = Minimum Landing Size).

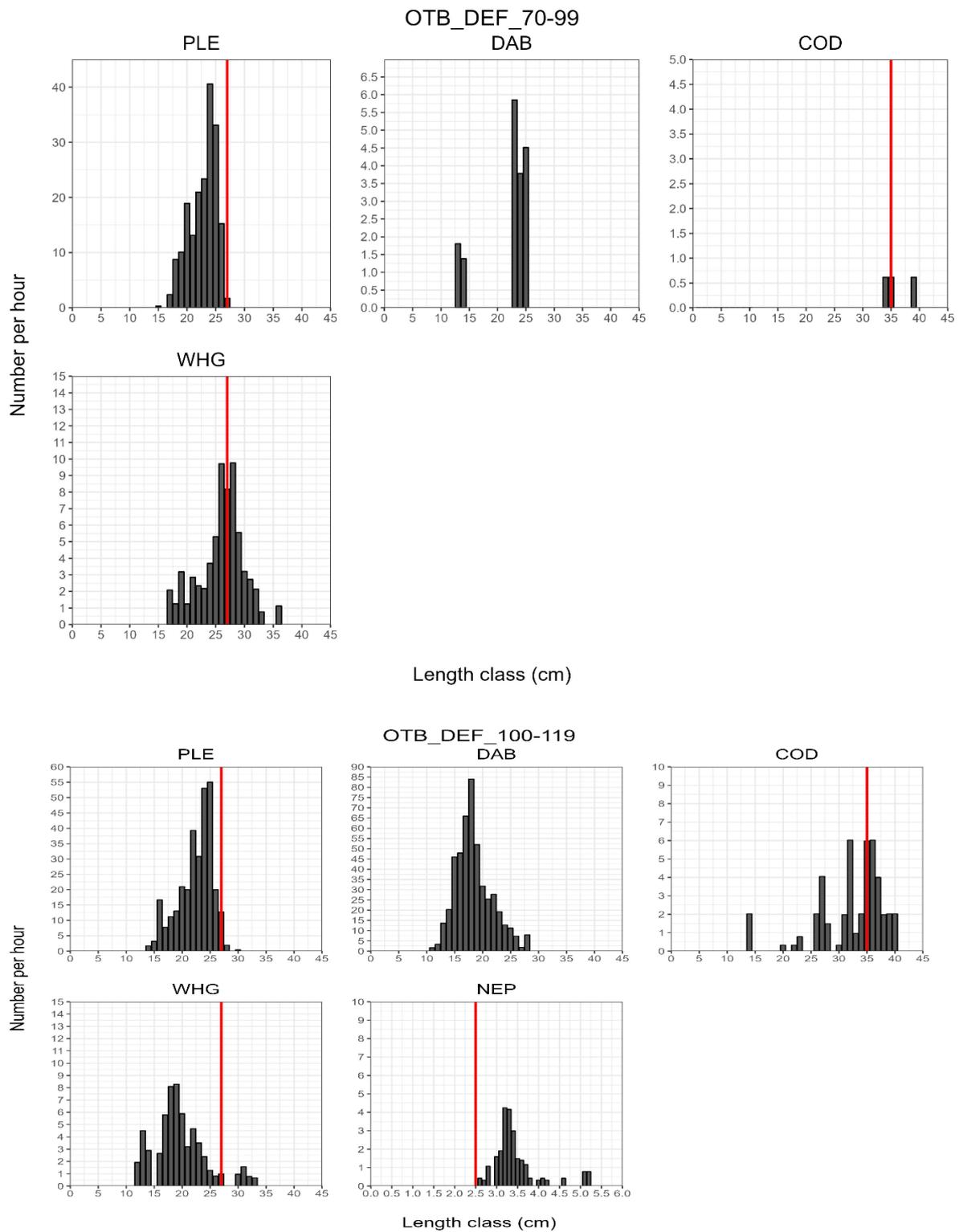


Figure 4. Continued.

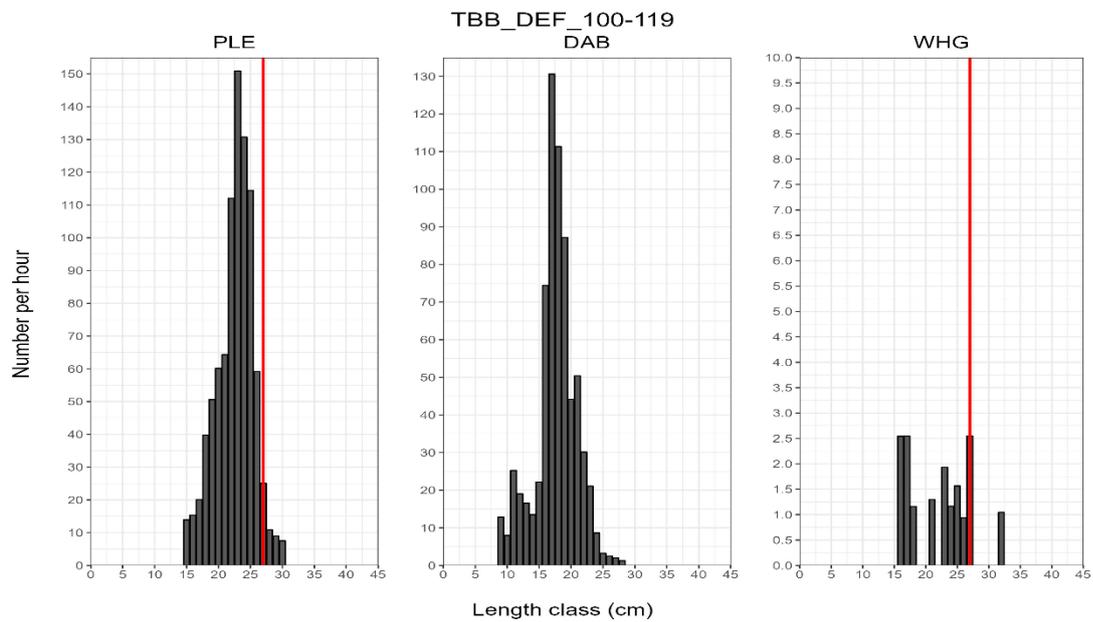
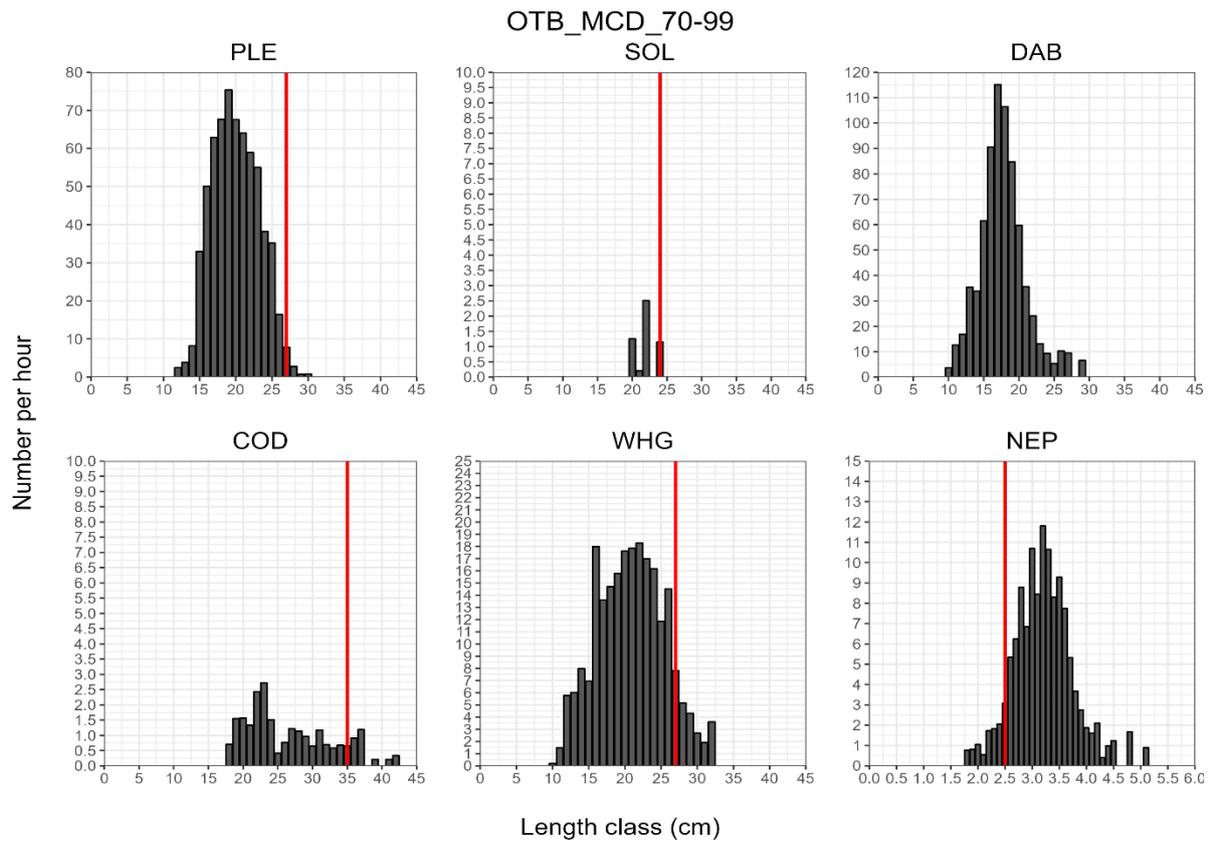


Figure 4. Continued.

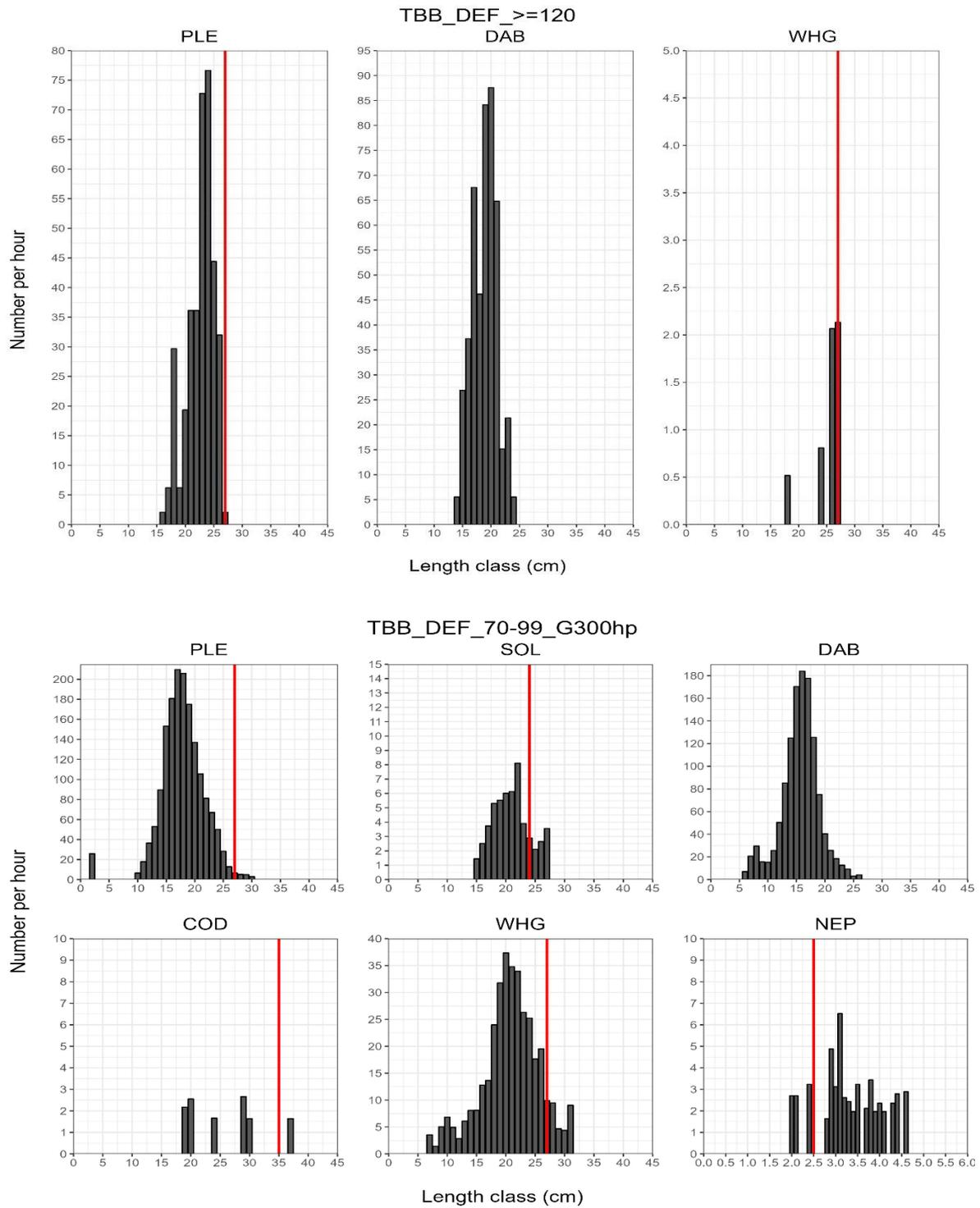


Figure 4. Continued.

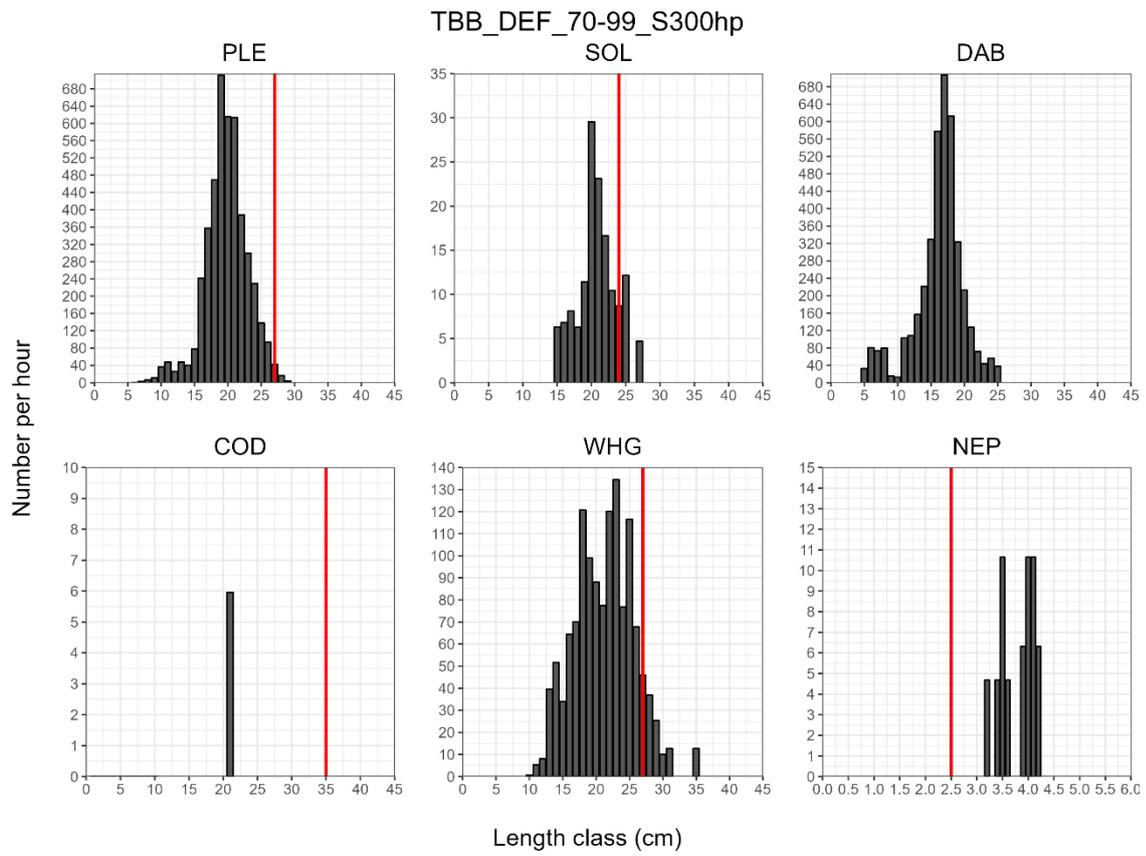


Figure 4. Continued.

Justification

CVO Report: 25.013

Project number: 4311213052

The quality of this report has been peer reviewed by a colleague scientist and the head of CVO.

Approved by: A.T.M. van Helmond MSc.
Colleague scientist

Signature:

Signed by:

64353276481640B...

Date: May 14th 2025

Approved by: Ing. S.W. Verver
Head Centre for Fisheries Research

Signature:

Signed by:

16FB8AB8B972444...

Date: May 14th 2025