Stichting Wageningen Research
Centre for Fisheries Research (CVO)

Catch sampling of the pelagic freezer trawler fishery operating in European waters in 2021-2022
Joint report of the Dutch and German national on-board sampling programmes

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Summary

The pelagic freezer trawler fishery targets small pelagic species. The economically most important species are: herring (*Clupea harengus*), blue whiting (*Micromesistius poutassou*), horse mackerel (*Trachurus trachurus*), mackerel (*Scomber scombrus*), greater argentine (*Argentina silus*) and pilchard (*Sardina pilchardus*). Annual landings of this fishery follow seasonal patterns; different species are targeted during different parts of the year. The total landings of these target species by the Dutch fleet were about 188,000 tonnes in 2021 and about 196,000 tonnes in 2022 (in European waters). The total landings of these target species by the German fleet were about 78,000 tonnes in 2021 and 90,000 tonnes in 2022 (in European waters). In total, 35 species were reported by the Dutch and German fleet in the period 2021-2022. Herring, blue whiting, mackerel and horse mackerel were the most abundant landed species.

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, from 2002 onwards, catches of the European freezer trawler fleet are sampled by the Netherlands and Germany through two separate observer programmes. A process to harmonize the pelagic onboard sampling programmes has started a few years ago and is still ongoing. This report presents a summary of the data collected in the two monitoring programmes in European waters during the period 2021 and 2022. Within the Dutch programme, 12 trips were observed by scientific observers in both 2021 and 2022. Within the German sampling programme, 4 trips were observed by scientific observers in both 2021 and 2022. The two sampling programmes together correspond with a sampling coverage of around 15% of the total Dutch- and German-flagged pelagic freezer trawler fleet effort (expressed in number of trips) in European waters in 2021 and 2022. The planned number of observer trips in 2021 was affected by the COVID-19 pandemic, which arrived in Europe at the end of January 2020. In order to ensure sufficient monitoring of the pelagic target species, the German DCF industry co-sampling had to be intensified.

Five different fishing grounds were sampled during the observer trips, namely the Celtic Sea, West of Scotland, North Sea, English Channel and Norwegian Sea. Overall, the species composition of the sampled trips is comparable with the species composition of the landings statistics of the Dutch and German pelagic freezer trawler fleet. In addition, the sampled trips provide information on rare, incidental bycatch species. In total, 123 species were observed during the sampled trips, both target and bycatch species.

An interesting element in the reform of the Common Fisheries Policy (CFP) is the concept of regionalisation, meaning that Member States which share a fishing area should work together in collecting, managing and making the data available for scientific advice. Regionalisation of data collection was established in 2017 during the recast of the Council Regulation describing the DCF (EU 2017/1004). Ultimately, under regional sampling, the Dutch and German pelagic sampling programmes are expected to converge or at least be completely harmonised and thus interchangeable. Currently, the EU Regional Coordination Group (RCG) for the North Atlantic, North Sea & Eastern Arctic (NANSEA) is working on a regional sampling plan for the freezer trawler fleet exploiting pelagic fisheries in the Northeast Atlantic.

Samenvatting

De pelagische vriestrawlervloot vist op een aantal pelagische doelsoorten, namelijk haring (*Clupea harengus*), blauwe wijting (*Micromesistius poutassou*), horsmakreel (*Trachurus trachurus*), mackerel (*Scomber scombrus*), grote zilvesmelt (*Argentina silus*) en pelser (*Sardina pilchardus*). In 2021 en 2022 werd van deze soorten uit Europese wateren respectievelijk 188,000 ton en 196,000 ton aangeland door de Nederlandse vloot. Door de Duitse vloot werd in 2021 en 2022 respectievelijk 78,000 ton en 90,000 ton aangeland. Er zijn 35 verschillende soorten door de Nederlandse en Duitse vloot aangevoerd in 2021-2022. De aanvoer bestond voor het grootste gedeelte uit haring, blauwe wijting, makreel en horsmakreel. De aanvoergegevens laten tevens zien dat de visserij gedurende het jaar varieert in de gerichtheid op doelsoorten.

In de Europese Unie wordt het verzamelen en beheren van visserijgegevens gereguleerd doormiddel van de Data Collecte Verordening (DCF) van de Europese Commissie (EC). Binnen deze regulatie bemonsteren Nederland en Duitsland sinds 2002 jaarlijks de vangsten van de Europese pelagische vriestrawler vloot. Met behulp van twee onafhankelijke waarnemersprogramma worden biologische gegevens over de vangsten verzameld. Een paar jaar geleden is de harmonisatie van deze twee bemonsteringsprogramma's in gang gezet. Dit rapport presenteert de gegevens die verzameld zijn in de periode 2021-2022. Binnen het Nederlandse bemonsteringsprogramma zijn respectievelijk 12 waarnemersreizen in zowel 2021 als 2022 uitgevoerd. Binnen het Duitse bemonsteringsprogramma zijn 4 waarnemersreizen in zowel 2021 en 2022 uitgevoerd. De programma's dekken samen ongeveer 15% van de totale Nederlandse en Duits gevlagde pelagische vriestrawler vloot (uitgedrukt in aantal reizen) die actief was in Europese wateren in 2021 en 2022. De geplande waarnemersreizen zijn door de uitbraak van corona in Europa januari 2020 in 2021 beïnvloed. Als gevolg moest de Duitse DCF zelfbemonstering uitgebreid worden zodat voldoende gegevens verzameld zouden worden van de pelagische target soorten.

Vijf gebieden, d.w.z. Keltische zee, ten Westen van Schotland, Noordzee, het Kanaal en de Noorse zee, zijn bevist tijdens de waarnemersreizen. De soorten samenstelling waargenomen in de bemonsterde reizen is vergelijkbaar met de soorten samenstelling van de aanvoer gegevens van de Nederlandse en Duitse pelagische vriestrawlervloot. De waarnemersreizen bieden tevens informatie over zeldzame, incidentele bijvangst soorten die niet aangeland mogen worden. In totaal zijn 123 soorten, zowel target als bijvangstsoorten, waargenomen tijdens de waarnemersreizen.

Een interessant element in de herziening van het Gemeenschappelijk Visserij Beleid (GVB) het concept van *regionalisering*. Dit betekent dat alle lidstaten die een gemeenschappelijk visgebied delen samen moeten werken in het verzamelen, beheer en beschikbaar maken van de gegevens. *Regionalisatie* van de dataverzameling is vastgelegd in de herschikking van de DCF in 2017 (EU 2017/1004). Uiteindelijk zal binnen een regionaal bemonsteringsprogramma de Nederlandse en Duitse pelagische bemonstering samengaan of op zijn minst volledig geharmoniseerd en uitwisselbaar zijn. Momenteel wordt binnen de regionale coördinatie groep van de EU aan een regionaal bemonsteringsplan voor de pelagische vriestrawlervloot die actief is Europese wateren.

Zusammenfassung

Die pelagische Schleppnetzfischerei mit Frostfischtrawlern hat als Zielarten kleinere pelagische Schwarmfischarten, von denen Hering (*Clupea harengus*), Makrele (*Scomber scombrus*), Blauer Wittling (*Micromesistius poutassou*), Stöcker (*Trachurus trachurus*), Goldlachs (*Argentina silus*) und Sardine (*Sardina pilchardus*) die kommerziell wertvollsten Arten sind. Die jährlichen Anlandungen folgen dabei saisonalen Mustern, da die unterschiedlichen Arten zu unterschiedlichen Zeiten in unterschiedlichen Meeresgebieten im Jahresverlauf gefangen werden. Die Gesamtanlandungen der niederländischen Flotte betrugen 2021 dabei etwa 188000 Tonnen und 2022 etwa 196000 Tonnen für die oben aufgezählten Arten in europäischen Gewässern. Die Gesamtanlandungen der deutschen Flotte in europäischen Gewässern betrugen 2021 etwa 78000 Tonnen und 2022 etwa 90000 Tonnen. Dabei wurden insgesamt 35 unterschiedliche Arten von der deutschen und holländischen Flotte während 2021 bis 2022 erfasst. Der Großteil der Anlandungen bestand aus Hering, Blauer Wittling, Makrele und Stöcker.

Die Sammlung von Daten zur Fischerei wie auch das Fischereimanagement sind in der Europäischen Union in der Verordnung zur Fischereidatenerhebung (Data Collection Framework – DCF) der Europäischen Kommission geregelt, die seit 2002 besteht. Seitdem wurden sowohl in den Niederlanden als auch Deutschland Programme etabliert, bei denen wissenschaftliche Beobachter an Fangreisen der pelagischen Fischerei teilnehmen und die Fangzusammensetzung aufnehmen. Seit einigen Jahren wird versucht, diese beiden Programme zu harmonisieren und mehr zusammenzuarbeiten. Dieser Bericht ist eine Zusammenfassung der Aktivitäten innerhalb der Beobachterprogramme in den Jahren 2021 und 2022. Dabei wurden jeweils 12 Reisen der niederländischen Flotte in den beiden Jahren und jeweils 4 Reisen der deutschen Flotte durch wissenschaftliche Beobachter begleitet. Dies entspricht einer Abdeckung bezogen auf alle durchgeführten Reisen in den beiden Jahren von etwa 15% für die gesamte niederländische und deutsche pelagische Fischerei mit Frostfischtrawlern. Die geplante Anzahl der Beobachterreisen war im Jahr 2021 noch durch die seit Ende Januar 2020 in Europa einsetzende COVID-19-Pandemie beeinträchtigt. Um ein ausreichendes Monitoring zu gewährleisten, wurde daher die Anzahl der Selbstbeprobungen der Fischerei intensiviert.

Fünf unterschiedliche Fischereigebiete wurden durch die Beobachterreisen abgedeckt, die Keltische See, das Gebiet westlich von Schottland, die Nordsee, der Englische Kanal sowie die Norwegische See. Insgesamt ist die Artenzusammensetzung der beprobten Reisen deckungsgleich zu der Arten-zusammensetzung der offiziellen Anlandungsstatistiken der niederländischen und deutschen Flotte. Zusätzlich konnten Informationen über den Beifang von selteneren Arten gesammelt werden. Insgesamt wurden 123 Arten auf den Beprobungsreisen identifiziert.

Ein wichtiges Element der Reform der Gemeinsamen Fischereipolitik (Common Fisheries Policy - CFP) ist das Konzept der Regionalisierung. Damit soll die Zusammenarbeit von Mitgliedstaaten beim Sammeln, dem Management und der Bereitstellung von Fischereidaten gefördert werden, die sich eine gemeinsame Fischereiregion teilen. Dieses Konzept der Regionalisierung wurde mit der Neufassung der Verordnung zur Fischereidatenerhebung eingeführt (EU 2017/1004). Letztlich wird angestrebt, dass das niederländische und deutsche pelagischen Beobachterprogramm im Rahmen dieser Regionalisierung in ein einziges regionales Programm integriert wird oder vollständig harmonisiert und somit auch vollständig vergleichbar wird. Zurzeit wird innerhalb der regionalen Koordinierungsgruppe für den Nordatlantik, die Nordsee und die östliche Arktis (RCG NANSEA) der EU ein solcher regionaler Beprobungsplan für die pelagische Schleppnetzfischerei im nordöstlichen Atlantik ausgearbeitet.

1 Introduction

Pelagic freezer trawlers use a mid-water pelagic trawl to target pelagic species (Box 1); depending on the season, freezer trawlers target herring (*Clupea harengus*), blue whiting (*Micromesistius poutassou*), horse mackerel (*Trachurus trachurus*), mackerel (*Scomber scombrus*), greater argentine (*Argentina silus*) and pilchard (*Sardina pilchardus*). Their most important fishing grounds in European waters are situated on the continental slope west of the British Isles, in the English Channel, along the British eastern coast, the northern North Sea and the Norwegian Sea (ICES divisions 2a, 4abc, 5b, 6ab, 7bcdefghjk, 8abd; Table 1 and Figure 1). Differences in catch composition are caused by seasonal changes, fishing ground, or changes in the market situation; i.e. market prices fluctuate by season per species. Since the fishing companies concentrate on different markets and have different quota shares, the fleet is usually spread over a number of different areas throughout the year. Data on catch composition including discards/unwanted by-catch data of pelagic freezer trawlers have been monitored since 2002 under the European Commission Data Collection Framework (DCF) (Box 2).

The pelagic freezer trawler fishery is an international fishery, monitored at sea by both the Netherlands and Germany, conducting their own monitoring programmes and sampling protocols (Ulleweit et al., 2010; https://www.dcf-germany.de/sampling, Verver 2020; Verver, 2021). Since the 1st of January 2015, the pelagic freezer trawlers are regulated under the landing obligation (CFP Regulation 1380/2013 article 15). Consequently, the DCF programmes shifted from a discards to a catch monitoring scheme.

Box 1: Pelagic freezer fishery
Pelagic freezer trawlers target schooling fish. Echo-sounding equipment on board of the trawlers provides information on the size and position of a shoal of fish, which makes this fishery very efficient. As a full net is too large to get on board, a hauled net remains in the water, while the catch is pumped on board. Catch is temporally stored in cooling tanks until it can be processed in the factory below deck. In principle all fish is maintained on board and frozen in blocks of 20-25 kg.
The duration of each fishing trip depends mainly on the catch of target species and the storing capacity of the vessel. The vessels usually return when all freezing stores are full. Smaller vessels make trips of 2-4 weeks, larger vessels of 5-6 weeks. A more detailed description of the fishery is given by Couperus *et al* (2004).

Box 2: 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 aim of this report is to present an overview of the data that has been collected within the Dutch and German DCF on-board observer programme of pelagic freezer trawlers, operating in European waters for 2021 and 2022. The data is used for further analyses within stock assessment working groups and various projects.

2 Methods

Information on landings and effort by the Dutch pelagic freezer fleet in 2021 and 2022 has been derived from the Dutch Wageningen Marine Research (WMR) VISSTAT database (*Visserij Statistieken*). Information on landings and effort by the German pelagic freezer fleet in 2021 and 2022 has been derived from the German FIT database (Fischereistatistik) held by the Federal Office for Agriculture and Food. In both countries, this information is based on official logbook registrations of commercial fishing vessels.

In contrast with landing and effort registration, which is based on a census of logbook information, biological information needs to be sampled to fulfil the obligations of the DCF. Information on the total population (fleet) based on sampled data requires an estimation procedure that respects the sampling design. In the Dutch and German DCF on-board observer programme of pelagic freezer trawlers operating in European waters, biological sampling of unsorted catch is carried out onboard the vessels.

2.1 Sampling procedures of the Dutch sampling programme

Annually 12 trips are sampled, homogenously distributed (monthly) over the year. Since 2019, sampling is randomized through a weighted random selection of fishing companies based on the number of freezer trawler vessels (active in European waters) owned by each company. In 2018, it was agreed between the two research institutes (i.e. Thünen Institute and WMR) responsible for the observer programmes that German-flagged vessels are excluded from the Dutch sampling programme as these vessels are sampled within the German sampling programme. The fishing area is not a consideration in the stratification of sampling trips. The choice of fishing area and target species is usually a last minute decision, and may even change during the trip. It is not uncommon that during one trip, several fishing and management areas are visited.

Sampling is conducted by an observer who is instructed to take samples from all hauls. If this is not possible due to working hour restrictions or technical issues, non-sampled hauls are not taken into account and are presented as "not sampled" in the results. The following sampling is conducted on a haul basis:

1. Total catch estimate (TCW_h)
   The observer estimates the total catch of the haul (h) from the bridge in cooperation with the skipper and verifies it with the number of cooling tanks that are filled (with help of the fish quality manager). The observer validates his estimates of the total catch, several times during the trip, by comparing his estimates with the actual number of boxes of retained catch onboard the vessel.
2. Unsorted catch sample (Cw_h)
   An unsorted catch sample of 30-150 kg (depending on the target species (s); e.g. herring "small" sample and mackerel "large sample") is taken prior to the sorting process. The sample is weighed, the weight of each species in the sample is recorded ($Cw_{h,s}$) and all fish are measured to the cm below (herring and sprat from 0.5 cm below).
3. Incidental bycatches
   Incidental bycatches are monitored on the bridge and at the conveyer belt by the observer in close collaboration with the crew.
4. Discarding
   Since 1st of January 2015 the pelagic freezer trawler fleet falls under the landing obligation. This means that in principle, the fishery is obliged to keep catches of quota-regulated species onboard. However, fish that is still discarded (possibly due to an assigned exemption on the landing obligation), is sampled:

a) Discard percentage (discards%)
The observer estimates the discard percentage by the ratio between catch and discards.
b) Discards sample (Dw_h)
The discards sample of the haul is taken of a minimum of 20 kg (if discarding occurs in these numbers). The sample is weighed, the weight of each species in the sample is recorded ($Dw_{h,s}$) and all fish are measured to the cm below (herring and sprat from 0.5 cm below).

During each trip, the data is stored into a computer programme on haul-by-haul basis. After quality control, the data is transferred into the central WMR database (FRISBE).

2.2 Sampling procedures of the German sampling programme

Only one fishing company is involved in the pelagic freezer trawler fleet in Germany. The general sampling scheme is discussed with this company once or twice a year, after which vessels are selected on an ad-hoc basis.

Sampling onboard is conducted by one observer. The observer is advised to take samples from all hauls. If this is not possible due to working hour restrictions or technical issues, non-sampled hauls are not taken into account. On average, the number of non-sampled hauls varies between 2 and 4 within a trip consisting of 25 to 30 hauls. From each sampled haul, an unsorted catch sample (Cw_h) is taken. The total sample size depends on the target species (e.g. herring >50 kg, mackerel >200 kg). The unsorted catch sample is split by the observer into the different fractions according to the crew´s behaviour:

- Landings for human consumption (*LW*)
  The sample is weighed, the weight of each species in the sample is recorded ($Lw_{h,s}$) and all fish are measured.
- BMS Landings (*LbmsW*)
  The sample is weighed, the weight of each species in the sample is recorded ($Lbmsw_{h,s}$) and all fish are measured.
- Other components (Ow_h)
  Other components might be related to a discard fraction in the catch or another fraction according to the landing obligation. The sample is weighed, the weight of each species in the sample is recorded ($Ow_{h,s}$) and all fish are measured.

If possible, the sample should be taken from different cooling tanks. Total landings of the haul by species ($LW_{h,s}$ $LbmsW_{h,s}$) is estimated after the processing of the haul in cooperation with the skipper. The data are verified with the information of the fish quality manager on the number of cooling tanks which were filled during the processed haul. In addition, the samples are used to estimate the percentage of other components by species in the haul (e.g. discards). This percentage is used to calculate the total weight per species and haul of those other components ($OW_{h,s}$). The estimated weight of these components is also verified with the fish quality manager and skipper in order to avoid later misunderstandings. Subsamples are taken for further age analysis in the laboratory. After each trip, data are stored in a central database.

2.3 Raising collected data of the Dutch sampling programme to trip level

2.3.1 Raising the samples to haul level

Total weight per species in unsorted catch sample
Total catch weight per species and haul ($TCW_{h,s}$) is estimated by multiplying the weight of the species in the catch sample ($Cw_{h,s}$) with the ratio between the estimated total catch weight (TCW_h) and the weight of the catch sample (Cw_h):

$$TCW_{h,s} = Cw_{h,s} \times (TCW_h / Cw_h)$$

Total numbers at length per species
The total numbers caught at length ($TCN_{l,h,s}$) are estimated per species and haul by multiplying the numbers at length (l) in the catch sample ($Cn_{l,h,s}$) with the ratio between the estimated total catch weight (TCW_h) and the weight of the catch sample (Cw_h):

$$TCN_{l,h,s} = Cn_{l,h,s} \times (TCW_h / Cw_h)$$

2.3.2 Raising sampled hauls to trip level

Total weight per species
Total catch weight per species and trip ($TCW_{t,s}$) is estimated by summing the catch weight per species over all hauls:

$$TCW_{t,s} = \sum_h TCW_{h,s}$$

Total numbers at length per species
Total numbers caught at length per species and trip ($TCN_{l,t,s}$) is estimated by summing the numbers at length per species over all sampled hauls:

$$TCN_{l,t,s} = \sum_h TCN_{l,h,s}$$

2.3.3 Non-sampled hauls

During the sampled trips, it sporadically happens that the observer only estimates the weight of the catch and does not perform sampling, i.e. non-sampled hauls. Because the species composition and length frequency distribution of the catch for such hauls is unknown, non-sampled hauls are presented as a separate component in this report.

2.4 Raising collected data of the German sampling programme to trip level

2.4.1 Raising the samples to haul level

Total weight per species in unsorted catch sample
Total landings weight per haul and species ($LW_{h,s}$) is estimated in cooperation with the skipper after the sampling and processing of the sampled haul.

Total weight per species and haul ($LbmsW_{h,s}$) of other catch fractions (BMS landings or other components according to the landings obligation like discards etc.) is estimated by multiplying the estimated total landings per haul (LW_h) with the ratio between the proportion of the specific components and proportion landings:

$$LbmsW_{h,s,} = LW_h \times (LbmsW\%_{h,s} / L\%_{h,s})$$

(In case of more than one additional component, the total weight of the specific component is estimated in relation to all components)

Total numbers at length per species

The total numbers of landed fish caught at length ($LN_{l,h,s}$) are estimated per species and haul by multiplying the numbers at length in the landings sample ($Ln_{l,h,s}$) by the ratio of the estimated total landing weight by species ($LW_{h,s}$) to the weight of the landings sample by species ($Lw_{h,s}$):

$$LN_{l,h,s} = Ln_{l,h,s} \times (LW_{h,s}/Lw_{h,s})$$

The total numbers of fish of other catch components (e.g. BMS landings) caught at length ($LbmsN_{l,h,s}$) are estimated per species and haul by multiplying the numbers at length in the sample ($Lbmsn_{l,h,s}$) by the ratio between the estimated total discards weight by species ($LbmsW_{h,s}$) and the weight of the sample by species ($Lbmsw_{h,s}$):

$$LbmsN_{l,h,s} = Lbmsn_{l,h,s} \times (LbmsW_{h,s}/Lbmsw_{h,s})$$

(In case of more than one additional component, the total numbers by length of the specific component is estimated in relation to all components)

2.4.2 Raising sampled hauls to trip level

Total weight per species

Total landings weight per species trip ($LW_{t,s}$) is estimated by summing the landings weight per species over all sampled hauls:

$$LW_{t,s} = \sum_{h} LW_{h,s}$$

Total weight per species trip of other components ($LBMSW_{t,s}$) is estimated by summing the weight per species in those components over all sampled hauls:

$$LbmsW_{t,s} = \sum_{h} LbmsW_{h,s}$$

Total length per species

Total landings numbers caught at length per species and trip ($LN_{l,t,s}$) are estimated by summing the numbers at length per species over all sampled hauls:

$$LN_{l,t,s} = \sum_{h} LN_{l,h,s}$$

Total numbers caught at length per species and trip of other components (Lbms$N_{l,t,s}$) are estimated by summing the numbers at length per species in those components over all sampled hauls:

$$LbmsN_{l,t,s} = \sum_{h} LbmsN_{l,h,s}$$

2.4.3 Non-sampled hauls

Non-sampled hauls which are not observed due to working hour restrictions or technical issues are excluded from calculations. Another reason for non-sampling might be a very poor/small catch. Those hauls are also not taken into account.

3 Results

3.1 Fleet

Target species of the pelagic freezer trawler fleet in European waters differ by season and area. The main target species are herring, blue whiting, horse mackerel, mackerel, pilchard and greater argentine. The total landings of these target species by the Dutch fleet were about 188,000 tonnes in 2021 and 196,000 tonnes in 2022 (in European waters). The total landings of these target species by the German fleet were about 78,000 tonnes in 2021 and 90,000 tonnes in 2022 (in European waters).

Herring, blue whiting, mackerel and horse mackerel were the most abundant species landed by both countries (Table 1, Figure 2a-d). Herring is generally caught in the 2nd half of the year (June to December). During summer, the herring fishery is concentrated in the North Sea (ICES Subarea 4), in autumn in ICES Division 2.a and 2.b, targeting Atlanto-scandian herring, and in December in the English Channel (ICES Division 7.d, see Figure 1 for an explanation of the ICES areas). Blue whiting was caught throughout the years with peaks in the spring. Most of blue whiting catch was taken from ICES Divisions 6.a, 7.c, 7.j and in 2022 also 8.d by the Dutch flagged fleet. Mackerel and horse mackerel are mainly caught in the autumn and winter, the majority of the mackerel catch originated from the North Sea and the majority of the horse mackerel from the Celtic Sea. Greater argentine is targeted in April-June.

In total, 35 species were reported in the logbooks by the Dutch and German fleet in the period 2021-2022; 30 and 28 species by the Dutch fleet in 2021 and 2022, respectively, and 17 and 20 species by the German fleet in 2021 and 2022, respectively. Beside the main target species, sprat (*Sprattus sprattus*), deepwater redfish (*Sebastes mentella*), boarfish (*Capros aper*), hake (*Merluccius merluccius*) and whiting (*Merlangius merlangus*) were frequently caught. Hake, boarfish and whiting, on the other hand, are, due to a lack of quota, typical unwanted bycatch species.

3.2 Sampled trips

3.2.1 Number of sampled trips

Within the Dutch programme, 12 trips were observed by scientific observers in 2021, from which 9 trips were onboard Dutch-flagged vessels, 2 trips onboard French-flagged vessels and 1 trip onboard a UK-flagged vessel. In 2022, 12 trips were observed by scientific observers, from which 9 trips were onboard Dutch-flagged vessels, 2 trips onboard UK-flagged vessels and 1 trip onboard a French-flagged vessel. (Table 3).

Within the German sampling programme, 4 trips were observed by scientific observers in both 2021 and 2022. Additional samples of the target species were obtained by the ship´s crew during some fishing trips (co-sampling[1]) who were asked beforehand to take a random sample. Altogether, 4 co-sampling trips (3 trips in 2021 and 1 trip in 2022) were carried out. All trips were onboard German-flagged vessels (Table 3).

3.2.2 Sampled fishing grounds

Five different fishing grounds were sampled during the observer trips, namely the Celtic Sea, West of Scotland, North Sea, English Channel, Bay of Biscay and Norwegian Sea (Figures 4a,b and Table 4; ICES Divisions 2a, 4abc, 5b, 6a, 7bcdefghj, and Subarea 8).

[1] Co-sampling: the industry collected the sample(s), and scientists processed the sample(s).

3.2.3 Sampled hauls

Within the Dutch sampling programme, a total of 422 hauls in 2021 and 411 hauls in 2022 were sampled, which was a sampling coverage of 97% and 90%, respectively (Table 3).

Within the German sampling programme, a total of 104 hauls in 2021 and 154 hauls in 2022 were sampled by observers, which was 91% and 74%, respectively, of all hauls during the sampled observer trips (Table 3).

3.3 Collected data

During the sampled trips, one or several species were targeted (Tables 4 and 5). In addition, a number of non-target species were caught. Table 6 provides an overview of all observed species that were caught during the sampled trips. In total, 123 species were observed during the sampled trips in the period 2021-2022; 86 and 83 species in the Dutch sampling programme in 2021 and 2022, respectively, and 28 and 29 species in the German sampling programme in 2021 and 2022, respectively. The lower number of observed species in the German sampling programme is likely to be caused by the difference in the number of executed observer trips. Overall, it must be noted that as the observer is unable to monitor all rare, incidental bycatches, the presented numbers for these species are likely underestimates.

Sampled trips in January - February targeted horse mackerel, mackerel, blue whiting and to a lesser extent herring (trips P204-P206, G70, P216-P218). In March-May, the target species in the sampled trips shifted towards blue whiting and greater argentine (trips P207-P208, P219). During the summer months (June – September), the sampled trips mainly targeted herring (trips P209-P211, G71, P220-P224, G76-G77) with occasional, commercially interesting, bycatches of mackerel. In September-November, several species were targeted, namely herring, mackerel, horse mackerel (trips P212-P214, G72, P225-P227, G78). In December, the fishery targeted herring in the Eastern Channel (G79) and blue whiting in the Celtic Sea (P215, G73).

The average length distributions of observed catches of blue whiting, greater argentine, herring, horse mackerel, mackerel and pilchard are presented in Figure 3. The length distributions generally show regular bell-shaped patterns, where each bell-shaped component can most likely be attributed to an age group (i.e. age cohort). The length frequency distributions of herring from the German sampled trips in 2021 shows two peaks. This second peak represents Atlanto-scandian herring (=Norwegian spring-spawning herring) caught in ICES Subarea 2 which are larger than the North Sea herring despite being the same species.

4 Discussion

4.1 Deviations in the two sampling programmes

The two sampling programmes together correspond with a sampling coverage of around 15% of the total Dutch- and German-flagged pelagic freezer trawler fleet effort (expressed in number of trips) in European waters in 2021 and 2022 (Table 7). Sampling was conducted throughout the year with an observer trip carried out each month, except in May in 2021 and March in 2022. Overall, all fishing grounds were covered by the sampled trips (Figures 2,4).

The planned number of observer trips in 2021 was affected by the COVID-19 pandemic, which arrived in Europe at the end of January 2020. The placing of observers onboard fishing vessels was not always possible due to the pandemic. In the end, for the German observer programme, this resulted in not covering all target fisheries e.g. the German herring fishery in the English Channel in 2021. This could be partly compensated by intensifying the co-sampling programme.

4.2 Results of the two sampling programmes

With the introduction of the landing obligation in 2015, the sampling protocols of the two observer programmes have been brought closer together; the Dutch sampling programme shifted from discards monitoring to catch monitoring. However, an important difference between the two programmes that still remains is that within the German sampling programme, the observer splits the catch sample into the different fractions according to the crew's behaviour, namely landings for human consumption, landings for non-human consumption and discards (if occurring). In contrast, the Dutch sampling programme samples the unsorted catch, regardless the subsequent classification by the crew. The Dutch and German results are therefore presented for different types of catch fractions (Table 5a,b).

Overall, the species composition of the sampling programmes is comparable with the species composition of the landings statistics. In addition, the sampling programmes provide information on a number of rare, incidental bycatch species (Table 6a,b). As the observer is unable to monitor all rare, incidental bycatches, it must be noted that the presented numbers for these species are likely underestimates. Having said that, the observations of tuna are interesting and may indicate that this species is possibly becoming more abundant in the study area. The first tuna species in recent decades was observed within the Dutch observer programme in 2014 (Ulleweit et al., 2016; Table 5) and has been observed every year ever since (van Overzee et al., 2017; Table 6, van Overzee et al., 2020; Table 6, Ulleweit et al., 2022; Table 6).

In order to gain some insight into the sampling coverage of the observations of incidental bycatches, observers are requested within both sampling programmes to record which percentage of the total sorting process below deck, based on time, has been monitored for rare, incidental bycatches. Furthermore, for each haul, observers are advised to record whether they were able to observe the opening of the net, as during the net opening, most larger bycatch is released/removed from the net (Couperus, 2018; Couperus, 2019; Couperus, 2020). At present, guidance is needed from expert groups working with incidental bycatches (e.g. ICES Working Group on Bycatch of Protected Species (WGBYC)) on how such sampling coverage can be used to raise, if possible at all, observed incidental occurrences to fleet level.

4.3 Regionalisation of sampling

An interesting element in the reform of the Common Fisheries Policy (CFP) is the concept of regionalisation. In fisheries data collection, regionalisation means that Member States sharing a fishing

area should work together in collecting, managing, sharing and preparing data for scientific advice. In 2017, Council Regulation 199/2008 describing the Data Collection Framework was repealed by Regulation 2017/1004 where the focus indeed shifted towards regionalisation of data collection. In order to work towards harmonised regional sampling of commercial fisheries, the results for the German and Dutch observer programmes of pelagic freezer trawlers operating in European waters are presented together since 2011 (van Overzee et al., 2013; Ulleweit et al., 2016; van Overzee et al., 2017; van Overzee et al., 2020; Ulleweit et al., 2022).

Ultimately, under a regional sampling plan, the two sampling programmes are merged or at least completely harmonised and thus interchangeable. Currently, a subgroup of the EU Regional Coordination Group (RCG, see also https://www.fisheries-rcg.eu) for the North Atlantic, North Sea & Eastern Arctic (NANSEA) is working on a regional sampling plan for the freezer trawler fleet exploiting pelagic fisheries in the Northeast Atlantic (RCG NANSEA RCG Baltic, 2023). The primary aim of this subgroup is to propose a statistically robust regional sampling scheme for the European pelagic freezer trawler fleet where both the monitoring of the pelagic target species and the incidental bycatches are taken into account. So far, simulation studies have been conducted to investigate annual sampling coverage for a suite of preselected stocks under various sampling schemes including random selection of individual fishing trips and vessel. Furthermore, a pilot study was carried out on the North Sea herring fishery in quarter 3 in 2022. The pilot study showed promising results. However, in order to extend to the entire fleet, a common practically feasible protocol for all species*area combinations needs to be developed and tested. The subgroup therefore recommended to identify and conduct two additional pilot studies in 2023/2024, one by the Netherlands and one by Germany, preferably focussing on the blue whiting fishery in quarter 4 and the mackerel fishery in quarter 1 (RCG NANSEA RCG Baltic 2023).

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Justification

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

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Appendix: Tables and Figures

Table 1a. *Landings (tonnes) per year, species and ICES Division by the* ***Dutch*** *freezer trawler fleet in* ***2021****. Data are extracted from VISSTAT database, landings in non-ICES areas are not included. For ICES Divisions: see Figure 1; for species names: see Table 2. * Due to rounding, this value may differ slightly from when one would sum the values by species and area from this table.*

	2.a	4.a	4.b	4.c	4.c_7.d	5.b	6.a	7.b	7.c	7.d	7.e	7.f	7.g	7.h	7.j	7.k	8.a	8.b	8.d	Total*
ANE			<0.1								<0.1	1								1
ARU	<0.1	24					2447	8	14											2493
ARY							1572		12											1584
BFT																				
BOC							52	228	1		123	3		77	<0.1	248		48		780
BRB										58										58
BRF							<0.1													<0.1
BYS																				
COD		<0.1																		<0.1
DPF									<0.1						<0.1					<0.1
GFB							<0.1													<0.1
GUG											<0.1	1		<0.1						1
GUR							<0.1													<0.1
GUU																				
HAD	<0.1	111	56				<0.1	7	<0.1			1	<0.1			10				186
HER	10716	47960	691	4972			5			12226										76570
HKE		8					104	7	4		<0.1			1		35		7		167
HOM		27	1				1309	2575	267	2928	1399	1145	627	4667	<0.1	6763		1976		23686
JOD							<0.1				1									1
MAC		14938	63	3			5558	381	21	343	1	1		2		543		812		22665
MCD							20													20
MON																				
NOP		23					5													28
PIL			273							66	30	3				<0.1				372
POA																<0.1				<0.1
POK	7	54					3													64
POL		<0.1																		<0.1
REB	<0.1																			<0.1
SPR			<0.1	138																139
SQI							3													3

Table 1a. *Continued*

	2.a	4.a	4.b	4.c	4.c_7.d	5.b	6.a	7.b	7.c	7.d	7.e	7.f	7.g	7.h	7.j	7.k	8.a	8.b	8.d	Total*
SQM						<0.1	5											3		8
SQR				<0.1			13	<0.1	1	<0.1	<0.1					<0.1				15
WHB	7	457				132	30921	5694	10909		<0.1			260	9732	558		3346		62017
WHG		60	4	1			<0.1	1		<0.1		<0.1				<0.1				67

Table 1b. *Landings (tonnes) per year, species and ICES Division by the* ***Dutch*** *freezer trawler fleet in* ***2022****. Data are extracted from VISSTAT database, landings in non-ICES areas are not included. For ICES Divisions: see Figure 1; for species names: see Table 2.* Due to rounding, this value may differ slightly from when one would sum the values by species and area from this table.*

	2.a	4.a	4.b	4.c	4.c_7.d	5.b	6.a	7.b	7.c	7.d	7.e	7.f	7.g	7.h	7.j	7.k	8.a	8.b	8.d	Total*
ANE											<0.1									<0.1
ARU	2						8658		16								1			8677
ARY							6													6
BFT										<0.1										<0.1
BOC							1	12	<0.1	<0.1	2	1	<0.1	27	<0.1	783	33			858
BRB					2					14										16
BRF							<0.1													<0.1
BYS																			1	1
COD																				
DPF																				
GFB							3													3
GUG		<0.1																		<0.1
GUR																				
GUU													<0.1							<0.1
HAD	<0.1	302	144				3	<0.1			<0.1	<0.1	2			2				453
HER	3783	50516	6123	12854						4869										78145
HKE							288	<0.1				3		1		37	<0.1			330
HOM		52	1	376	582		500	84		1298	250	2321	1163	1336		11671	1085			20719
JOD																<0.1	<0.1			<0.1
MAC	119	21187	129	53	31		1994	1398	12	31	4	21	1	1		197	193			25368
MCD						106	2													108
MON																<0.1				<0.1
NOP		60	<0.1										<0.1							60
PIL					9					35	24									68
POA																				
POK	52	23	<0.1																	75
POL																				
REB	586																			586
SPR			374	<0.1																374
SQI																				

Table 1b. *Continued*

	2.a	4.a	4.b	4.c	4.c_7.d	5.b	6.a	7.b	7.c	7.d	7.e	7.f	7.g	7.h	7.j	7.k	8.a	8.b	8.d	Total*
SQM				<0.1			7													7
SQR				3		9	53		1							<0.1				65
WHB	245	1				5475	16640	3	7731			<0.1	1	235	16548	2047	623		13698	63249
WHG	3	86	12	<0.1	<0.1						<0.1	1	1			1				103

Table 1c. *Landings (tonnes) per year, species and ICES Division by the* ***German*** *freezer trawler fleet in* ***2021****. Data are extracted from FiStat database, landings in non-ICES areas are not included. For ICES Divisions: see Figure 1; for species names: see Table 2..*

	2.a	4.a	4.b	4.c	5.b	6.a	6.b	7.b	7.c	7.d	7.e	7.f	7.g	7.h	7.j	8a	8.b	8.d	Total*
ARU		455				364													819
ARY		69				423			2										494
BOC											45			16	48				109
BRB										29									29
DPY		1			1	13													15
HAD																			1
HER	3283	13913								5282		19							22497
HKE		7				3													10
HOM		4								85	1617	559	987	2805	1303	2			7362
MAC	9	9339				2035			4	2				1	1				11391
NOP		4										2							5
POK	2	9				1													12
REB	536																		536
SQM						3													3
SQR						74			1										75
WHB	21	2095			636	23309		483	8770			1			13				35327
WHG		1										1							1

** Due to rounding this value may differ slightly from when one would sum the values by species and area from this table.*

Table 1d. *Landings (tonnes) per year, species and ICES Division by the* ***German*** *freezer trawler fleet in* ***2022****. Data are extracted from FiStat database, landings in non-ICES areas are not included. For ICES Divisions: see Figure 1; for species names: see Table 2.*

	2.a	4.a	4.b	4.c	5.b	6.a	6.b	7.b	7.c	7.d	7.e	7.f	7.g	7.h	7.j	8.b	8.d	Total*
ANE											<0.1							<0.1
ARU						739												739
ARY															<0.1			<0.1
BOC							1			1	30		6	492		13		543
BRB									15									15
COD		<0.1																<0.1
DPY					55													55
HAD		89																89
HER	5600	34561		3084					4880									48124
HKE						10								7		1		18
HOM		8				2			69			96	330	3503		324	1	4332
MAC		11679	<0.1	1		966			1					21		797	434	13900
NOP		<0.1																<0.1
PIL									1	1								2
POK	16	7																23
REB	610																	610
SQM						7												7
SQR					5													5
WHB	4				5106	583		8957					111	269	6619	18		21667
WHG	2	8																11

** Due to rounding this value may differ slightly from when one would sum the values by species and area from this table.*

Table 2. *Species names..*

Species code	Scientific name	English name
ANE	*Engraulis encrasicolus*	Anchovy
ARU	*Argentina silus*	Greater argentine
ARY	*Argentina sphyraena*	Argentine
BFT	*Thunnus thynnus*	Atlantic bluefin tuna
BOC	*Capros aper*	Boarfish
BRB	*Spondyliosoma cantharus*	Black sea bream
BRF	*Helicolenus dactylopterus*	Blackbelly rosefish
BYS	*Beryx splendens*	Lowe's Beryx
COD	*Gadus morhua*	Cod
DPF	*Diaphus rafinesquii*	White-spotted lanternfish
DPY		Short-headed lantern fish
GFB	*Gadiculus argenteus*	Greater forbeard
GUG	*Eutrigla gurnardus*	Grey gurnard
GUR	*Eutrigla gurnardus*	Red gurnard
GUU	*Trigla lucerna*	Tub gurnard
HAD	*Melanogrammus aeglefinus*	Haddock
HER	*Clupea harengus*	Herring
HKE	*Merluccius merluccius*	Hake
HOM	*Trachurus trachurus*	Horse mackerel
JOD	*Zeus faber*	Atlantic John Dory
MAC	*Scomber scombrus*	Mackerel
MCD	*Lampanyctus macdonaldi*	Rakery beaconlamp
MON	*Lophius piscatorius*	Anglerfish
NOP	*Trisopterus esmarkii*	Norway pout
PIL	*Sardina pilchardus*	Pilchard
POA	*Brama brama*	Rays bream
POK	*Pollachius virens*	Saithe
POL	*Pollachius pollachius*	Pollack
REB	*Sebastes mentella*	Deepwater redfish
SPR	*Sprattus sprattus*	Sprat
SQI	*Illex illecebrosus*	Northern shortfin squid
SQM	*Illex coindetii*	Broadtail shortfin squid
SQR	*Loligo vulgaris*	European squid
WHB	*Micromesistius poutassou*	Blue whiting
WHG	*Merlangius merlangus*	Whiting

Table 3. *Overview of sampled trips in* ***2021*** *and* ***2022*** *in the* ***Dutch*** *and* ***German*** *observer programme.*

Year	Trip	Sampling programme	Flag vessel	Nr of hauls	Nr of hauls sampled *	% of hauls sampled
2021	P204	NLD	NLD	43	36	84%
	P205	NLD	FRA	35	35	100%
	P206	NLD	NLD	43	41	95%
	P207	NLD	UK	32	31	97%
	P208	NLD	NLD	38	38	100%
	P209	NLD	FRA	42	42	100%
	P210	NLD	NLD	44	42	95%
	P211	NLD	NLD	35	35	100%
	P212	NLD	NLD	52	51	98%
	P213	NLD	NLD	34	32	94%
	P214	NLD	NLD	23	23	100%
	P215	NLD	NLD	16	16	100%
	G68*	DEU	DEU	35	5	14%
	G69*	DEU	DEU	11	3	27%
	G70	DEU	DEU	32	23	72%
	G71	DEU	DEU	29	29	100%
	G72	DEU	DEU	43	42	98%
	G73	DEU	DEU	10	10	100%
	G74*	DEU	DEU	6	56	10%
2022	P216	NLD	UK	31	30	97%
	P217	NLD	NLD	43	38	88%
	P218	NLD	NLD	30	29	97%
	P219	NLD	NLD	65	62	95%
	P220	NLD	FRA	32	31	97%
	P221	NLD	NLD	38	35	92%
	P222	NLD	NLD	34	32	94%
	P223	NLD	NLD	45	27	60%***
	P224	NLD	NLD	20	20	100%
	P225	NLD	NLD	71	58	82%
	P226	NLD	UK	25	24	96%
	P227	NLD	NLD	25	25	100%
	G75*	DEU	DEU	10	1	10%
	G76	DEU	DEU	44	39	89%
	G77	DEU	DEU	48	37	77%
	G78	DEU	DEU	70	49	70%
	G79	DEU	DEU	45	29	64%

** Co-sampling (the industry collected the sample(s), and scientists processed the sample(s).)*

*** Including hauls with zero catch*

**** During this trip an adjusted protocol was tested for which sampling occurred for the first five hauls, followed by every second haul.*

Table 4. *Period, target species and ICES areas of the trips conducted during the* ***Dutch*** *and* ***German*** *observer programme in* ***2021*** *and* ***2022****.*

Year	Trip	Period**	Target species***	ICES areas
2021	P204	Jan, Feb	Whb, Hom, Mac	27.6.a, 27.7.b, 27.7.c, 27.7.j
	P205	Feb	Hom, Her, Mac	27.4.c, 27.6.a, 27.7.b, 27.7.d, 27.7.f
	P206	Feb, Mar	Hom, Whb	27.7.b, 27.7.c, 27.7.e, 27.7.h, 27.7.j, 27.7.k
	P207	Mar, Apr	Whb	27.6.a, 27.7.b, 27.7.c
	P208	Apr	Whb, Arg	27.6.a, 27.7.b
	P209	June	Hom, Her	27.4.a, 27.7.j
	P210	July	Her	27.4.a
	P211	Aug, Sep	Her	27.4.a
	P212	Oct	Her, Mac	27.4.a, 27.4.b, 27.2.a
	P213	Oct, Nov	Mac, Her	27.4.a, 27.2.a
	P214	Nov	Mac, Pil, Spr, Her, Hom	27.4.a, 27.4.b, 27.4.c, 27.7.d
	P215	Nov, Dec	Whb	27.5.b, 27.6.a
	G68*	Jan	Whb	27.6.a
	G69*	Jan	Mac	27.6.a
	G70	Jan, Feb	Hom, Mac, Whb	27.7.c, 27.7.f, 27.7.g, 27.7.h, 27.7.j
	G71	Jun, Jul	Her	27.4.a
	G72	Nov	Mac	27.2.a, 27.4.a
	G73	Nov, Dec	Whb	27.5.b, 27.6.a
	G74*	Dec	Her	27.7.d
2022	P216	Jan	Mac	27.4.a
	P217	Jan	Her, Hom, Whb	27.7.c, 27.7.d, 27.7.j, 27.8
	P218	Feb	Whb	27.7.j, 27.8
	P219	Apr, May	Whb, Arg	27.5.b, 27.6.a
	P220	June	Her	27.4.a
	P221	July	Her	27.4.a
	P222	July, Aug	Her	27.4.a
	P223****	Aug, Sep	Her	27.4.a
	P224	Sep	Her	27.4.a, 27.4.b
	P225	Oct, Nov	Hom, Mac	27.4.a, 27.7.e, 27.7.h, 27.7.j, 27.8
	P226	Nov	Mac, Her	27.4.a, 27.4.c
	P227	Nov, Dec	Hom	27.7.d, 27.7.e, 27.7.f, 27.7.g
	G75*	Jan	Her	27.4.a
	G76	June	Her	27.4.a, 27.4.b
	G77	July	Her	27.4.a
	G78	Sep, Oct	Hom	27.7.c, 27.7.h, 27.7.j
	G79	Dec	Her	27.4.a, 27.7.d, 27.7.g

** Co-sampling (the industry collected the sample(s), and scientists processed the sample(s).)*

*** During fishing (not steaming)*

**** These species are described as target species in the observer journals, based on information prior to the trip. This does not necessarily mean that the species are caught during the trip; if they fail to find the species the catch is zero.*

***** During this trip an adjusted protocol was tested for which sampling occurred for the first five hauls, followed by every second haul.*

Table 5a. *Total catch (tonnes) per sampled pelagic trip within the* ***Dutch*** *observer programme in* ***2021*** *and* ***2022****. * During fishing (not steaming). ** See also Table 6 for other species. *** During this trip an adjusted protocol was tested for which sampling occurred for the first five hauls, followed by every second haul.*

Year	Trip	Period*		Blue whiting	Greater argentine	Herring	Horse mackerel	Mackerel	Pilchard	Others**	Total	Not sampled
2021	P204	Jan, Feb	Catch	1066.3	<0.1		351.8	272.6		18.4	1709.1	63.1
	P205	Feb	Catch	<0.1		385.0	489.9	596.8	0.6	4.1	1476.4	
	P206	Feb, Mar	Catch	3058.0			902.0	6.4		50.1	4016.5	86
	P207	Mar, Apr	Catch	3678.4	18.6			92.9		5.7	3795.6	1
	P208	Apr	Catch	3491.3	597.2			56.4		1.2	4146.1	
	P209	June	Catch	<0.1		1572.0	<0.1	31.9		6.5	1610.4	
	P210	July	Catch			3601.6	<0.1	52.7		10.0	3664.3	110
	P211	Aug, Sep	Catch			3992.2	14.5	125.5		24.0	4156.2	
	P212	Oct	Catch	3.9	<0.1	4055.7	4.6	1531.5		49.0	5644.7	124
	P213	Oct, Nov	Catch	1.7		3377.7	<0.1	180.2		2.1	3561.7	27
	P214	Nov	Catch			414.4	192.7	1503.5	272.6	108.5	2491.7	
	P215	Nov, Dec	Catch	626.8				<0.1		3.1	629.9	
2022	P216	Jan	Catch			229.9		3200.1	0.7	<0.1	3430.7	4
	P217	Jan	Catch	1591.9		108.8	2046.5	33.3		117.2	3897.7	67
	P218	Feb	Catch	4019.0						0.1	4019.1	90
	P219	Apr, May	Catch	1293.8	1838.9		<0.1	28.5		70.0	3231.2	67
	P220	June	Catch			1567.8	0.3	26.2		3.7	1598.0	9
	P221	July	Catch			3866.8		138.8		97.7	4103.3	80
	P222	July, Aug	Catch	0.2		3822.6		136.0		94.2	4053.0	95
	P223***	Aug, Sep	Catch	0.3		2432.5	16.2	150.4	<0.1	25.1	2624.5	1531
	P224	Sep	Catch			1548.4	0.2	192.9		11.3	1752.8	
	P225	Okt, Nov	Catch	8.6		10.9	1918.7	1712.5		73.1	3723.8	131.8
	P226	Nov	Catch			352.1	<0.1	3064.4	<0.1	<0.1	3416.5	93
	P227	Nov, Dec	Catch	1.5		80.9	1270.2	7.2	0.9	6.3	1367.0	

Table 5b. *Total commercial and non-commercial landings (tonnes) per sampled pelagic trip by species caught for human consumption within the* ***German*** *observer programme in* ***2021*** *and* ***2022.*** *Commercial landings (Com. Landings) are landings for human consumption, non-commercial landings (Non Com. Landings) are landings according to the landing obligation, i.e. BMS. * During fishing (not steaming). ** See also Table 6 for other species.*

Year	Trip	Period*		Blue whiting	Greater argentine	Herring	Horse mackerel	Mackerel	Pilchard	Others**	Total	Not sampled
2021	G70	Jan, Feb	Com. Landings	34.1	0	0.3	1164.9	0	0	0.2	1199.5	
			Non Com. landings	0.1	<0.1	0	0	<0.1	<0.1	13.1	15.0	
	G71	Jun, Jul	Com. Landings	0	0	1435.1	0	0.7	0	0	1435.8	
			Non Com. landings	0	0	8.4	0	1.9	0	15.1	25.5	
	G72	Nov	Com. Landings	19.1	0	3210.0	0	2462.2	0	2.3	5693.6	
			Non Com. landings	<0.1	0	78.2	0	147.0	0	<0.1	225.4	
	G73	Nov, Dez	Com. Landings	1463.4	<0.1	0	0	0	0	2.2	1465.7	
			Non Com. landings	13.4	0	0	0	0	0	2.8	16.2	
2022	G76	June	Com. Landings	0	0	1252.7	0	12.2	0	1.1	1265.9	
			Non Com. landings	0	0	4.5	0	31.2	0	13.2	49	
	G77	July	Com. Landings	0	0	5306.7	<0.1	24.4	0	6.8	5337.8	
			Non Com. landings	0	0	36.2	<0.1	<0.1	0	0.4	36,6	
	G78	Sep, Oct	Com. Landings	324.6	<0.1	0	2922.3	5.1	0	2.1	3254.2	
			Non Com. landings	6.7	0	0	22	1.1	0	210.3	240.1	
	G79	Dec	Com. Landings	0	0	3096.2	69.5	1.9	0	5.6	3173.3	
			Non Com. landings	<0.1	0	37.8	0	2.1	0	0.1	40	

Table 6a. *Total amount of catch (tonnes) or total number of individuals observed during all sampled pelagic trips within the* ***Dutch*** *observer programme in* ***2021*** *and* ***2022****. With regards to incidental bycatches, note that the total number of individuals observed may only have occurred during one or a few trips.*

Species	Scientific name	2021 Total weight (tonnes) / total individuals	2022 Total weight (tonnes) / total individuals
Blue whiting	*Micromesistius poutassou*	11926.4	6915.2
Greater argentine	*Argentina silus*	615.9	1838.9
Herring	*Clupea harengus*	17398.5	14020.6
Horse mackerel	*Trachurus trachurus*	1955.5	5252.2
Mackerel	*Scomber scombrus*	4450.4	8690.2
Pilchard	*Sardina pilchardus*	273.2	1.6
Alfonsino	*Beryx decadactylus*	<0.1	<0.1
Anchovy	*Engraulis encrasicolus*	0.3	0.4
Anglerfish	*Lophius piscatorius*	<0.1	<0.1
Argentines	*Argentina sp.*	0.6	
Atlantic footballfish	*Himonatolophus groenlandicus*		<0.1
Atlantic halibut	*Hippoglossus hippoglossus*		<0.1
Black dogfish	*Centroscyllium fabricii*		<0.1
Black scabbardfish	*Aphanopus carbo*	<0.1	<0.1
Black seabream	*Spondyliosoma cantharus*	<0.1	6.4
Blackbelly rosefish	*Helicolenus dactylopterus*	0.1	3.1
Blackfish	*Centrolophus niger*	<0.1	<0.1
Bluntsnout smoothheard	*Xenodermichthys copei*	<0.1	
Boarfish	*Capros aper*	63.8	92.1
Broadtail shortfin squid	*Illex coindetii*		<0.1
Cephalopods nei	*Cephalopoda*	1.4	
Common Atlantic grenadier	*Nezumia aequalis*		<0.1
Common clubhook squid	*Onychoteuthis banskii*		<0.1
Common cuttlefish	*Sepia officinalis*	<0.1	
Conger	*Conger conger*	<0.1	<0.1
Cornish blackfish	*Schedophilus medusophagus*	<0.1	<0.1
Dab	*Limanda limanda*	0.1	
Deal-fish	*Trachipterus arcticus*		<0.1

Table 6a. *Continued.*

Species	Scientific name	2021 Total weight (tonnes) / total individuals	2022 Total weight (tonnes) / total individuals
Deepwater redfish	*Sebastes mentella*	0.3	
European flying squid	*Todarodes sagittatus*		16.6
European squid	*Loligo vulgaris*	6.4	26.2
Golden redfish	*Sebastes norvegicus*	<0.1	
Greater forkbeard	*Phycis blennoides*		<0.1
Greater weever	*Trachinus draco*	<0.1	<0.1
Greenland halibut	*Reinhardtius hippoglossoides*	<0.1	
Grey gurnard	*Eutrigla gurnardus*	0.3	0.1
Hachetfish	*Argyropelecus olfersi*	<0.1	0.1
Haddock	*Melanogrammus aeglefinus*	67.8	149.6
Hake	*Merluccius merluccius*	7.4	34.3
Hooknose	*Agonus cataphractus*	<0.1	
John Dory	*Zeus faber*	0.1	3.0
Lemon sole	*Microstomus kitt*	<0.1	
Lesser argentine	*Argentina sphyraena*	<0.1	
Lesser spotted dogfish	*Scyliorhinus acanthias*	<0.1	
Lesser flying squid	*Todaropsis eblanae*		<0.1
Lesser weever	*Echiichthys vipera*	<0.1	
Ling	*Molva molva*	<0.1	
Long rough dab	*Hippoglossoides platessoides*		<0.1
Longtooth anglemouth	*Gonostoma elongatum*		<0.1
Lowe’s Beryx	*Beryx splendens*		<0.1
Lumpsucker	*Cyclopterus lumpus*	1.0	0.1
Megrim	*Lepidorhombus whiffiagonis*		0.9
Mirror lampfish	*Lampadena speculigera*		<0.1
Norway pout	*Trisoperus esmarkii*	2.1	16.1
Pearl side	*Maurolicus muelleri*	<0.1	
Plaice	*Pleuronectes platessa*	<0.1	4.4

Table 6a. *Continued.*

Species	Scientific name	2021 Total weight (tonnes) / total individuals	2022 Total weight (tonnes) / total individuals
Rabbit-fish	*Chimaera monstrosa*		<0.1
Rays bream	*Brama brama*	<0.1	36.8
Ribbon barracudina	*Arctozenus risso*		<0.1
Rough pomfret	*Taractes asper*	<0.1	37.2
Saithe	*Pollachius virens*	2.0	4.4
Schnakenbecks searsid	*Sagamichthys chnakenbecki*	<0.1	<0.1
Sea bass	*Dicentrarchus labrax*	<0.1	1.4
Silver pomfret	*Pterycombus brama*	<0.1	
Silvery pout	*Gadiculus argenteus*	<0.1	<0.1
Skipper	*Scomberesox saurus*		<0.1
Sloanes viperfish	*Chauliodus sloani*		<0.1
Smalleye squaretail	*Tetragonurus cuvieri*		<0.1
Smoothhounds	*Mustelus sp.*		0.1
Solenette	*Buglossidium luteum*	<0.1	
Sprat	*Sprattus sprattus*	108.0	
Starry smoothhound	*Mustelus asterias*	<0.1	
Striped red mullet	*Mullus surmuletus*	<0.1	
Sunbeam lampfish	*Lampadena urophaos*		<0.1
Tub gurnard	*Chelidonichthys lucerna*	<0.1	<0.1
Twaite shad	*Alosa fallax*	<0.1	
Velvet belly	*Etmopterus spinax*	<0.1	1.0
Whiting	*Merlangius merlangus*	19.1	63.6
Witch	*Glyptocephalus cynoglossus*	<0.1	0.2
-	*Arctozenus risso*	0.1	
-	*Beryx*	<0.1	<0.1
-	*Beryx splendens*	<0.1	
-	*Cirostomias pliopterus*		<0.1
-	*Cryptopsaras couesii*	<0.1	
-	*Lampanyctus macdonaldi*	<0.1	
-	*Liocarcinus holsatus*	<0.1	

Table 6a. *Continued.*

Species	Scientific name	2021 Total weight (tonnes) / total individuals	2022 Total weight (tonnes) / total individuals
-	*Macroparalepis nigra*	<0.1	<0.1
-	*Nesarchius nasutus*	<0.1	
-	*Notoscopelus kroeyeri*	<0.1	0.3
-	*Polaemonidae*	<0.1	
-	*Polymetme corythaeola*		<0.1
-	*Scopelosaurus lepidus*	<0.1	<0.1
Basking shark	*Cetorhinus maximus*	15 individuals	
Birdbeak dogfish	*Centrolophus niger*	13 individuals	8 individuals
Blue shark	*Prionace glauca*	4 individuals	9 individuals
Bluefin tuna	*Thunnus thynnus*	4 individuals	8 individuals
Cod	*Gadus morhua*	1 individual	108 individuals
Eel	*Anguilla anguilla*	3 individuals	
Frilled shark	*Chlamydoselachus anguineus*		3 individuals
Greater lanternshark	*Etmopterus princeps*	2 individuals	1 individual
Greenland shark	*Somniosus microcephalus*		1 individual
Kitefin shark	*Dalatias licha*	1 individual	
Lamprey	*Lampetra fluviatilis*	1 individual	
Leafscale gulpershark	*Centrophorus squamosus*	9 individuals	
Porbeagle	*Lamna nasus*	23 individuals	32 individuals
Roundhead rat-tail	*Taractes asper*	9 individuals	
Scaleless black dragonfish	*Melanostomias bartonbeani*		1 individual
Sea lamprey	*Petromyzon marinus*	1 individual	
Shagreen ray	*Leucoraja fullonia*		1 individual
Silver pomfret	*Pterycombus brama*		2 individuals
Smoothhound	*Mustelus mustelus*	1 individual	
Spurdog	*Squalus acanthias*	231 individuals	44 individuals

Table 6a. *Continued.*

Species	Scientific name	2021 Total weight (tonnes) / total individuals	2022 Total weight (tonnes) / total individuals
Squids	*Teuthida*		1 individual
Sunfish	*Mola mola*		12 individuals
Swordfish	*Xiphias gladius*		2 individuals
Tope	*Galeorhinus galeus*	5 individuals	2 individuals
Umbrella squid	*Histioteuthis bonnellii*	6 individuals	3 individuals
Yellowfin tuna	*Thunnus albacares*		1 individual
Salmon	*Salmo salar*	2 individuals	
-	*Gonostoma denudatum*		5 individuals

Table 6b. *Total amount of catch (tonnes) or total number of individuals observed during all sampled pelagic trips within the* ***German*** *observer programme in* ***2021*** *and* ***2022****. With regards to incidental bycatches, note that the total number of individuals observed may only have occurred during one or a few trips.*

Species	Scientific name	2021 Total weight (tonnes) / total individuals	2022 Total weight (tonnes) / total individuals
Blue whiting	*Micromesistius poutassou*	1530.2	331.3
Greater argentine	*Argentina silus*	<0.1	<0.1
Herring	*Clupea harengus*	4732.1	9734.1
Horse mackerel	*Trachurus trachurus*	1164.9	3013.8
Mackerel	*Scomber scombrus*	2613.7	78
Pilchard	*Sardina pilchardus*	<0.1	0
Anglerfish	*Lophius piscatorius*	<0.1	
Argentine	*Argentina shyraena*	<0.1	
Black seabream	*Spondyliosoma cantharus*		5
Boarfish	*Capros aper*	6.3	210
Broadtail shortfin squid	*Illex coindetii*	<0.1	<0.1
Cod	*Gadus morhua*		<0.1
European squid	*Loligo vulgaris*		0.6
Greater weever	*Trachinus draco*		<0.1
Grey gurnard	*Eutrigla gurnardus*	0.3	<0.1
Haddock	*Melanogrammus aeglefinus*	13.1	17.8
Hake	*Merluccius merluccius*	<0.1	1.9
John Dory	*Zeus faber*	0.1	<0.1
Lampfishes	*Notoscopelus*	2.8	
Lemon sole	*Microstomus kitt*		<0.1
Ling	*Molva molva*	<0.1	
Lowe’s Beryx	*Beryx splendens*		<0.1
Lumpsucker	*Cyclopterus lumpus*		0.1
Norway Pout	*Trisopterus esmarkii*	0.3	
Red mullet	*Mullus surmuletus*		<0.1
Saithe	*Pollachius virens*	2.3	0.3
Sea bass	*Dicentrarchus labrax*	<0.1	0.2
Sepia	*Sepia officinalis*		
Sprat	*Sprattus sprattus*	<0.1	

Table 6b. *Continued*

Species	Scientific name	2021 Total weight (tonnes) / total individuals	2022 Total weight (tonnes) / total individuals
Squids	*Loligo* sp.	2.2	<0.1
Tub gurnard	*Chelidonichthys lucerna*	0.3	0.3
Whiting	*Merlangius merlangus*	0.3	3.3
Albacore	*Thunnus alalunga*		4 individuals
Basking Shark	*Cetorhinus maximus*	1 individual	
Blue Skate	*Dipturus batis*	1 individual	
Kaup's arrowtooth eel	*Synaphobranchus kaupii*	1 individual	
Porbeagle	*Lamna nasus*		3 individuals
Small-spotted catshark	*Scyliorhinus canicula*	1 individual	
Spurdog	*Squalus acanthias*	730 individuals	57 individuals
Sunfish	*Mola mola*		41 individuals

Table 7. *Overview of number of trips by the Dutch and German pelagic fleet and sampled observer trips within the* ***Dutch*** *and* ***German*** *observer programme for 2021 and 2022.*

Year	Country	Quarter	Nr trips pelagic fleet	Nr trips sampled
2021	NLD	1	15	4
		2	11	2
		3	18	3
		4	24	3
	DEU	1	8	1*
		2	8	
		3	6	1
		4	8	2**
2022	NLD	1	22	3
		2	12	2
		3	20	4
		4	22	3
	DEU	1	6	***
		2	7	
		3	9	2
		4	8	2

** In addition, two co-sampling trips were carried out in this quarter.*

*** In addition, one co-sampling trip was carried out in this quarter.*

**** Quarter was only sampled by one co-sampling trip.*

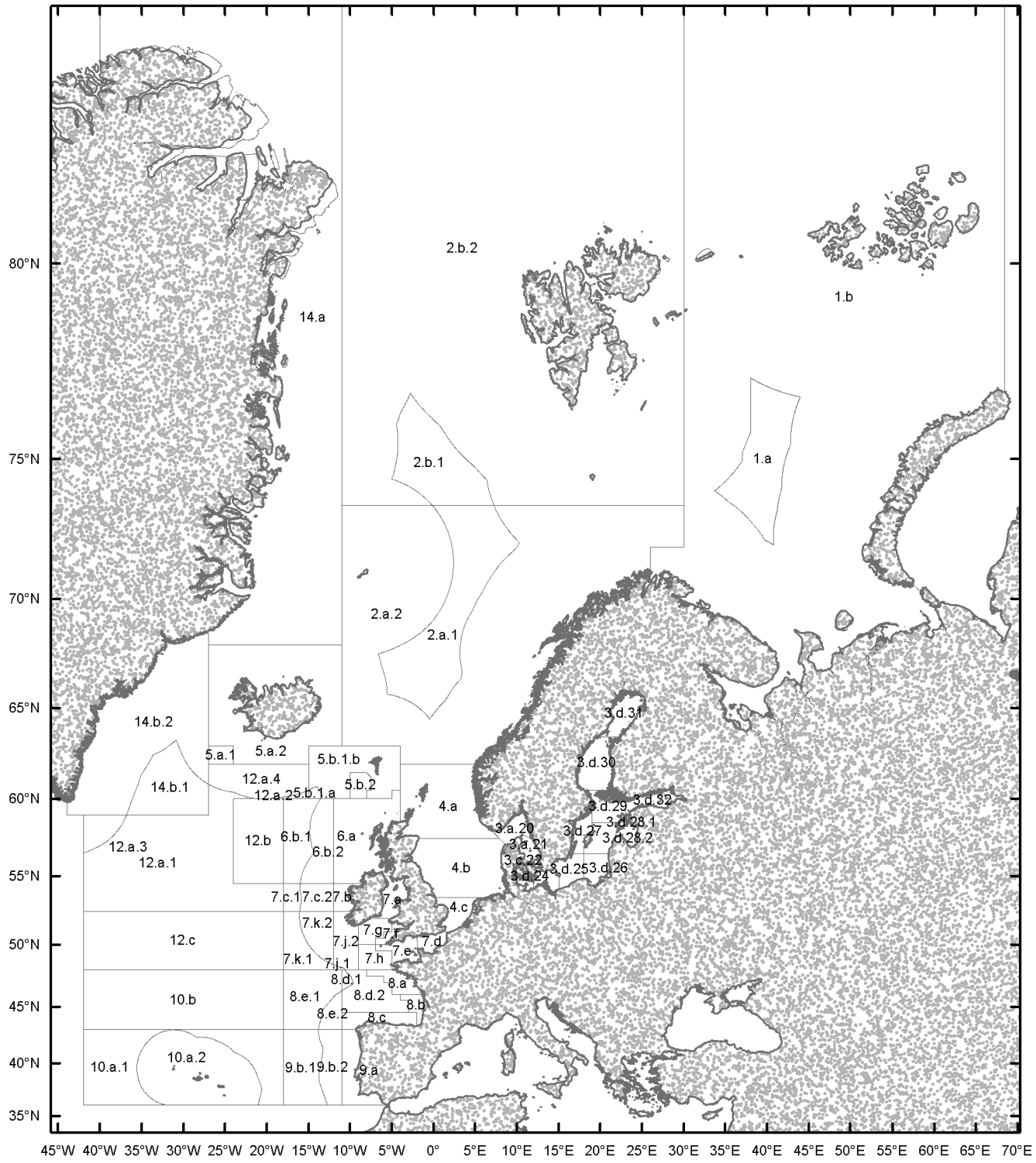
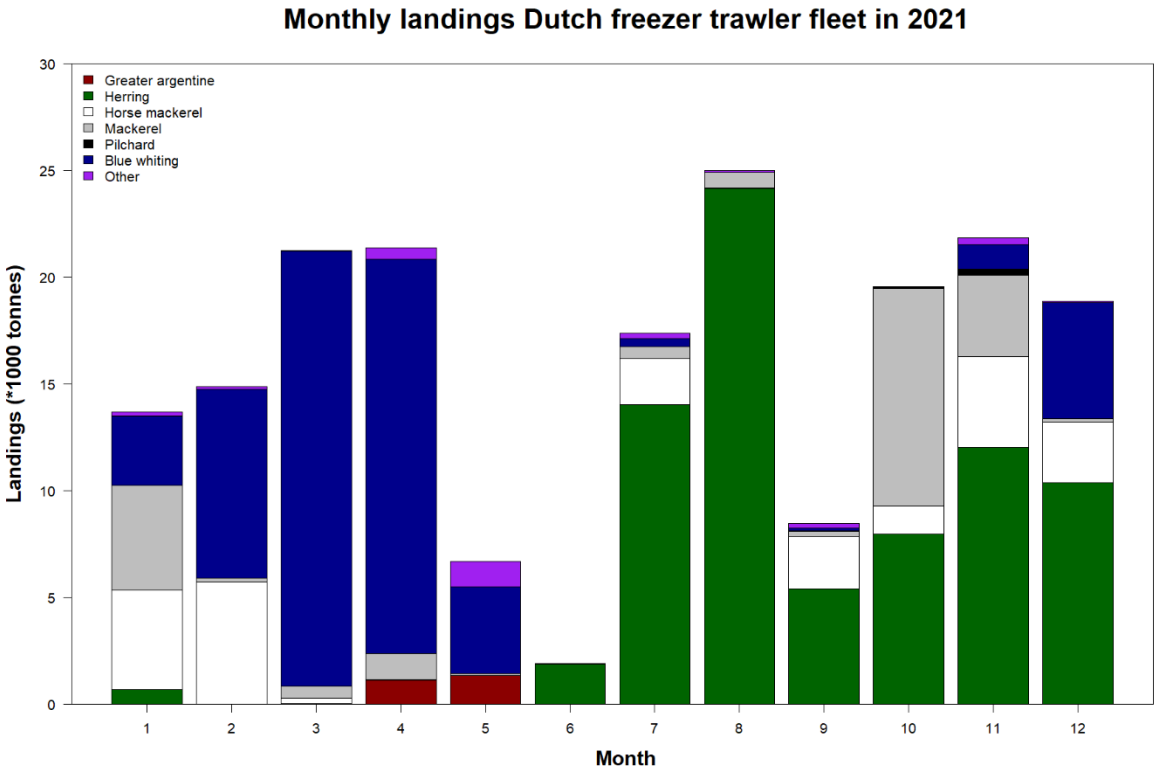


Figure 1. *Map of ICES Divisions (www.ices.dk)*



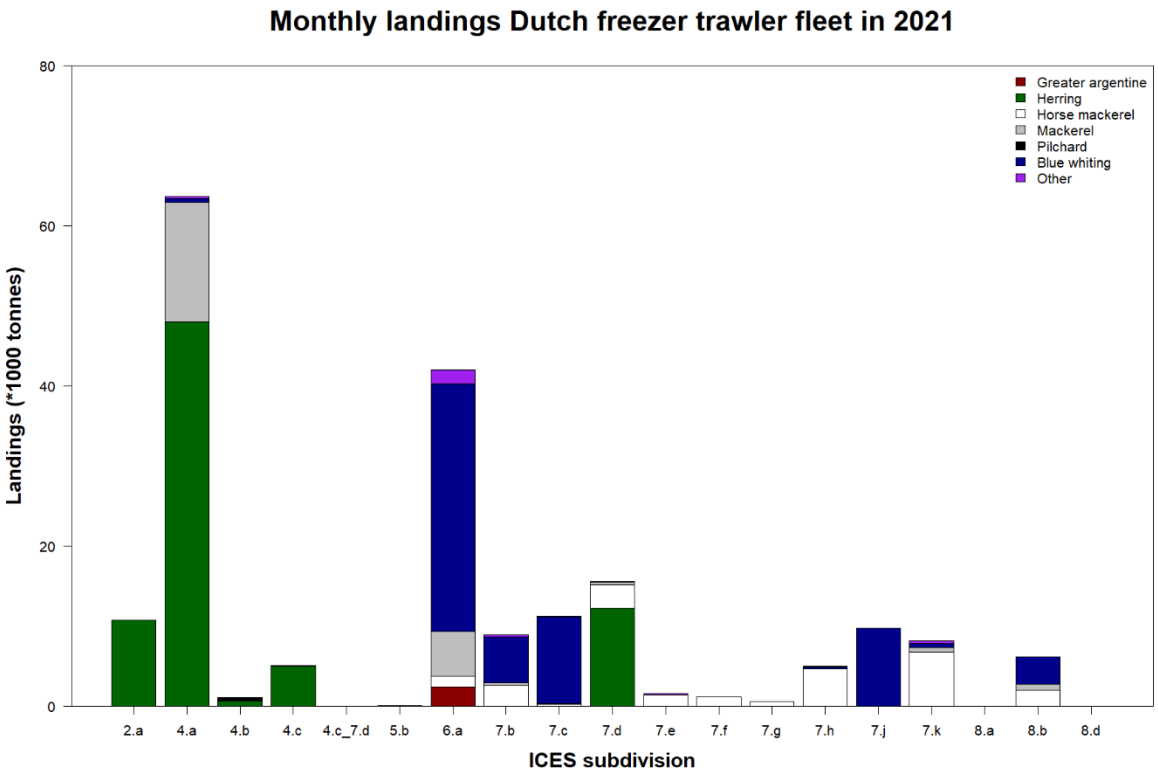


Figure 2a. *Landings (*1000 tonnes) from the* ***Dutch*** *freezer trawler fleet in* ***2021****. Upper panel shows monthly landings by species, lower panel shows landings per ICES Division (Figure 1) by species. Data extracted from VISSTAT database. Note that these two panels have a different scale in comparison with the panels in Figures 2cd.*

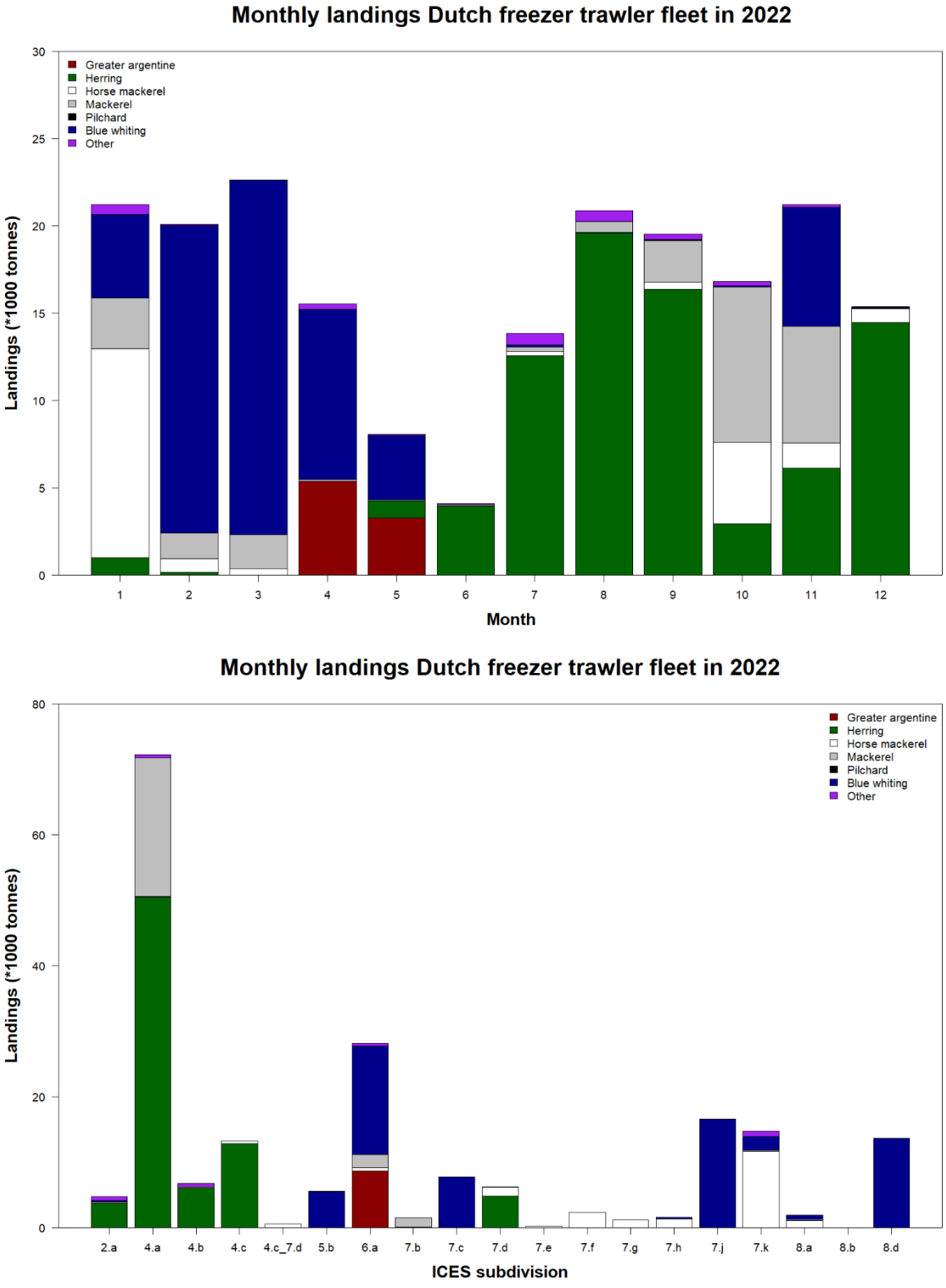


Figure 2b. *Landings (*1000 tonnes) from the* ***Dutch*** *freezer trawler fleet in* ***2022****. Upper panel shows monthly landings by species, lower panel shows landings per ICES Division (Figure 1) by species. Data extracted from VISSTAT database. Note that these two panels have a different scale in comparison with the panels in Figures 2cd*.

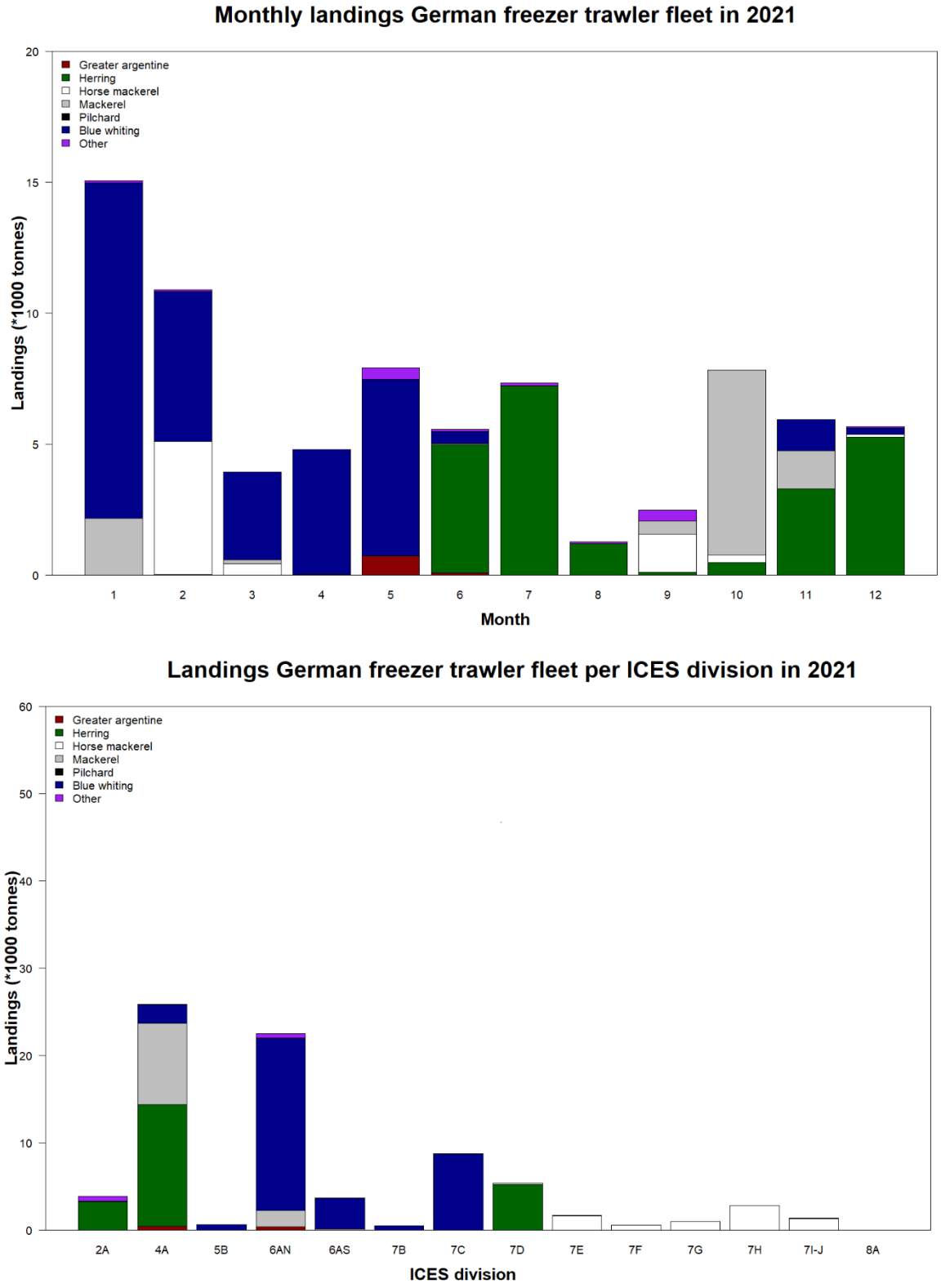


Figure 2c. *Landings (*1000 tonnes) from the* ***German*** *freezer trawler fleet in* ***2021****. Upper panel shows monthly landings by species, lower panel shows landings per ICES Division (Figure 1) by species. Data extracted from FiStat database. Note that these two panels have a different scale in comparison with the panels in Figures 2ab.*

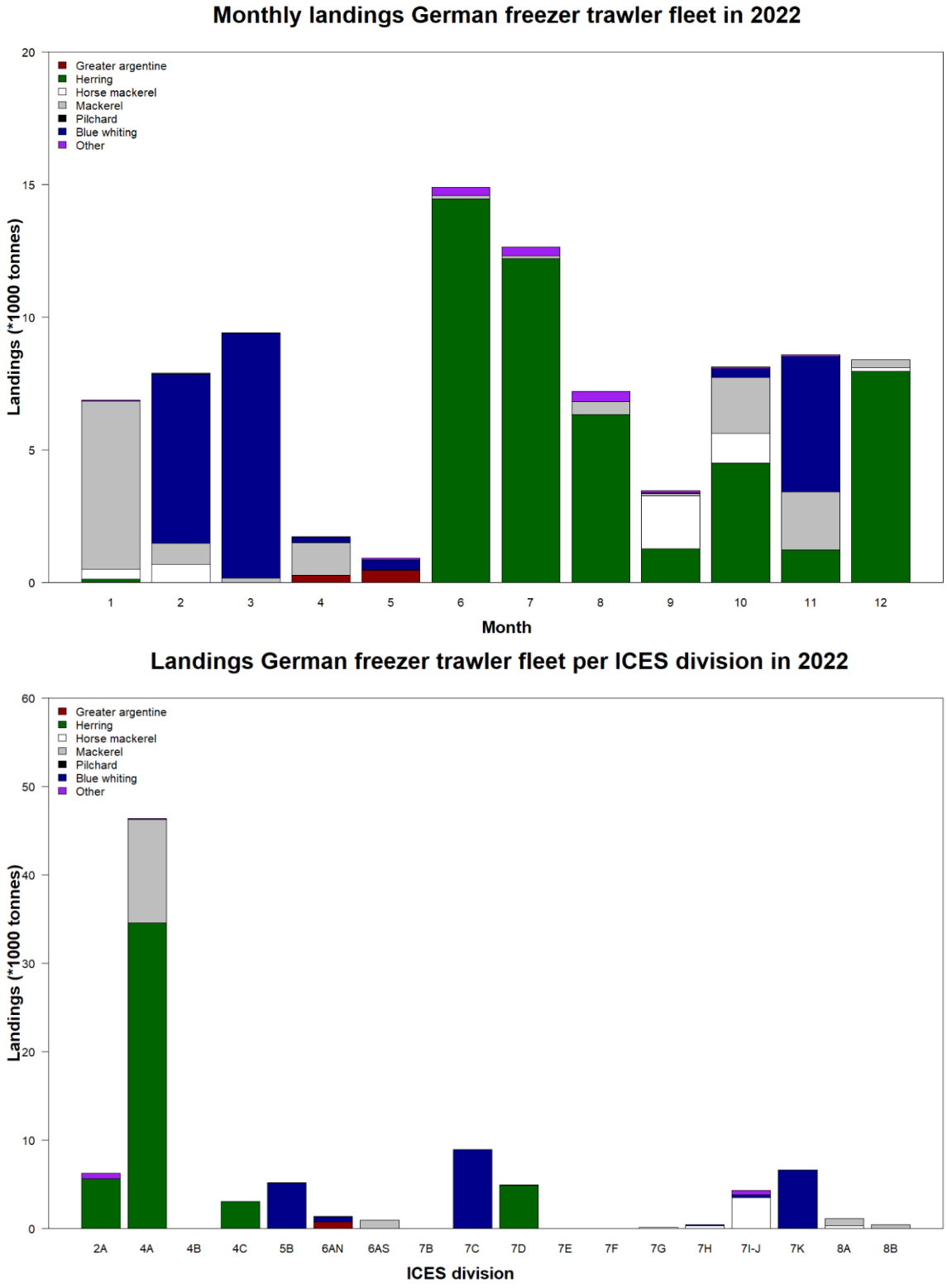


Figure 2d. *Landings (*1000 tonnes) from the* ***German*** *freezer trawler fleet in* ***2022****. Upper panel shows monthly landings by species, lower panel shows landings per ICES Division (Figure 1) by species. Data extracted from FiStat database. Note that these two panels have a different scale in comparison with the panels in Figures 2ab.*

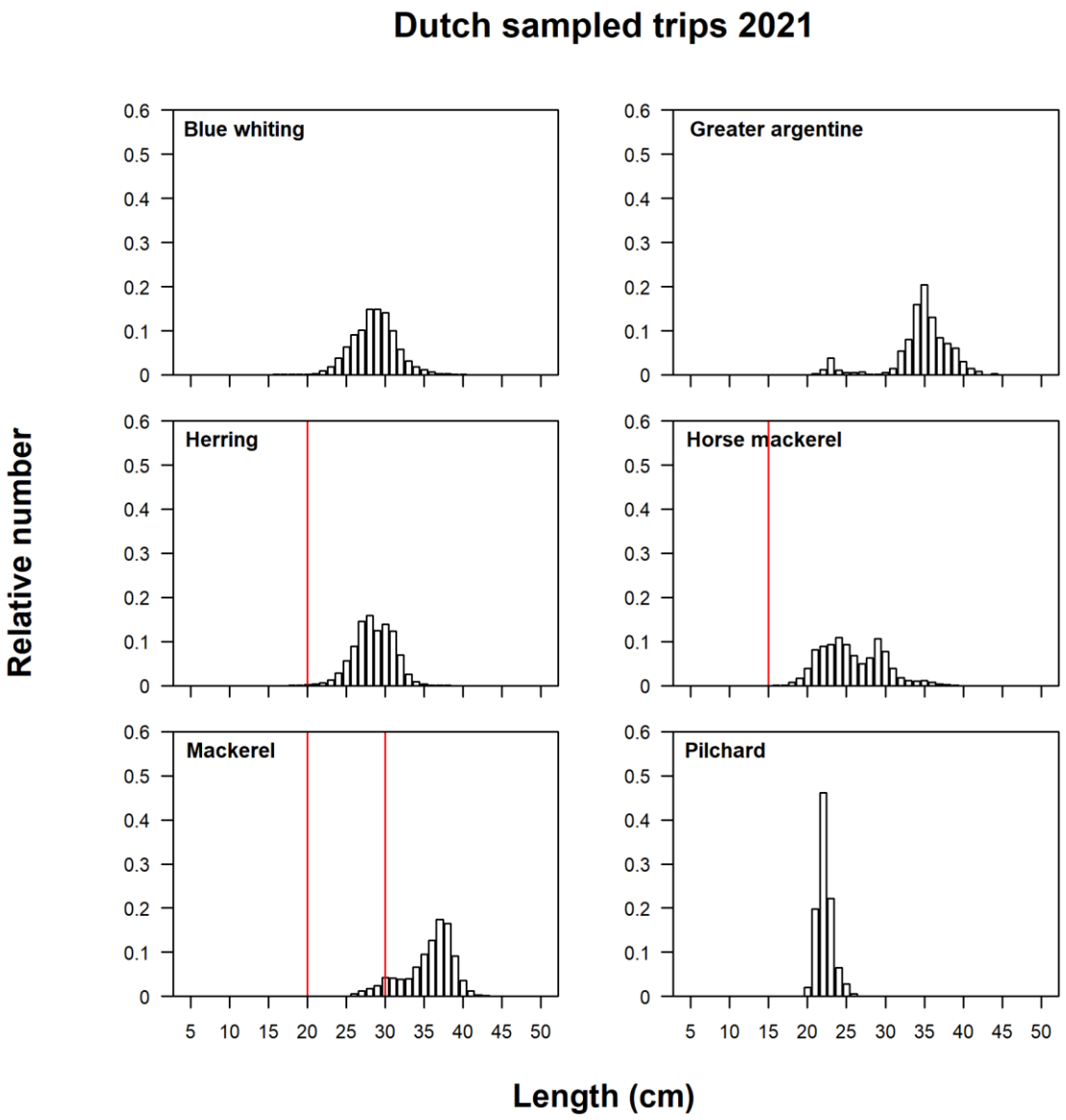


Figure 3a. *Relative number of blue whiting (top left), greater argentine (top right), herring (middle left), horse mackerel (middle right), mackerel (bottom left) and pilchard (bottom right) caught against length (cm) during the sampled trips within the* ***Dutch*** *observer programme in* ***2021*****. Red lines indicate minimum conservation reference size (herring = 20 cm, horse mackerel = 15 cm, North Sea mackerel = 30 cm, non-North Sea mackerel = 20 cm).*

** An example on how to read this Figure; for mackerel, 0.10 (i.e. 10%) of the mackerel catches consisted of individuals with a length of 35 cm.*

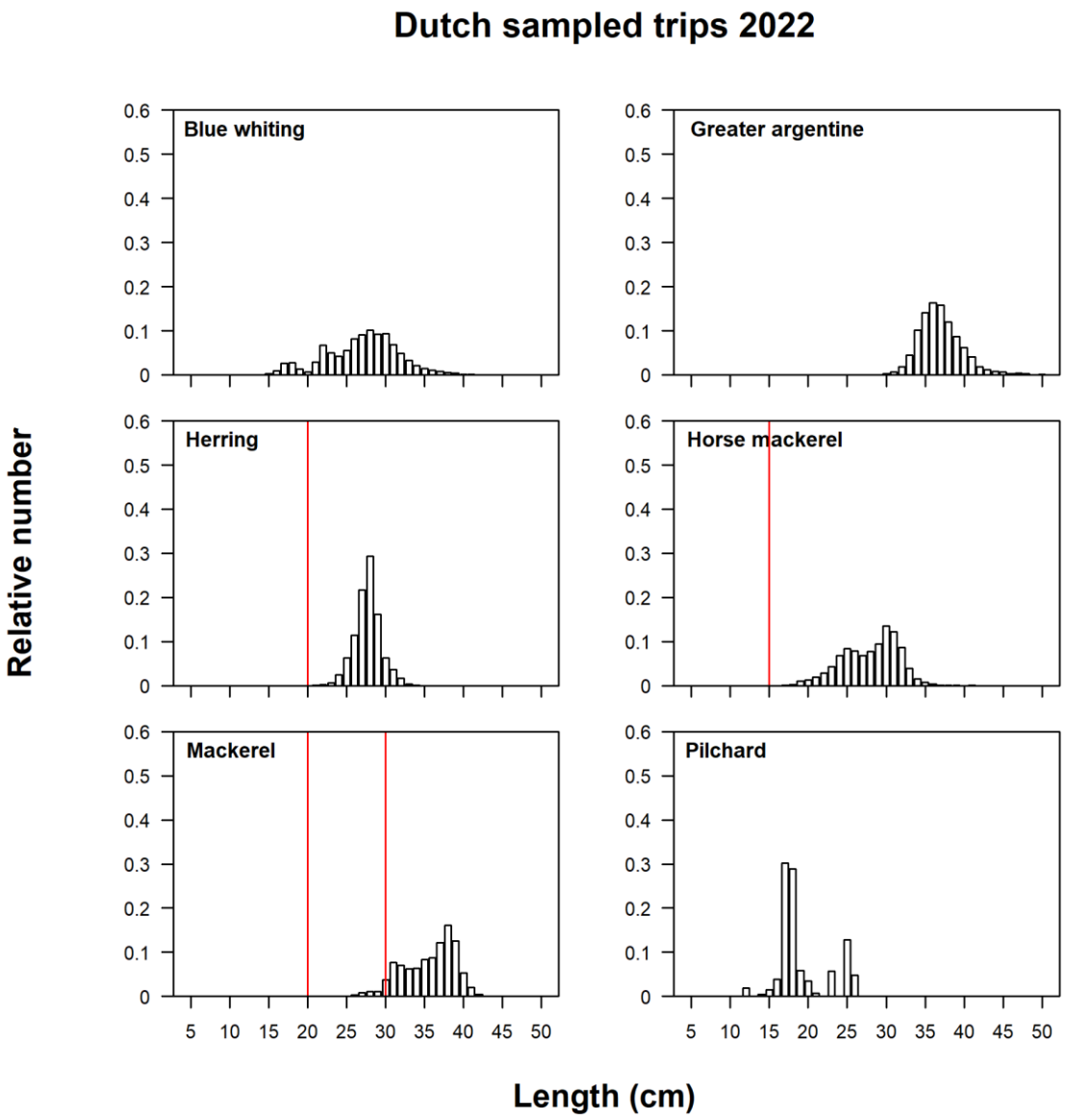


Figure 3b. *Relative number of blue whiting (top left), greater argentine (top right), herring (middle left), horse mackerel (middle right), mackerel (bottom left) and pilchard (bottom right) caught against length (cm) during the sampled trips within the* ***Dutch*** *observer programme in* ***2022****. Red lines indicate minimum conservation reference size (herring = 20 cm, horse mackerel = 15 cm, North Sea mackerel = 30 cm, non-North Sea* mackerel = 20 cm).

** An example on how to read this Figure; for mackerel, 0.08 (i.e. 8%) of the mackerel catches consisted of individuals with a length of 35 cm.*

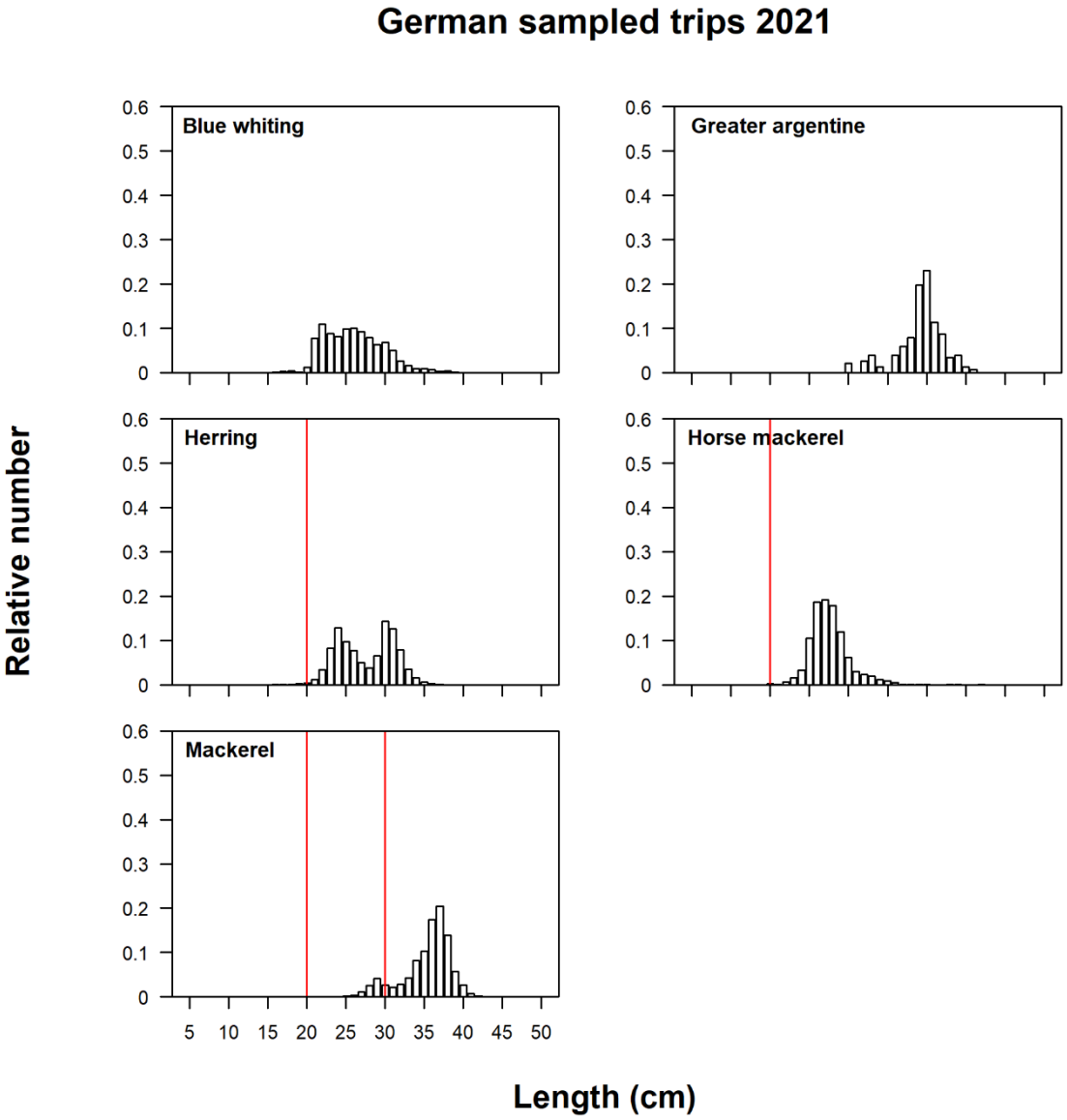


Figure 3c. *Relative number of blue whiting (top left), greater argentine (top right), herring (middle left), horse mackerel (middle right), mackerel (bottom left) and pilchard (bottom right) caught against length (cm) during the sampled trips within the* ***German*** *observer programme in* ***2021*****. Red lines indicate minimum conservation reference size (herring = 20 cm, horse mackerel = 15 cm, North Sea mackerel = 30 cm, non-North Sea mackerel = 20 cm).*

** An example on how to read this Figure; for mackerel, 0.10 (i.e. 10%) of the mackerel catches consisted of individuals with a length of 35 cm.*

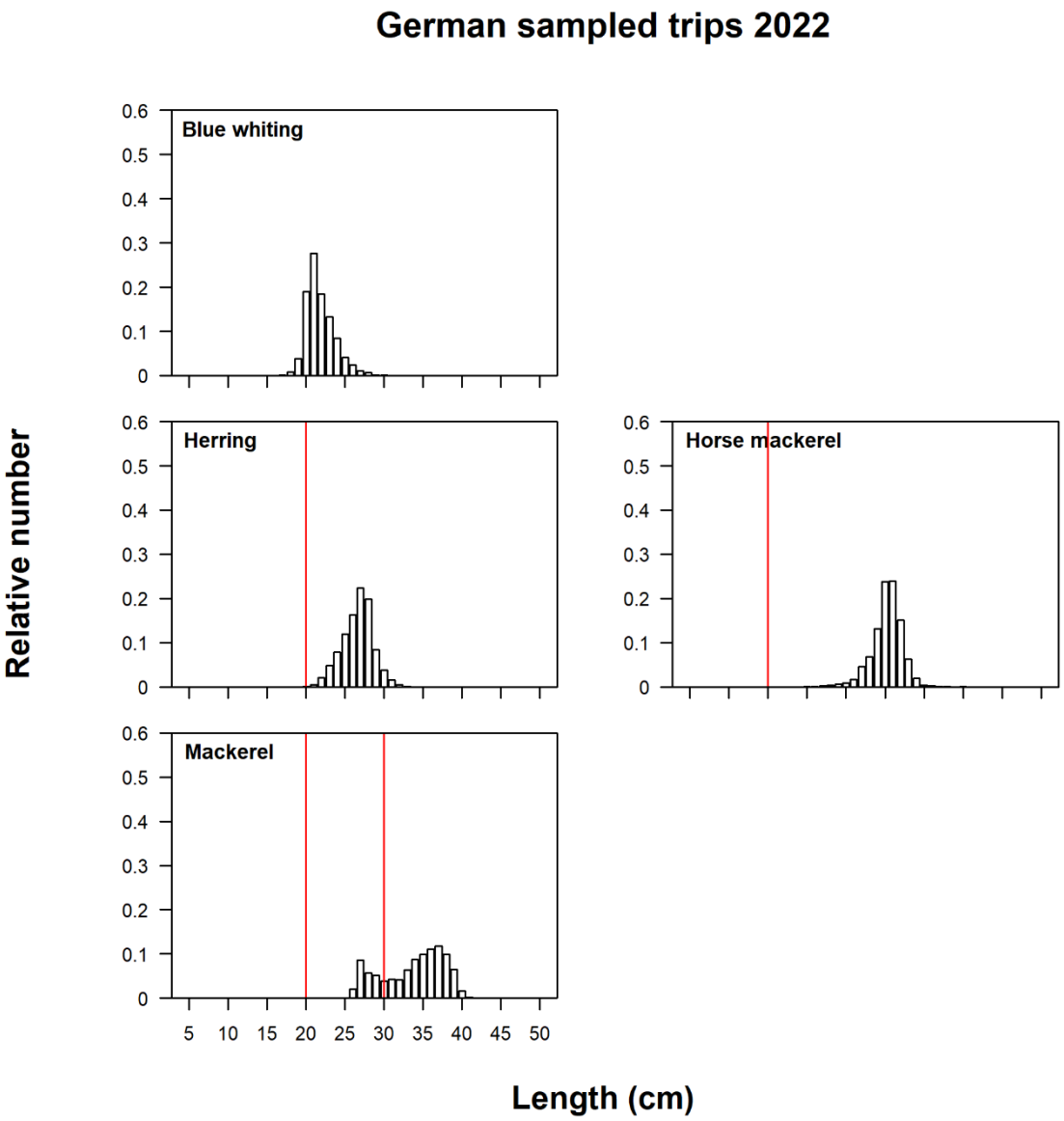


Figure 3d. *Relative number of blue whiting (top left), greater argentine (top right), herring (middle left), horse mackerel (middle right), mackerel (bottom left) and pilchard (bottom right) caught against length (cm) during the sampled trips within the* ***German*** *observer programme in* ***2022*****. Red lines indicate minimum conservation reference size (herring = 20 cm, horse mackerel = 15 cm, North Sea mackerel = 30 cm, non-North Sea mackerel = 20 cm).*

** An example on how to read this Figure; for mackerel, 0.10 (i.e. 10%) of the mackerel catches consisted of individuals with a length of 35 cm.*

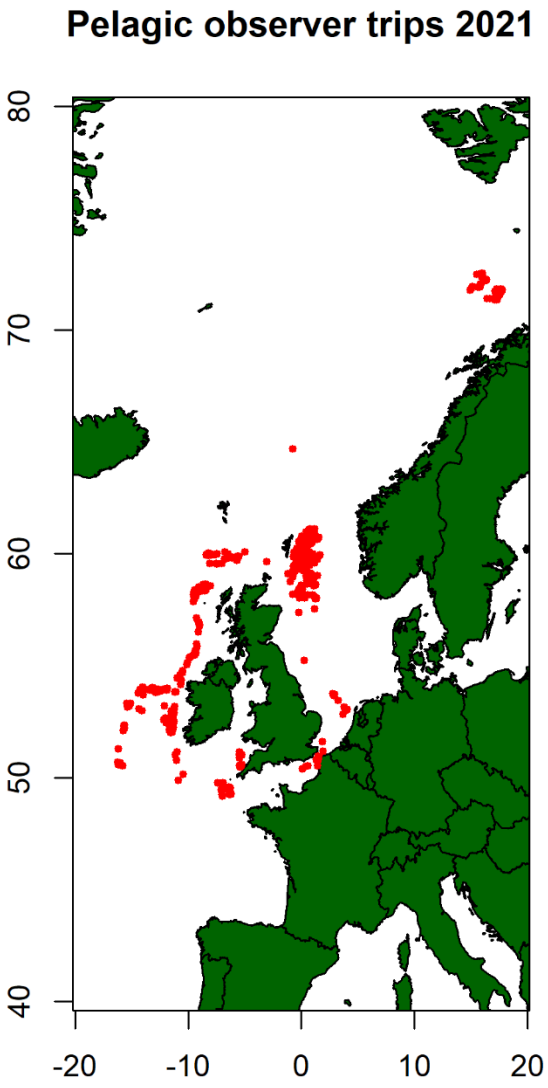


Figure 4a. *Positions of sampled pelagic hauls within the* ***Dutch*** *and* ***German*** *observer programme per haul in* ***2021***

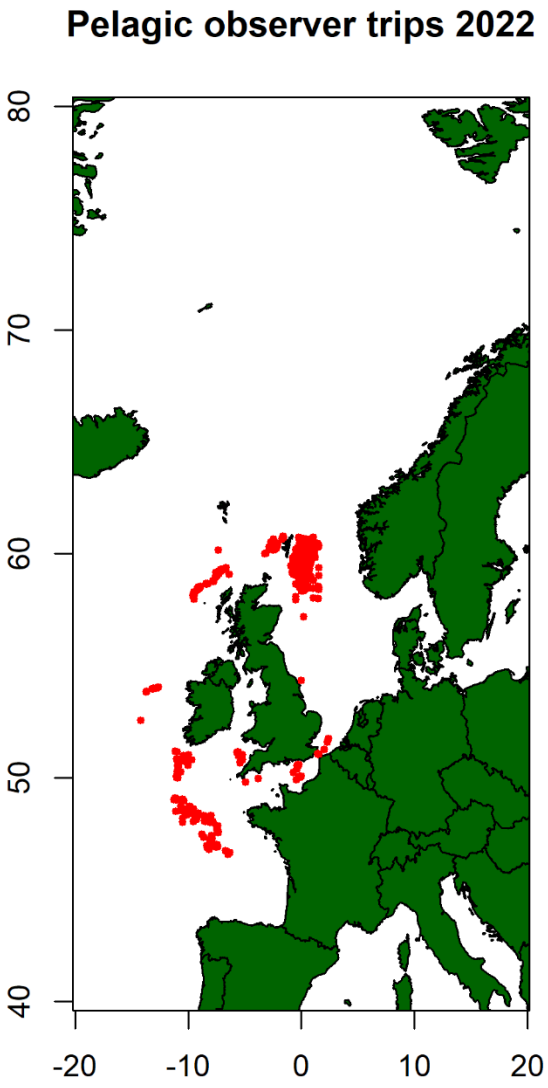


Figure 4b. *Positions of sampled pelagic hauls within the* ***Dutch*** *and* ***German*** *observer programme per haul in* ***2022***.