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Catch sampling of the pelagic freezer trawler fishery operating in European waters in 2019-2020
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 220,000 tonnes in 2019 and 200,000 tonnes in 2020 (in European waters). The total landings of these target species by the German fleet were about 120,000 tonnes in 2019 and 117,000 tonnes in 2020 (in European waters). In total, 38 species were reported by the Dutch and German fleet in the period 2019-2020. 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 on board sampling programmes has started a few years ago and is still continuing. This report presents a summary of the data collected in the two monitoring programmes in European waters during the period 2019 and 2020. Within the Dutch programme, 12 and 10 trips were observed by scientific observers in 2019 and 2020, respectively. Within the German programme, Within the German sampling programme, 4 and 2 trips were observed by scientific observers in 2019 and 2020, respectively. The two programmes together correspond with a sampling coverage of around 16% in 2019 and 13% in 2020 of the total Dutch and German flagged pelagic freezer trawler fleet effort (expressed in number of trips) in European waters. The planned number of observer trips in 2020 and consequently the sampling coverage 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 self-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, 77 species were observed during the sampled trips.

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 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 merge together 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 2019 en 2020 werd van deze soorten uit Europese wateren respectievelijk 220,000 ton en 200,000 ton aangeland door de Nederlandse vloot. Door de Duitse vloot werd in 2019 en 2020 respectievelijk 120,000 ton en 117,000 ton aangeland. Er zijn 38 verschillende soorten door de Nederlandse en Duitse vloot aangevoerd in 2019-2020. 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 2019-2020. Binnen het Nederlandse bemonsteringsprogramma zijn respectievelijk 12 en 10 waarnemersreizen in 2019 en 2020 uitgevoerd. Binnen het Duitse bemonsteringsprogramma zijn respectievelijk 4 en 2 waarnemersreizen in 2019 en 2020 uitgevoerd. De programma's dekken samen ongeveer 16% in 2019 en 13% in 2020 van de totale Nederlandse en Duits gevlagde pelagische vriestrawler vloot (uitgedrukt in aantal reizen) die actief was in Europese wateren. Het geplande aantal waarnemersreizen is door de uitbraak van corona in Europa januari 2020 voor beide programma's in 2020 niet gehaald. 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 77 soorten 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 (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 hat als Zielarten kleinere pelagische Fischarten wie Hering (*Clupea harengus*), Makrele (*Scomber scombrus*), Blauer Wittling (*Micromesistius poutassou*), Stöcker oder Bastardmakrele (*Trachurus trachurus*), Goldlachs (*Argentina silus*) und Sardine (*Sardina pilchardus*). Die jährlichen Anlandungen folgen dabei saisonalen Mustern, da die unterschiedlichen Arten zu unterschiedlichen Zeiten im Jahresverlauf gefangen werden. Die Gesamtanlandungen der niederländischen Flotte betrugen 2019 dabei etwa 220000 Tonnen und 2020 etwa 200000 Tonnen für die oben aufgezählten Arten in europäischen Gewässern. Die Gesamtanlandungen der deutschen Flotte in europäischen Gewässern betrugen 2019 etwa 120000 Tonnen und 2020 etwa 117000 Tonnen. Dabei wurden insgesamt 38 unterschiedliche Arten von der deutschen und holländischen Flotte während 2019 bis 2020 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 (EC) 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 2019 und 2020. Dabei wurden 12 Reisen in 2019 und 10 Reisen in 2020 der holländischen Flotte und 4 Reisen in 2019 und 2 Reisen in 2020 der deutschen Flotte durch wissenschaftliche Beobachter begleitet. Dies entspricht einer Abdeckung der Reisen von etwa 16% für die niederländische und von etwa 13% für die deutsche Fischerei. Die Beobachterprogramme beider Länder waren 2020 von der seit Ende Januar einsetzenden COVID Pandemie betroffen. Um ein ausreichendes Monitoring der kommerziell wichtigen pelagischen Schwarmfischarten zu gewährleisten, wurde in Deutschland die Anzahl der Selbstbeprobungen durch die Fischerei erhöht.

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 in 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 77 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 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, 2016; Verver 2017). 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) (EC 1543/2000 and EC 199/2008, EU 2016/1701, EU 2016/1251, EU 2017/1004, EU 2019/909, EU 2019/910). 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 2019 and 2020. 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 2019 and 2020 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 2019 and 2020 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 of 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 on board 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 hours 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 on board 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, 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 on board. However, fish that is still discarded (possibly due to an assigned exemption), 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, 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 on board is conducted by one observer. The observer is advised to take samples from all hauls. If this is not possible due to working hours 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, weight of each species in the sample is recorded ($Lw_{h,s}$) and all fish are measured.
- BMS Landings (*LbmsW*)
  The sample is weighed, 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, 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 by 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 ($TCN_{l,h,s}$) is 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 ($LN_{l,h,s}$) is 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$_{l,h,s}$*) is 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$_{l,t,s}$*) is 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$_{l,t,s}$*) is 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 hours 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 freezer trawler fleet in European waters differ by season and area. The main target species are greater argentine, herring, horse mackerel, mackerel, pilchard and blue whiting. The total landings of these target species by the Dutch fleet were about 220,000 tonnes in 2019 and 200,000 tonnes in 2020 (in European waters). The total landings of these target species by the German fleet were about 120,000 tonnes in 2019 and 117,000 tonnes in 2020 (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). The herring fishery is concentrated in the North Sea herring during summer, in autumn targeting Atlantoscandian herring in ICES division 2.a and 2.b and in December in the English Channel (ICES area 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 areas 6.a and 7.c. Mackerel and horse mackerel are mainly caught in the autumn and winter, the majority of the mackerel catch originated from the North Sea and Celtic Sea and horse mackerel from the Celtic Sea. Greater argentine is targeted in April-June.

In total, 38 species were reported by the Dutch and German fleet in the period 2019-2020; 30 and 34 species by the Dutch fleet in 2019 and 2020, respectively, and 18 and 21 species by the German fleet in 2019 and 2020, 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. A few vessels target sprat for a limited time in the months January and November and deepwater redfish in July-October. 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 2019, from which 9 trips were on board Dutch-flagged vessels and 3 trips on board UK flagged vessels. In 2020, 10 trips were observed by scientific observers, all on board Dutch-flagged vessels (Table 3).

Within the German sampling programme, 4 and 2 trips were observed by scientific observers in 2019 and 2020, respectively. Additional samples of the target species were obtained by the ship´s crew during some fishing trips (self-sampling) who were asked beforehand to take a random sample. Altogether, 6 self-sampling trips (1 trip in 2019 and 5 trips in 2020) were carried out in this way. All trips were on board 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 and Norwegian Sea (Figures 4a,b and Table 4; ICES divisions 2a, 4abc, 5b, 6ab, 7bcdefgj).

3.2.3 Sampled hauls

Within the Dutch sampling programme, a total of 448 hauls in 2019 and 404 hauls in 2020 were sampled, which was a sampling coverage of 98% and 94% in 2019 and 2020, respectively (Table 3).

Within the German sampling programme, a total of 181 hauls in 2019 and 55 hauls in 2020 were sampled by observers, which was 75% and 92%, 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, 77 species were observed during the sampled trips in the period 2019-2020; 56 and 52 species in the Dutch sampling programme in 2019 and 2020, respectively, and 28 and 8 species in the German sampling programme in 2019 and 2020, respectively. The lower number of observed species in the German sampling programme in 2020 compared to 2019 is likely to be caused by the difference in the number of executed observer trips in 2019 (*i.e.* 4 observer trips) and 2020 (*i.e.* 2 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 and mackerel (trips P182-P183, G56, P194-P195, G61). In March, the target species in the sampled trips shifted towards mackerel and blue whiting (trips P184-P185, P196-P197). In April-June, the trips targeted blue whiting, greater argentine and horse mackerel (trips P186-P188, P198). Thereafter, during the summer months (June – August), the sampled trips mainly targeted herring (trips P189-P190, G58, P199-P201, G63) with occasional, commercially interesting, bycatches of mackerel. In September-November, several species were targeted, namely herring, mackerel, horse mackerel and blue whiting (trips P191-P192, P202, G59). In December, the fishery targeted herring in the Eastern Channel (trips G60, P203) and blue whiting in the Celtic Sea (P193).

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 2019 show a second peak for larger, older, herring. This second peak represents Atlantoscandian herring (=Norwegian spring-spawning herring) caught in ICES subarea 2 which are larger than the North Sea herring despite being the same species. The two peaks in the length frequency distribution of horse mackerel in 2019 (Figure 3c) represent two year classes which were caught on the same German trip in ICES division 6.a.

4 Discussion

4.1 Deviations in the two sampling programmes

The two sampling programmes together correspond with a sampling coverage of around 16% and 13% of the total Dutch- and German-flagged pelagic freezer trawler fleet effort (expressed in number of trips) in European waters in 2019-2020, respectively (Table 7). Sampling was conducted throughout the year with an observer trip carried out each month, except in May and June 2020. Overall, all fishing grounds were covered by the sampled trips (Figures 2,4).

The planned number of observer trips in 2020 and consequently the sampling coverage was affected by the COVID-19 pandemic, which arrived in Europe at the end of January 2020. While the fisheries continued throughout the pandemic, additional COVID-19 protocols that were put into place by both the fishing industry and the research institutes responsible for the observer programmes (i.e. Thünen Institute and WMR) resulted in a number of observer trips being postponed and/or cancelled. In the end, 5 observer trips were cancelled in 2020, 2 trips in the Dutch observer programme and 3 trips in the German observer programme. In order to ensure sufficient monitoring of the pelagic target species, the German DCF industry self-sampling programme was intensified. As the Dutch DCF industry self-sampling programme already sufficiently monitored the pelagic target species, no intensification was needed. For the monitoring of incidental bycatches, no alternative sampling could be conducted.

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 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).

In order to gain some insight on 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 on 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).

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, 2021). 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 vessels (*i.e.* a reference fleet). It is expected that in the near future, a pilot study on a regional sampling scheme for the European pelagic freezer trawler fleet will be proposed by the RCG subgroup.

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Quality assurance

CVO is certified to ISO 9001:2015 (certificate number: 268632-2018-AQ-NLD-RvA). This certificate is valid until December 15th, 2024. The certification was issued by DNV Business Assurance B.V

Appendix: Tables and Figures

Table 1a. *Landings (tonnes) per year, species and ICES area by the* ***Dutch*** *freezer trawler fleet in* ***2019****. Data are extracted from VISSTAT database, landings in non-ICES areas are not included. For areas, 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	5.b	6.a	6.b	7.b	7.c	7.d	7.e	7.f	7.g	7.h	7.j	7.k	8.b	Total*
ANE										<1	1	<1	2					3
ARU		191		3991				<1	4						1			4187
ARY		214		493														707
BOC				76				123	<1		1	6	1	<1	111		<1	318
BRB										14								14
COD		<0.1	<0.1															<0.1
GDG				13											1		2	16
GUG		1		1				<1				<1						2
GUR		2	<0.1	4				1		<0.1		<1	1					7
GUU				2				<1			<0.1							2
HAD		9	2	56				4				3	2		12			86
HER	5111	43906	20973	710				<1		14590	<1	4	38					85333
HKE		2		142				13			2	2	2	<1	183		1	348
HOM		73	<1	14594				3027	<0.1	1806	665	1475	2172	323	7274		<1	31409
JOD				<1						<0.1	<1				<0.1			<1
LUM		1																1
MAC	13	8140	116	9168				3244	4	65		45	86	<1	467		324	21670
MCD				22														22
MUR										<0.1								<0.1
NOP		15	1	<1														16
PIL				1						59	2	5	2					67
PLE										<0.1								<0.1
POK	<1	77		3														80
REB	247																	247
REG	1																	1
SFV	1																	1
SPR				1														1
SQR		2	<1	4						<1							<1	6
WHB	604	1073		53017			369	699	15444			<0.1		17	330	3076	392	75021
WHG		85	6	24				<1		<1	<1	8	5		<0.1			128

Table 1b. *Landings (tonnes) per year, species and ICES area by the* ***Dutch*** *freezer trawler fleet in* ***2020****. Data are extracted from VISSTAT database, landings in non-ICES areas are not included. For areas, 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	5.b	6.a	6.b	7.b	7.c	7.d	7.e	7.f	7.g	7.h	7.j	7.k	8.b	Total*
ANE						<1					<1	60	6	<1				67
ARU		181				2841		<1	58						<0.1			3080
ARY		41				1489			5									1534
BFT						<0.1												<0.1
BOC						111		210				<1	<1	14	64		17	416
BRB						<0.1				117	1							118
BRF						<1												<1
BSS						<0.1												<0.1
COD		<0.1				<0.1												<0.1
DGS						<0.1												<0.1
GFB		<0.1				1												1
GUG		<1				1		<1			<1	4						5
GUR		1	<1			1		1					1		<1			4
GUU				<0.1		<1							<1					1
HAD		14	44			24		5			<0.1	<0.1	16		5			108
HER	5060	50363	8814	1463		86		<0.1		14396			<1					80182
HKE		3				75		5	<1		<0.1	1	1	<1	40			124
HOM		1		6		5282		3616		4374	26	413	2003	1	2867		<1	18589
JOD								<0.1				<1	<0.1					<1
LUM		<1																<1
MAC	29	17486	100	4	<1	6799	8	1875	1	181	1	13	14	<0.1	2593			29105
MCD		1				27												28
NOP		86	<1										<0.1					87
PIL		<0.1	32	6						78	11	85						211
PLE				<0.1														<0.1
POK	10	39				<1												49
REB	1483																	1483
REG	<1																	<1
SPR			509	1568														2077
SQI						<1												<1

Table 1b. *Continued*.

	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	7.k	8.b	Total*
SQR		<1				16		<0.1	<1	<1								16
TOZ				<0.1														<0.1
WHB	109	1592			618	31957	1559	143	17760		<0.1		<1		127	8444	1	62309
WHG	<0.1	56	3	1		13		1		<1	1	1	57		<1			132

Table 1c. *Landings (tonnes) per year, species and ICES area by the* ***German*** *freezer trawler fleet in* ***2019****. Data are extracted from FiStat database, landings in non-ICES areas are not included. For areas, 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	Total*
ANE											<1							<1
ARU		146			2	989												1137
ARY						714												714
BOC						22		9			<1				11			42
BRB										2	<1							3
GUG		<1				<1												1
HAD						<1		<1							<1			1
HER	4188	18287	6113			2				9280								37871
HKE		2			<1	10		8			<1			<1	22			44
HOM		2				1419		1486	120	942	2143			308	1847	144		8411
MAC	188	7596	2		2	7611		881		21					99	143	181	16724
NOP		<1																<1
PIL		<1				<1				18	10							28
POK		4				<1												5
REB	450																	450
SPR			6								31							38
SQI																2		2
SQR						5												5
SQU						1												1
WHB	576	1173			195	25671	177	408	9220						89	733		38242
WHG		2									<1							2

** 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 area by the* ***German*** *freezer trawler fleet in* ***2020****. Data are extracted from FiStat database, landings in non-ICES areas are not included. For areas, 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*
ARU		146				402			47						<1			596
ARY		54				1366			5									1425
BOC						1		26							21			48
BRB										29								29
GUG		1																1
HER	2969	15194	1098							8546								27807
HKE		<1				11		<1							3			15
HOM		<1				<1		764		2					188	2		957
MAC	<1	15456	42			4541		1721	84						1602	603	324	24579
NOP		4																4
POK		2																2
REB	1176																	1176
SPR			66	145														212
SQR						2												2
SQU						6												6
WHB	5084	1731				19913		2	15162						16	20	434	42362
WHG		5																5

** 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. * English name is unknown.*

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
BSS	*Dicentrarchus labrax*	Sea bass
COD	*Gadus morhua*	Cod
DGS	*Squalus acanthias*	Spurdog
GDG	*Gadiculus argenteus*	*
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
LUM	*Cyclopterus lumpus*	Lumpfish
MAC	*Scomber scombrus*	Mackerel
MCD	*Lampanyctus macdonaldi*	*
MUR	*Mullus surmuletus*	Red mullet
NOP	*Trisopterus esmarkii*	Norway pout
PIL	*Sardina pilchardus*	Pilchard
PLE	*Pleuronectes platessa*	Plaice
POK	*Pollachius virens*	Saithe
REB	*Sebastes mentella*	Deepwater redfish
REG	*Sebastes marinus*	Golden redfish
SFV	*Sebastes viviparus*	Norway redfish
SPR	*Sprattus sprattus*	Sprat
SQI	*Illex illecebrosus*	*
SQR	*Loligo vulgaris*	European squid
SQU	*Loliginidae*	Various squids nei
TOZ	*Trachinus vipera*	Lesser weever
WHB	*Micromesistius poutassou*	Blue whiting
WHG	*Merlangius merlangus*	Whiting

Table 3. *Overview of sampled trips in* ***2019*** *and* ***2020*** *in the* ***Dutch*** *and* ***German*** *observer programme.*

Year	Trip	Sampling programme	Flag vessel	Nr of hauls	Nr of hauls sampled **	% of hauls sampled
2019	P182	NLD	NLD	22	20	91%
	P183	NLD	NLD	57	57	100%
	P184	NLD	GBR	23	23	100%
	P185	NLD	GBR	45	43	96%
	P186	NLD	NLD	27	27	100%
	P187	NLD	NLD	40	38	95%
	P188	NLD	NLD	45	45	100%
	P189	NLD	NLD	40	37	93%
	P190	NLD	NLD	41	41	100%
	P191	NLD	NLD	57	56	98%
	P192	NLD	GBR	33	32	97%
	P193	NLD	NLD	29	29	100%
	G56	DEU	DEU	55	36	65%
	G57*	DEU	DEU	64	4	6%
	G58	DEU	DEU	47	40	85%
	G59	DEU	DEU	64	61	95%
	G60	DEU	DEU	74	44	60%
2020	P194	NLD	NLD	38	37	97%
	P195	NLD	NLD	55	40	73%
	P196	NLD	NLD	48	45	94%
	P197	NLD	NLD	44	44	100%
	P198	NLD	NLD	38	38	100%
	P199	NLD	NLD	26	25	96%
	P200	NLD	NLD	38	37	97%
	P201	NLD	NLD	39	39	100%
	P202	NLD	NLD	60	54	90%
	P203	NLD	NLD	45	45	100%
	G61	DEU	DEU	15	13	87%
	G62*	DEU	DEU	21	3	14%
	G63	DEU	DEU	45	42	93%
	G64*	DEU	DEU	51	9	18%
	G65*	DEU	DEU	20	4	20%
	G66*	DEU	DEU	27	5	19%
	G67*	DEU	DEU	56	5	9%

** Self-sampling by industry*

*** Including hauls with zero catch*

Table 4. *Period, target species and ICES areas of the trips conducted during the* ***Dutch*** *and* ***German*** *observer programme in* ***2019*** *and* ***2020****. * Self-sampling by industry*

Year	Trip	Period**	Target species***	ICES areas
2019	P182	Jan	Mackerel	4.a
	P183	Jan, Feb	Herring, horse mackerel	6.a, 7.b, 7.d, 7.e
	P184	Feb, Mar	Mackerel, horse mackerel	6.a
	P185	Mar	Mackerel	6.a, 7.b, 7.j
	P186	Apr	Blue whiting, greater argentine, mackerel	6.a
	P187	May	Blue whiting, horse mackerel	4.a, 6.a, 7.b, 7.f, 7.j
	P188	Jun, Jul	Horse mackerel	7.b, 7.j
	P189	Jul	Herring	4.a
	P190	Aug	Herring	4.a, 4.b
	P191	Sep, Oct	Herring, mackerel	4.a, 4.b
	P192	Nov	Mackerel, horse mackerel, blue whiting	4.a, 5.b, 6.a
	P193	Dec	Blue whiting	4.a, 5.b, 6.a
	G56	Jan	Mackerel	4.a, 6.a
	G57*	Apr, May	Blue Whiting	4.a, 6.a
	G58	Jun, Jul	Herring	4.a
	G59	Oct, Nov	Herring	2.a, 5.b, 6.a
	G60	Dec	Herring	7.d
2020	P194	Jan	Sprat, horse mackerel, mackerel	4.c, 6.a, 7.b, 7.d, 7.g, 7.j
	P195	Jan, Feb	Mackerel, horse mackerel	4.a, 6.a, 7.b, 7.j
	P196	Feb, Mar	Horse mackerel, mackerel, blue whiting	6.a, 7.b, 7.c, 7.j
	P197	Mar	Horse mackerel, mackerel, blue whiting, greater argentine	6.a, 6.b, 7.b, 7.c, 7.j
	P198	Apr	Horse mackerel, mackerel, greater argentine	6.a
	P199	Jul	Herring	4.a
	P200	Aug	Herring, redfish	4.a, 2.a
	P201	Aug	Herring	4.a
	P202	Sep	Herring, mackerel, blue whiting	4.a, 4.b, 6.a, 2.a
	P203	Nov	Herring, sprat	4.b, 4.c, 7.d
	G61	Jan	Mackerel	4.a
	G62*	Mar, Apr	Mackerel, blue Whiting	8.b, 8.d
	G63	Jun, Jul	Herring	4.a
	G64*	Aug, Sep	Blue Whiting, herring	2.a
	G65*	Oct	Mackerel	4.a
	G66*	Nov	Herring	2.a
	G67*	Dec	Herring	7.d

** Self-sampling by industry*

*** 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.*

Table 5a. *Total catch (tonnes) per sampled pelagic trip within the* ***Dutch*** *observer programme in* ***2019*** *and* ***2020****. * 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
2019	P182	Jan	Catch			0.2		1625.6		0.5	1626.3	22
	P183	Jan, Feb	Catch		0.2	324.1	2410.3	318.2	0.5	73.3	3126.6	
	P184	Feb, Mar	Catch				20.6	2919.4		<0.1	2940.0	
	P185	Mar	Catch	8.7			449.0	2598.2	<0.1	4.4	3060.3	10
	P186	Apr	Catch	3417.6	181.3			127.5		0.6	3727.0	
	P187	May	Catch	2987.5	129.1	3.1	126.7	144.2		16.7	3407.2	155
	P188	Jun, Jul	Catch	74.4			2873.4	116.0		61.2	3125.0	
	P189	Jul	Catch			4084.0	<0.1	26.0		9.2	4119.2	18
	P190	Aug	Catch			3745.8	0.4	142.2		13.9	3902.2	
	P191	Sep, Oct	Catch			3028.1	0.7	882.8		44.5	3956.1	140
	P192	Nov	Catch	845.3	0.3	42.0	223.5	849.6		4.7	1965.3	1
	P193	Dec	Catch	3435.8	1.5			0.8		28.5	3466.5	
2020	P194	Jan	Catch	0.5		18.1	1839.6	929.2	0.2	219.6	3007.2	10
	P195	Jan, Feb	Catch	0.2	0.1		1451.3	2328.5		26.5	3806.6	61
	P196	Feb, Mar	Catch	1540.8	1.6		1196.0	1007.6		51.4	3797.4	59
	P197	Mar	Catch	5376.6	16.5		262.7	425.0		1.3	6082.3	
	P198	Apr	Catch	6116.3	17.2		1.1	77.7		14.1	6226.3	
	P199	Jul	Catch	1.5		1757.5	0.5	29.1		3.9	1792.5	5
	P200	Aug	Catch	<0.1	<0.1	1598.4	0.9	76.6		103.9	1779.7	25
	P201	Aug	Catch	<0.1		4015.7		111.4		4.4	4131.5	
	P202	Sep	Catch	45.8		1950.3	0.7	1812.3	<0.1	1.6	3810.9	180
	P203	Nov	Catch			3186.1	0.3	11.8	0.1	624.0	3822.3	

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* ***2019*** *and* ***2020.*** *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
2019	G56	Jan	Com. Landings	7.2	<0.1	<0.1	389.4	5026,1	0.1	0.4	5423.5	
			Non Com. Landings	0	0	0	0	45.8	0	<0.1	45.9	
	G58	Jun, Jul	Com. Landings	0	0	4956.1	0.1	24.5	0	0	4980.8	
			Non Com. Landings	0	0	0	0	0	0	0.3	0.3	
	G59	Oct, Nov	Com. Landings	1853.7	3.2	4212.3	0	2.0	0	<0.1	6071.9	
			Non Com. Landings	11.6	0	37.3	0	0	0	0	48.9	
	G60	Dec	Com. Landings	0	0	2632.4	0.4	4.4	0	1	2638.2	
			Non Com. Landings	0	0	27.0	0	0	0	0.3	27.3	
2020	G61	Jan	Com. Landings	0	0	0	0	1289.5	0	0	1289.5	
			Non Com. Landings	0	0	0	0	46.6	0	0	46.6	
	G63	Jun, Jul	Com. Landings	0	0	4642.7	0	75.3	0	0	4718.0	
			Non Com. Landings	0	0	117.6	<0.1	15.3	0	28.8	161.8	

Table 6a. *Total amount of catch (tonnes) or total number of individuals observed during all sampled pelagic trips within the* ***Dutch*** *observer programme in* ***2019*** *and* ***2020****. 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	2019 Total weight (tonnes) / total individuals	2020 Total weight (tonnes) / total individuals
Blue whiting	*Micromesistius poutassou*	10769.2	13081.1
Greater argentine	*Argentina silus*	312.3	35.4
Herring	*Clupea harengus*	11227.3	12526.1
Horse mackerel	*Trachurus trachurus*	6104.6	4753.0
Mackerel	*Scomber scombrus*	9750.7	6809.3
Pilchard	*Sardina pilchardus*	0.5	0.3
Alfonsino	*Beryx decadactylus*	<0.1	
Anchovy	*Engraulis encrasicolus*		<0.1
Anglerfish	*Lophius piscatorius*	<0.1	<0.1
Argentines	*Argentina* sp.	1.1	0.1
Black seabream	*Spondyliosoma cantharus*		6.4
Blackbelly rosefish	*Helicolenus dactylopterus*	0.1	
Bluntsnout smoothhead	*Xenodermichthys copei*	<0.1	
Boarfish	*Capros aper*	94.5	105.5
Boreoatlantic gonate squid	*Gonatus fabricii*		<0.1
Broadtail shortfin squid	*Illex coindetii*	1.5	
Chub mackerel	*Scomber japonicus*		<0.1
Cod	*Gadus morhua*	<0.1	<0.1
Common squids	*Loligo* sp.		1.5
Dab	*Limanda limanda*		<0.1
Deepwater redfish	*Sebastes mentella*	<0.1	90.3
European flying squid	*Todarodes sagittatus*	1.3	
European squid	*Loligo vulgaris*	<0.1	
Golden redfish	*Sebastes norvegicus*		<0.1
Greater forkbeard	*Phycis blennoides*	<0.1	

Table 6a. *Continued.*

Species	Scientific name	2019 Total weight (tonnes) / total individuals	2020 Total weight (tonnes) / total individuals
Greater weever	*Trachinus draco*		<0.1
Greenland argentine	*Nansenia groenlandica*	0.1	0.1
Grey gurnard	*Eutrigla gurnardus*	2.0	0.3
Hachetfish	*Argyropelecus olfersi*	<0.1	0.1
Haddock	*Melanogrammus aeglefinus*	34.2	21.4
Hake	*Merluccius merluccius*	37.7	15.8
Jelly wolf-fish	*Anarhichas denticulatus*		<0.1
John Dory	*Zeus faber*	0.1	<0.1
Ling	*Molva molva*		<0.1
Longtooth anglemouth	*Gonostoma elongatum*	<0.1	
Lumpsucker	*Cyclopterus lumpus*	3.1	<0.1
Northern shortfin squid	*Illex illecebrosus*	<0.1	
Norway pout	*Trisopterus esmarkii*	2.1	9.1
Plaice	*Pleuronectes platessa*		<0.1
Red gurnard	*Chelidonichthys cuculus*	<0.1	
Saithe	*Pollachius virens*	14.8	0.9
Sea bass	*Dicentrarchus labrax*	0.1	0.6
Silver pomfret	*Pterycombus barma*	<0.1	
Silvery pout	*Gadiculus argenteus*	<0.1	
Smoothhound	*Mustelus mustelus*		<0.1
Sprat	*Sprattus sprattus*		777.1
Starry smoothhound	*Mustelus asterias*		<0.1
Thicklipped grey mullet	*Chelon labrosus*		<0.1
Thornback ray	*Raja clavata*		<0.1
Tub gurnard	*Chelidonichthys lucerna*	<0.1	<0.1
Veined squid	*Loligo forbesii*	<0.1	
Velvet belly	*Etmopterus spinax*	<0.1	
Whiting	*Merlangius merlangus*	34.9	20.9

Table 6a. *Continued.*

Species	Scientific name	2019 Total weight (tonnes) / total individuals	2020 Total weight (tonnes) / total individuals
-	*Arctozenus risso*	0.4	<0.1
-	*Benthosema glaciale*	<0.1	
-	*Centroscymnus crepidater*	<0.1	
-	*Epigonus telescopus*	<0.1	
-	*Gadiculus*	<0.1	0.1
-	*Lampanyctus macdonaldi*	26.6	0.1
-	*Notoscopelus kroeyeri*	0.2	
-	*Scyphozoa*	<0.1	
-	*Searsia koefoedi*		<0.1
-	*Stomias boa*	<0.1	
-	*Theutida*	<0.1	
Birdbeak dogfish	*Deania calcea*		4 individuals
Blue shark	*Prionace glauca*	1 individual	
Bluefin tuna	*Thunnus thynnus*	7 individuals	9 individuals
Congers nei	*Congridae*		2 individuals
Eel	*Anguilla anguilla*	3 individuals	3 individuals
Greenland shark	*Somniosus microcephalus*	2 individuals	
Grey seal	*Halichoerus grypus*	9 individuals	20 individuals
Long-finned pilot whale	*Globicepahala melas*		3 individuals
Ling	*Molva molva*	1 individual	
Porbeagle	*Lamna nasus*	11 individuals	2 individuals
Six-gilled shark	*Hexanchus griseus*	1 individual	
Spurdog	*Squalus acanthias*	125 individuals	58 individuals
Tope	*Galeorhinus galeus*		7 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* ***2019*** *and* ***2020****. 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	2019 Total weight (tonnes) / total individuals	2020 Total weight (tonnes) / total individuals
Blue whiting	*Micromesistius poutassou*	1872.4	
Greater argentine	*Argentina silus*	3.2	
Herring	*Clupea harengus*	11865.3	4760.3
Horse mackerel	*Trachurus trachurus*	390.0	<0.1
Mackerel	*Scomber scombrus*	5102.9	1226.8
Pilchard	*Sardina pilchardus*	0.1	
Black seabream	*Spondyliosoma cantharus*	1	
Blackbelly rosefish	*Helicolenus dactylopterus*	<0.1	
Boarfish	*Capros aper*	<0.1	
Cod	*Gadus morhua*	<0.1	
European squid	*Loligo vulgaris*	<0.1	
Garfish	*Belone belone*	<0.1	
Grey gurnard	*Eutrigla gurnardus*	0.2	0.7
Haddock	*Melanogrammus aeglefinus*	<0.1	0.6
Hake	*Merluccius merluccius*	0.15	
John Dory	*Zeus faber*	<0.1	
Lesser flying squid	*Todaropsis eblanae*	0.15	
Lumpsucker	*Cyclopterus lumpus*	<0.1	<0.1
Plaice	*Pleuronectes platessa*	<0.1	
Red mullet	*Mullus surmuletus*	<0.1	
Saithe	*Pollachius virens*	<0.1	
Sea bass	*Dicentrarchus labrax*	0.2	
Sepia	*Sepia officinalis*	<0.1	
Sprat	*Sprattus sprattus*	<0.1	
Squids	*Loligo* sp.	0.1	
Tub gurnard	*Chelidonichthys lucerna*	<0.1	
Whiting	*Merlangius merlangus*	<0.1	27.5
Spurdog	*Squalus acanthias*	173 individuals	2 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 2019 and 2020.*

Year	Country	Quarter	Nr trips pelagic fleet	Nr trips sampled
2019	NLD	1	14	3
		2	17	4
		3	19	2
		4	13	3
	DEU	1	10	1
		2	7	1*
		3	9	1
		4	10	2
2020	NLD	1	12	3
		2	16	2
		3	14	4
		4	17	1
	DEU	1	9	1
		2	10	1**
		3	10	1**
		4	8	***

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

*** In addition, one self-sampling trip was carried out which concerned quarters 2 and 3, as it was conducted in both quarters; half of the trip in quarter 2 and half of the trip in quarter 3.*

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

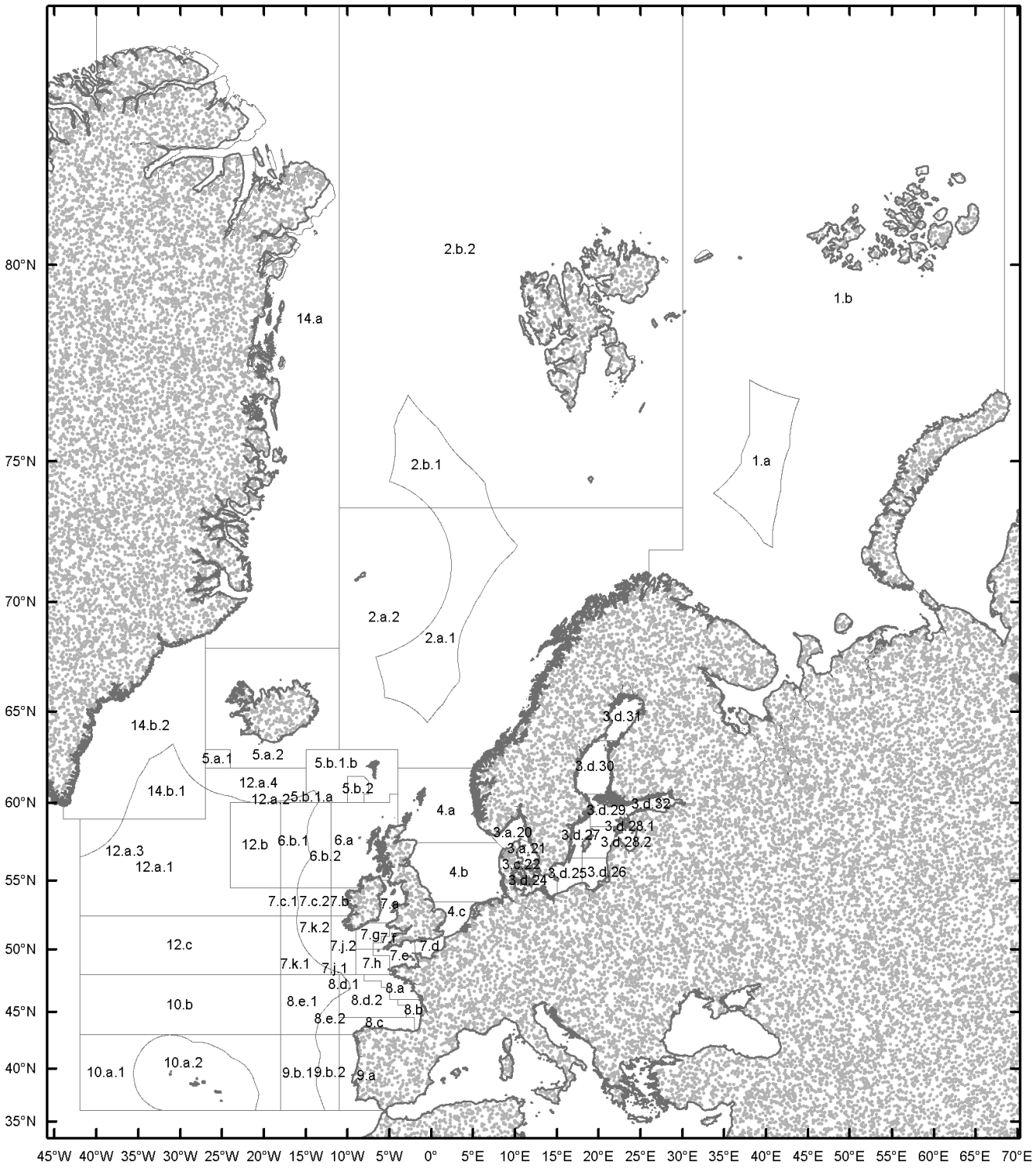


Figure 1. *Map of ICES divisions (www.ices.dk)*

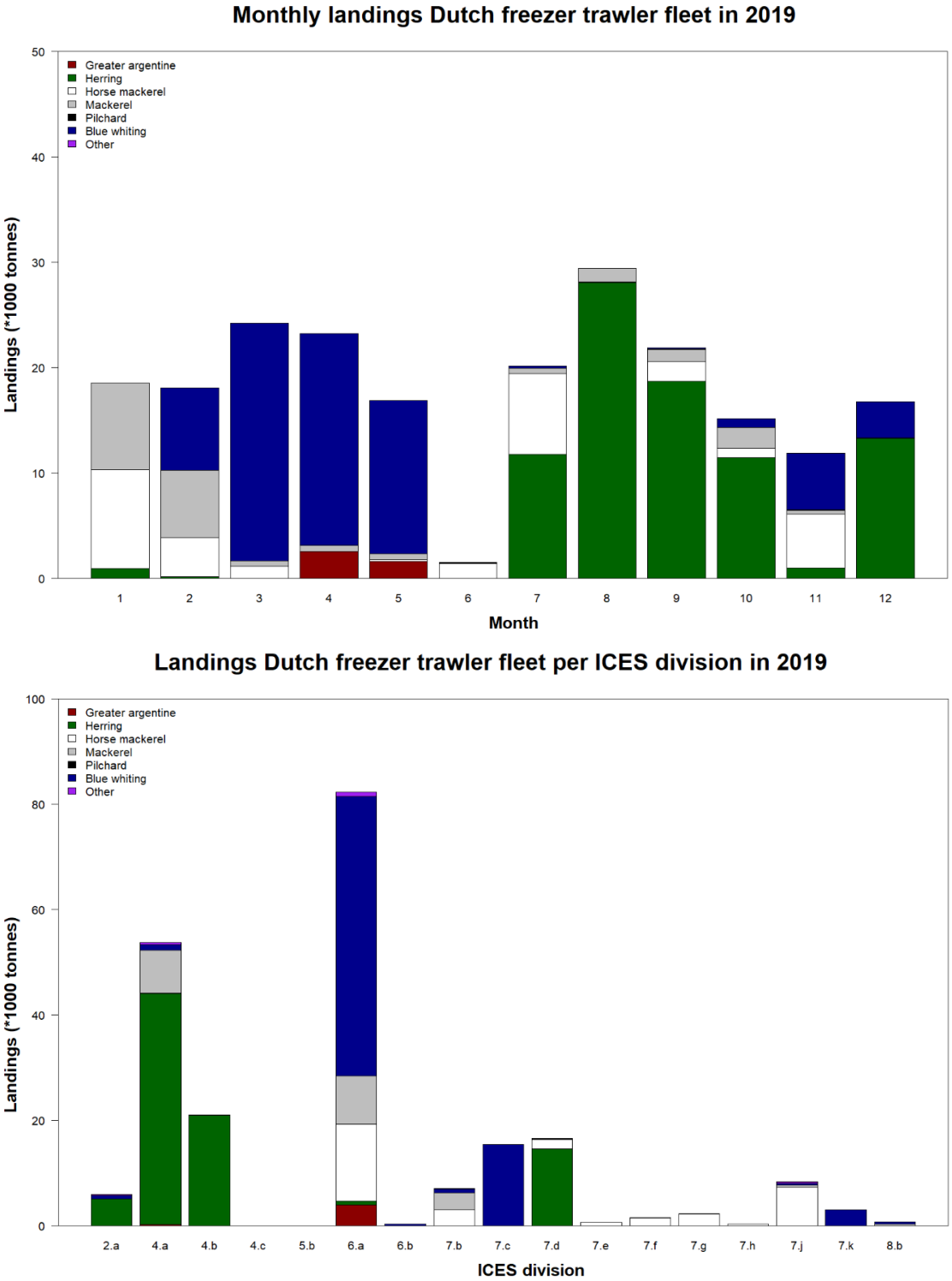


Figure 2a. *Landings (*1000 tonnes) from the* ***Dutch*** *freezer trawler fleet in* ***2019****. Upper panel shows monthly landings by species, lower panel shows landings per ICES division (Figure 1) by species. Data extracted from VISSTAT database. Note that these two panels have a different scale in comparison with the panels in Figures 2cd.*

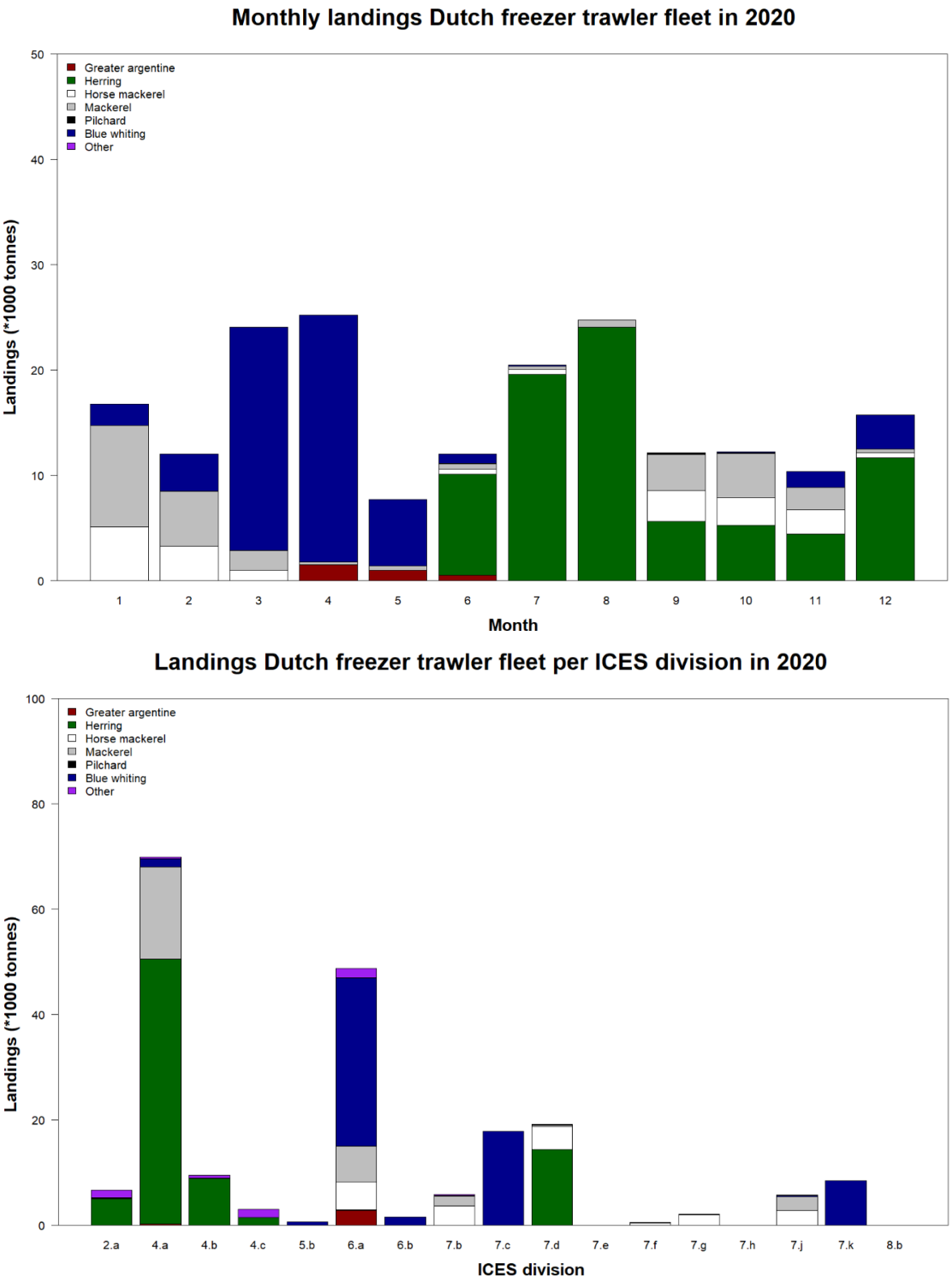


Figure 2b. *Landings (*1000 tonnes) from the* ***Dutch*** *freezer trawler fleet in* ***2020****. Upper panel shows monthly landings by species, lower panel shows landings per ICES division (Figure 1) by species. Data extracted from VISSTAT database. Note that these two panels have a different scale in comparison with the panels in Figures 2cd.*

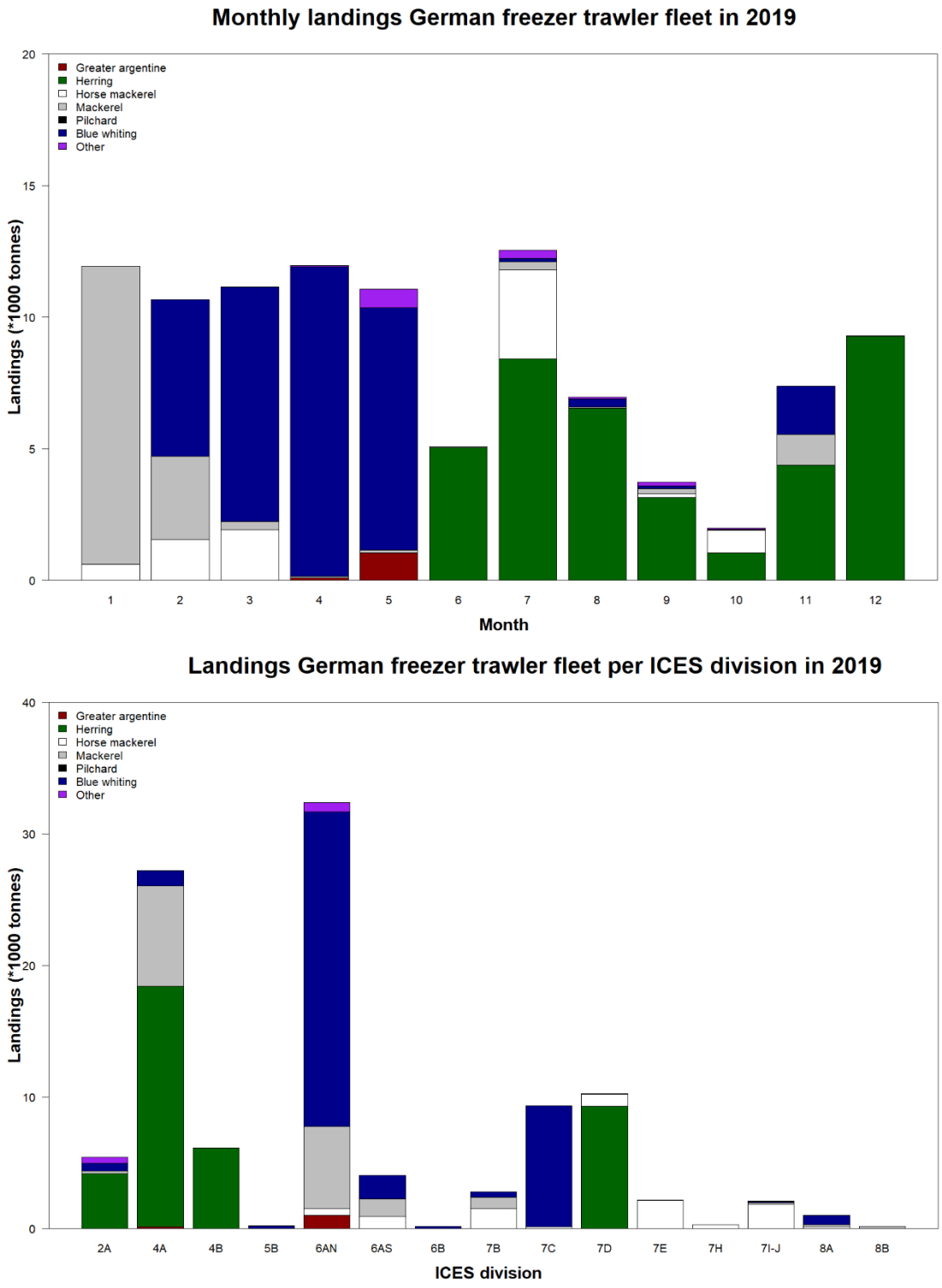


Figure 2c. *Landings (*1000 tonnes) from the* ***German*** *freezer trawler fleet in* ***2019****. Upper panel shows monthly landings by species, lower panel shows landings per ICES subarea (Figure 1) by species. Data extracted from FiStat database. Note that these two panels have a different scale in comparison with the panels in Figures 2ab*.

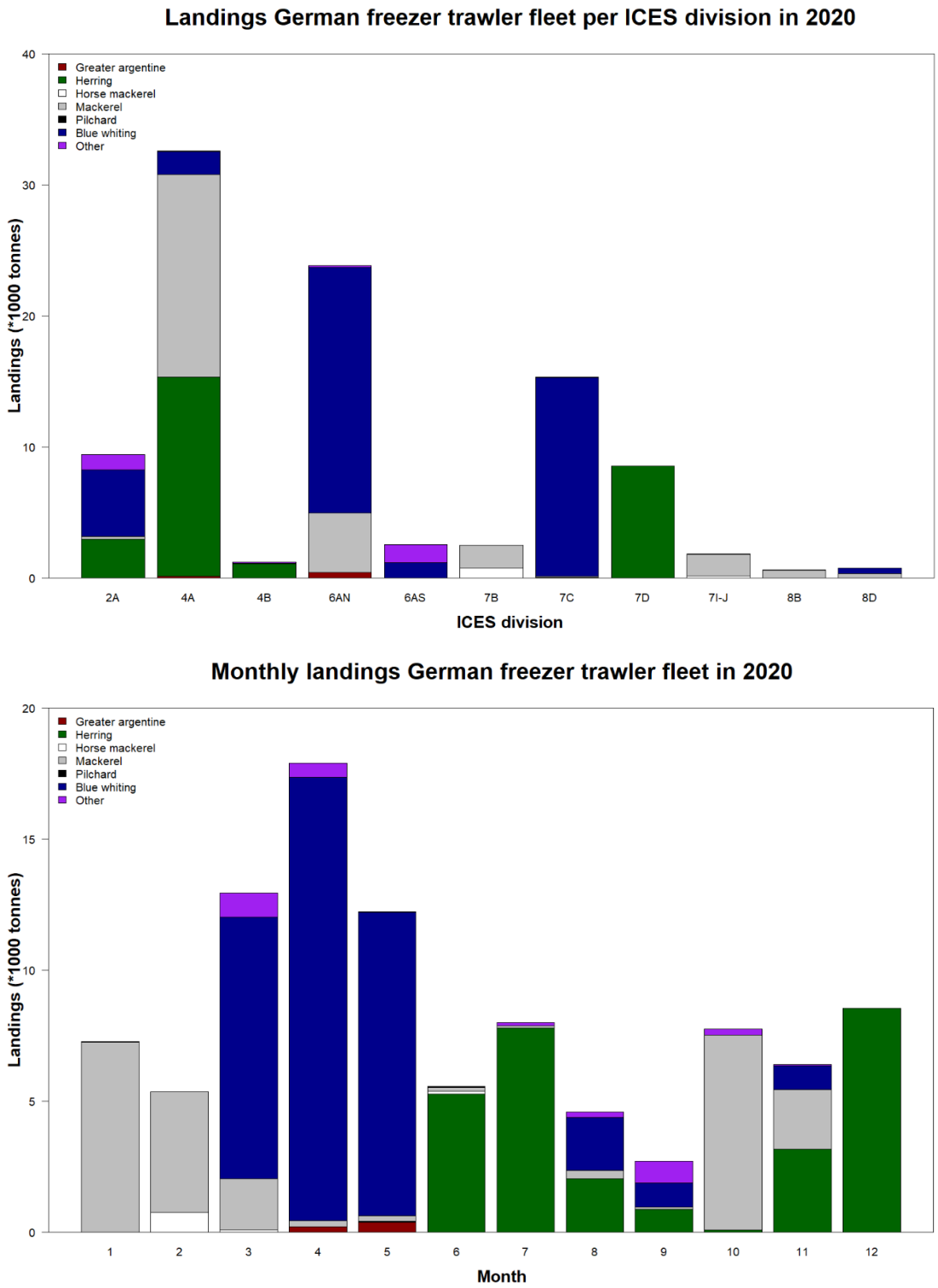


Figure 2d. *Landings (*1000 tonnes) from the* ***German*** *freezer trawler fleet in* ***2020****. Upper panel shows monthly landings by species, lower panel shows landings per ICES subarea (Figure 1) by species. Data extracted from FiStat database. Note that these two panels have a different scale in comparison with the panels in Figures 2ab*.

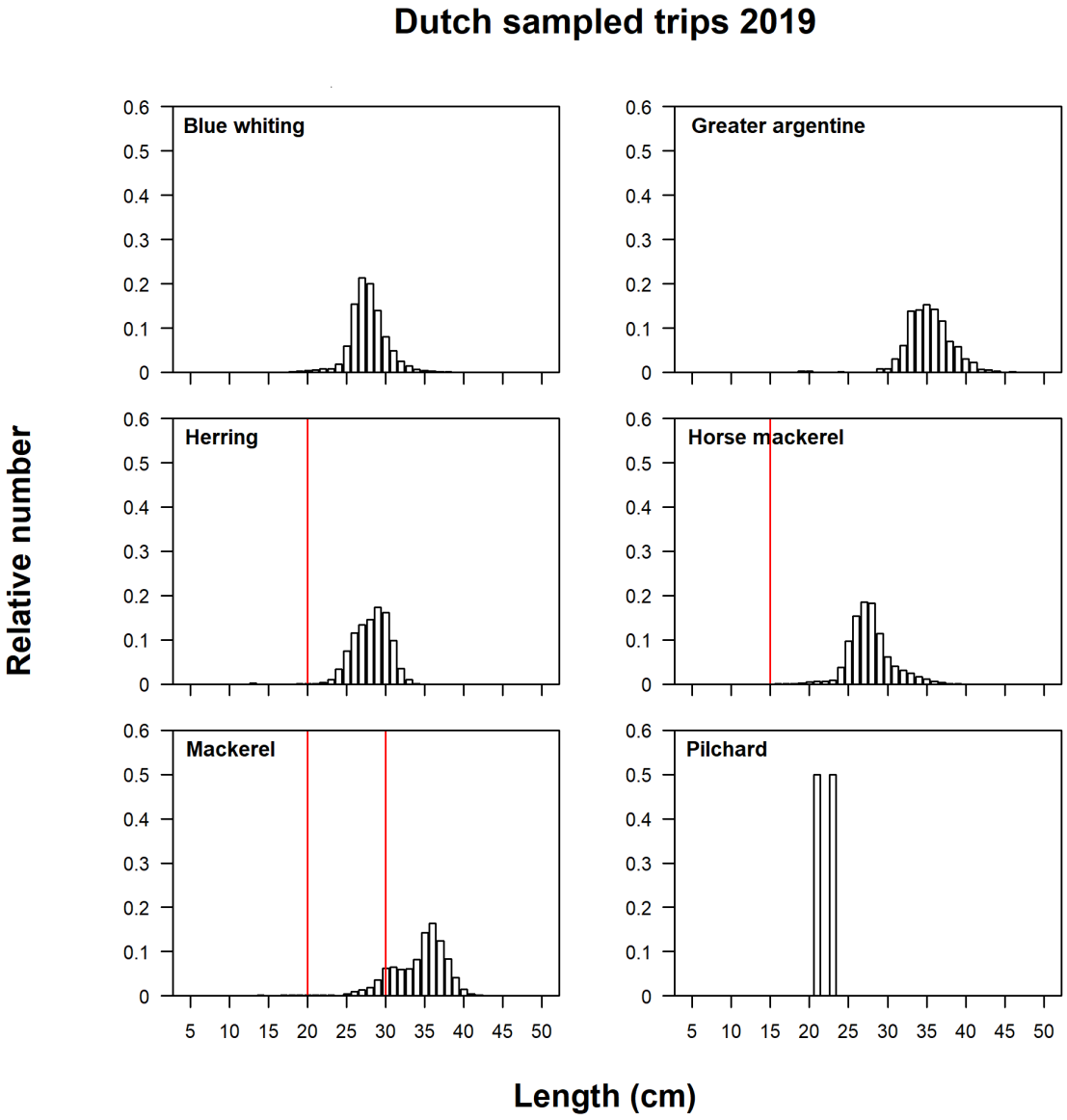


Figure 3a. *Relative number of blue whiting (top left), greater argentine (top right), herring (middle left), horse mackerel (middle right), mackerel (bottom left) and pilchard (bottom right) caught against length (cm) during the sampled trips within the* ***Dutch*** *observer programme in* ***2019****. Red lines indicate minimum 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, 0.14 (i.e. 14%) of the mackerel catches consisted of individuals with a length of 35 cm.*

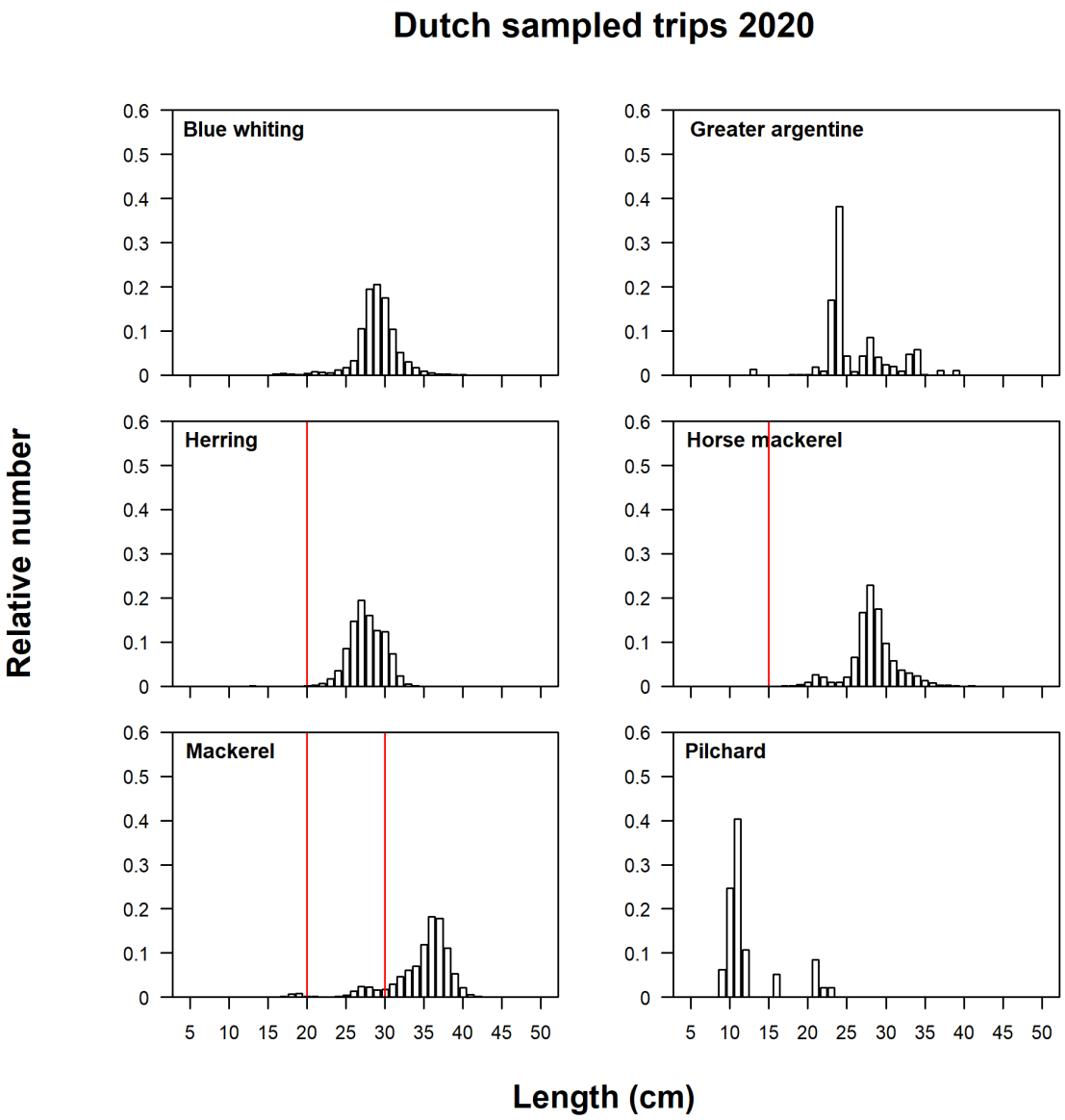


Figure 3b. *Relative number of blue whiting (top left), greater argentine (top right), herring (middle left), horse mackerel (middle right), mackerel (bottom left) and pilchard (bottom right) caught against length (cm) during the sampled trips within the* ***Dutch*** *observer programme in* ***2020*****. Red lines indicate minimum 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, 0.12 (i.e. 12%) of the mackerel catches consisted of individuals with a length of 35 cm.*

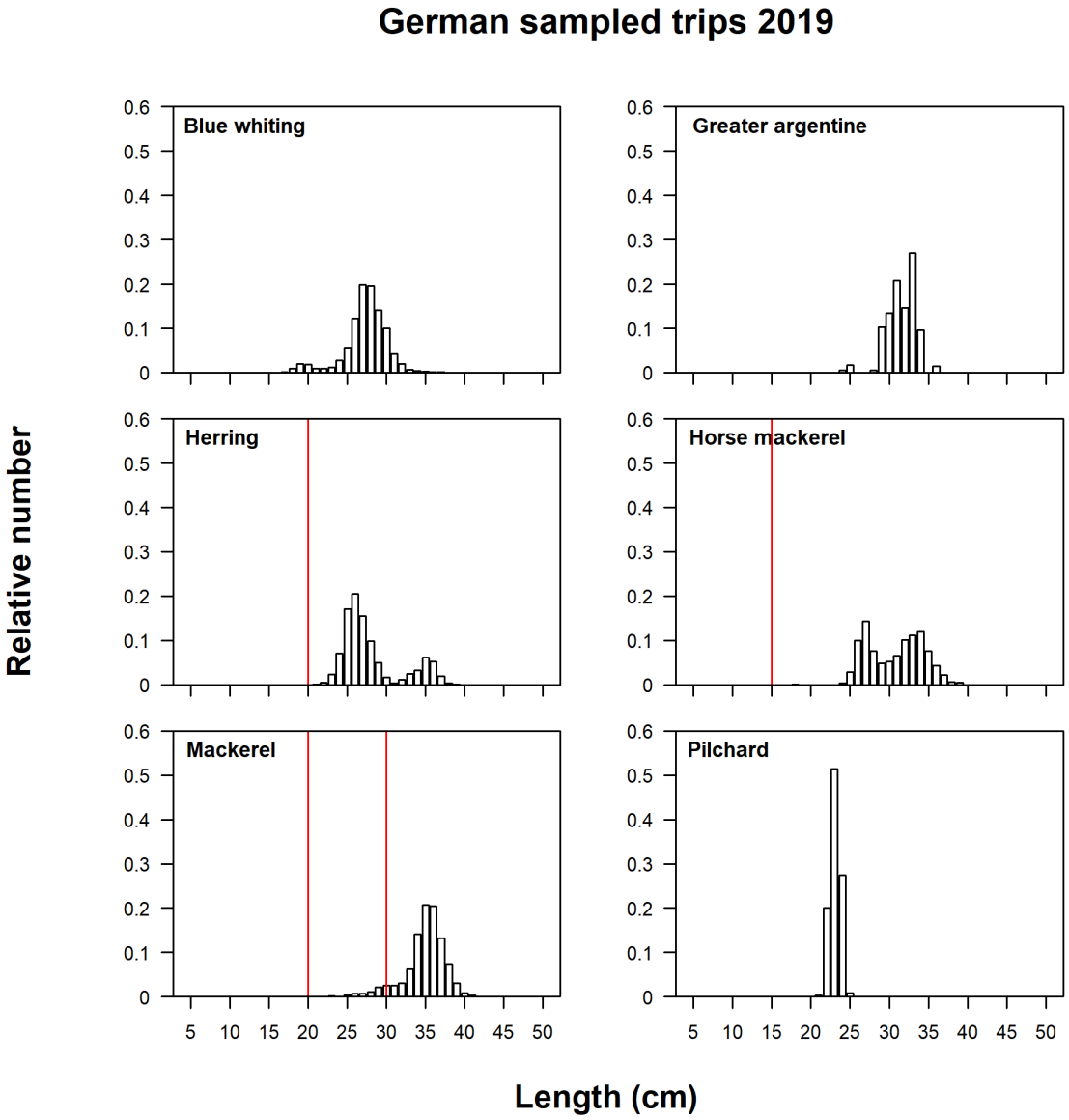


Figure 3c. *Relative number of blue whiting (top left), greater argentine (top right), herring (middle left), horse mackerel (middle right), mackerel (bottom left) and pilchard (bottom right) caught against length (cm) during the sampled trips within the* ***German*** *observer programme in* ***2019*****. Red lines indicate minimum 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, 0.21 (i.e. 21%) of the mackerel catches consisted of individuals with a length of 35 cm.*

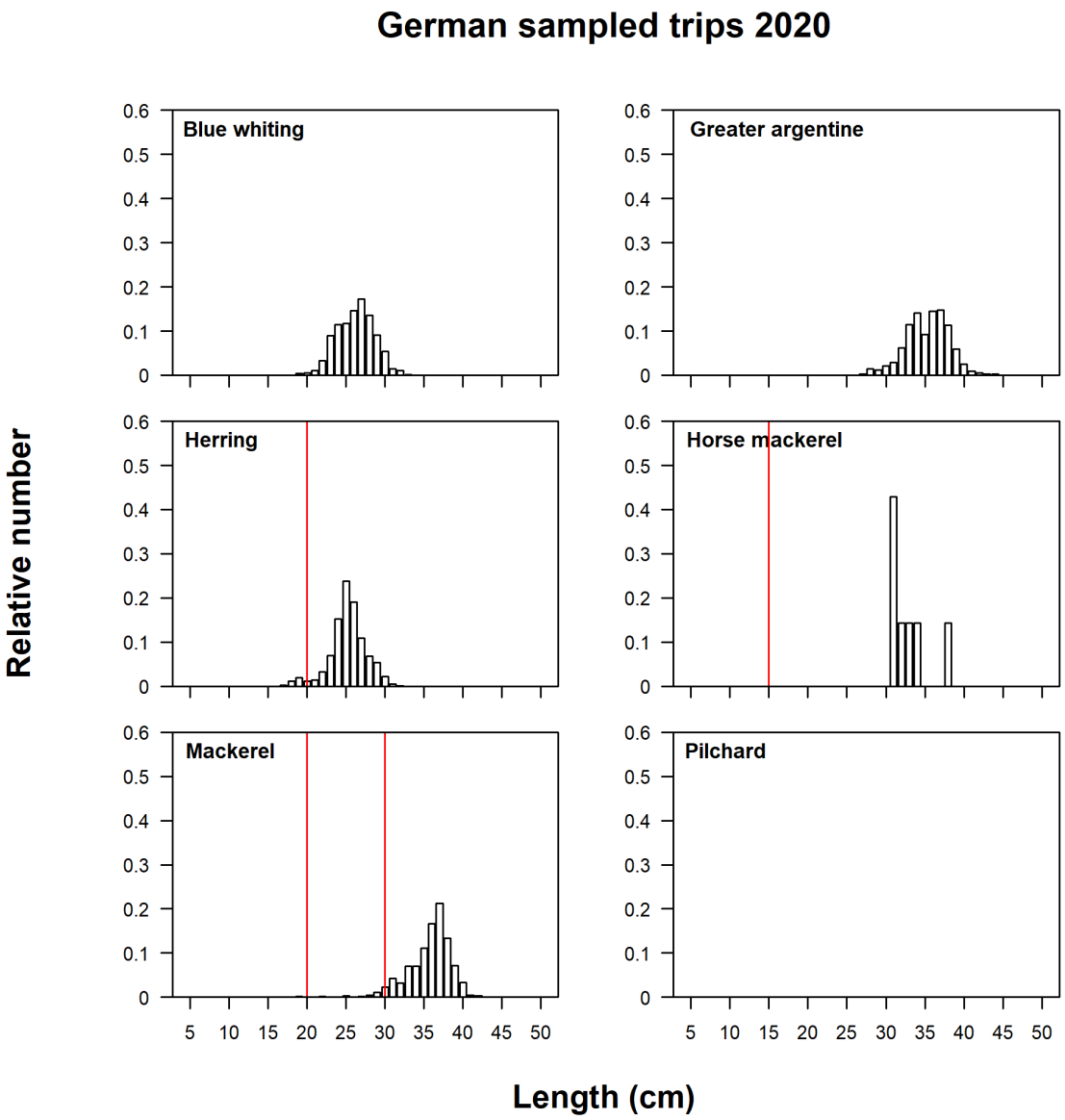


Figure 3d. *Relative number of blue whiting (top left), greater argentine (top right), herring (middle left), horse mackerel (middle right), mackerel (bottom left) and pilchard (bottom right) caught against length (cm) during the sampled trips within the* ***German*** *observer programme in* ***2020*****. Red lines indicate minimum 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, 0.11 (i.e. 11%) of the mackerel catches consisted of individuals with a length of 35 cm.*

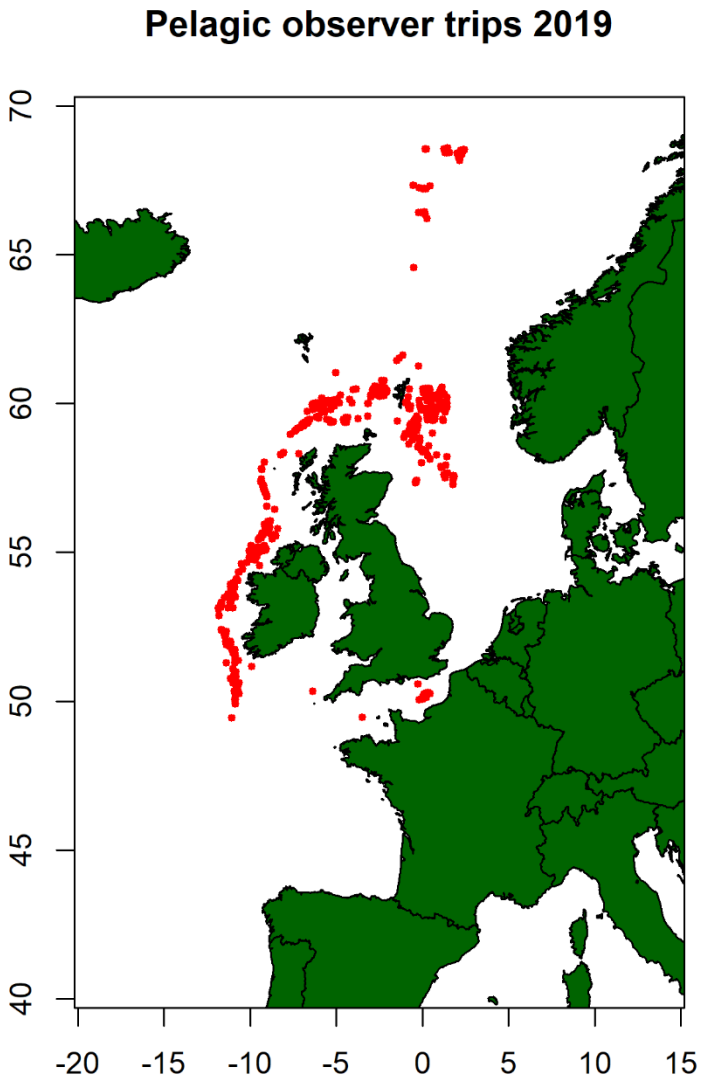


Figure 4a. *Positions of sampled pelagic hauls within the* ***Dutch*** *and* ***German*** *observer programme per haul in* ***2019***.

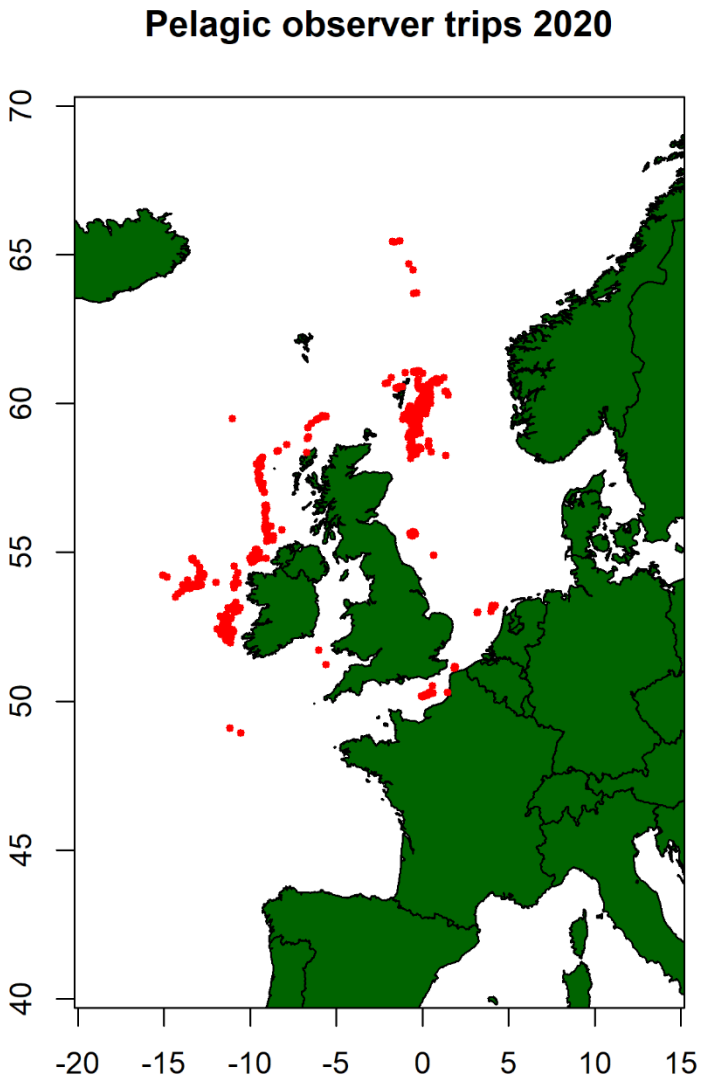


Figure 4b. *Positions of sampled pelagic hauls within the* ***Dutch*** *and* ***German*** *observer programme per haul in* ***2020***.

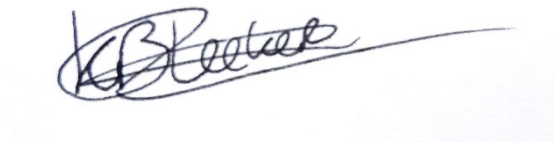
Justification

CVO Report: 22.008
Project number: 4311213035 and 4311213036

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

Approved by: K. Bleeker MSc.
Researcher

Signature:



Date: 16 Februari 2022

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

Signature:

Date: 16 Februari 2022