International Bottom Trawl Survey (IBTS2020-Q1)

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French cruise report

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Résumé/ Abstract :

IBTS surveys (International Bottom Trawl Survey) are carried out within an international framework. Main countries bordering the North Sea participate to it according to the European Community regulations (EC N°1543/2000 and N° 1639/2001) which specify that countries from E.U. have to carry out surveys at sea in order to evaluate abundance and stocks distribution, independently of commercial fisheries data. The first target of the IBTS survey is to have a diagnosis on the main commercial fish stock and to calculate abundances index by age for these species. This survey started in the years 70's and gradually standardised. Since the years 80's, a common protocol is implemented and used by all participants. The same fishing gear and the same working methods are used. In addition, to calculate an index for herring and sprat larvae (0 groups), each participating vessel operates with a MIK net during the night (Methot Isaac Kidd). For 20 years, the southern part of the North Sea has been allocated to the French vessel and since 2007, the Eastern Channel has been integrated to the whole sampled area. As interactions and circulation of stock between these two areas are important, Eastern Channel is often associated the North Sea for stock assessment. Herring for example which is exploited all the year in the North Sea comes into the Channel during November and December for reproduction. More precise information on larvae indices will be obtained when this area is sampled. In order to study the whole marine ecosystem of the North Sea and English Channel, some additional studies are carried out during the Survey on the R/V Thalassa. For example, the Continuous Underwater Fish Eggs Sampler device (CUFES) is used to study fish spawning areas. Abundance and distribution of the winter planktonic community (phyto and zoo plankton) and a monitoring study on the structure and distribution of the benthic macroinvertebrates community are also carried out. At last, more samples are done for the Marine Strategy framework since 2015.

Mots-clés/ Key words: North sea, GOV, beam trawl, MIK, abundance, stock assessment.

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Summary

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1 The International Bottom Trawl Survey (IBTS)

1.1 History of the survey

In spring and autumn of the years 1960 and 1961 a series of four large international research vessel trawl surveys were organized under the auspices of ICES, to map the distribution of juvenile herring *Clupea harengus* in the North Sea and to investigate the links between herring nursery grounds and the adult populations (ICES, 1963). In the following years most of the countries participating in the former exercise continued similar surveys.

From 1966 onwards these surveys were conducted annually with the objective of obtaining annual recruitment indices for the combined North Sea herring stocks. Gradually additional countries started to participate in the survey, which was named the "International Young Herring Survey" (IYHS). For the first few years, sampling was restricted to the southern and central North Sea and, beginning in 1969, the Skagerrak and Kattegat. Although the emphasis from the start of the surveys focused mainly on herring, data collected for whiting *Merlangius merlangus* were also analyzed. In the course of the 1970s it was realized that the IYHS could be useful for providing recruitment indices not only for herring, but also for roundfish species such as cod *Gadus morhua*, haddock *Melanogrammus aeglefinus* and whiting. This growing interest resulted in a northwards extension of the survey area and the whole North Sea, Skagerrak and Kattegat have been surveyed since 1974.

In 1981, the survey was renamed the International Young Fish Survey (IYFS). Apart from the international IYFS, these surveys were composed of at least seven national surveys. The IYFS working group proposed to combine the IYFS and the national surveys in Quarterly Coordinated Surveys in the North Sea, Skagerrak and Kattegat, which were to be known as the International Bottom Trawl Surveys (IBTS). It was recommended that quarterly surveys should run for a period of five years. These surveys should provide a full description of the seasonal distribution of the stocks sampled, which was considered urgently needed for the further improvement of multispecies assessments and the development of spatially disaggregated assessment models. This proposal resulted in a series of six years with quarterly surveys, which, with a few exceptions, covered the whole survey area in the North Sea, Skagerrak and Kattegat. Subsequently, it has proven impossible to maintain these high levels of research vessel effort, especially as research budgets have decreased in most countries and, from 1997, the majority of countries have only carried out a survey twice a year; a first quarter survey (January-February) and a third quarter survey (August -September). Having evolved from a herring survey, when only pelagic data were collected, the IBTS survey dataset is now made up of data collected on all finfish species. However, survey dataset is now made up of data collected on all fish species. Since 2006, the 1st quarter IBTS survey perform additional tows in the Eastern English Channel as part of the standard IBTS survey.

1.2 Objectives of the survey

The North Sea IBTS Q1 survey aims to provide ICES (International Council for the Exploration of the Sea) assessment and science groups with consistent and standardized data for examining

spatial and temporal changes in the distribution and relative abundance of fish and fish assemblages and of the biological parameters for commercial fish species for stock assessment purposes. The main objectives are:

- To determine the distribution and relative abundance of pre-recruits of the main commercial species with a view of deriving recruitment indices;
- To monitor changes in the stocks of commercial fish species independently of commercial fisheries data;
- To monitor the distribution and relative abundance of all fish species and selected invertebrates;
- To collect data for the determination of biological parameters for selected species;
- To collect hydrographical and environmental information;
- To determine the abundance and distribution of late herring larvae.

1.3   Methods

1.3.1   GOV bottom trawl (fish and macroinvertebrate communities)

The current stratification of the survey has always been grid-based, using ICES statistical rectangles of roughly 30 x 30 nautical miles (1 degree longitude x 0.5 degree latitude; see Figure 1). These rectangles were convenient to use for stratification of the survey because they were already being used for fisheries management purposes. Typically, each rectangle is sampled with two hauls, by two different countries/vessels, where logistically possible. The priority is given to sample all rectangles rather than performing the two hauls per ICES rectangle. The rectangle allocation between countries is assigned annually by the IBTS working group and, if necessary, by the international coordinators prior to and during the survey. The vessels are free to choose any position in the rectangles as long as the hauls are separated by at least 10 nautical miles where possible, except where nations take more than two tows per rectangle. Whenever possible, tows in adjacent rectangles should be separated by at least 10 miles.

Since 1983 all nations use the GOV 36/47 ('Grande Ouverture Verticale'), with a 20 mm stretched mesh size in the codend. Since 1992, it constitutes the recommended standard gear of the IBTS (Figure 2). A standard fishing speed is about 4 knots during 30 minutes. Start time is defined as the moment when the vertical net opening and doorspread are stable. Stop time is defined as the start of the winches hauling the net back in. It may be acceptable to fish for less than 30min (for safety reasons or for very large catches), however, tow under 15 minutes should be tagged as non-standard and associated reasons must be given. As a minimum, vertical net opening (distance between the groundrope and the headline) and doorspread should be monitored during the haul (Figure 2), and after appropriate filtering for invalid values, the mean values should be reported. It is also recommended to measure the wing spread distance.
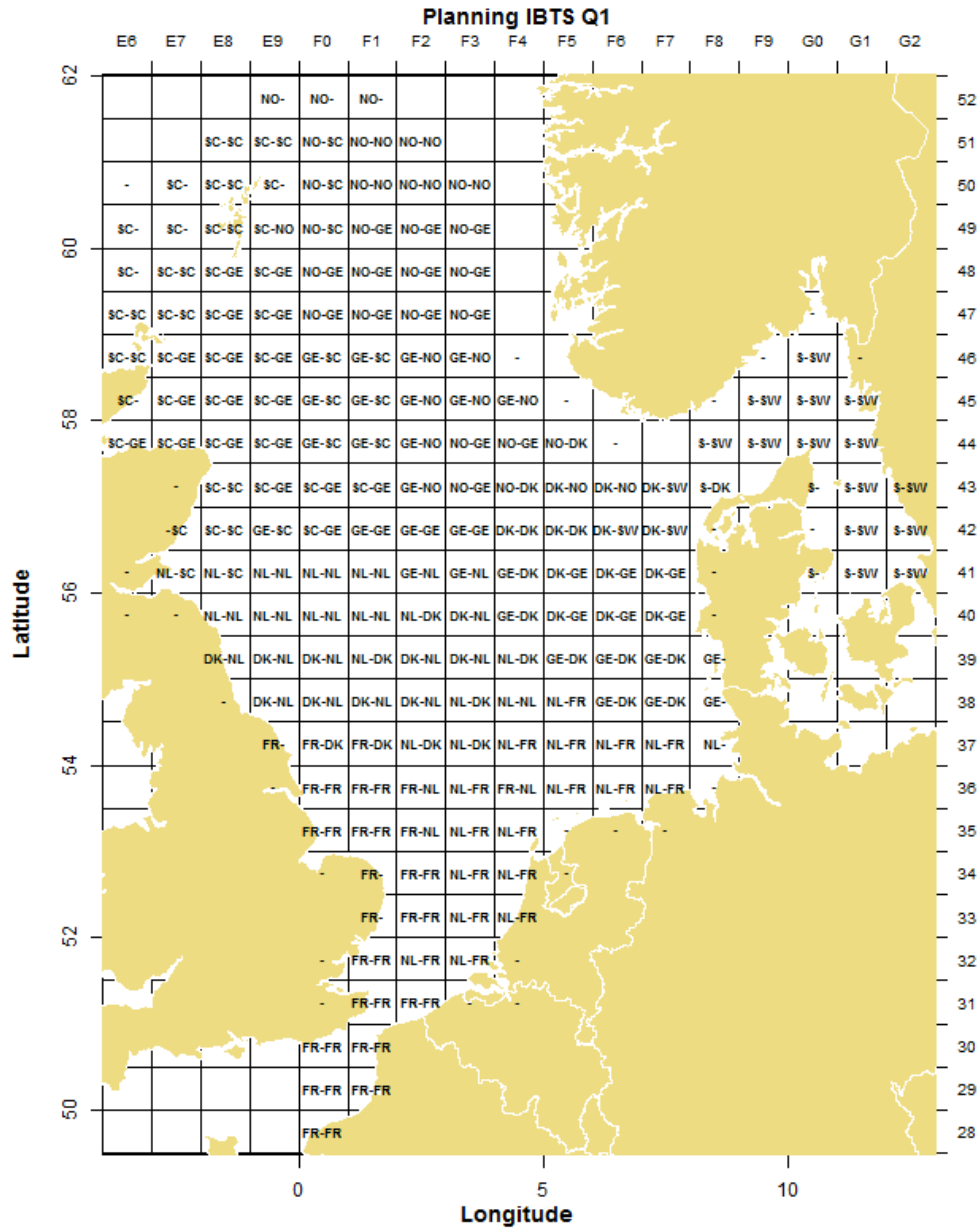
Planning IBTS Q1

Figure 1: Allocation map for all participants (FR: France, NL: Netherlands; GE: Germany, DK: Denmark, SW: Sweden, SC: Scotland, NO: Norway)
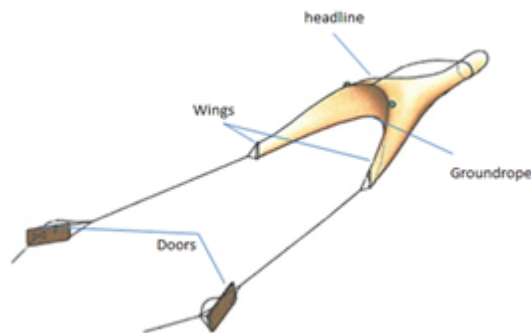

Figure 2: Illustration of a standard ground gear. To record trawl parameters, sensors are fixed on the doors, on the wings and on the middle of the headline.

1.3.2 MIK net (Fish larvae sampling)

The Methot Isaac Kidd (MIK) net is a midwater ring trawl usually deployed to sample fish larvae during the 1st quarter survey (Figure 3A). At least 2 hauls per ship per rectangle are made within each ICES rectangle and the distance between hauls mustn't be less than 10 nautic miles. Hauls should only be made during the period between 30 minutes past sunset to 30 minutes before sunrise. Fishing speed is 3 knots through the water. The haul profile is oblique to 5 meter above the bottom (Figure 3B). Maximum depth of tow should, however, be 100 meter. If the haul duration of a single oblique haul is less than 10 minutes a double oblique haul must be made. The wire is deployed/retrieved at a speed of 25 and 15m/min, respectively. All collected samples must be preserved in either 4% formalin in freshwater or in 96% ethanol. Larvae are then identified and measured. Data are finally included in an International database and used just after the survey by the Herring Assessment Working Group (HAWG).
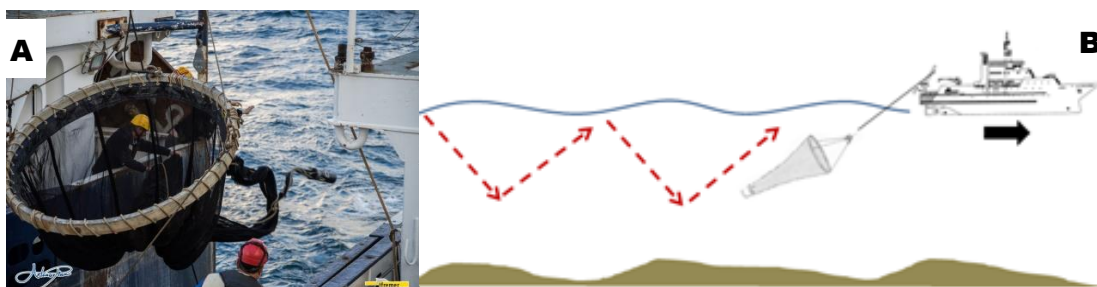

Figure 3: A. MIK net used during the Survey (13 meters long) B. During at least 10 minutes, the net goes down near the bottom (5meters) and it is retired immediately in order to have an oblique haul.

1.3.2 MIK net (Fish larvae sampling)

2 International preliminary results of the 2020 IBTS survey

After the survey, all the data from all the participating countries have been stored in the ICES database (DATRAS: http://www.ices.dk/marine-data/data-portals/Pages/DATRAS.aspx). These data are used by the different working groups that are in charge of assessing fish stocks. The first groups which need IBTS survey data are the "Herring assessment working group for the Area South of 62° N" immediately after the survey in March, and the IBTS working group which meets in April to coordinate all bottom trawl survey. In this report, some preliminary data are presented. More results will be available soon in the reports of these groups and available on the ICES website (http://www.ices.dk/community/groups/Pages/default.aspx).

2.1 General overview

The quarter 1 2020 fleet consisted of six vessels: "Dana" (Germany and Denmark), "GO Sars" (Norway), "Scotia" (Scotland), "Thalassa" (France), "Svea" (Sweden) and "Tridens II" (Netherlands). The survey covered the period 8 January to 4 March 2020 (Table 1). A total of 349 GOV hauls (9 of which were invalid) and 557 valid MIK hauls were deployed. Most ICES-rectangles were covered by at least 1 GOV haul (Fig. 4), 1 CTD water-column profiles, and at least 2 MIK hauls. Next to the GOV and MIK tows all countries have collected additional data like sea floor litter from the GOV tows.

Table 1: Overview of the surveys performed during the North Sea IBTS Q1 survey in 2020

Country	Ship	January		February		March
		8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28		1 2 3 4 5
Denmark	Dana					
France	Thalassa II					
Germany	Dana					
Netherlands	R.V. Tridens II					
Norway	G.O. Sars					
Scotland	Scotia III					
Sweden	R/V Svea					

Figure 4: Number of hauls per ICES rectangle with GOV during the North Sea IBTS Q1 2020 and the start positions of the trawl by country.

2.2 Fish recruitment indices

The preliminary indices for the recruits of seven commercial species based on the 2020 quarter 1 survey are shown in Figure 5. According to these preliminary results, Sprat, Norway pout, Mackerel and Haddock were substantially above average for the last 40 years, with Sprat being the highest of the time series. Cod and herring were below average, but cod were above than the previous year. The Withing was just above average as 2017.

Figure 5: Time-series of indices for 1-group (1-ring) herring, sprat, haddock, cod, whiting, Norway pout, and mackerel caught during the quarter 1 IBTS survey in the North Sea, Skagerrak and Kattegat. Indices for the last year are preliminary, and based on a length split of the catches. Horizontal line is the mean 1980-2019

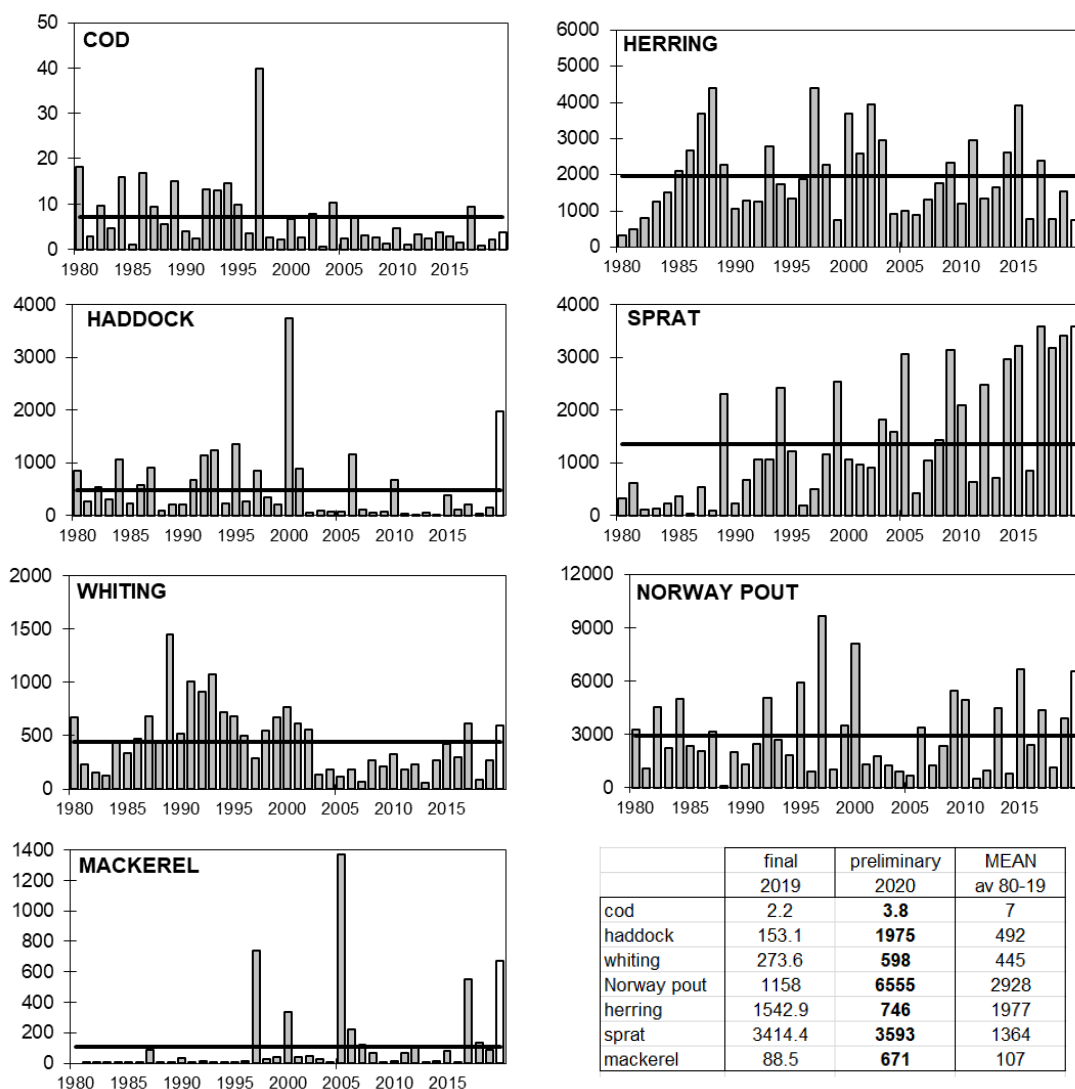|	final 2019	preliminary 2020	MEAN av 80-19
cod	2.2	**3.8**	7
haddock	153.1	**1975**	492
whiting	273.6	**598**	445
Norway pout	1158	**6555**	2928
herring	1542.9	**746**	1977
sprat	3414.4	**3593**	1364
mackerel	88.5	**671**	107

2.3   Herring larvae indices

For the ICES Herring Assessment Working Group for the area South of 62°N (HAWG), the IBTS survey provides recruitment indices and abundance estimates of adults. Sampling at night with fine meshed nets (MIK; Midwater Ring Net) was implemented from 1977 onwards, and the catch of herring larvae has been used for the estimation of 0 ringer abundance in the survey area. The abundance of 0 ringers in the survey area is used as recruitment index for the North Sea herring stock. This year, 667 depth-integrated hauls were completed with the MIK-net. The coverage of the survey area was good with at least 2 hauls in most of ICES rectangles in the North Sea as well as in Kattegat and Skagerrak.

Figure 6 and 7, shows the length distribution of all herring larvae caught during the 2020 Q1 IBTS.
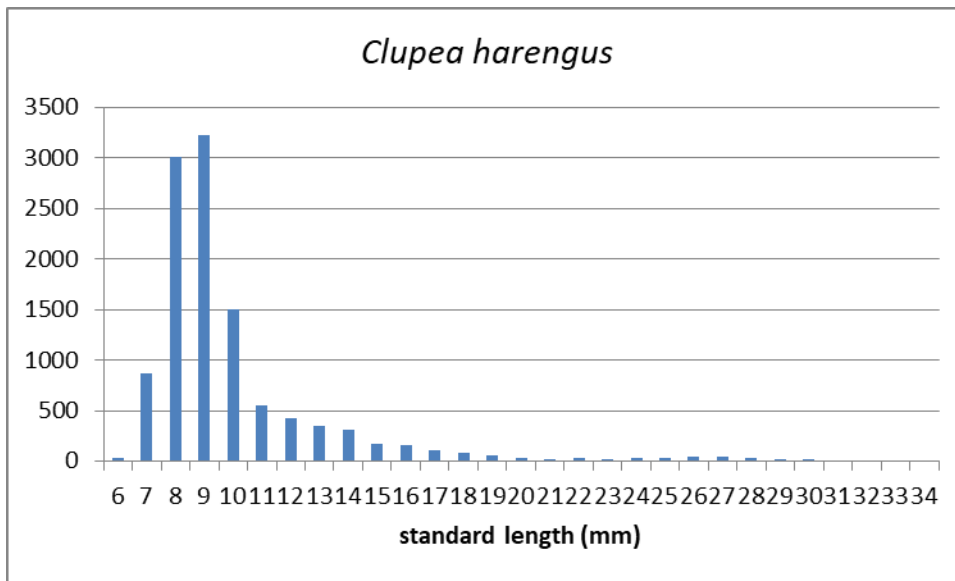
Figure 6: Length distribution of all herring larvae caught during the 2020 Q1 IBTS.
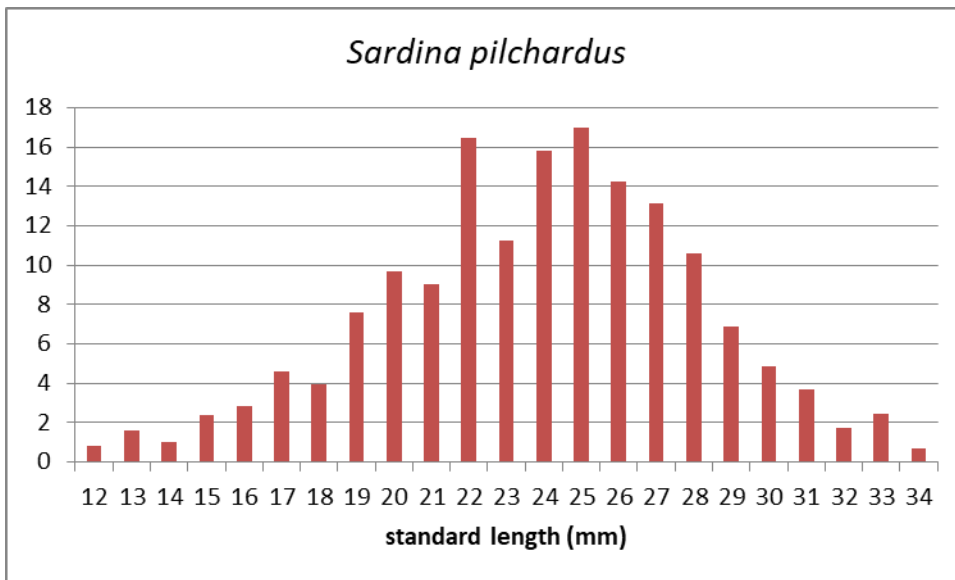

Figure 7:. Length distribution of all sardine larvae caught during the 2020 Q1 IBTS.

3   The IBTS 2020 survey on research Vessel Thalassa

3.1   Survey planning

The R/V Thalassa left Boulogne-sur-Mer (France) the 10th of January (Fig 8) and field work started in the Eastern English Channel. The 14th of January, the Thalassa stopped in front of Boulogne and 4 persons left the vessel using the pilot boat. The R/V Thalassa then moved to the North and came down along the Dutch Coasts. The 19rd of January, the Thalassa vessel stopped in Scheveningen (The Netherlands) for 36 hours. During the second part of the survey, trawling lines were performed in English waters. The survey finished in Boulogne-sur-Mer the 1st of February 2020.
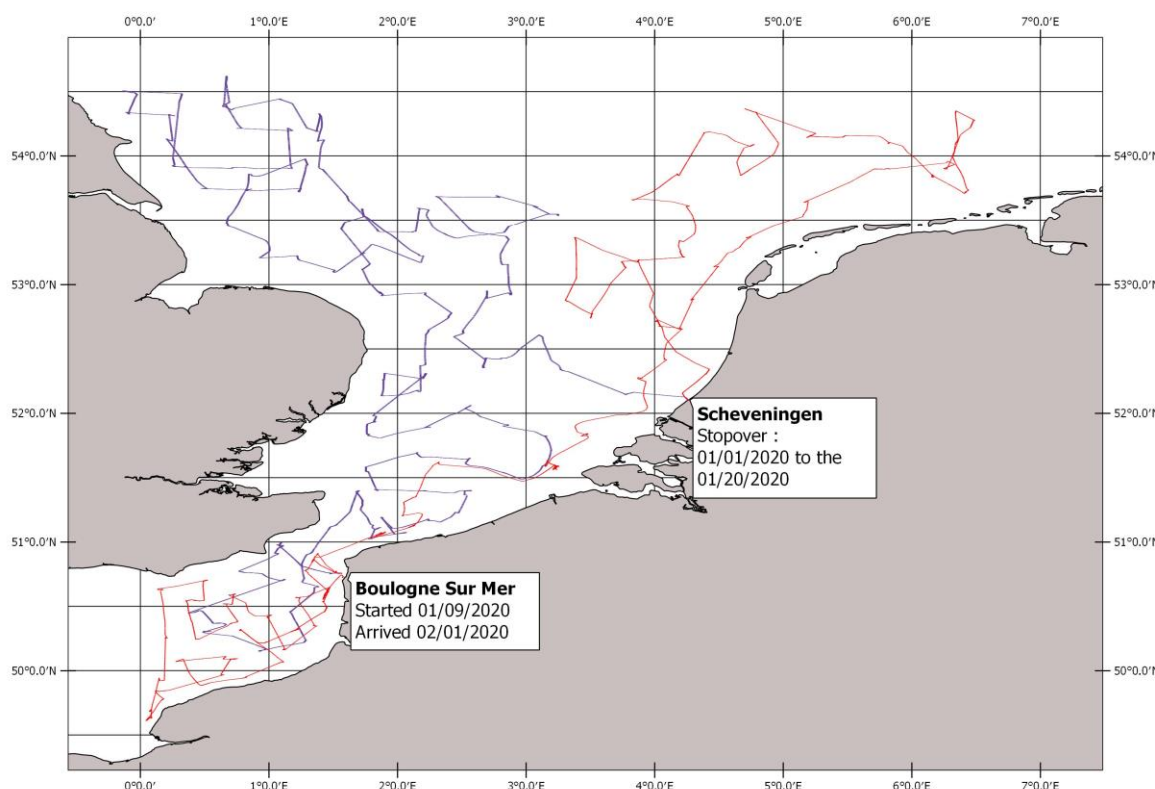
Figure 8: R/V Thalassa navigation during IBTS Q1 2020. First part (red track) between the 9th and the 19th of January, second part (purple track) between the 20th of January and the 1st of February

3.2   Participants

The team was composed of 22 scientists from the Ifremer's Center of Boulogne, Port-en-Bessin, Brest, Dinard, Lorient and from other French Institutes (Anses, CNRS, Pelagis), from Universities (ULCO), from the sea center "Cinéaqua" and for the second part only, from the Environment institute of Finland. During the first four days an employee from a fisherman association (FromNORD) were on board to observe the different fieldwork activities. During the survey, scientists are divided in different teams. In the fish laboratory, 8 scientists sort, measure the catch, collect fish otoliths and various biological samples. In the hydrological laboratory, 7

scientists take turns during day and night to carry out the various devices as SBe, Niskin bottle, WP2, CUFES, Manta and MIK net. Birds and mammals watchers constitute a third team and are posted at the higher level of the ship.

3.3 Results from IBTS2020

3.3.1 Fish communities

14 fishing stations were carried out in the Eastern Channel and 45 in the North Sea. At least one haul of ½ hour was done in each ICES squares during day time. In the English Channel and the Strait of Dover, the sampling level was higher with 2 hauls by rectangles. Figure 9 shows the position of these GOV trawls and the characteristics of these hauls are listed in annex 1. The trawl used was the standard GOV 36/47 as described paragraph 1.3.1.
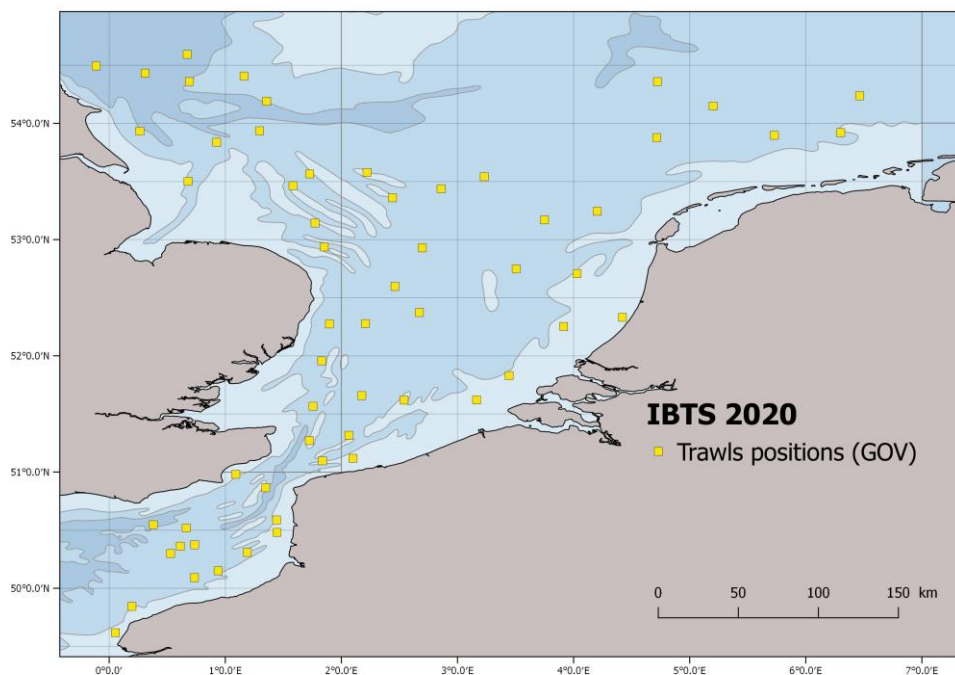
Figure 9: Positions of GOV trawls

After each trawl, the catch was sampled. It is recommended to sort the fully catch when possible from all valid hauls, with fish and shellfish species identified to the lowest taxonomic level possible. For larger catches a selection of species/size categories of species may be identified as being sufficiently abundant that they can be subsampled, appropriately. Invertebrate species ('benthos'), was also sorted even if the GOV is not an effective gear for catching benthos for quantitative sampling. But it can be used for some distribution information, remembering the limitation of the gear, given the ground gear set up and the size of the meshes within the net make-up. Wastes caught in the net are also counted by category. The size and the weight of various wastes as plastics, clothes, fishing lines etc. are recorded at each haul.

Length distributions were recorded for all fish species caught. Length is measured to 0.1cm below for shellfish, to 0.5 cm below for herring and sprat, and to 1 cm below for all other species. In order to obtain age-length key, otoliths samples were collected for main commercial species: The otolith is a calcified piece found in the internal ear of the fish and used to estimate

the age. Table 2 gives the number of otoliths collected on the main commercial species as herring, sprat mackerel, cod, haddock, whiting, and also for other species. Sex, maturity and weight data were also reported for all the target species for which age data are collected.

Table 2 : Number of biological samples

Species	Number of biological samples
Chelidonichthys cuculus	64
Clupea harengus	397
Dicentrarchus labrax	88
Gadus morhua	73
Melanogrammus aeglefinus	65
Merlangius merlangus	939
Mullus surmuletus	88
Pleuronectes platessa	573
Scophthalmus maximus	14
Scophthalmus rhombus	4
Solea solea	149
Sprattus sprattus	381
Trisopterus esmarkii	12
Trisopterus luscus	71

3.3.2 Species Distribution and community structure

During this survey, 89 different fish species were caught, included sharks, rays and cephalopods. The whole list is presented in Annex 3. Figure 10 shows the main species found: As last year, the whiting (*Merlangius merlangus*) was the most dominant (in biomass) species and represent 25 % of the total catch, similar in 2019 with 27 %. This year, the herring (*Clupea harengus*) is just got ahead the sprat (*Sprattus sprattus*) with respectively 16% and 12%. Contrary to last year, the dab (*Limanda limanda*) is in the third place representing 9% of that catch against 16% in 2019.
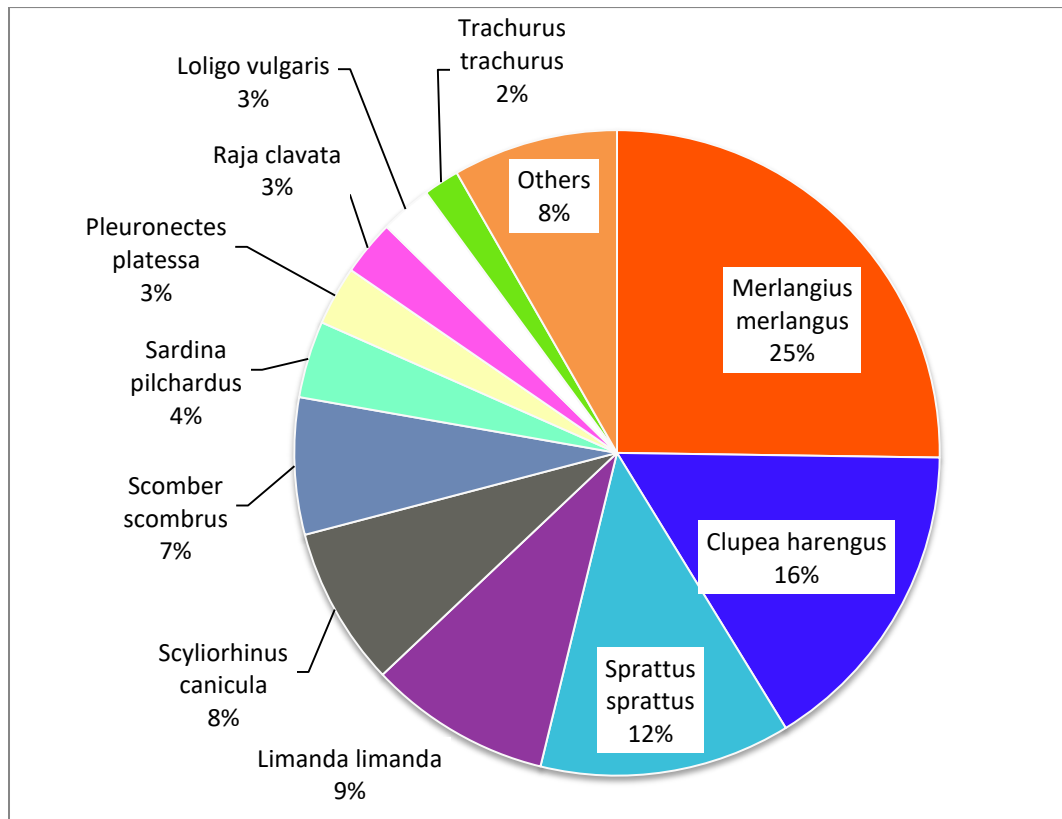
Figure 10: Main species biomass in the total catch

Figure 11 shows the spatial distribution of the main species (biomass by hauls). As usual, whiting, sprat and dab are mostly present in the North Sea. Whiting biomass was especially located along the west coast and in the Strait of Dover. More various species were found in the English Channel in lower quantity: the catch was composed of various species as rays, red mullet, dogfishes, etc.
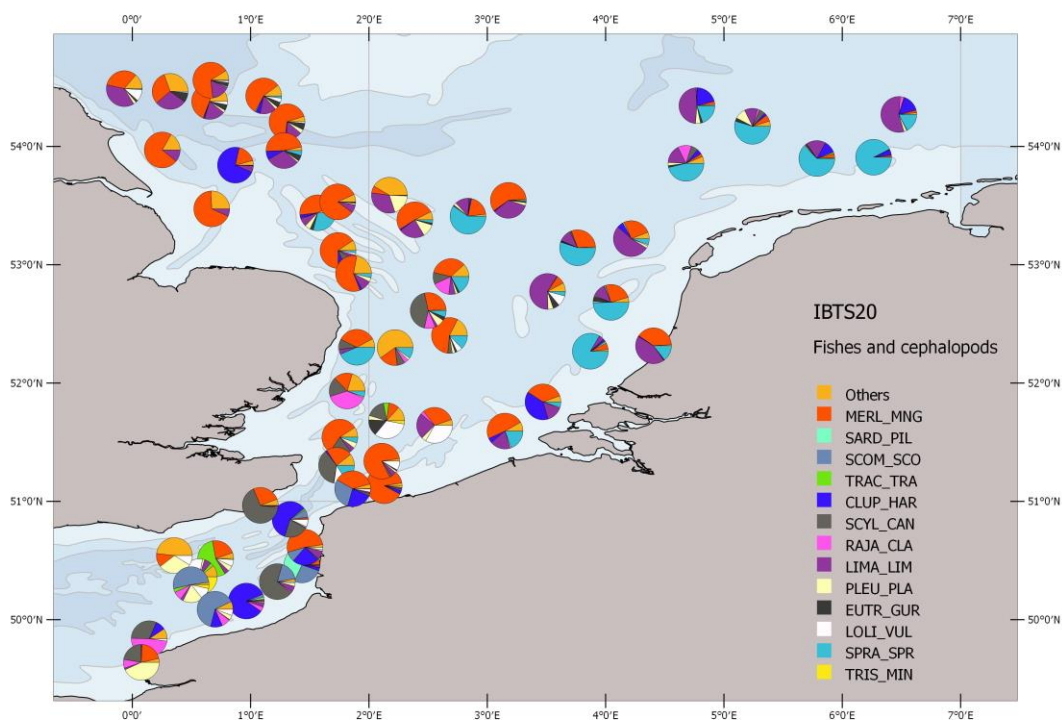
Figure 11: Biomass distribution of the main caught species

Benthic macroinvertebrate taxa collected by the trawl were also identified, counted and weighted (if possible) within each haul.

3.3.2.1   Clupea harengus (Herring)

The length distribution (Fig. 12) clearly shows the separation between juveniles (less than 19 cm) and adults cohorts. This year, juveniles were less abundant in the French caught than 2019 and 2018, and this observation is in accordance with the preliminary recruitment indice. On the contrary, adults are more abundant than the two previous year. The German Bight (off the German coast) is a feeding area in the North Sea for herrings. It is in this area where most of small herring were found (Fig 13). Adults were found in the English Channel, where the "Downs" herring population spawns between November and January along the French coasts. Because huge schools of herring were observed on the echosounder in the Strait of Dover it was decided to not fishing for preventing any gear damage.
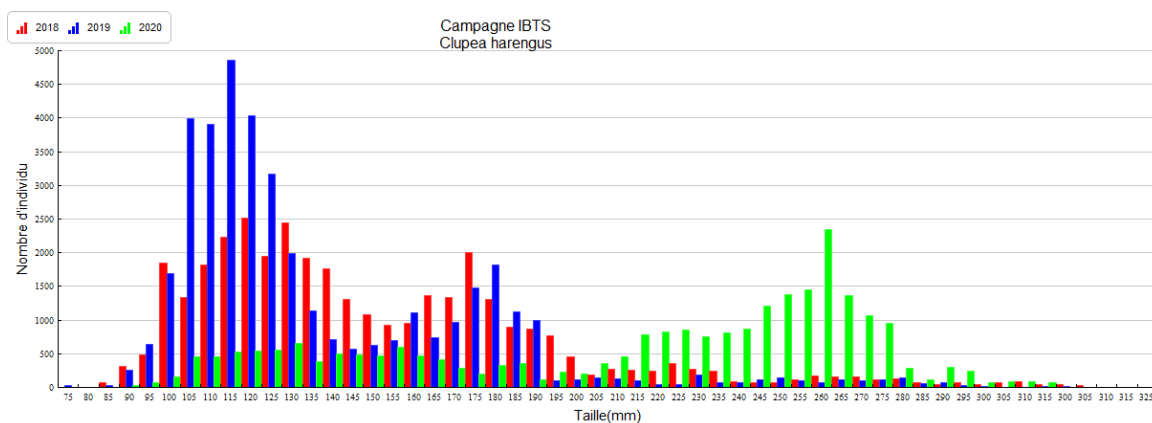
Figure 12: Herring length distribution
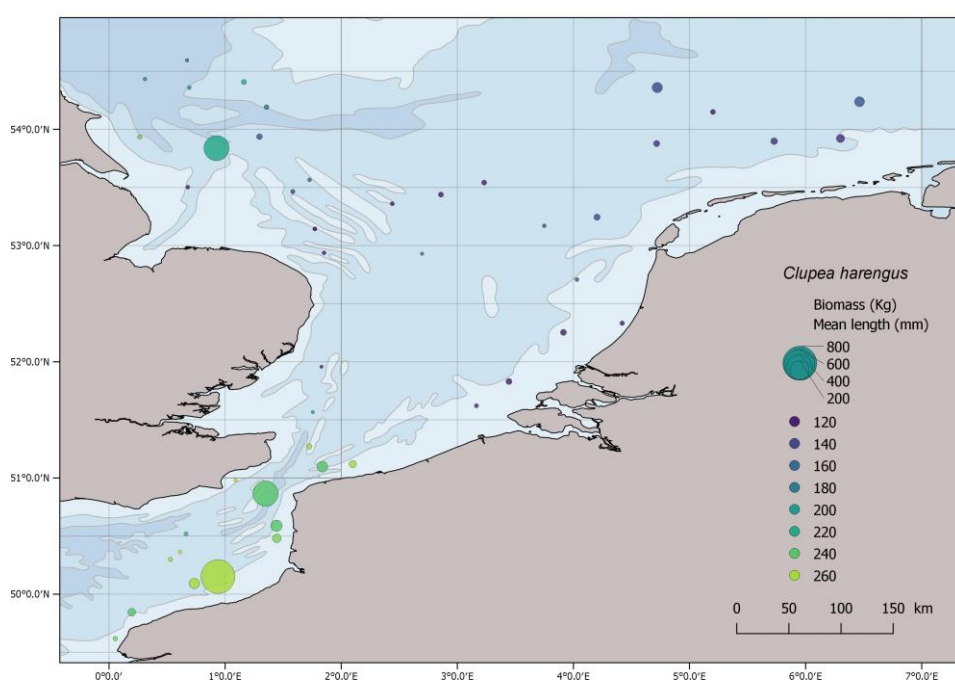
Figure 13: Herring distribution map (mean length by hauls)

3.3.2.2 Sprattus sprattus (Sprat)

Adults were especially observed in central North Sea and in the Channel. Sprat has a short life (5 years) and is mainly caught by industrial fleets to be processed in animal meal; but there is also a fishing activity in the English Channel for human consumption. The length distribution on figure 14 shows that the mean length is at 10 cm as last year, and corresponds to 1-year old sprat. On the map distribution (Fig. 15), sprat was present on the whole area and was particularly abundant in the east part of the North Sea and in the Strait of Dover.
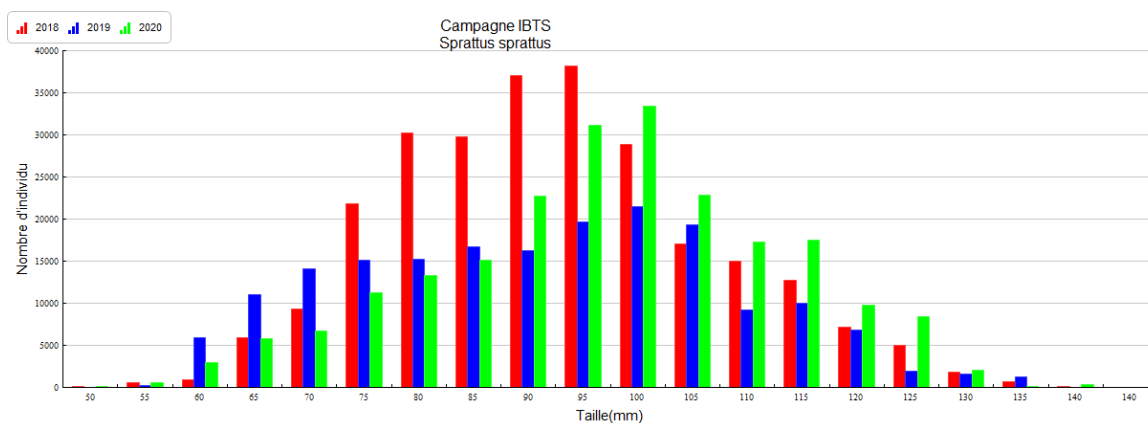
Figure 14 : Sprat length distribution
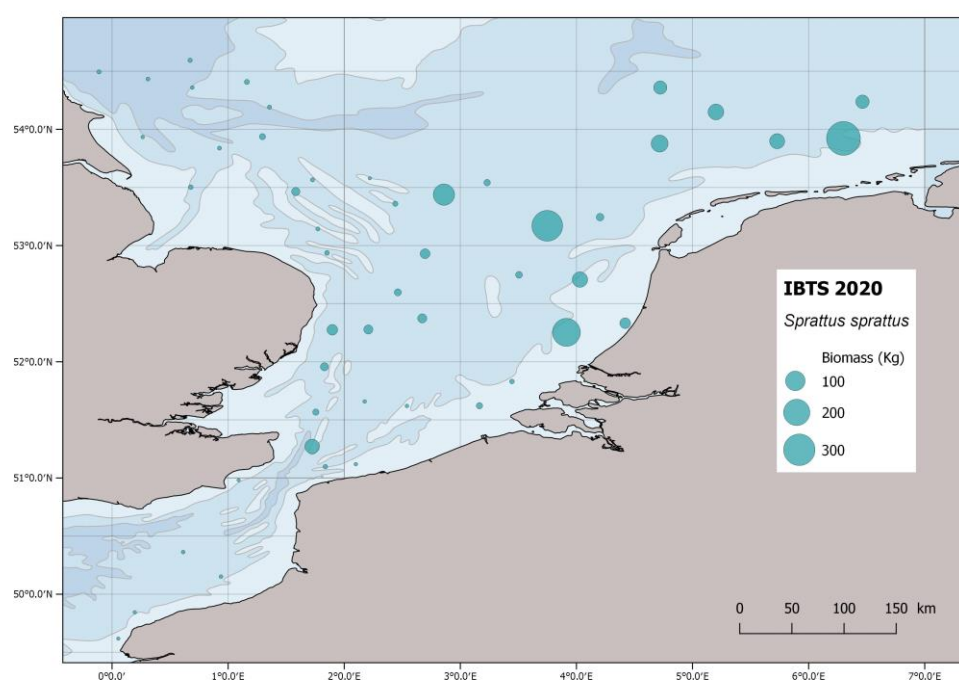
Figure 15 : Sprat distribution map (biomass in kilos per haul)

3.3.2.3   Merlangus merlangius (whiting)

The whiting is an important species for french artisanal fisheries and represent near from 90% of international landing in south of North Sea and Eastern Channel (Carpentier et al., 2009). This year, the whiting represented 25% of the total biomass caught by the Thalassa vessel .The length distribution (Fig. 16) is grouped around 18cm and 19 cm, with for size class under 25 cm. They correspond to juveniles cohort, for this species the length of the first maturity is around 25 cm (2 years old).   Compared to 2018 and 2019, a consistent increase has been observed in the juvenile's cohort. The whiting was present in each haul, highest quantities were noticed in the southwest of the North Sea and in the Eastern Channel (Fig. 17).
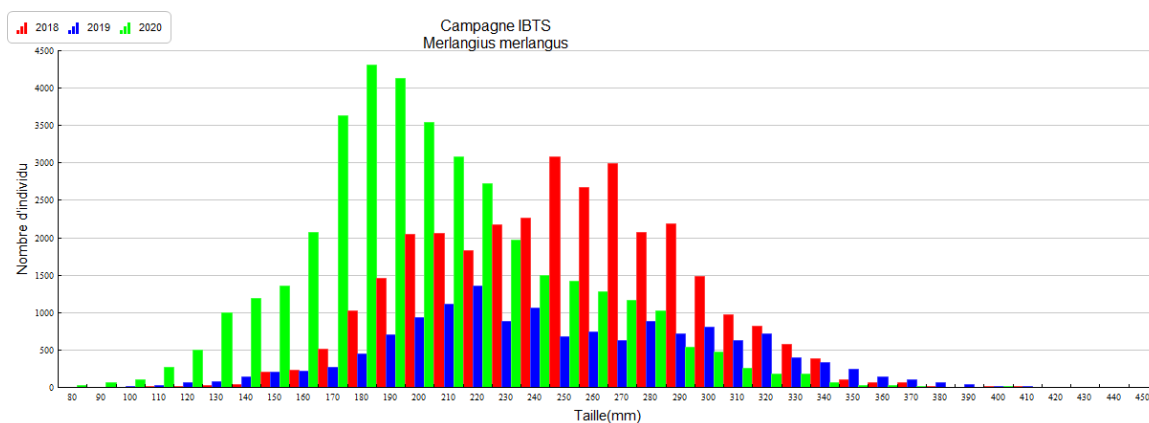
Figure 16 : Whiting length distribution
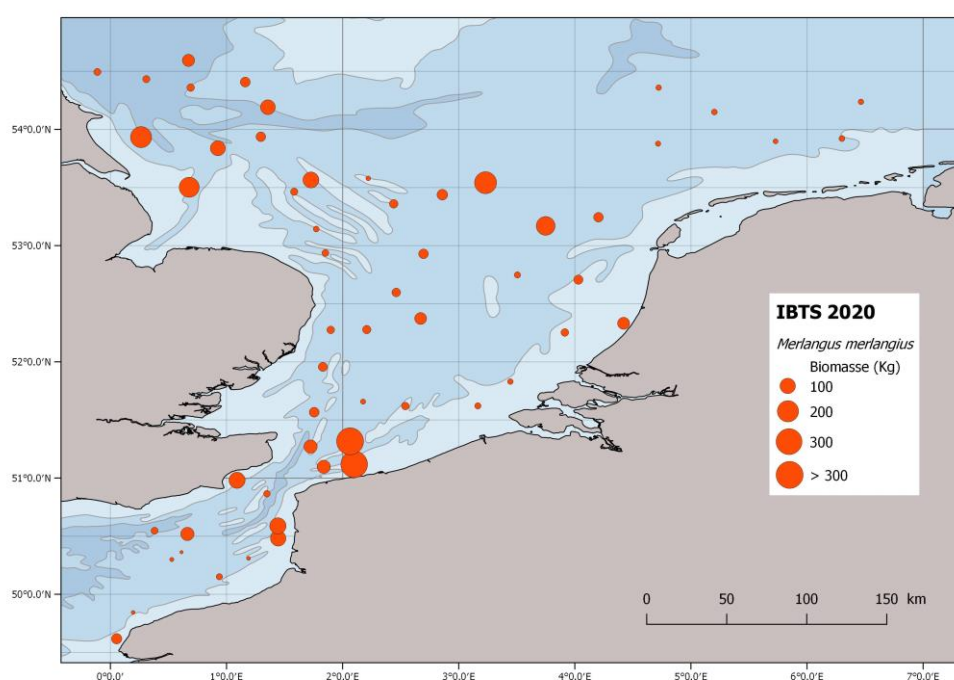
Figure 17 : Whiting distribution map (biomass in kilos per haul)

3.3.2.4 Limanda Limanda (Dab)

Individuals smaller than 10 cm (i.e., juveniles under 21 cm), were found in rather large quantities contrary to 2019 or 2018 (Fig. 18). In 2020, the mean length was about 17 cm, one centimetre taller than 2019 but it's still juvenils under 21 cm. Even if it is not an important commercial species, dab is exploited by beam trawlers in the German Bight. Dab is well distributed on the whole southern North Sea but particularly on the eastern part (Fig 19) and it is also present in the English Channel.
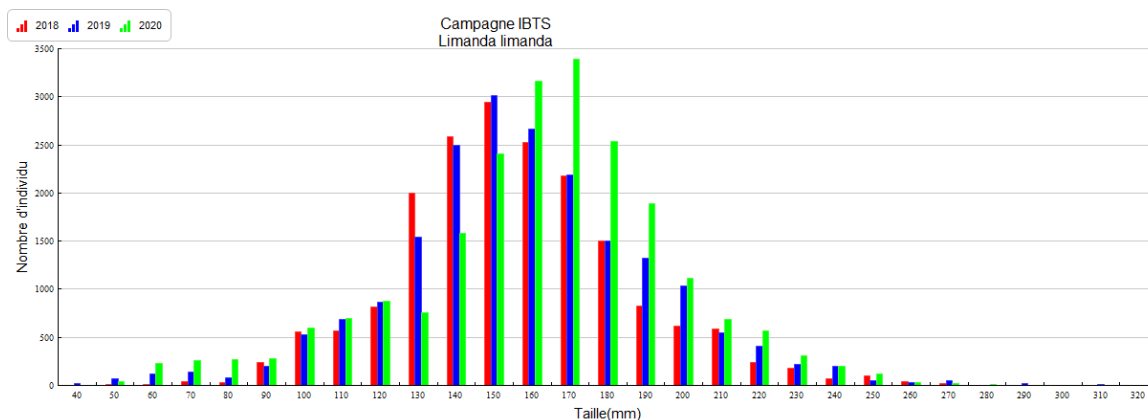
Figure 18: Dab length distribution
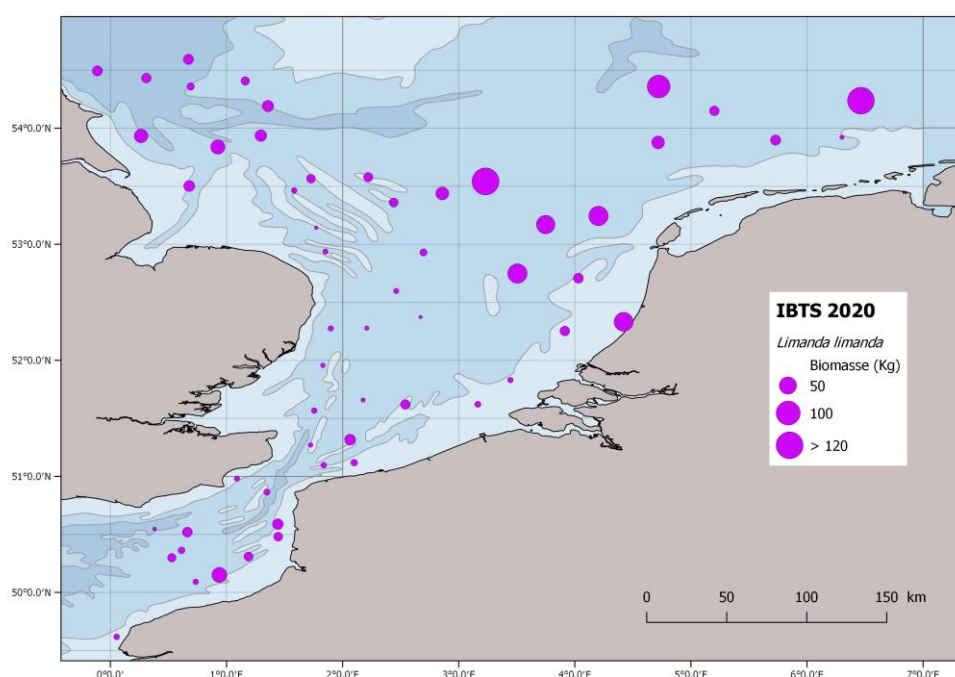
Figure 19 : Dab distribution map (biomass in kilogram per haul)

3.3.2.5 Gadus morhua (Cod)

The recruitment indice in 2020 was upper than last years but still lower than the mean of over the last 39 years. This year, juveniles (less than 25 cm) were significantly more present than the two previous years (Fig 20). Particularly for fishes between 16 and 21 cm. For example, in 2020 the number of individual of 18 cm caught has been multiplied by 10 compared to last year. In a general way, cods were found in the Southeast North Sea (Fig 21), particularly on the German Bight.
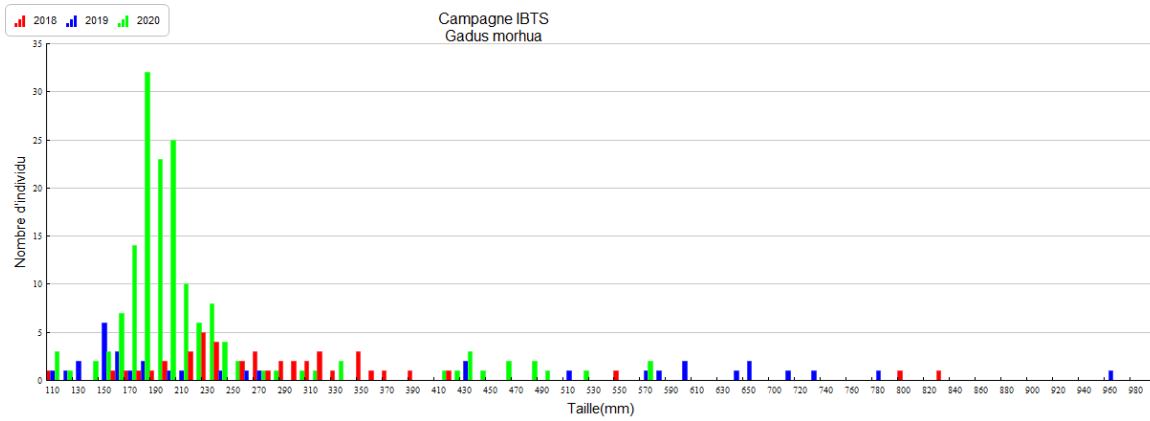
Figure 20 : Cod length distribution
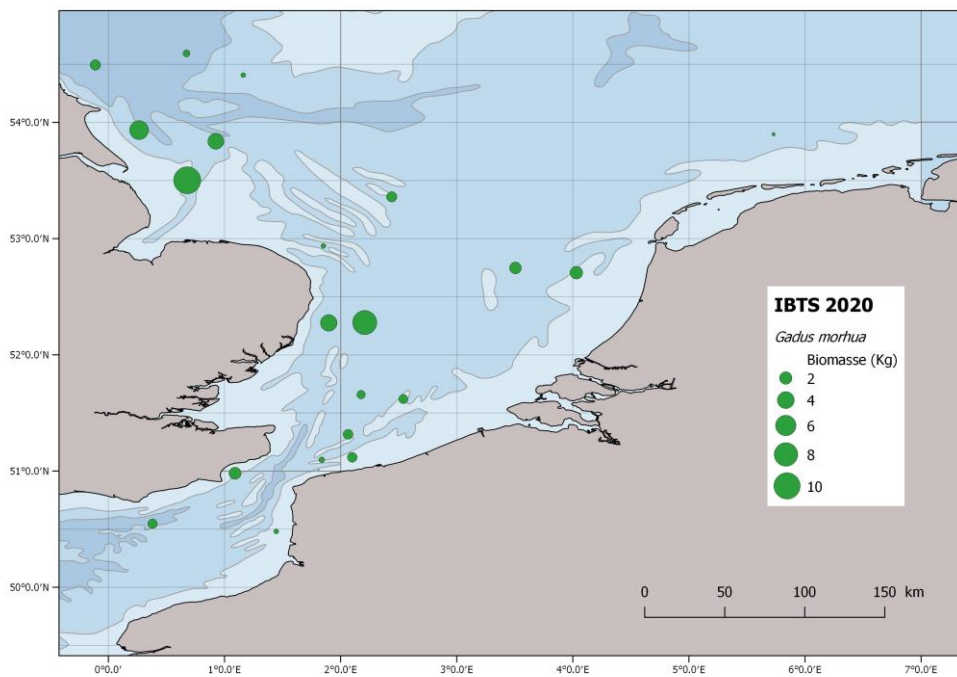
Figure 21: Cod distribution map (biomass in kilos per haul)

3.3.2.6 Mullus surmuletus (Red mullet)

The red mullet is an economically important species for trawler and seiner working in the Channel and in the southern North Sea. As the spatial distribution shown in figure 23, red mullet was present on the Eastern Channel and in southern North sea, along the English coasts. The length distribution is characterized by two cohorts (Fig 22). This year, juveniles (inferior to 16 cm, less than 1 year old) were slightly more abundant than the two previous years, but the difference is much more significant for adults (superior to 16 cm).
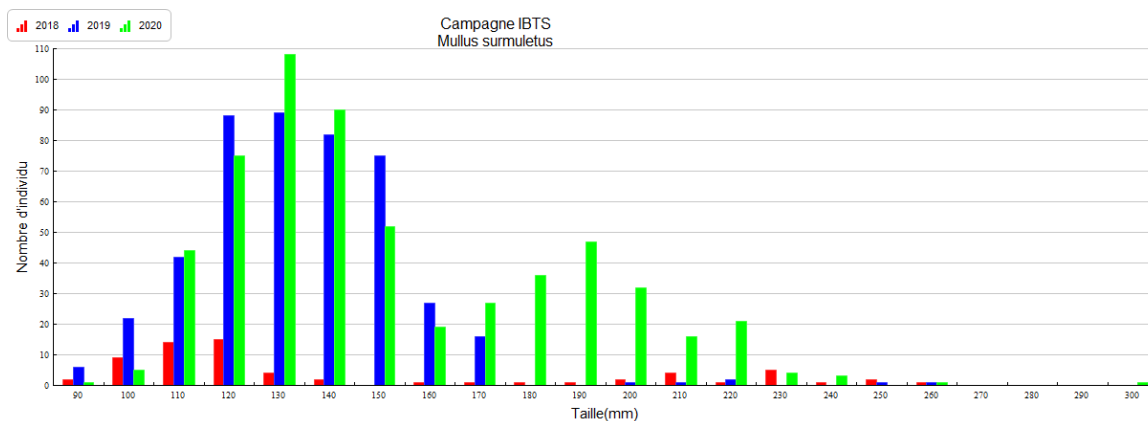
Figure 22 : Red mullet length distribution
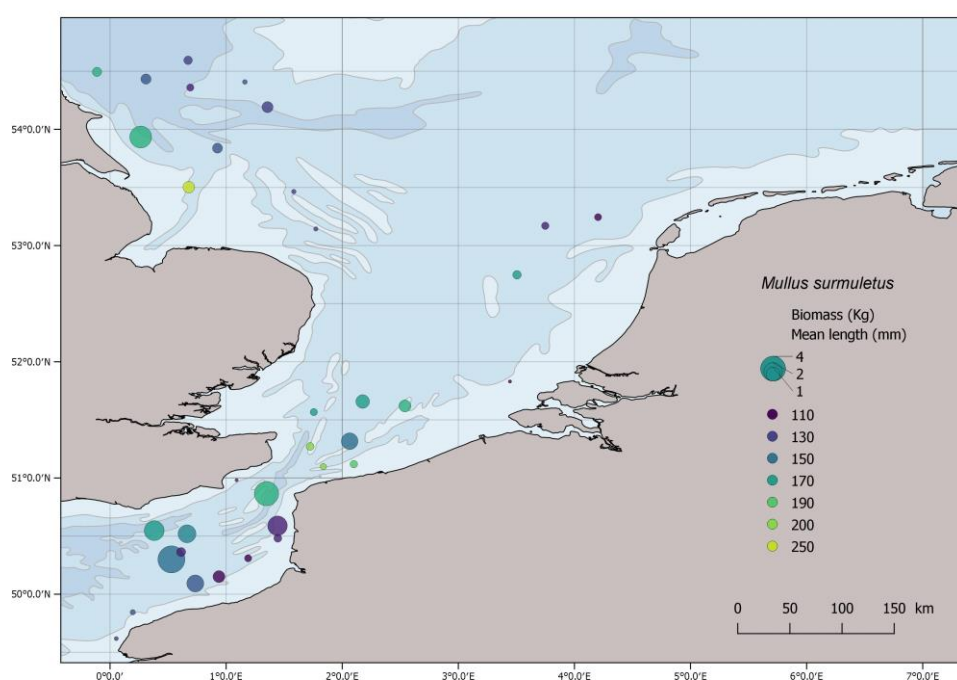
Figure 23 : Red mullet distribution map (Mean length class per haul)

3.3.2.7   Pleuronectes platessa (Plaice)

Plaice are mainly caught in bottom trawl fisheries, especially as a bycatch for undersized plaice, or even target by gill net in the eastern channel. The length distribution is spread from 7 cm until 47 cm with two peaks. The first one at 11 cm represents plaice juveniles (0 years old) and the second at 18 cm, are young adults (Fig. 24). Contrary to 2019, this year juveniles are less abundant but adults are concentrated around 18 cm and formed a bigger peak. Plaice were present on the whole area, as well in the North Sea as the English Channel, and juveniles have been mainly located along the coast (Fig. 25).
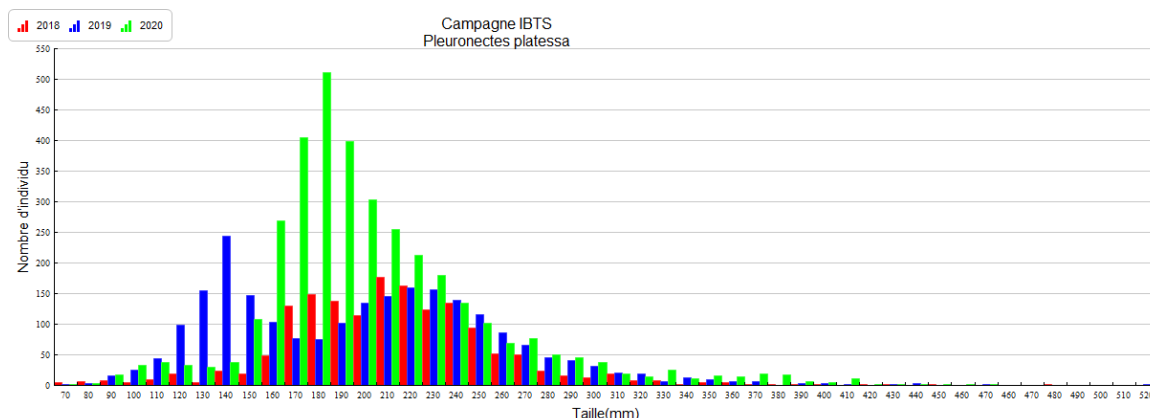
Figure 24 : Plaice length distribution
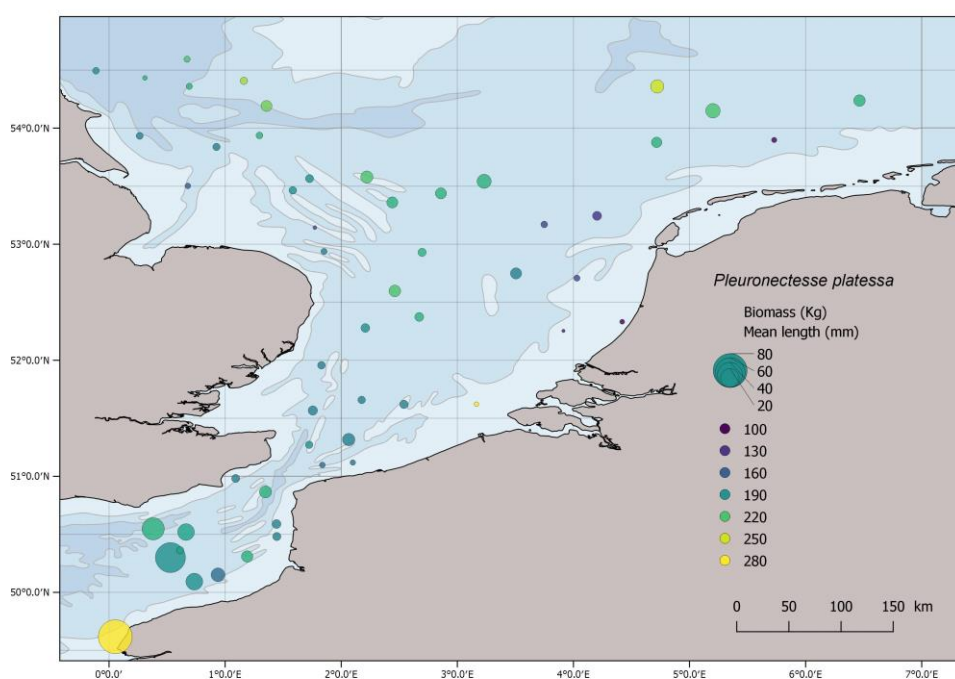
Figure 25 : Plaice distribution map (biomass in kilos per haul and length class in mm)

3.3.3 Fish larvae

A MIK net was used to sample herring larvae and thus assess their abundances (see paragraph 1.3.2). At each station (with 2 stations within each ICES rectangle), an oblique haul of at least 10 minutes duration (depending on the depth) was performed during the night. In the Eastern English Channel 20 stations were made and 83 in the North Sea (Fig 26). Positions are given Annex 2. After each station, clupeids larvae were sorted before being measured at the laboratory.
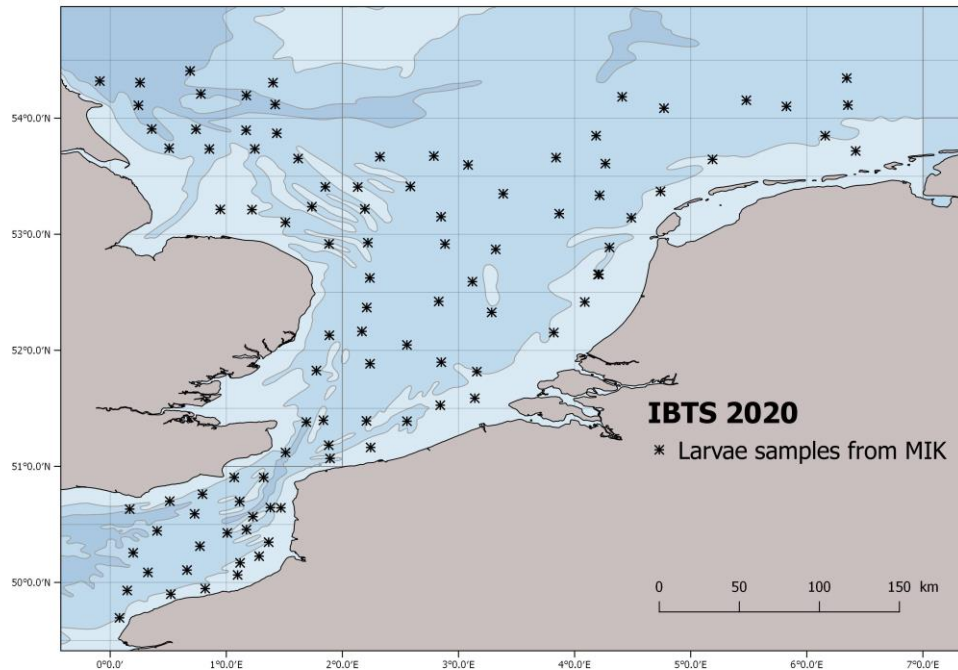
Figure 26 : positions of MIK net stations

3.3.3.1 Fish larvae distribution

Because the assessment Working Group for herring stock in the North Sea is early after the survey, it is essential to prepare data rapidly. So, for MIK samples, clupeids larval are firstly removed and determined. The other larval are sorted latter. Generally, two clupeids are caught during this survey: sardine and herring. Smalls herring larvae were caught mainly in the English Channel and along the Dutch coasts (Figure 27) and correspond to the Downs herring. Biggest larvae are from another stock and were born in September or October.

For sardines, the spawning period in the English Chanel and the south of the North Sea is diffused during the summer (Bennet D. et al, 1993). That why, sardine's larvae were caught in different size on the area (Figure 28).
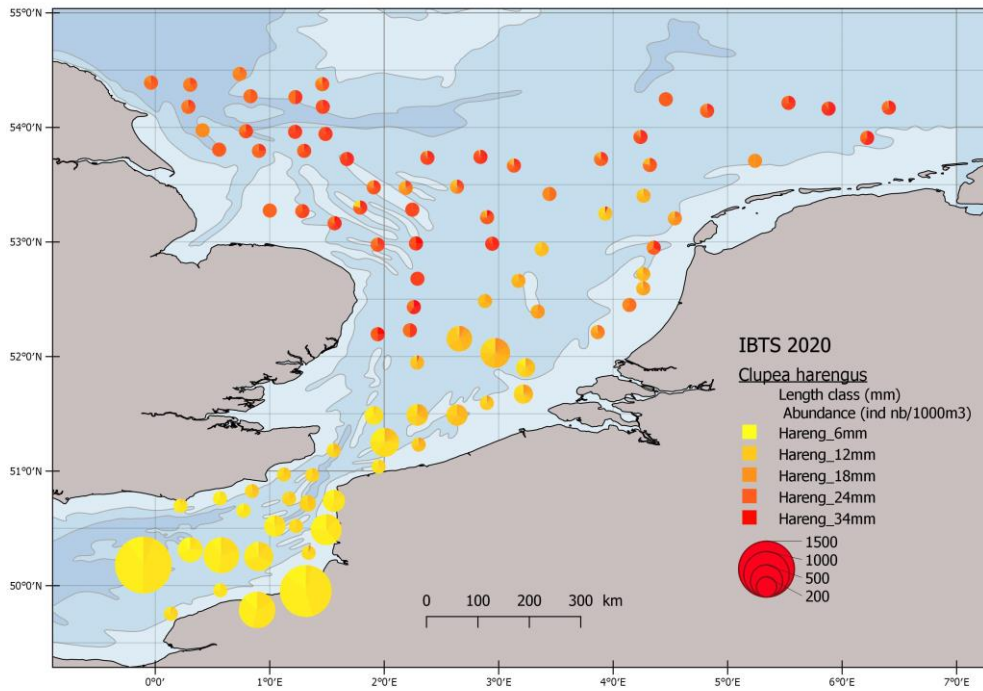
Figure 27 : Herring larvae distribution during french IBTS-Q1
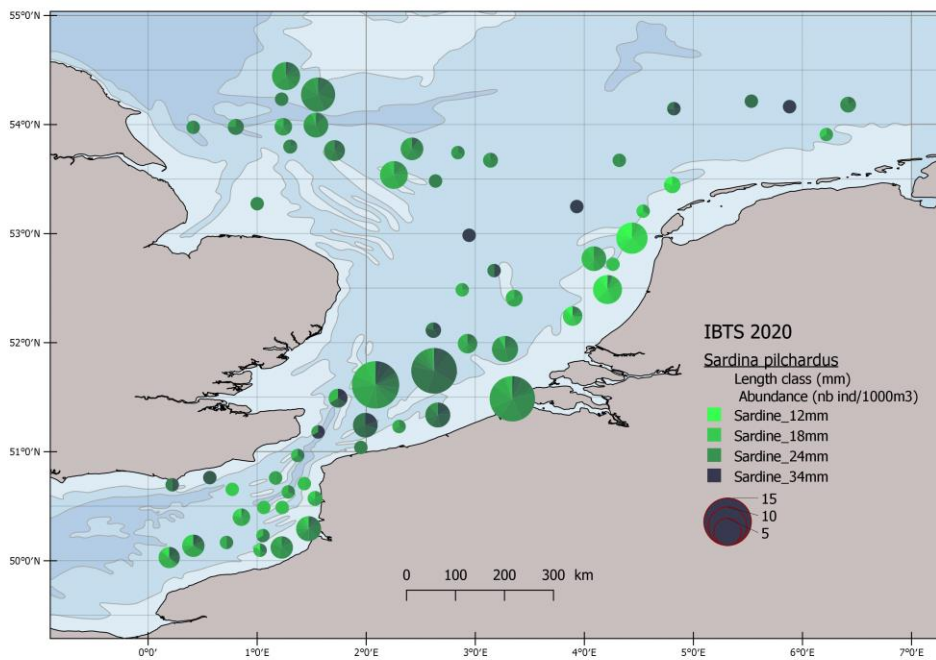
Figure 28: Sardine larvae distribution during French IBTS-Q1

3.3.4 Sea water parameters

A CTD sensor (Seabird19) was submerged after each GOV and MIK hauls to measure in priority temperature and salinity on the whole water column (Fig 28). Several sensors included in the CTD allowed measuring also other parameters as dissolved oxygen, turbidity, pH, conductivity, etc. After each station, niskin bottle samples were filtered and finally used to measure concentrations of suspended matter, chlorophyll a and nutrients. A part of water and fixed with lugol to be identified in a second time.

Figure 29 : Hydrological station. The SBE 19 sensor and the Niskin Bottle

3.3.4.1 Spatial distribution of environmental parameters

Figures 29A, 29B and 29C respectively show temperature, salinity and the algae concentration measures at the sea surface in the English Channel and in the North Sea for 2019 survey. These 3 parameters were automatically recorded along the ship route every 30s with the Ferrybox. For the year 2020, the sea surface temperature was comprised between 7.2 and 11.3°C (Fig. 29A), salinity between 30.8 and 35.3‰ (Figure 29B), total algae concentration between 0.6 and 6.3 µg.L^{-1} (Fig. 29C). The rivers and estuaries influence on salinity is well identified by looking at Belgium, Netherland and German areas (Escaut, Rhin and Elbe River, respectively).
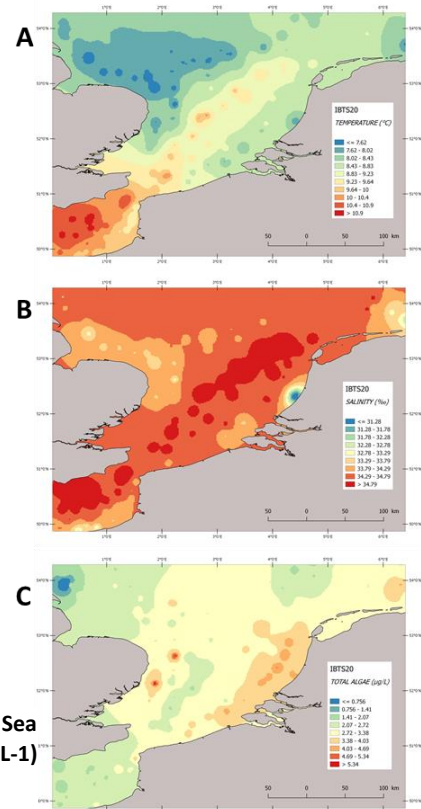
Figure 30 : Figure 30A. Sea Surface temperature (°C) during IBTS20, 30B. Sea Surface Salinity (‰) during IBTS20, 30C. Total algae concentration (µg.L-1) during IBTS20.

3.3.5 Fish eggs

Sea water was pumped at 3 meters under sea surface by the CUFES device (Continuous Underway Fish Egg Sampler) and filtered (Fig 30). Every hour, along the ship route a sample was taken during all the survey (day and night). 203 samples were collected in the English Channel and the North Sea (Fig 31). Each sample was analyzed by the Zoocam. It is a device which allows taking picture of each particle in the samples (eggs, copepods, dirts, etc.)

Figure 31 : The Continuous Underway Fish Eggs Sampler.
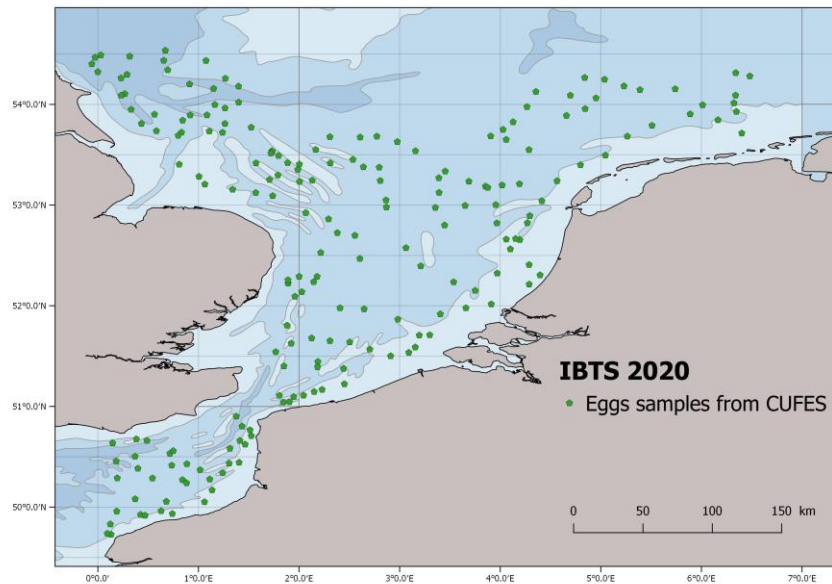
Figure 32 : Eggs samples during the IBTS 20 survey. One sample (orange point) is taken every hour.

3.3.6 Zooplankton

The WP2 net (Fig 32) was used to sample zooplankton. The mesh size for this net is 200 microns and at each station it is submerged from the surface until 3 meters upper the bottom. Fresh samples were analyzed by the zoocam. So during the survey most of samples from the CUFES and the WP2 were analyzed on board (Fig 33).

Figure 33 : WP2 net
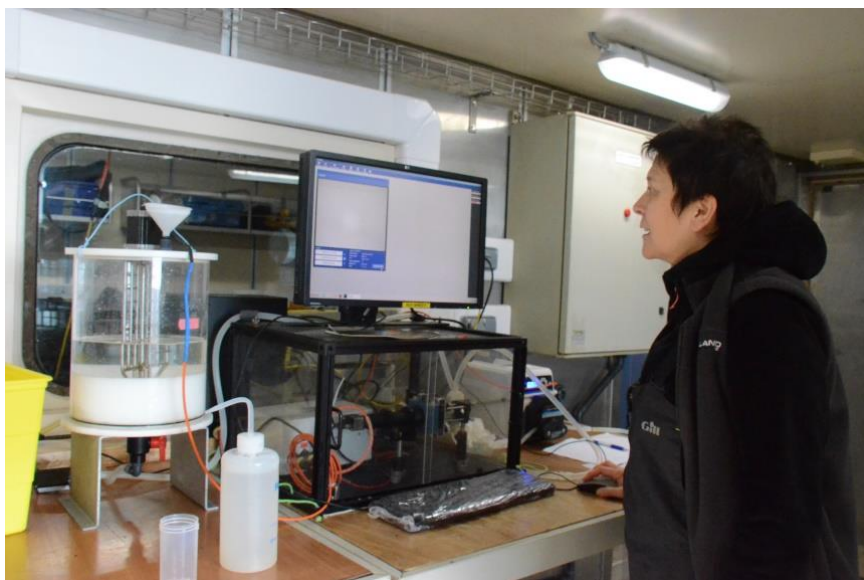
Figure 34 : Samples identification by the Zoocam device

3.3.7 Microplastics

In the context of MSFD (Marine Strategy Framework Directive), surface water samples are collected each year since 2015, in order to assess plastic particle's concentrations (300µm<size<20mm). In 2019, because of bad weather conditions, only six samples were collected by using a 'Manta' net. These data are used to study spatial distribution and temporal variations in the aim to assess the ecological state of marine ecoregions.

Figure 35 : Manta net

3.3.8 Marine mammals and birds

Information has been collected during the first part of the survey in the English Channel by several mammal and bird watchers. Posted on the higher deck of the vessel, they determined and counted mammals and sea birds according to an International protocol. In addition, floating wastes and marine traffic were also assessed.

Annexes

ANNEX 1: IBTS trawl positions 2020

StNo	HaulNo	Year	Month	Day	Stratum	ShootLat	ShootLong	HaulLat	HaulLong	Depth	HaulVal
Y0002	1	2020	1	10	29F1	50.48104333	1.445154833	50.46071567	1.433605	32	V
Y0003	2	2020	1	10	29F1	50.3089871	1.1895314	50.3212148	1.2279006	32	V
Y0011	3	2020	1	11	29F0	50.0919953	0.7344422	50.0880577	0.7017728	35	V
Y0013	4	2020	1	11	28F0	49.8445307	0.1958351	49.8385189	0.1442738	34	V
Y0015	5	2020	1	11	28F0	49.6176389	0.0537644	49.6382378	0.0784303	24	V
Y0021	6	2020	1	12	30F0	50.5470327	0.3803352	50.5408595	0.3559353	49	V
Y0023	7	2020	1	12	29F0	50.37444633	0.735993833	50.37591967	0.745305667	42	I
Y0024	8	2020	1	12	30F0	50.5194432	0.6630061	50.5164854	0.7055019	48	V
Y0031	9	2020	1	13	30F1	50.58846933	1.442407167	50.61054667	1.459886333	26	V
Y0033	10	2020	1	13	30F1	50.8655246	1.3476665	50.8462663	1.3358083	34	V
Y0038	11	2020	1	14	31F2	51.11848	2.0999024	51.1320121	2.130045	30	V
Y0040	12	2020	1	14	31F2	51.316356	2.0641599	51.3379061	2.1084886	40	V
Y0048	13	2020	1	15	32F3	51.6213006	3.1647087	51.5937813	3.1518094	26	V
Y0049	14	2020	1	15	32F3	51.8301462	3.4448208	51.840294	3.471304	29	V
Y0050	15	2020	1	15	33F3	52.2529106	3.9139914	52.2681001	3.8728787	26	V
Y0058	16	2020	1	16	36F5	53.8980174	5.729244	53.8969332	5.786494	32	V
Y0059	17	2020	1	16	36F6	53.92158917	6.300443833	53.90658033	6.264508667	30	V
Y0060	18	2020	1	16	37F6	54.237375	6.464281667	54.2686475	6.478190167	37	V
Y0067	19	2020	1	17	37F5	54.1496619	5.2017799	54.1682493	5.2412197	41	V
Y0068	20	2020	1	17	37F4	54.3594577	4.7220989	54.342197	4.772017	46	V
Y0069	21	2020	1	17	36F4	53.8775446	4.7168886	53.8546591	4.6789787	41	V
Y0076	22	2020	1	18	35F4	53.2441708	4.2035045	53.2191288	4.2186398	30	V
Y0077	23	2020	1	18	35F3	53.1698624	3.7489214	53.1428857	3.7650826	29	V
Y0078	24	2020	1	18	34F3	52.748121	3.5054508	52.7733436	3.5104019	26	V
Y0083	25	2020	1	19	34F4	52.7072255	4.0304902	52.6795402	4.0451842	26	V
Y0084	26	2020	1	19	33F4	52.3316591	4.4200546	52.3131347	4.4057178	18	V
Y0089	27	2020	1	21	33F2	52.3731432	2.6718082	52.4010705	2.6823635	44	V
Y0090	28	2020	1	21	34F2	52.5973228	2.4616909	52.611505	2.5031778	49	V
Y0091	29	2020	1	21	34F2	52.9295313	2.6965108	52.8987839	2.6949305	37	V
Y0099	30	2020	1	22	36F3	53.5415636	3.2308669	53.5418243	3.1793595	34	V
Y0100	31	2020	1	22	35F2	53.4381162	2.8587015	53.408869	2.8374288	31	V
Y0101	32	2020	1	22	35F2	53.35975	2.4399641	53.3773727	2.3885334	32	V
Y0102	33	2020	1	22	36F2	53.5785584	2.2206963	53.5864847	2.1722602	19	V
Y0109	34	2020	1	23	37F1	54.1909529	1.3563521	54.206279	1.3092944	64	V
Y0110	35	2020	1	23	37F1	54.4076265	1.16142	54.4251117	1.1104831	60	V
Y0111	36	2020	1	23	37F0	54.3598451	0.6912624	54.3793621	0.6535542	65	V
Y0112	37	2020	1	23	38F0	54.5940537	0.6721509	54.5599134	0.6646887	68	V
Y0119	38	2020	1	24	36F0	53.9335838	0.2639997	53.9675961	0.2554984	51	V

Y0120	39	2020	1	24	37F0	54.4326809	0.3094672	54.4636827	0.3201651	66	V
Y0121	40	2020	1	24	37E9	54.4944192	-0.1123582	54.486591	-0.0661968	62	V
Y0128	41	2020	1	25	36F1	53.936902	1.2956754	53.9644146	1.2834135	42	V
Y0129	42	2020	1	25	36F0	53.8381226	0.9255058	53.8391838	0.8724188	40	V
Y0130	43	2020	1	25	35F0	53.5022172	0.6786306	53.471433	0.6714868	89	V
Y0137	44	2020	1	26	36F1	53.5652749	1.7271104	53.5308084	1.7377116	36	V
Y0138	45	2020	1	26	35F1	53.4639808	1.5828136	53.4385607	1.5688827	29	V
Y0139	46	2020	1	26	35F1	53.1429907	1.7728063	53.1203012	1.7409365	35	V
Y0140	47	2020	1	26	34F1	52.9372406	1.8517231	52.9232977	1.8699084	32	V
Y0148	48	2020	1	27	33F1	52.2749902	1.8975934	52.2998111	1.900013	28	V
Y0149	49	2020	1	27	33F2	52.2778771	2.207666	52.2984048	2.221235	44	V
Y0150	50	2020	1	27	32F1	51.9569142	1.8296957	51.9310117	1.8164612	34	V
Y0158	51	2020	1	28	32F2	51.6196774	2.5401218	51.6420103	2.5568915	39	V
Y0159	52	2020	1	28	32F2	51.6580274	2.17606	51.6811421	2.1498803	46	V
Y0160	53	2020	1	28	32F1	51.566784	1.7552993	51.5419103	1.7552883	43	V
Y0168	54	2020	1	29	31F1	51.0971556	1.837475	51.1056665	1.863044	29	V
Y0170	55	2020	1	29	31F1	51.2713476	1.7237641	51.3028241	1.7262019	45	V
Y0177	56	2020	1	30	29F0	50.1510541	0.9382354	50.1556828	0.9643544	29	V
Y0178	57	2020	1	30	29F0	50.2992811	0.5286834	50.2947022	0.4972379	57	V
Y0179	58	2020	1	30	29F0	50.3625133	0.6124156	50.3617538	0.5687731	46	V
Y0184	59	2020	1	31	30F1	50.9811635	1.0903622	50.9638746	1.083873	28	V

Annex 2 : IBTS MIK positions 2020

StNo	HaulNo	Date	Stratum	ShootLat	ShootLong	HaulLat	HaulLong
Y0005	IBTSMIK1	10/01/2020	29F0	50.3123171	0.7727097	50.3192548	0.7796073
Y0006	IBTSMIK2	10/01/2020	29F1	50.0647989	1.0975264	50.0614834	1.0847407
Y0007	IBTSMIK3	10/01/2020	28F0	49.9468729	0.818363	49.9432291	0.80397
Y0008	IBTSMIK4	11/01/2020	28F0	49.8989769	0.52213	49.8907768	0.495288
Y0009	IBTSMIK5	11/01/2020	29F0	50.0867826	0.324887	50.0787231	0.3013102
Y0010	IBTSMIK6	11/01/2020	29F0	50.1069493	0.6620132	50.0994914	0.6522298
Y0016	IBTSMIK7	11/01/2020	28F0	49.6950892	0.0803103	49.6840605	0.0722018
Y0017	IBTSMIK8	11/01/2020	28F0	49.9309906	0.1465857	49.9236535	0.148818
Y0018	IBTSMIK9	11/01/2020	29F0	50.2556623	0.1982127	50.253367	0.194804
Y0019	IBTSMIK10	12/01/2020	30F0	50.6319933	0.1683343	50.630802	0.1531458
Y0020	IBTSMIK11	12/01/2020	30F0	50.7006487	0.512636	50.6972064	0.4997521
Y0025	IBTSMIK12	12/01/2020	30F0	50.5913108	0.7267541	50.5886411	0.6931379
Y0026	IBTSMIK13	12/01/2020	29F1	50.426965	1.0084767	50.4222437	0.9930698
Y0027	IBTSMIK14	12/01/2020	29F1	50.1689317	1.1188662	50.1641072	1.1129113
Y0028	IBTSMIK15	13/01/2020	29F1	50.3470981	1.3646275	50.3481885	1.3526747
Y0029	IBTSMIK16	13/01/2020	30F1	50.5664921	1.2294421	50.5669357	1.2173332
Y0030	IBTSMIK17	13/01/2020	30F1	50.6428723	1.4700297	50.6333546	1.4571984
Y0036	IBTSMIK18	14/01/2020	31F1	51.0683141	1.8935624	51.0647998	1.8864459
Y0051	IBTSMIK19	15/01/2020	33F4	52.4166444	4.0876105	52.4172604	4.0768171

Y0052	IBTSMIK20	15/01/2020	34F4	52.6552553	4.2096932	52.6559586	4.1969275
Y0053	IBTSMIK21	15/01/2020	34F4	52.8868638	4.30038	52.8843458	4.2893893
Y0054	IBTSMIK22	16/01/2020	35F4	53.1419677	4.4886641	53.1407263	4.4723407
Y0055	IBTSMIK23	16/01/2020	35F4	53.3697417	4.7403001	53.3673232	4.7240545
Y0056	IBTSMIK24	16/01/2020	36F5	53.6453705	5.1878939	53.6417143	5.1734174
Y0061	IBTSMIK25	16/01/2020	37F6	54.3456921	6.3437123	54.3371939	6.341743
Y0062	IBTSMIK26	16/01/2020	37F6	54.1133412	6.3534515	54.1023675	6.3449383
Y0063	IBTSMIK27	16/01/2020	36F6	53.7179073	6.4212252	53.7102024	6.4115919
Y0064	IBTSMIK28	16/01/2020	36F6	53.8492599	6.1581996	53.8396048	6.1582161
Y0065	IBTSMIK29	17/01/2020	37F5	54.1020293	5.8246488	54.09725	5.8191902
Y0066	IBTSMIK30	17/01/2020	37F5	54.1547539	5.4789426	54.1470565	5.4670738
Y0070	IBTSMIK31	17/01/2020	37F4	54.0861615	4.7698603	54.078714	4.7520192
Y0071	IBTSMIK32	17/01/2020	37F4	54.1843118	4.4092013	54.1820554	4.3912239
Y0072	IBTSMIK33	17/01/2020	36F4	53.8494769	4.184852	53.8581695	4.1754115
Y0073	IBTSMIK34	18/01/2020	36F3	53.6606183	3.8401744	53.660254	3.830336
Y0074	IBTSMIK35	18/01/2020	36F4	53.6088844	4.265005	53.6080777	4.2525208
Y0075	IBTSMIK36	18/01/2020	35F4	53.3361675	4.2149277	53.340735	4.1971084
Y0079	IBTSMIK37	18/01/2020	34F3	52.8700676	3.3202769	52.876602	3.3099705
Y0080	IBTSMIK38	18/01/2020	35F3	53.3493032	3.3851683	53.3587158	3.3827319
Y0081	IBTSMIK39	18/01/2020	35F3	53.1775965	3.8676457	53.1892102	3.875665
Y0082	IBTSMIK40	19/01/2020	34F4	52.6535041	4.2016869	52.6576232	4.2027416
Y0085	IBTSMIK41	20/01/2020	33F3	52.1529311	3.8205758	52.1452227	3.7888906
Y0086	IBTSMIK42	20/01/2020	33F3	52.3269568	3.2854621	52.3309877	3.2748544
Y0087	IBTSMIK43	21/01/2020	34F3	52.5916859	3.1196179	52.5989844	3.107128
Y0088	IBTSMIK44	21/01/2020	33F2	52.4212772	2.8295036	52.4213725	2.8109659
Y0092	IBTSMIK45	21/01/2020	34F2	52.9159393	2.8834087	52.9236627	2.8852317
Y0093	IBTSMIK46	21/01/2020	35F2	53.1511752	2.8498118	53.1517981	2.8283648
Y0095	IBTSMIK47	21/01/2020	35F2	53.4120601	2.5854453	53.4229614	2.5660943
Y0096	IBTSMIK48	22/01/2020	36F2	53.6680373	2.3231771	53.6759259	2.3086571
Y0097	IBTSMIK49	22/01/2020	36F2	53.6742743	2.7876704	53.6821289	2.7739026
Y0098	IBTSMIK50	22/01/2020	36F3	53.5979242	3.0820192	53.6044728	3.0635657
Y0103	IBTSMIK51	22/01/2020	35F2	53.4069932	2.1321995	53.4061903	2.1213862
Y0104	IBTSMIK52	22/01/2020	35F1	53.4086772	1.8524623	53.4152681	1.8436936
Y0105	IBTSMIK53	22/01/2020	36F1	53.6525236	1.6186508	53.6709259	1.610619
Y0106	IBTSMIK54	22/01/2020	36F1	53.8703061	1.4351598	53.8849618	1.4218265
Y0107	IBTSMIK55	23/01/2020	37F1	54.1185751	1.4205757	54.1109914	1.385715
Y0108	IBTSMIK56	23/01/2020	37F1	54.3063608	1.4024391	54.3192128	1.3925918
Y0113	IBTSMIK57	23/01/2020	37F0	54.4073681	0.6881119	54.3974893	0.6668638
Y0114	IBTSMIK58	23/01/2020	37F0	54.2092514	0.7809381	54.2075335	0.7617456
Y0115	IBTSMIK59	23/01/2020	37F1	54.1960066	1.172544	54.2056308	1.1540391
Y0116	IBTSMIK60	24/01/2020	36F1	53.8962947	1.1704656	53.8984026	1.1507586
Y0117	IBTSMIK61	24/01/2020	36F0	53.9044582	0.7387715	53.9036093	0.7227271
Y0118	IBTSMIK62	24/01/2020	36F0	53.906903	0.3580058	53.912789	0.3498151
Y0122	IBTSMIK63	24/01/2020	37E9	54.3200902	-0.0894427	54.331951	-0.105436
Y0123	IBTSMIK64	24/01/2020	37F0	54.3068268	0.2569767	54.312256	0.2316383

Y0124	IBTSMIK65	24/01/2020	37F0	54.1108514	0.2429096	54.1191436	0.2168746
Y0125	IBTSMIK66	25/01/2020	36F0	53.7411583	0.5079835	53.7422817	0.4896428
Y0126	IBTSMIK67	25/01/2020	36F0	53.7347038	0.8545875	53.7294675	0.8350298
Y0127	IBTSMIK68	25/01/2020	36F1	53.7354595	1.2454886	53.735406	1.2454215
Y0132	IBTSMIK69	25/01/2020	35F0	53.2142124	0.9478456	53.2051386	0.9314747
Y0133	IBTSMIK70	25/01/2020	35F1	53.2123976	1.2211879	53.1947622	1.2264188
Y0134	IBTSMIK71	25/01/2020	35F1	53.1026326	1.5090827	53.0962615	1.5028448
Y0135	IBTSMIK72	25/01/2020	35F1	53.23773	1.7371782	53.2333464	1.7202077
Y0136	IBTSMIK73	26/01/2020	35F2	53.2187081	2.1932518	53.218776	2.1782688
Y0141	IBTSMIK74	26/01/2020	34F1	52.916817	1.8848934	52.9083551	1.8786599
Y0142	IBTSMIK75	26/01/2020	34F2	52.9277998	2.2191099	52.9177406	2.2135152
Y0144	IBTSMIK76	26/01/2020	34F2	52.6237608	2.2361333	52.6079206	2.2232383
Y0145	IBTSMIK77	27/01/2020	33F2	52.3688382	2.2095435	52.3644276	2.1856179
Y0146	IBTSMIK78	27/01/2020	33F2	52.163083	2.1681261	52.1664376	2.1584824
Y0147	IBTSMIK79	27/01/2020	33F1	52.129541	1.8878157	52.1305372	1.8778401
Y0151	IBTSMIK80	27/01/2020	32F1	51.8259094	1.7762127	51.8215271	1.7734842
Y0152	IBTSMIK81	27/01/2020	32F2	51.8844893	2.2380745	51.8824742	2.2187823
Y0153	IBTSMIK82	27/01/2020	33F2	52.046635	2.5560069	52.0367019	2.5351824
Y0154	IBTSMIK83	28/01/2020	32F2	51.8977175	2.8515202	51.8969446	2.8313618
Y0155	IBTSMIK84	28/01/2020	32F3	51.8164556	3.1581199	51.8185577	3.1485766
Y0156	IBTSMIK85	28/01/2020	32F3	51.5873795	3.1401629	51.5848117	3.1294166
Y0157	IBTSMIK86	28/01/2020	32F2	51.5270983	2.8429768	51.5320228	2.8251357
Y0161	IBTSMIK87	28/01/2020	31F1	51.3976534	1.8360984	51.4019351	1.8256535
Y0162	IBTSMIK88	28/01/2020	31F2	51.3923876	2.2069427	51.3907658	2.1841415
Y0163	IBTSMIK89	28/01/2020	31F2	51.3892143	2.5561541	51.3911003	2.5326926
Y0165	IBTSMIK90	29/01/2020	31F2	51.1635373	2.24301	51.1707475	2.2390387
Y0166	IBTSMIK91	29/01/2020	31F1	51.1826202	1.8825967	51.1853758	1.8749732
Y0171	IBTSMIK92	29/01/2020	31F1	51.3820543	1.6895395	51.3738952	1.6845814
Y0172	IBTSMIK93	29/01/2020	31F1	51.1197239	1.5103121	51.1126276	1.4838654
Y0173	IBTSMIK94	29/01/2020	30F1	50.9045887	1.321821	50.8964955	1.2991334
Y0174	IBTSMIK95	30/01/2020	30F1	50.6447799	1.3794189	50.6416681	1.3621638
Y0175	IBTSMIK96	30/01/2020	29F1	50.4556227	1.1735787	50.4524797	1.1643263
Y0176	IBTSMIK97	30/01/2020	29F1	50.2260917	1.2830264	50.2153374	1.2748832
Y0180	IBTSMIK98	30/01/2020	29F0	50.4444529	0.4039636	50.4416671	0.3830249
Y0181	IBTSMIK99	30/01/2020	30F1	50.6977509	1.1147761	50.6926613	1.10054
Y0182	IBTSMIK100	31/01/2020	30F0	50.7609109	0.7946232	50.7639279	0.7768381
Y0183	IBTSMIK101	31/01/2020	30F1	50.9048288	1.0687128	50.9055875	1.0562365

Annex 3: Species caught during IBTS 2020 (fishes, skates, rays, and commercials crustacean and mollusk).

Aequipecten opercularis
Aequorea vitrina
Agonus cataphractus
Alloteuthis
Alosa fallax
Ammodytes marinus
Ammodytes tobianus
Anguilla anguilla
Arnoglossus laterna
Atherina presbyter
Aurelia aurita
Blennius ocellaris
Buccinum undatum
Buglossidium luteum
Callionymus lyra
Callionymus maculatus
Callionymus reticulatus
Cancer pagurus
Chelidonichthys cuculus
Chelidonichthys lucerna
Chrysaora hysoscella
Ciliata mustela
Ciliata septentrionalis
Clupea harengus
Conger conger
Cyclopterus lumpus
Dicentrarchus labrax
Echiichthys vipera
Eledone cirrhosa
Enchelyopus cimbrius
Engraulis encrasicolus
Entelurus aequoreus
Eutrigla gurnardus
Gadus morhua
Galeorhinus galeus
Gasterosteus aculeatus
Gobius gasteveni
Gobius niger
Gobius paganellus
Helicolenus dactylopterus
Hippocampus
Hippocampus hippocampus

Hippoglossoides platessoides
Homarus gammarus
Hyperoplus immaculatus
Hyperoplus lanceolatus
Leucoraja naevus
Limanda limanda
Liparis liparis
Liparis montagui
Loligo forbesii
Loligo vulgaris
Lophius piscatorius
Maja brachydactyla
Melanogrammus aeglefinus
Merlangius merlangus
Microchirus variegatus
Microstomus kitt
Mullus surmuletus
Mustelus
Mustelus asterias
Myoxocephalus scorpius
Necora puber
Nephrops norvegicus
Ostrea edulis
Pecten maximus
Pegusa lascaris
Pholis gunnellus
Phrynorhombus norvegicus
Platichthys flesus
Pleurobrachia
Pleurobrachia pileus
Pleuronectes platessa
Pollachius virens
Pomatoschistus
Pomatoschistus lozanoi
Pomatoschistus minutus
Raja brachyura
Raja clavata
Raja microocellata
Raja montagui
Raja undulata
Rhizostoma octopus
Sardina pilchardus
Scomber scombrus
Scophthalmus maximus
Scophthalmus rhombus
Scyliorhinus canicula
Sepia officinalis
Sepiola

Solea solea
Spondyliosoma cantharus
Sprattus sprattus
Syngnathus
Syngnathus acus
Syngnathus rostellatus
Taurulus bubalis
Tima bairdii
Todaropsis eblanae
Trachinus draco
Trachurus trachurus
Trigloporus lastoviza
Trisopterus esmarkii
Trisopterus luscus
Trisopterus minutus
Zeus faber