

**R/V Dana**

**Cruise 02/2019**

**"DK IBTS 1Q 2019"**



Vessel: R/V DANA

Cruise dates (planned): 7/2 – 25/2 2019

Cruise number: 02/19

Cruise name: DK IBTS 1Q 2019

<b>Port of departure:</b>	Hirtshals	<b>Date:</b>	07 Feb
<b>Port of return:</b>	Hirtshals	<b>Date:</b>	25 Feb
<b>Other ports:</b>		<b>Date and justification:</b>	

## Participants

<b>Name</b>	<b>Institute</b>	<b>Function and main tasks</b>
Kai Wieland	DTU Aqua, Monitoring	Cruise leader, Fish lab
Helle Rasmussen	DTU Aqua, Monitoring	Technician, Fish lab
Lise Sindahl	DTU Aqua, Monitoring	Technician, Fish lab
Tom Svoldgaard	DTU Aqua, Monitoring	Technician, Fish lab
Maria Jarnum	DTU Aqua, Monitoring	Technician, Fish lab
Gert Holst	DTU Aqua, Monitoring	Technician, Fish larvae
Ronny Sørensen	DTU Aqua, Monitoring	Technician, CTD, Maintenance
Bastian Huwer	DTU Aqua, Marine Living Resources	Scientist, Fish larvae and eggs
Sakis Kroupis	Institute for Sea Fisheries Bremerhaven	Guest technician, Fish lab

## Objectives

The survey is part of the 1<sup>st</sup> quarter International Bottom Trawl Survey in the North Sea (NS-IBTS), which is coordinated by the ICES International Bottom Trawl Survey Working Group and has been conducted with standard fishing gear in the 1<sup>st</sup> quarter since 1983.

The IBTS aims to provide ICES assessment and science groups with consistent and standardised data for examining spatial and temporal changes in (a) the distribution and relative abundance of fish and fish assemblages; and (b) of the biological parameters of commercial fish species for stock assessment purposes. The main objectives in the 1<sup>st</sup> quarter IBTS are to:

- To determine the distribution and relative abundance of pre-recruits of the main commercial species (cod, haddock, whiting, Norway pout, saithe, herring, sprat, and mackerel) 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 distribution of in particular herring and sprat larvae;

Technical details are described in the current version of the survey manual (ICES 2015: Manual for the International Bottom Trawl Surveys. Series of ICES Survey Protocols. SISP 1-IBTS IX. SISP 2 – MIK2. <http://datras.ices.dk/Documents/Manuals/>).

The area to be covered by Denmark with RV Dana in the 1<sup>st</sup> quarter 2019 was initially allocated during the most recent IBTS Working Group meeting in April 2018. However, the allocation of the survey areas was changed with short notice due to a breakdown of the German research vessel and a re-scheduling of the German part of the IBTS to early January using RV Dana. Originally, Germany should have covered the northern part of the NS-IBTS area while Denmark was supposed to survey a more southerly area. Due to the short daylight period at the time RV Dana was available for the German survey, the survey areas were swapped between the two countries.

## Itinerary

Scheduled departure was delayed by 6 hours due to technical issues with the engine and R/V Dana left Hirtshals on Thursday 7<sup>th</sup> February at 16:00 local time. The field work started with plankton sampling during the night and fishing commenced first next morning. Bad weather prevented any work on Sunday 10<sup>th</sup> February on the following day as well during which R/V DANA was seeking shelter off the southern Norwegian coast (Fig. 1). Poor weather conditions with strong winds (and frequently changing weather forecasts) prevailed during the entire survey (Fig. 2). R/V Dana returned to Hirtshals on Monday 25<sup>th</sup> February at 13:00 local time.

## Achievements

The re-allocated working area consisted of 46 ICES statistical rectangles located in the Skagerrak and the northern North Sea (Fig. 1). For two of these rectangles 'double coverage', i.e. two fishing stations and four plankton stations with a minimum distance of 10 nautical miles, was planned. However, due to delayed departure and bad weather not all of planned stations could be covered. That was reported in time to the coordinator and the Norwegian vessel operating in the area was able to cover two of the missing fishing stations. In summary, the following activities were carried out:

47 valid trawl hauls with a GOV 36/47 (chalut á Grande Overture Verticale), all hauls were carried with the standard groundgear A (see IBTS Manual for specifications) and with 60 m sweeps. Vonin flyers were used instead of the standard kite in all of these hauls.

40 CTD profiles (with additional sensors for dissolved oxygen, fluorescence and turbidity). The CTD sampling was dropped at 7 fishing stations to save time for conducting as many as possible fishing stations as possible. This prioritization was chosen considering the small distance between the stations and the homogeneity in the hydrographic conditions at that time of the years.

87 valid hauls with a 2 m ring net (MIK, see IBTS manual for specification). All of the of these tows were done with a 20 cm fine-meshed ringnet (MIKey M) attached to the main frame but in three cases no valid samples were received from the small net.

## Results

### *Routine sampling*

The trawl parameters (Net opening and door spread) as monitoring with a ScanMar system were in the range or close to the suggested limits specified in the IBTS manual in most cases (Fig. 3). Sensors for wing spread have not been available on this survey.

In total, 73 different species of fish and IBTS mandatory invertebrates were found in catches. The total weight of the fish and shellfish catches from the 47 tows was 9.8 tons (Tab. 1). Total catch and species richness in the standard tows ranged from 10 to 972 kg and from 9 to 30 different fish and IBTS invertebrate species, respectively (Fig. 4). Length measurements were made for all commercial and non-commercial fish, shellfish and cephalopod species. Sharks, skates and rays and selected shellfish species were measured separately by sex (length composition and weight).

Single fish data (length, weight, sex and maturity) and otoliths were collected for the main commercial species (cod, haddock, whiting, Norway pout, saithe, herring, sprat, mackerel and plaice) as well as for lemon sole, dab, witch flounder, hake and grey gurnard in order to fulfil requirements of the national DCF (Data Collection Framework of the European Union) sampling requirements (Tab. 2). The preliminary abundance indices for the main commercial species (Tab. 3) were reported to the coordinator of the 1<sup>st</sup> quarter IBTS. 10 monkfish above the usual maximum size of 60 cm were caught (Fig. 5) and more than 10 cod were larger than 80 cm were found (Fig. 6).

Total 'fishing' time and additional time the trawl was on the bottom outside the nominal tow duration of the standard tows with a nominal duration of 30 min ranged from 10 to 21 min and 4.5 to 10 min, respectively, which is positively correlated to depth and hence also to warp length, and winch speed during setting and retrieval was about 1 m/s on average (Fig. 7).

Marine litter was recorded in each GOV catch using four main categories: plastic, glass, metals and miscellaneous, which were subdivided in several minor categories to meet the request by the IBTS Working Group. The total amount of marine litter was 5.5 kg.

The MIK (500  $\mu$ m cod end mesh size) samples were pre-sorted onboard and herring larvae were counted prior to conservation in 96% ethanol for later detailed analysis and completion of length measurements in the laboratory. Herring larvae (all sizes pooled) were absent in the northern part of the survey area and were most abundant in the southern and southwestern part of the survey area (Fig. 8). A small fine-meshed (250  $\mu$ m) ring net for collecting fish eggs was attached to the main MIK, and the samples from the small ring net were conserved in buffered formaldehyde for later analysis.

Temperature, salinity and dissolved oxygen content at surface and bottom were extracted from the CTD profiles for storage in the institute's fish data base. These temperature and salinity values will be submitted to the ICES DATRAS database together with the GOV catch results to DATRAS, and the complete CTD profiles will be submitted to the ICES hydrographical data center.

Current speed and direction at surface and in the near bottom layer was recorded with a new Furuno current logger, and the data will be submitted with the GOV results to DATRAS.

### ***Additional activities***

Samples of cod livers were collected for toxicological analysis. For all cod, the liver was examined for external parasites, and the data are stored in our national database.

Selected mixed fish and shellfish species collections were taken for education and open ship arrangements at DTU Aqua, and some live fish and invertebrates were brought on shore for the Aquarium in Esbjerg and the North Sea Oceanarium in Hirtshals.

Squid samples were collected from 17 GOV stations for stomach analysis and taxonomic studies at the Institute of Baltic Sea Fisheries in Rostock, Germany.

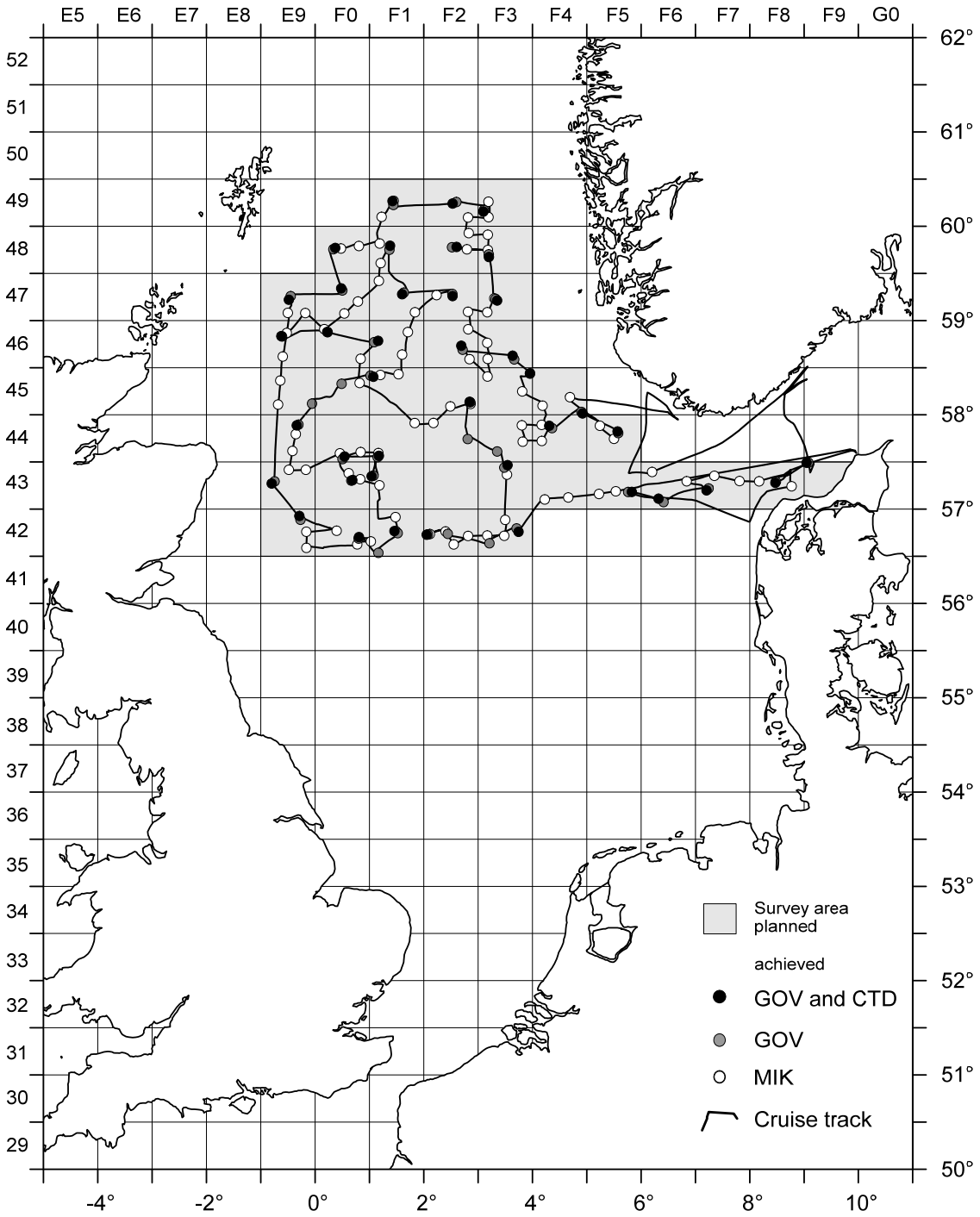


Fig. 1: Survey map with cruise track and sampling locations, Dana DK IBTS 1Q 2019.

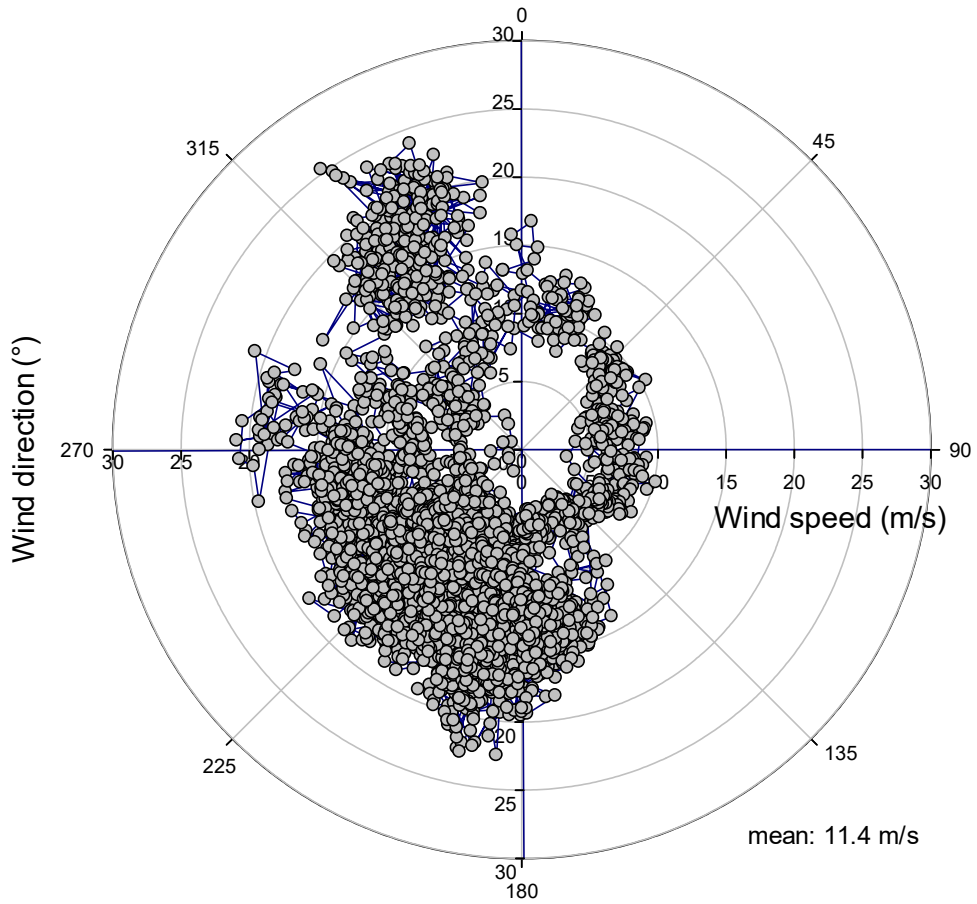


Fig. 2. Wind speed (m/s) and wind direction (°) recorded along the cruise track (mean for 5 min intervals), Dana DK IBTS 1Q 2019.

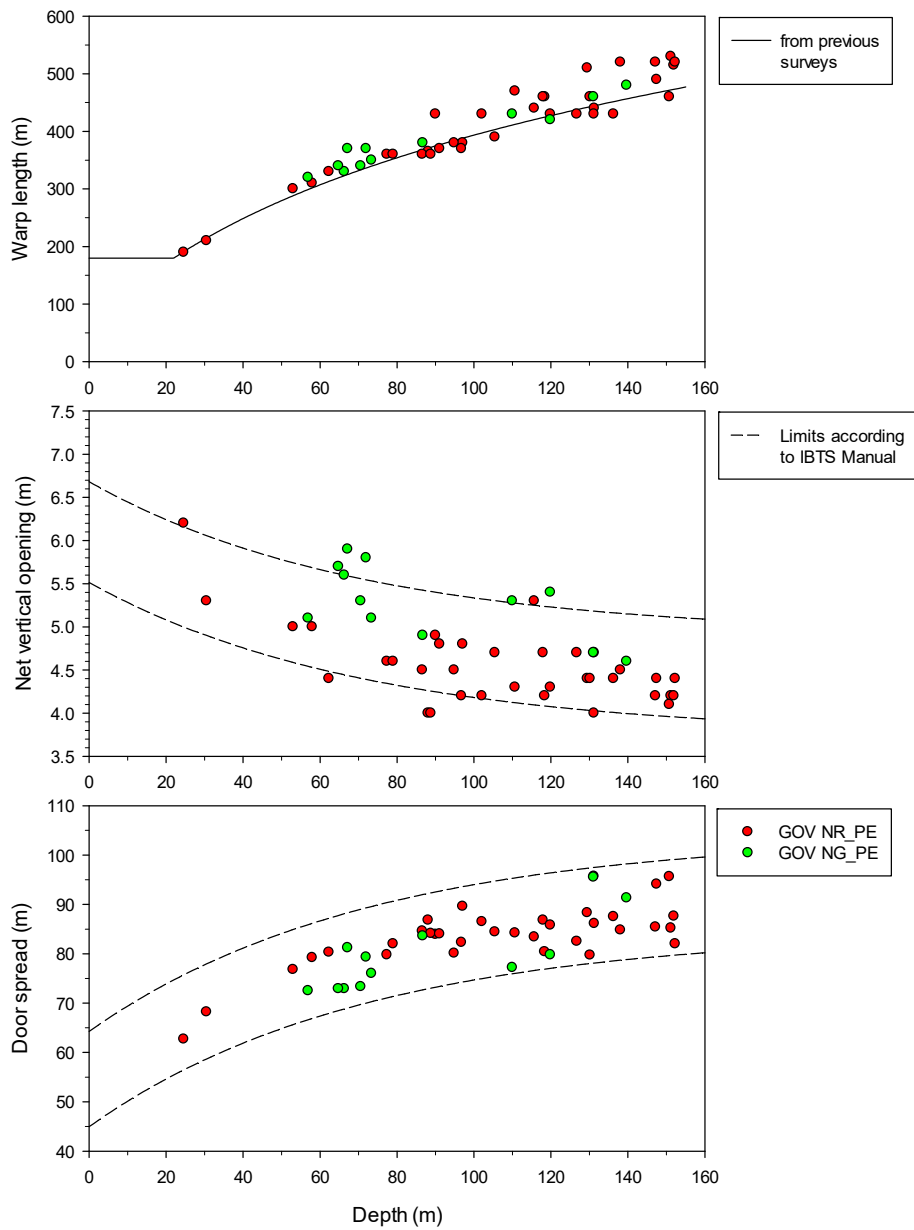


Fig. 3: Warp length, net opening and door spread in relation to depth for the two polyethylene GOV trawls used during the survey, Dana DK IBTS 1Q 2019.



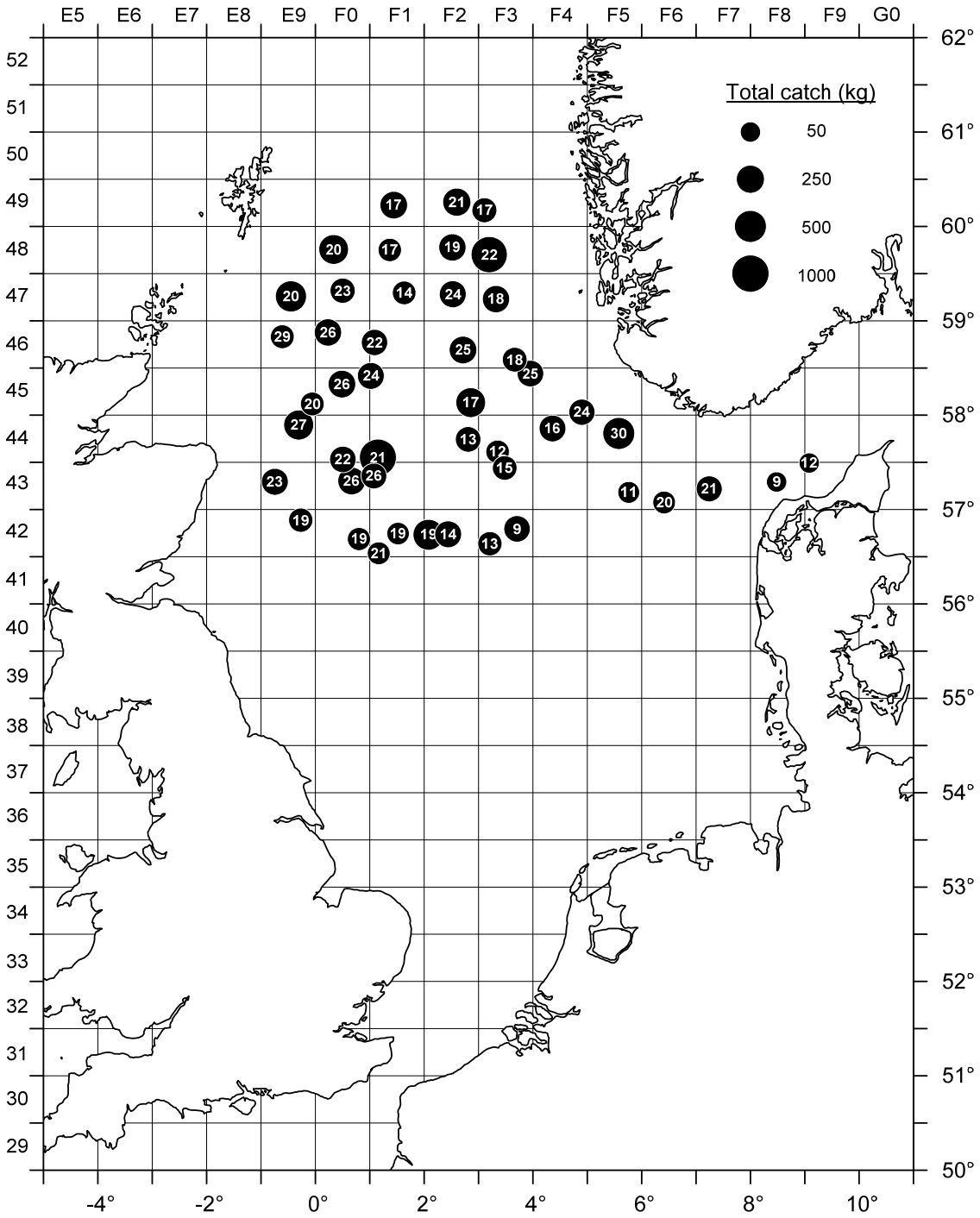


Fig. 4: Total catch (symbols) and species richness (numbers), Dana DK IBTS 1Q 2019.

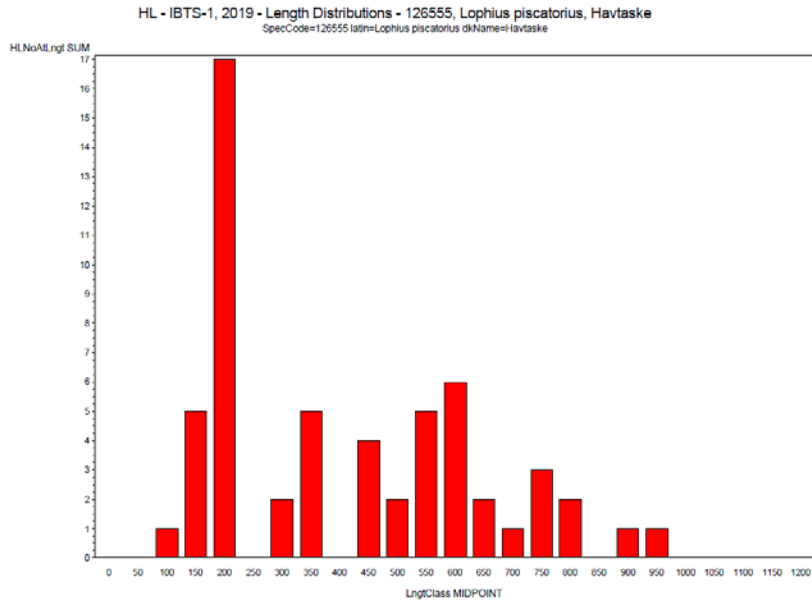


Fig. 5: Length frequency distribution of monkfish (LngrClass: in mm), Dana DK IBTS 1Q 2019.

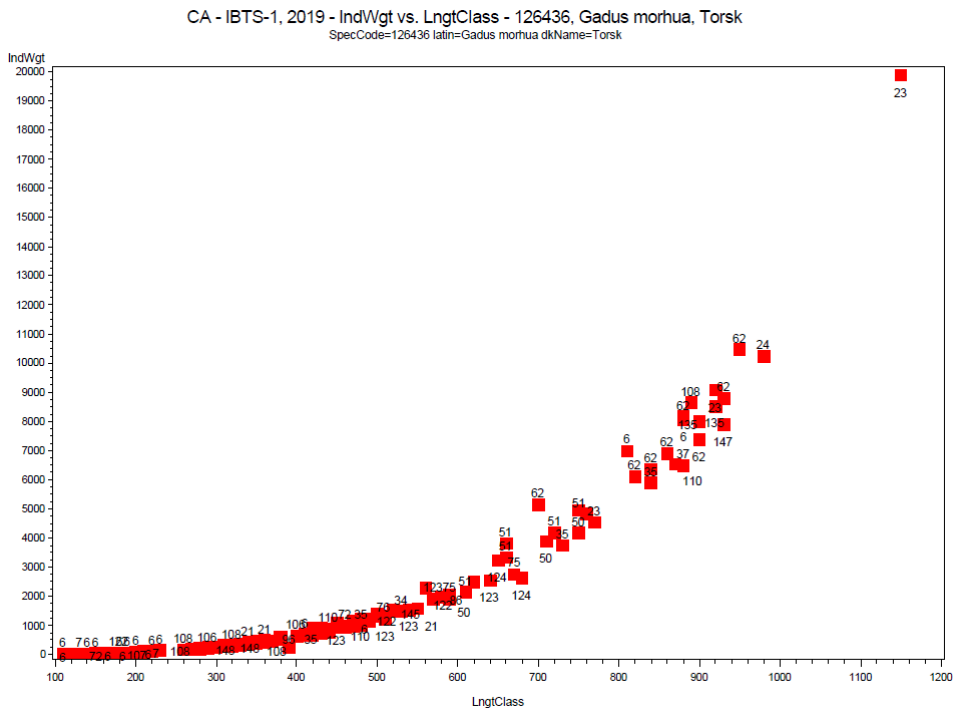


Fig. 6: Length (in mm) – weight (in g) relationship for cod (numbers at symbols denote station number, see Tab. 3 for rectangle and Fig. 1 for sampling location), Dana DK IBTS 1Q 2019.

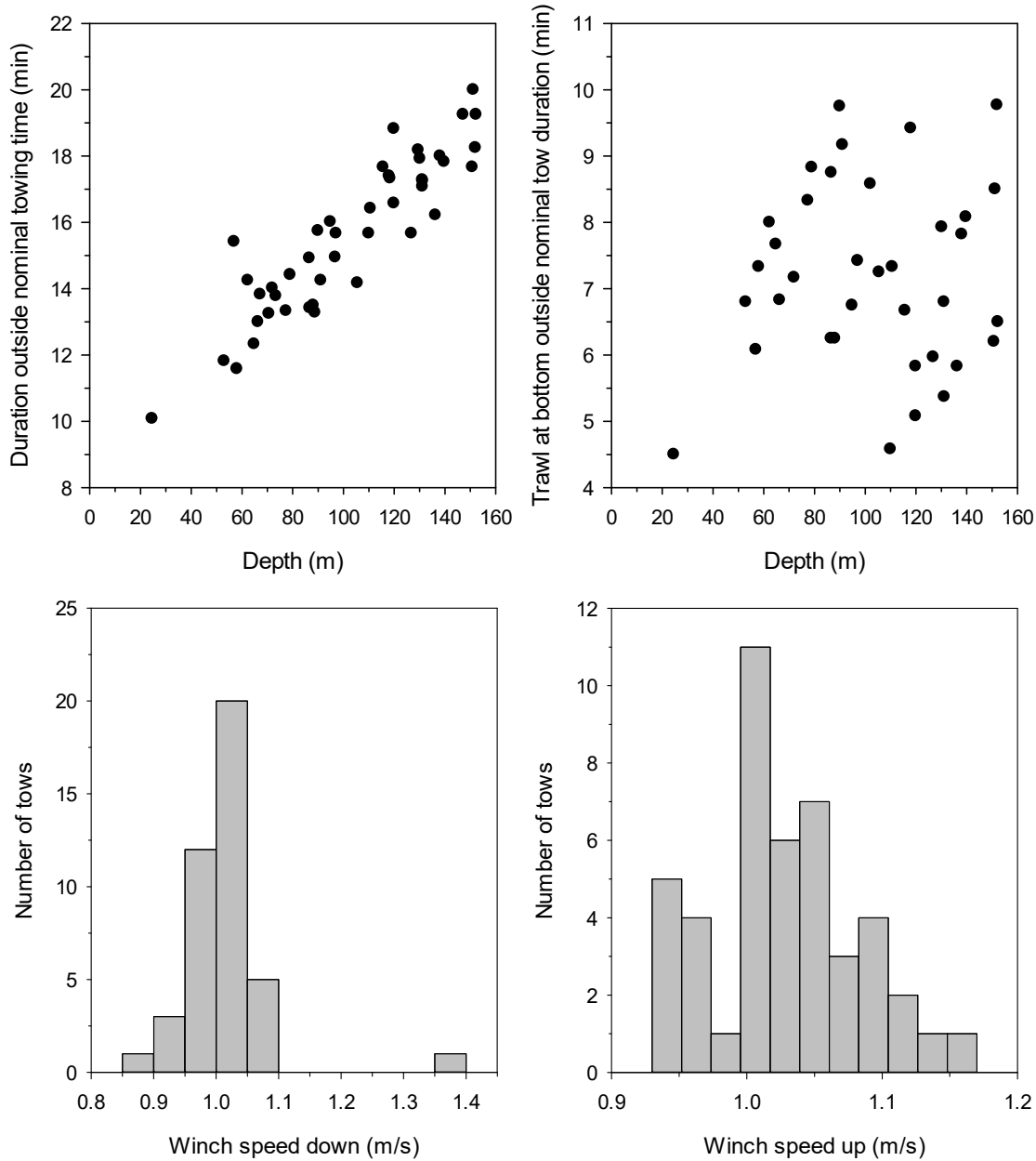


Fig. 7: Total fishing time and trawling time at bottom outside the nominal tow duration of standard 30 min tows and winch speed during setting and retrieval, Dana DK IBTS 1Q 2019.

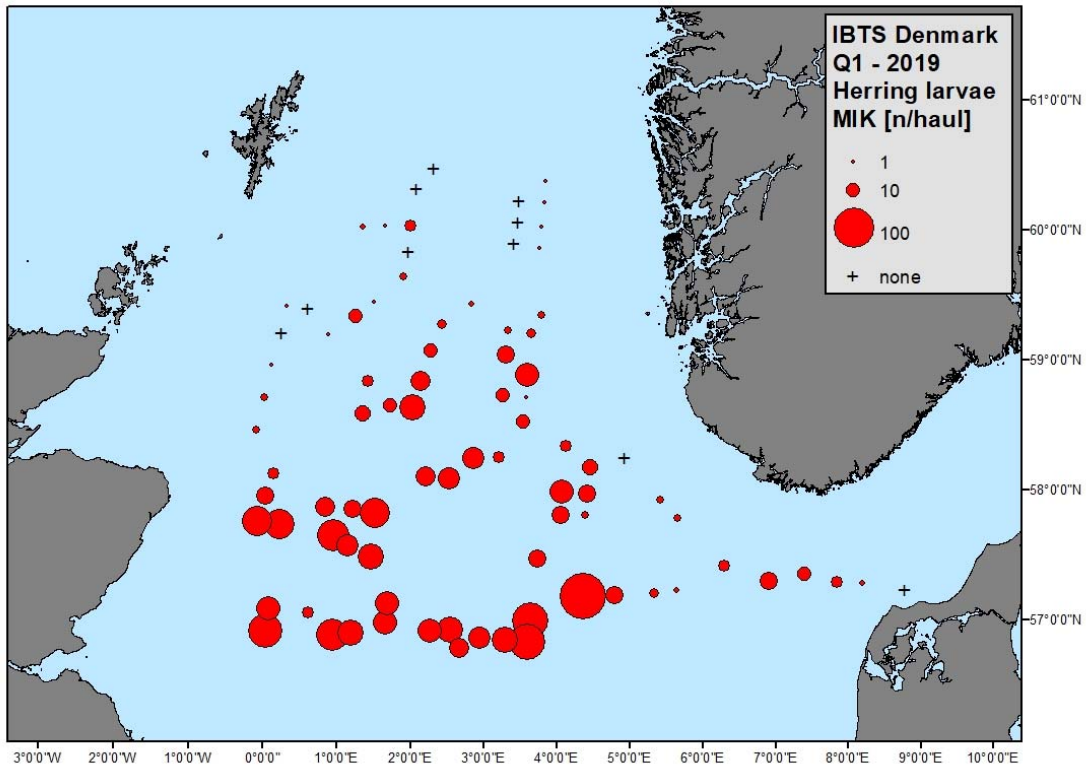


Fig. 8: Distribution of herring larvae, Dana DK IBTS 1Q 2019.

Tab. 1: Species list, Dana DK IBTS 1Q 2019 (L: total length in mm below (fish); ML: mantle length (cephalopods); CPL or CPW: carapace length or width (crustaceans)).

Latin name	English name	Danish name	Total weight (kg)	Total number	L <sub>min</sub> (cm)	L <sub>max</sub> (cm)	Remark
<i>Aequipecten opercularis</i>	Queen scallop	Jomfruøsters	0.253	4			
<i>Agonus cataphractus</i>	Pogge	Panser ulk	0.042	2	12.0	14.0	
<i>Alloteuthis subulata</i>	European common squid	Dværgeblæksprutte	49.089	14176	2.0	9.0	ML
<i>Amblyraja radiata</i>	Starry ray	Tørbe	25.418	59	27.0	47.0	
<i>Ammodytes marinus</i>	Sandeel	Tobis-hav	1.893	486	7.0	16.5	
<i>Anarhichas lupus</i>	Catfish	Stribet havkat	11.650	4	42.0	92.0	
<i>Argentina sphyraena</i>	Lesser silver smelt	Strømsild	17.983	461	8.0	25.0	
<i>Brosme brosme</i>	Tusk	Brosme	0.648	1	41.0	41.0	
<i>Callionymus lyra</i>	Common dragonet	Stribet fløjfisk	0.101	2	10.0	25.0	
<i>Callionymus maculatus</i>	Spotted dragonet	Plettet fløjfisk	0.139	21	7.0	13.0	
<i>Cancer pagurus</i>	Edible crab	Taskekrabbe	5.149	13	8.8	18.1	CPW
<i>Capros aper</i>	Boarfish	Havgalt	0.067	2	10.0	14.0	
<i>Chelidonichthys cuculus</i>	Red gurnard	Tværtribet knurhane	45.848	291	16.0	33.0	
<i>Clupea harengus</i>	Herring	Sild	1184.486	12143	8.5	34.5	
<i>Crystallogobius linearis</i>	Crystal goby	Krystalkutling	0.001	1	4.0	4.0	
<i>Cyclopterus lumpus</i>	Lumpfish	Stenbider	15.342	7	24.0	42.0	
<i>Eledone cirrhosa</i>	Horned octopus	Eledone Blæksprutte	2.553	24			
<i>Enchelyopus cimbrius</i>	Four-bearded rockling	Firetrådet havkvabbe	0.269	5	17.0	26.0	
<i>Engraulis encrasicolus</i>	Anchovy	Ansjos	0.493	36	12.0	16.0	
<i>Eutrigla gurnardus</i>	Grey gurnard	Grå knurhane	1028.298	8915	13.0	43.0	
<i>Gadiculus argenteus</i>	Silvery pout	Sølvorsk	1.995	207	4.0	13.0	
<i>Gadus morhua</i>	Cod	Torsk	328.418	216	11.0	115.0	
<i>Gaidropsarus vulgaris</i>	Three-bearded rockling	Tretrådet havkvabbe	0.030	1	16.0	16.0	
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	Trepigget hundestejle	0.010	4	6.0	6.0	
<i>Glyptocephalus cynoglossus</i>	Witch	Skærising	21.245	73	21.0	51.0	
<i>Hippoglossoides platessoides</i>	American plaice	Håising	115.679	3110	6.0	30.0	
<i>Hippoglossus hippoglossus</i>	Atlantic halibut	Hellefynder	6.016	3	54.0	59.0	
<i>Hyperoplus lanceolatus</i>	Greater sandeel	Tobiskonge	0.102	2	22.5	29.0	
<i>Illex coindetii</i>	Southern shortfin squid		134.837	1940	3.0	22.0	ML
<i>Lepidorhombus whiffiagonis</i>	Megrim	Glashvarre	7.584	13	25.0	52.0	
<i>Leucoraja naevus</i>	Cuckoo ray	Pletrokke	6.900	10	30.0	53.0	
<i>Limanda limanda</i>	Common dab	Ising	992.089	14913	10.0	32.0	
<i>Liparis liparis</i>	Sea snail	Finnebrømmet ringbug	0.004	1	7.0	7.0	
<i>Lithodes maja</i>	Norway king crab	Troldkrabbe	21.400	47	2.9	16.9	CPL
<i>Loligo forbesii</i>	Northern squid	Loligo forbesii	28.668	393	2.0	30.0	ML
<i>Loligo sp</i>	Loligo sp	Loligo forbesii/vulgaris	4.308	1351	2.0	6.0	ML
<i>Loligo vulgaris</i>	European squid	Loligo vulgaris	2.372	6	9.0	37.0	ML
<i>Lophius piscatorius</i>	Monk	Havtaske	122.781	57	10.0	95.0	
<i>Lycodes gracilis</i>	Vahls eelpout	Ålebrosme	0.014	1	15.0	15.0	
<i>Maurolicus muelleri</i>	Pearlside	Laksesild	0.013	6	4.0	7.0	
<i>Melanogrammus aeglefinus</i>	Haddock	Kuller	1880.241	12771	11.0	62.0	
<i>Merlangius merlangus</i>	Whiting	Hvilling	1714.104	10629	10.0	45.0	
<i>Merluccius merluccius</i>	Hake	Kulmule	39.442	232	17.0	53.0	
<i>Micromesistius poutassou</i>	Blue whiting	Blåhvilling	0.038	1	19.0	19.0	
<i>Microstomus kitt</i>	Lemon sole	Rødtunge	50.214	322	14.0	40.0	
<i>Molva molva</i>	Ling	Lange	6.039	7	39.0	66.0	
<i>Mullus surmuletus</i>	Striped red mullet	Stribet (rød) Mulle	1.530	16	13.0	38.0	
<i>Mustelus asterias</i>	Starry smooth-hound	Stjernehaj	36.444	24	48.0	99.0	
<i>Mustelus mustelus</i>	Smooth hound	Glathaj	12.171	11	44.0	86.0	
<i>Myoxocephalus scorpius</i>	Sculpin	Ulk	0.885	4	17.0	29.0	
<i>Myxine glutinosa</i>	Hagfish	Slimål	0.045	2	30.0	32.0	
<i>Nephrops norvegicus</i>	Norway lobster	Jomfruhummer	2.946	93	1.8	6.3	CPL
<i>Platichthys flesus x Pleuronectes platessa</i>		Skrubbe Rødspætte bastard	0.145	1	25.0	25.0	
<i>Pleuronectes platessa</i>	Plaice	Rødspætte	103.920	447	12.0	42.0	
<i>Pollachius pollachius</i>	Pollack	Lyssej	4.810	1	76.0	76.0	
<i>Pollachius virens</i>	Saithe	Sej	185.669	75	27.0	104.0	
<i>Pomatoschistus</i>	Sand gobies	Sand kutlinger	0.002	3	3.0	5.0	
<i>Raja brachyura</i>	Blonde ray	Blond rokke	1.588	2	42.0	49.0	
<i>Raja clavata</i>	Thornback ray	Sømrrokke	3.390	1	78.0	78.0	
<i>Raja montagui</i>	Spotted Ray	Storpletet Rokke	1.032	2	43.0	43.0	
<i>Rossia macrosoma</i>	Stout bobtail squid	Ross's blæksprutte	0.427	20			
<i>Sardina pilchardus</i>	Pilchard	Sardin	3.404	189	9.0	26.0	
<i>Scomber scombrus</i>	Mackerel	Makrel	114.251	2280	16.0	41.0	
<i>Scophthalmus maximus</i>	Turbot	Pighvarre	3.182	4	32.0	37.0	
<i>Scyliorhinus canicula</i>	Lesser-spotted dogfish	Småpletet rødhaj	24.075	33	20.0	67.0	
<i>Sebastes viviparus</i>	Redfish	Lille rødfisk	1.560	59	9.0	14.0	
<i>Sprattus sprattus</i>	Sprat	Brisling	5.081	785	6.0	14.5	
<i>Squalus acanthias</i>	Spurdog	Pighaj	2.983	10	22.0	71.0	
<i>Todaropsis eblanae</i>	Lesser flying squid		3.909	53	4.0	14.0	ML
<i>Trachinus draco</i>	Greater weever fish	Fjæsing	0.940	5	28.0	34.0	
<i>Trachurus trachurus</i>	Horse mackerel	Hestemakrel	1.576	30	11.0	37.0	
<i>Trisopterus esmarkii</i>	Norway pout	Sperling	1411.633	180922	7.0	21.0	
<i>Trisopterus minutus</i>	Poor-cod	Glyse	3.245	70	11.0	23.0	

Tab. 2: Number of single fish data (length, weight, sex and maturity) and samples for ageing, Dana DK IBTS 1Q 2019 (\*: no age samples).

Species	Total number
Herring ( <i>Clupea harengus</i> )	523
Sprat ( <i>Sprattus sprattus</i> )	30
Cod ( <i>Gadus morhua</i> )	196
Haddock ( <i>Melanogrammus aeglefinus</i> )	718
Whiting ( <i>Merlangius merlangus</i> )	844
Saithe ( <i>Pollachius virens</i> )	65
Norway pout ( <i>Trisopterus ermarkii</i> )	333
Mackerel ( <i>Scomber scombrus</i> )	146
Plaice ( <i>Pleuronectes platessa</i> )	215
Witch flounder ( <i>Glyptocephalus cynoglossus</i> )	52
Dab ( <i>Limanda limanda</i> )	233
Lemon sole ( <i>Microstomus kitt</i> )	103
Hake ( <i>Merluccius merluccius</i> )*	66
Grey gurnard ( <i>Eutrigla gurnardus</i> )*	60
Sum:	3584

Tab. 3: Preliminary age 1 abundance indices (number per hour trawling) for commercial IBTS species per rectangle, Dana DK IBTS 1Q 2019.

station	rect	herr	cod	had	w hi	Npout	sprat	mack
6	43F7	1691	30	0	395	232	2	75
7	43F6	1609	4	0	128	0	0	26
8	43F5	10	0	0	0	0	0	1241
13	43F8	738	0	0	24	0	470	0
15	43F9	609	2	0	36	0	423	0
21	44F5	0	0	0	27	81299	0	4
23	45F4	0	2	2	64	9780	0	46
24	44F4	2	0	60	0	0	0	2
34	45F3	0	0	9	0	2122	0	4
35	46F3	0	0	64	2	6598	0	24
37	46F2	0	0	14	30	26302	0	146
48	47F3	0	0	0	0	2781	0	4
50	48F3	0	0	2	0	1075	0	8
51	48F2	0	0	740	84	31733	0	502
61	49F3	0	0	68	0	0	0	8
62	49F2	0	2	3146	20	171	0	12
64	49F1	0	0	1057	7	22	0	34
72	48F0	0	2	1105	0	23039	0	136
75	47F0	26	0	18	12	10334	0	12
76	47E9	2	0	20	28	142	0	4
84	43E9	0	0	2920	6	2176	0	0
86	42E9	0	0	176	68	0	0	0
95	42F0	0	2	2	2	22	0	2
96	42F1	14	2	39	44	2	0	2
97	42F1	30	0	6	18	522	0	0
106	43F0	2	2	39	28	0	0	2
107	44F0	0	6	205	52	2237	0	6
108	44F1	10	0	0	0	0	0	0
110	43F1	8	0	106	18	123	0	0
121	44E9	0	2	38	103	838	0	2
122	45E9	12	2	0	14	12404	0	2
123	45F0	297	0	0	23	47295	0	0
124	45F1	2	0	4	18	20533	0	0
133	47F2	0	2	172	91	9153	0	6
135	47F1	0	0	252	0	36	0	0
136	48F1	0	0	1157	12	0	0	0
145	46E9	14	0	0	0	0	0	0
147	46F0	16	0	24	19	6	0	6
148	46F1	2	0	184	48	0	0	0
157	45F2	0	0	6	20	0	0	0
158	44F2	0	4	2	20	0	0	6
159	44F3	0	0	2	28	0	0	0
160	43F3	0	0	0	20	0	0	422
171	42F2	10	0	172	812	0	0	2
172	42F2	0	0	2	39	0	0	1001
173	42F3	0	0	0	14	0	0	635
174	42F3	0	0	0	6	0	0	0