

R/V Dana

Cruise 02/2020

"DK IBTS 1Q 2020"



Vessel: R/V DANA

Cruise dates (planned): 11/2 – 28/2 2020

Cruise number: 02/20

Cruise name: DK IBTS 1Q 2020

Port of departure:	Hirtshals	Date:	11 February
Port of return:	Hirtshals	Date:	28 February
Other ports:	Esbjerg	Date and justification:	19 February: Scheduled exchange of scientific staff and crew, Repair of winch for MIK

Participants

Leg 1: Hirtshals – Esbjerg		
Name	Institute	Function and main tasks
Helle Rasmussen	DTU Aqua, Monitoring Hirtshals	Cruise leader, Fish lab
Jesper Knudsen	DTU Aqua, Monitoring Hirtshals	Technician, Fish lab
Tom Svoldgaard	DTU Aqua, Monitoring Hirtshals	Technician, Fish lab
Maria Jarnum	DTU Aqua, Monitoring Hirtshals	Technician, Fish lab
Reinhardt Jensen	DTU Aqua, Monitoring Hirtshals	Technician, Fish lab
Bastian Huwer	DTU Aqua, Lyngby	Scientist, Fish eggs and larvae
Gert Holst	DTU Aqua, Monitoring Hirtshals	Technician, Fish eggs and larvae
Ronny Sørensen	DTU Aqua, Monitoring Hirtshals	Technician, CTD, Maintenance
Louise Flensburg	DTU Aqua, Lyngby	Scientist, Jellyfish

Leg 2: Esbjerg – Hirtshals		
Name	Institute	Function and main tasks
Kai Wieland	DTU Aqua, Monitoring Hirtshals	Cruise leader, Fish lab
Helle Rasmussen	DTU Aqua, Monitoring Hirtshals	Technician, Fish lab
Tom Svoldgaard	DTU Aqua, Monitoring Hirtshals	Technician, Fish lab
Jesper Knudsen	DTU Aqua, Monitoring Hirtshals	Technician, Fish lab
Mads Jensen	DTU Aqua, Monitoring Hirtshals	Technician, Fish lab
Bastian Huwer	DTU Aqua, Lyngby	Scientist, Fish eggs and larvae
Gert Holst	DTU Aqua, Monitoring Hirtshals	Technician, Fish eggs and larvae
Ronny Sørensen	DTU Aqua, Monitoring Hirtshals	Technician, CTD, Maintenance
Louise Flensburg	DTU Aqua, Lyngby	Scientist, Jellyfish

Objectives

The survey is part of the 1st 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 1st 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 1st 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 1st quarter 2020 was initially allocated during the most recent IBTS Working Group meeting in April 2019. However, the allocation of the survey areas was changed with short notice just prior to the 1st leg of the cruise and updated again at the beginning of the 2nd cruise leg due to several reasons:

- No permit for Germany to operate in UK waters.
- Technical problems covering North Sea rectangles by Sweden
- Poor coverage in some core area by e.g. Scotland in UK waters due to adverse weather conditions.

Additional requests from the IBTS WG for the 1Q survey in 2020 were to collect information on the trawl setting and retrieval duration of the standard 30 minute tows.

Itinerary

R/V Dana left Hirtshals on Tuesday 11th February at 12:30 local time which behind the schedule departure time set for 11:00, and the weather conditions did not allow to start the field work that day. Field work began in the western Skagerrak with plankton sampling on 11th February in the evening and the first fishing track was done on 13th February in the north-eastern North Sea. The vessel stayed in the port of Esbjerg on Wednesday 19th February from 9:00 to 15:30 for a scheduled exchange of scientific staff and crew and a repair of the winch used for the MIK delaying the departure which had been scheduled for 12:30, and due to the late departure not fishing was possible on that day.

Extremely adverse weather conditions prevailed in particular during the 1st cruise leg and some more favourable conditions were met first during the last two days of the 2nd cruise leg (Fig. 2a), and the weather conditions prevented any field work on several days (Fig. 2b). R/V Dana returned to Hirtshals on Friday 28th February at 14:00 local time.

Achievements

The original survey area consisted of 43 ICES statistical rectangles located in the Skagerrak and the North Sea (Fig. 1). The working area was changed several times during the survey and sampling focused on rectangles which had not been covered at all by other countries

or where fishing or plankton stations were missing. The number of CTD stations on fishing tracks during the day were reduced in favor to conduct more fishing stations.

The following activities were carried out:

34 valid standard 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. In all of hauls two Vonin flyers were used replacing the standard kite. At two additional stations, the tows were invalid (gear parameters outside the requested limits or trawl damage).

26 CTD profiles (with additional sensors for dissolved oxygen, fluorescence and turbidity) at standard GOV stations.

65 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 3 cases no valid samples were received from the small net. At 4 other stations the tows were invalid. 2 additional stations for flowmeter calibration.

Results

Routine sampling

The trawl parameters for the standard tows (vertical 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. 3a). The remaining deviations from the theoretical values for door spread and in particular net opening are likely due to the high sensibility of the GOV to current effects. However, the wire length to depth ratio should be updated and slightly longer wire length at depths below 95 m maybe used in future surveys. New Marport distance sensors were tried for measuring wing spread but the results were only obtained for a stations and were not very convincing at all (Fig. 3b). This was caused by some problems with the technical setup but also because of the poor weather conditions.

In total, 68 different species of fish and invertebrates were found in catches. The total weight of the catches from the 34 valid tows has been 10.5 tons (Tab. 1). Total catch of fish, cephalopods and shellfish and species richness in the standard tows ranged from 24 to 1261 kg and from 10 to 27 different fish and IBTS invertebrate species with low and species-poor catches predominantly recorded in the north-western part of the survey area (Fig. 4).

Length measurements were made for all commercial and non-commercial fish 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 hake in order to fulfil requirements of the national DCF (Data Collection Framework of the European Union) sampling requirements (Tab. 2). It appears noteworthy that for haddock in particular in the size range of 26 – 40 cm a very poor condition was observed (Fig. 5).

Total 'fishing' time and additional time the trawl was on the bottom outside the nominal tow duration of the 30 min standard tows ranged from 9 to 19 min and 2 to 9 min, respectively, of which total fishing time is positively correlated to depth, and winch speed during deployment and retrieval amounted to about 1 m/s on average (Fig. 6).

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 recorded from the catch retrieved in the cod-end was 3.95 kg.

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. The 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.

Additional activities

Selected fish and squid species collections were taken for education and open ship arrangements at DTU Aqua.

Others

A cruise summary report has been delivered online to

http://seadata.bsh.de/csr/online/V1_index.html.

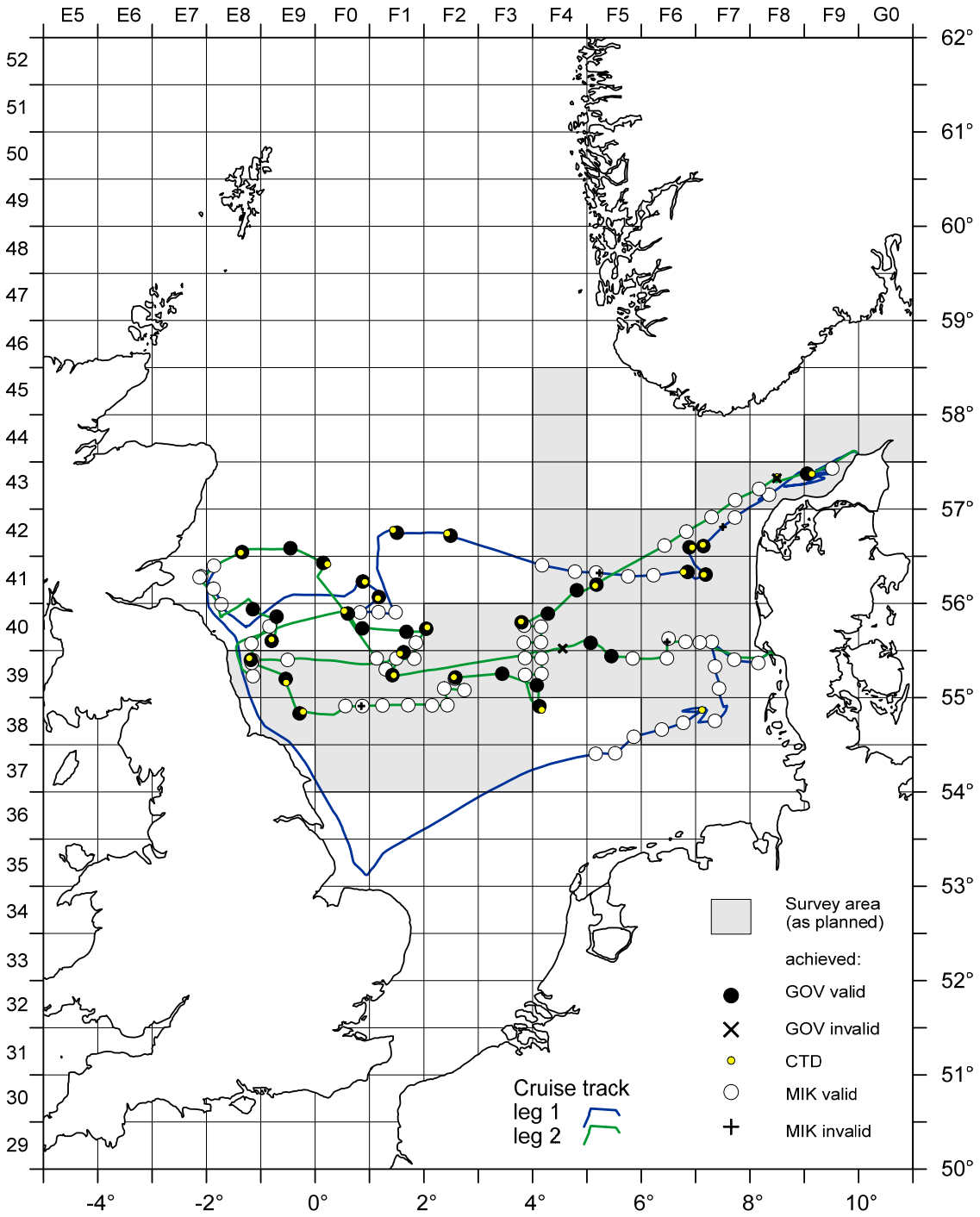


Fig. 1: Survey map with cruise track and sampling locations, Dana DK IBTS 1Q 2020.

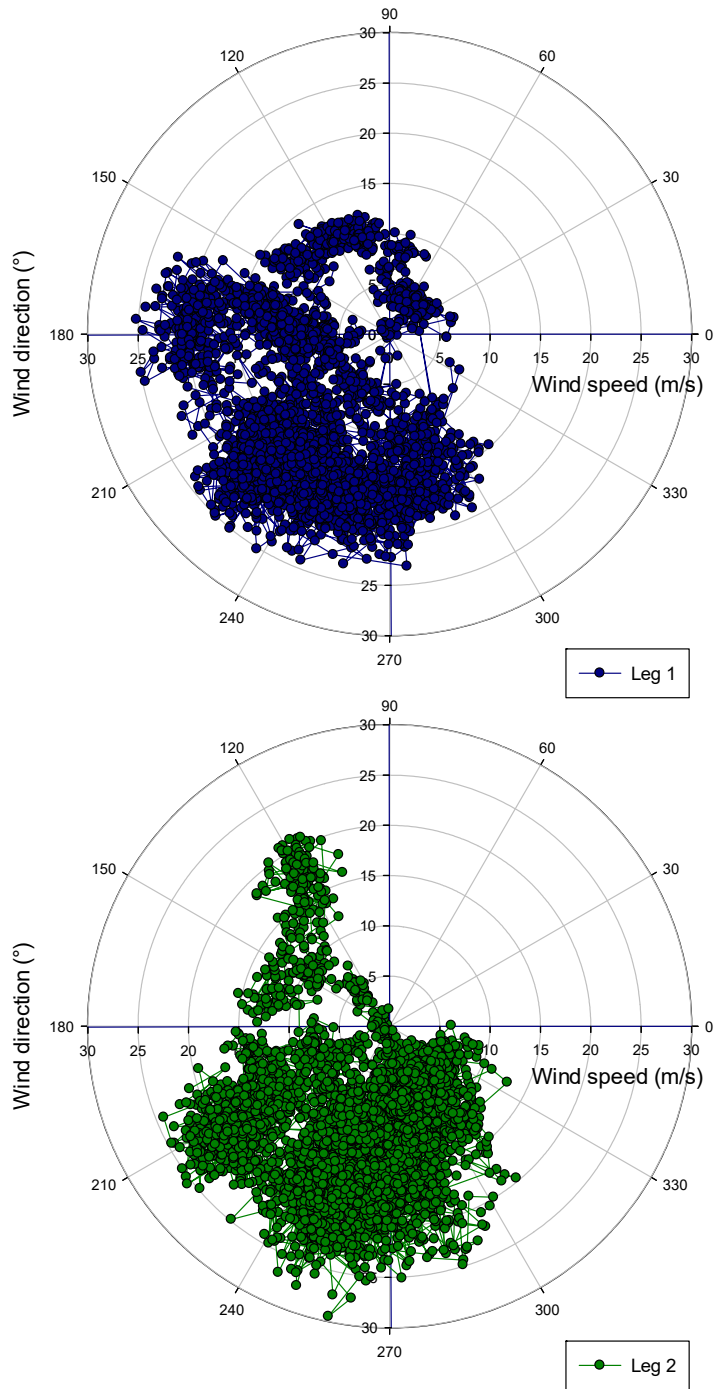


Fig. 2a. Wind speed (m/s) and wind direction ($^{\circ}$) recorded along the cruise track, Dana DK IBTS 1Q 2020.

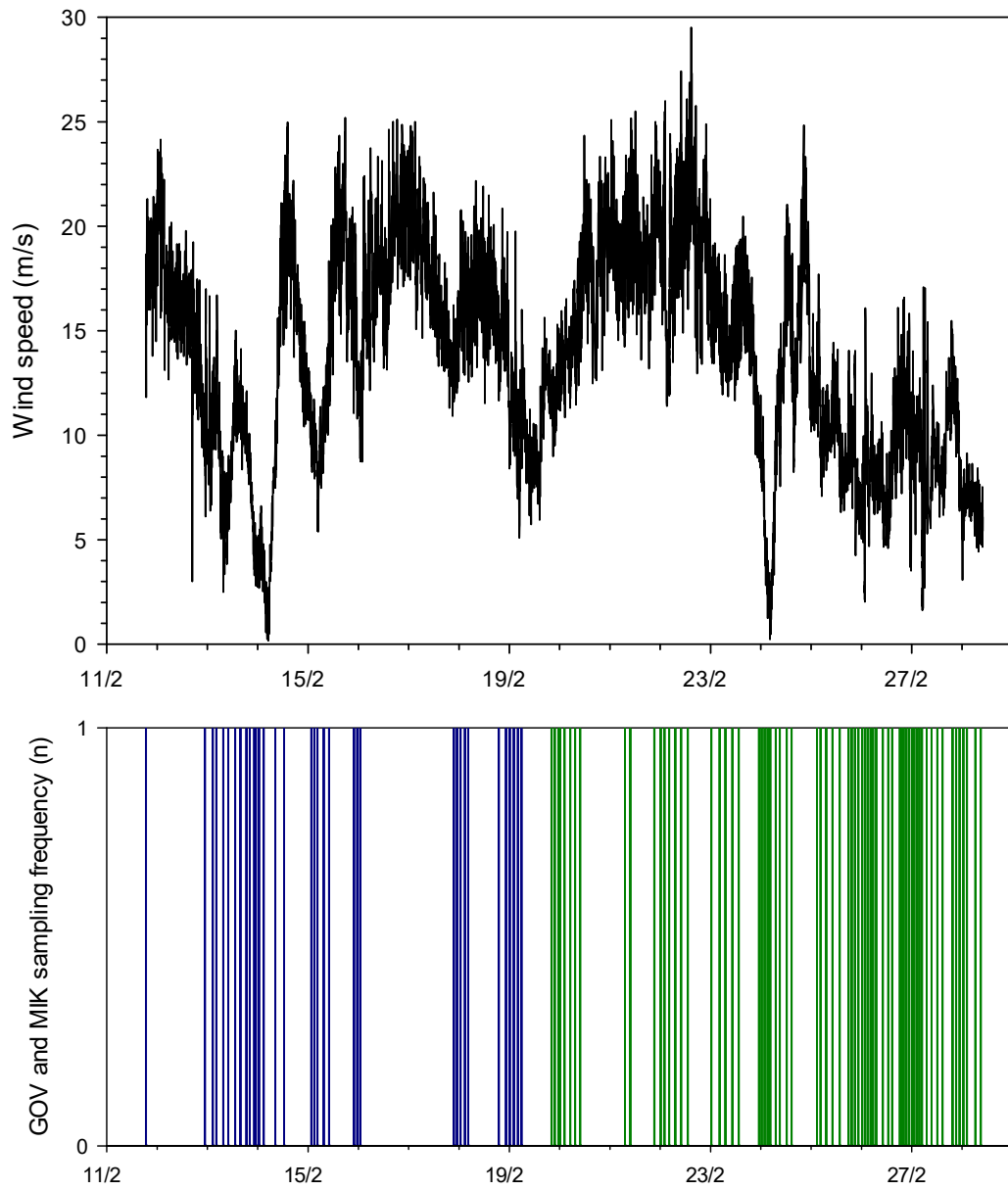


Fig. 2b. Wind speed (m/s) recorded along the cruise track and frequency of sampling activities (MIK and GOV), Dana DK IBTS 1Q 2020.

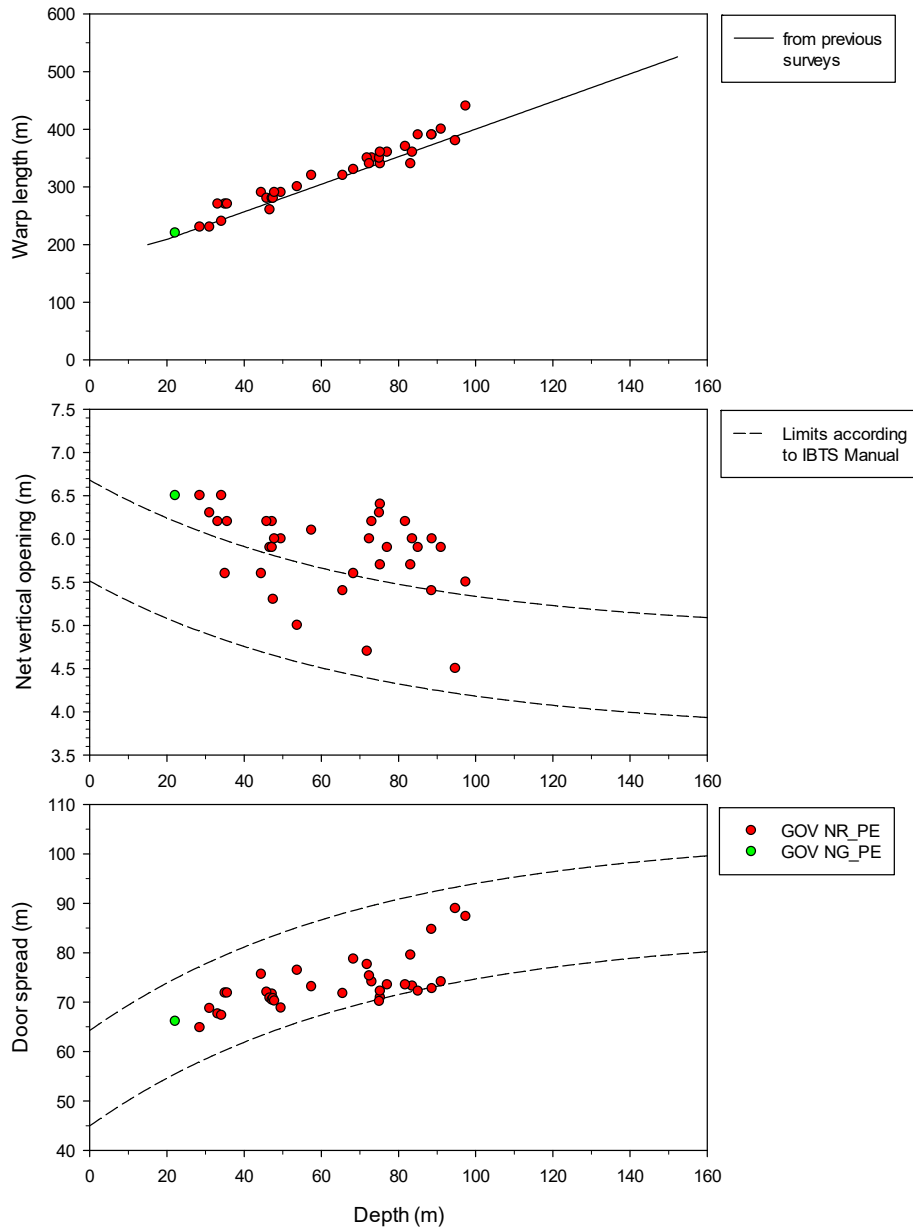


Fig. 3a: Warp length, net opening and door spread in relation to depth, Dana DK IBTS 1Q 2020.

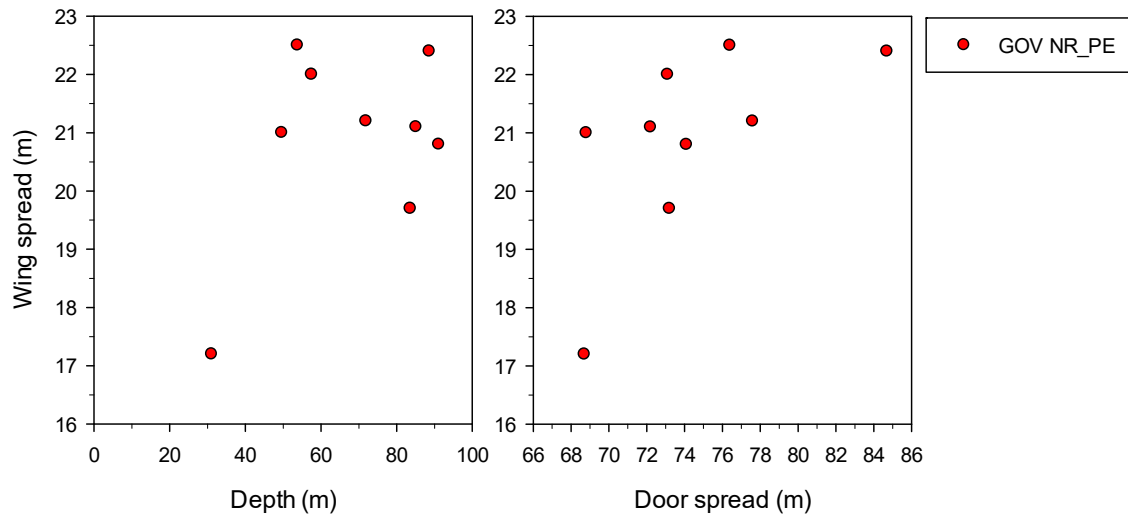


Fig. 3b: Wing spread in relation to depth and door spread, Dana DK IBTS 1Q 2020.

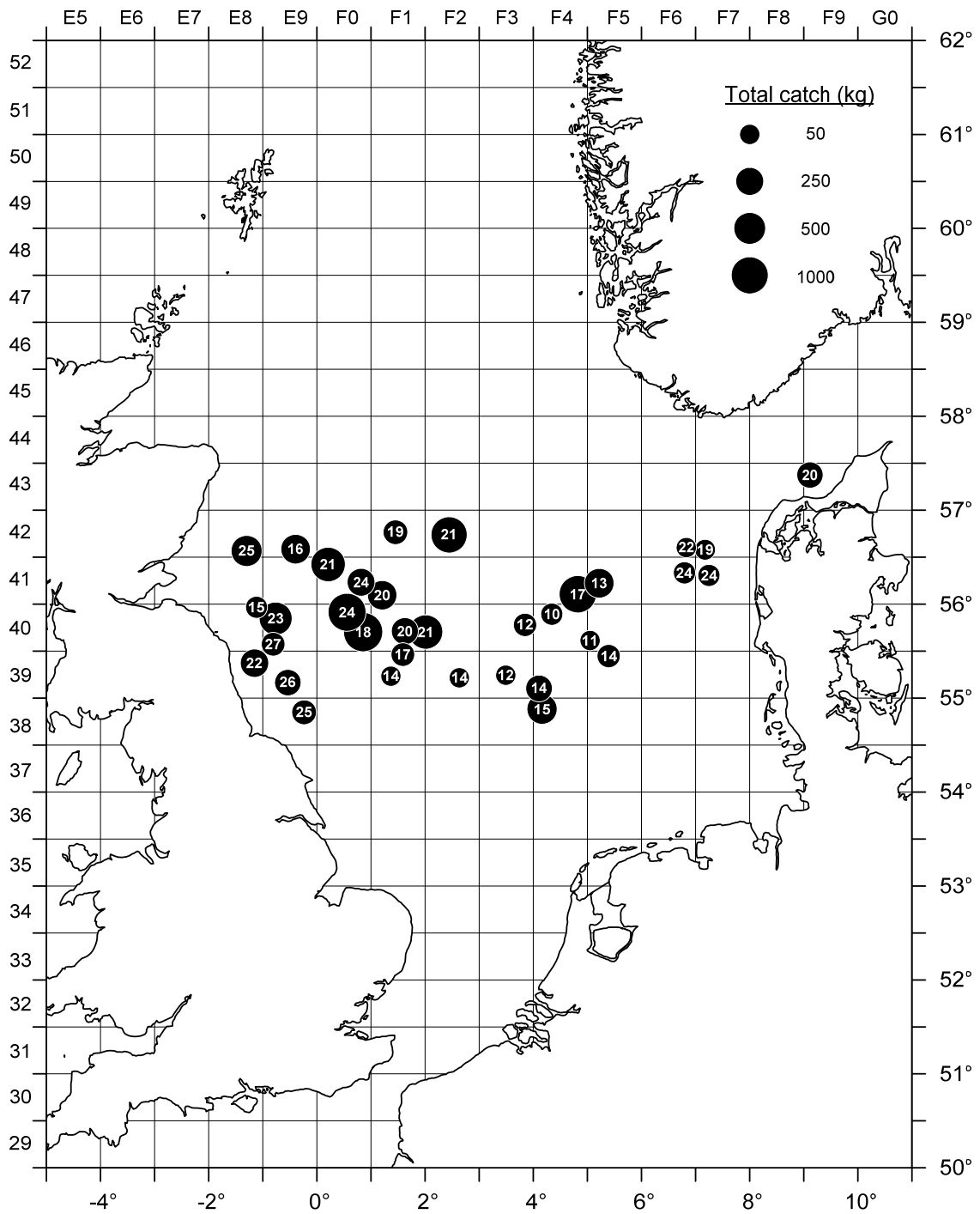


Fig. 4: Total catch (symbols) and species richness (numbers), Dana DK IBTS 1Q 2020.

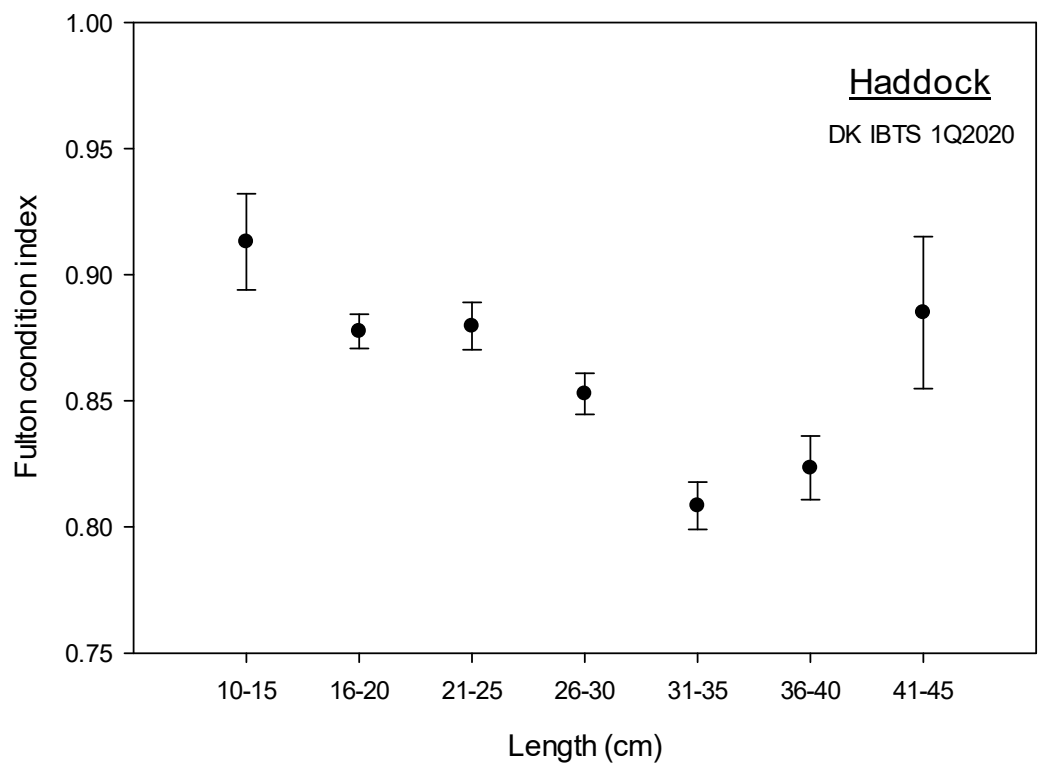


Fig. 5: Fulton condition index for haddock (based on ungutted weight), Dana DK IBTS 1Q 2020.

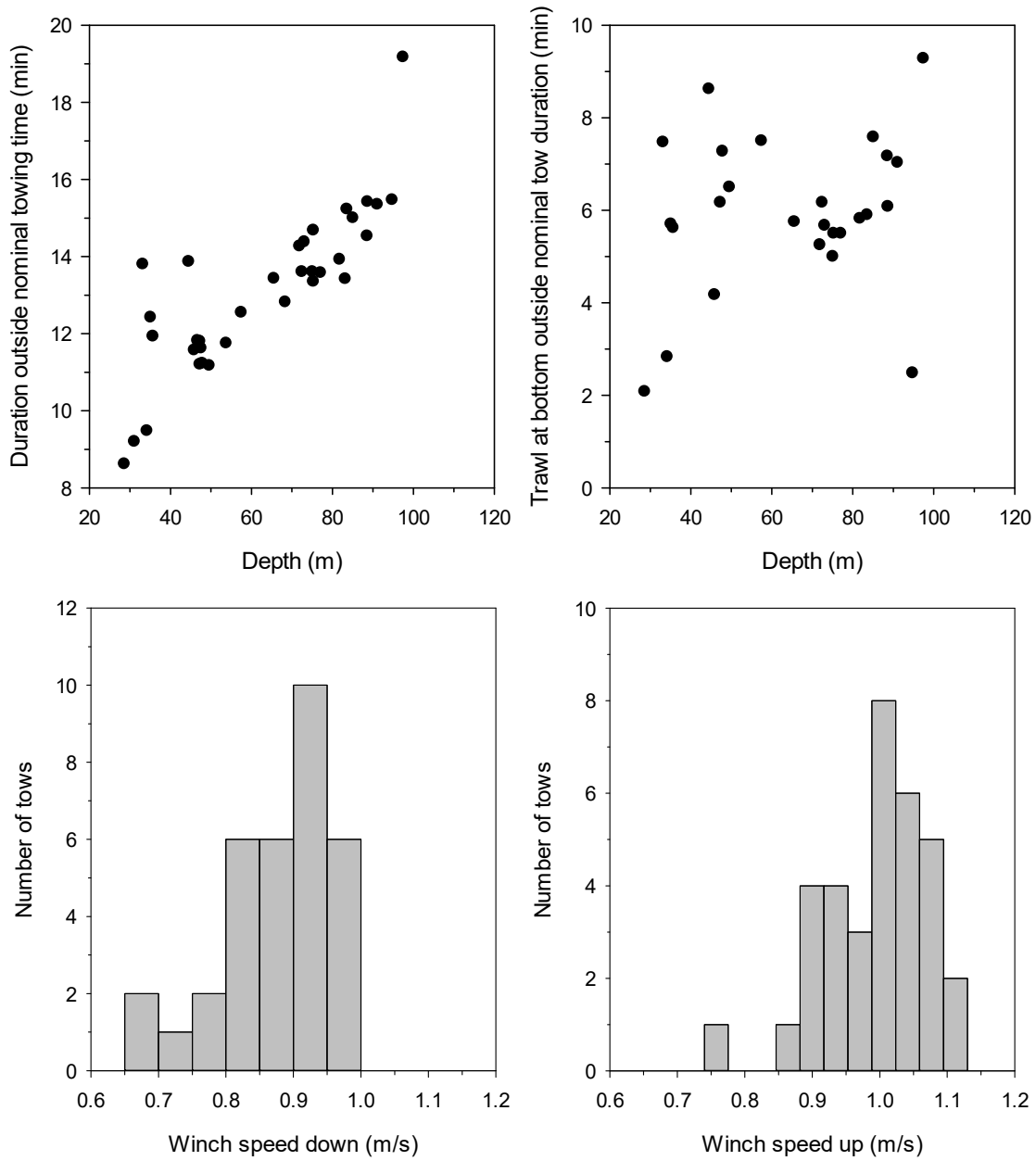


Fig. 6: Fishing times outside the nominal tow duration and winch speeds during descend and ascent, Dana DK IBTS 1Q 2020.

Tab. 1: Species list, Dana DK IBTS 1Q 2020 (L: total length in cm below (fish); ML: mantle length (cephalopods); CPL or CPW: carapace length or width (crustaceans)).

Latin name	English name	Danish name	Weight (kg)	Number	L _{min} (cm)	L _{max} (cm)	Remark
<i>Aequipecten opercularis</i>	Queen scallop	Jomfruøsters	0.296	9	-	-	
<i>Agonus cataphractus</i>	Pogge	Panser ulk	0.098	4	13.0	15.0	
<i>Alloteuthis subulata</i>	European common squid	Dværgblæksprutte	17.949	5272	2.0	12.0	ML
<i>Amblyraja radiata</i>	Starry ray	Tærbe	5.915	13	20.0	47.0	
<i>Ammodytes marinus</i>	Lesser sandeel	Tobis-hav	9.887	2503	7.0	17.5	
<i>Arnoglossus laterna</i>	Scaldfish	Tungeharre	0.133	8	6.0	16.0	
<i>Raja brachyura</i>	Blonde ray	Blond rokke	3.529	3	49.0	64.0	
<i>Buglossidium luteum</i>	Solenette	Glastunge	0.363	33	6.0	12.0	
Callionymidae	Dragonets	*Fløjfisk (uspec)	0.003	1	8.0	8.0	
<i>Callionymus lyra</i>	Common dragonet	Stribet fløjfisk	0.526	13	5.0	22.0	
<i>Callionymus maculatus</i>	Spotted dragonet	Plettet fløjfisk	0.082	13	4.0	15.0	
<i>Callionymus reticulatus</i>	Reticulated dragonet	Kortfinnet fløjfisk	0.018	6	5.0	9.0	
<i>Cancer pagurus</i>	Edible crab	Taskekrabbe	25.968	70	8.7	18.5	CPW
<i>Chelidonichthys cuculus</i>	Red gurnard	Tværstribet knurhane	0.447	4	17.0	28.0	
<i>Clupea harengus</i>	Herring	Sild	604.013	18194	8.5	34.0	
<i>Cyclopterus lumpus</i>	Lumpfish	Stenbider	6.646	2	29.0	45.0	
<i>Eledone cirrhosa</i>	Horned octopus	Eledone Blæksprutte	0.451	3	-	-	
<i>Enchelyopus cimbrius</i>	Four-bearded rockling	Firetrådet havkvabbe	0.166	4	11.0	25.0	
<i>Engraulis encrasicolus</i>	Anchovy	Ansjos	0.331	40	7.0	15.0	
<i>Eutrigla gurnardus</i>	Grey gurnard	Grå knurhane	393.521	4960	7.0	34.0	
<i>Gadus morhua</i>	Cod	Torsk	15.351	84	11.0	60.0	
<i>Gaidropsarus vulgaris</i>	Three-bearded rockling	Tretrådet havkvabbe	0.010	2	8.0	9.0	
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	Trepigget hundestejle	0.024	9	6.0	6.0	
<i>Glyptocephalus cynoglossus</i>	Witch	Skærising	0.898	6	7.0	35.0	
Gobiidae	True gobies	*kutling	0.001	1	5.0	5.0	
<i>Gymnammodytes semisquamatus</i>	Smoothed sandeel	Tobis-nøgen	0.017	2	15.5	17.0	
<i>Helicolenus dactylopterus</i>	Blackbelly rosefish	Blåkjefte	0.473	9	13.0	17.0	
<i>Hippoglossoides platessoides</i>	American plaice	Håising	32.229	787	7.0	27.0	
<i>Homarus gammarus</i>	Lobster	Almindelig hummer	1.308	1	13.6	13.6	CPL
<i>Hyperoplus lanceolatus</i>	Greater sandeel	Tobiskonge	0.262	11	20.0	24.0	
<i>Illex coindetii</i>	Southern shortfin squid	Illex coindetii	9.882	380	2.0	19.0	ML
<i>Leucoraja naevus</i>	Cuckoo ray	Pletrokke	2.818	6	33.0	47.0	
<i>Limanda limanda</i>	Common dab	Ising	401.634	6540	5.0	30.0	
<i>Lithodes maja</i>	Norway king crab	Troldkrabbe	9.316	22	2.0	12.3	CPW
<i>Loligo forbesii</i>	Northern squid	Loligo forbesii	19.166	89	11.0	33.0	ML
<i>Loligo vulgaris</i>	European squid	Loligo vulgaris	9.776	36	15.0	35.0	ML
<i>Lophius budegassa</i>	Black-bellied monkfish	Sort Havtaske	0.194	1	22.0	22.0	
<i>Lophius piscatorius</i>	Monkfish	Havtaske	5.564	8	28.0	38.0	
<i>Lumpenus lamprætaeformis</i>	Snake blenny	Spidshalet langebarn	0.026	1	30.0	30.0	
<i>Mauroliscus muelleri</i>	Sheppy argentine / Pearlside	Laksesild	0.002	1	5.0	5.0	
<i>Melanogrammus aeglefinus</i>	Haddock	Kuller	5733.785	105800	12.0	43.0	
<i>Merlangius merlangus</i>	Whiting	Hvilling	1379.405	23484	8.0	38.0	
<i>Merluccius merluccius</i>	Hake	Kulmule	0.927	2	26.0	48.0	
<i>Microstomus kitt</i>	Lemon sole	Rødtunge	13.887	129	15.0	29.0	
<i>Mullus surmuletus</i>	Striped red mullet	Stribet (rød) Mulle	1.936	27	13.0	23.0	
<i>Mustelus asterias</i>	Starry smooth-hound	Stjernehaj	3.960	10	42.0	57.0	
<i>Mustelus mustelus</i>	Smooth hound	Glathaj	0.255	1	42.0	42.0	
<i>Myoxocephalus scorpius</i>	Sculpin	Ulke	2.934	17	15.0	29.0	
<i>Nephrops norvegicus</i>	Norway lobster	Jomfruhummer	12.426	384	2.1	5.5	CPL
<i>Pleuronectes platessa</i>	Plaice	Rødspætte	226.722	2295	7.0	52.0	
<i>Pollachius virens</i>	Saithe	Mørksej	0.096	1	23.0	23.0	
<i>Pomatoschistus spp.</i>	Sand gobies	Sand kutling	0.013	9	5.0	7.0	
<i>Raja clavata</i>	Thornback ray(roker)	Sømrrokke	3.700	2	62.0	64.0	
<i>Rossia macrosoma</i>	Stout bobtail squid	Ross's blæksprutte	0.053	21	-	-	
<i>Sardina pilchardus</i>	Pilchard	Sardin	0.029	3	11.0	12.0	
<i>Scomber scombrus</i>	Mackerel	Makrel	7.231	102	17.0	35.0	
<i>Scophthalmus maximus</i>	Turbot	Pighvarre	13.746	3	28.0	71.0	
<i>Scophthalmus rhombus</i>	Brill	Slethvarre	0.603	1	34.0	34.0	
<i>Scylliorhinus canicula</i>	Lesser spotted dogfish	Småpletet rødhaj	5.235	9	38.0	68.0	
<i>Sepiolla atlantica</i>	Atlantic bobtail squid	Sepiolla atlantica	0.051	14	-	-	
<i>Solea solea</i>	Sole	Tunge	1.511	7	21.0	35.0	
<i>Sprattus sprattus</i>	Sprat	Brisling	1395.228	241585	5.5	14.0	
<i>Todaropsis eblanae</i>	Lesser flying squid	Todaropsis eblanae	0.065	4	5.0	7.0	ML
<i>Trachinus draco</i>	Greater weever fish	Fjæsing	3.609	14	27.0	40.0	
<i>Trachurus trachurus</i>	Horse mackerel	Hestemakrel	1.885	25	10.0	28.0	
<i>Trisopterus esmarkii</i>	Norway pout	Sperling	115.383	8201	9.0	20.0	
<i>Trisopterus luscus</i>	Whiting pout	Skægtorsk	0.072	1	18.0	18.0	
<i>Trisopterus minutus</i>	Poor-cod	Glyse	0.087	3	12.0	16.0	

Tab. 2: Number of single fish data (length, individual weight, and sex; maturity for whiting and hake) and samples for ageing, Dana DK IBTS 1Q 2020 (*:single weight and maturity, no age reading).

Species	Total number
Herring (<i>Clupea harengus</i>)	494
Sprat (<i>Sprattus sprattus</i>)	277
Cod (<i>Gadus morhua</i>)	61
Haddock (<i>Melanogrammus aeglefinus</i>)	413
Whiting (<i>Merlangius merlangus</i>)	633
Saithe (<i>Pollachius virens</i>)	1
Norway pout (<i>Trisopterus ermarkii</i>)	84
Mackerel (<i>Scomber scombrus</i>)	45
Plaice (<i>Pleuronectes platessa</i>)	327
Witch flounder (<i>Glyptocephalus cynoglossus</i>)	4
Dab (<i>Limanda limanda</i>)	408
Lemon sole (<i>Microstomus kitt</i>)	106
Hake (<i>Merluccius merluccius</i>)	1
Grey gurnard (<i>Eutrigla gurnardus</i>)*	206
Sum:	3060

Tab. 3: Preliminary age 1 abundance indices (number per hour trawling) for commercial IBTS species per rectangle, Dana DK IBTS 1Q 2020.

Station	Rectangle	Herring	Cod	Haddock	Whiting	Norway pout	Sprat	Mackerel
6	42F7	1012	0	0	16	0	2269	0
8	42F6	351	0	0	118	0	3881	0
10	41F7	1558	2	0	16	0	1144	0
11	41F6	480	0	0	78	0	2994	0
19	42F2	2	4	30703	375	66	28	4
21	42F1	0	0	2069	8	4767	0	0
27	41F1	10	2	4411	9	4576	0	4
29	41F0	60	0	463	0	2609	2	0
51	39F5	936	0	2	49	0	9049	2
52	40F5	941	0	2	38	0	2641	0
54	39F1	2	2	4	1799	0	6	0
55	39F1	6	0	339	1360	0	28	4
62	40E9	907	80	257	2168	1242	0	66
63	40E9	42	12	18015	7835	527	354	2
64	40E8	1761	2	338	495	60	5428	0
68	42E8	14	8	13910	810	154	44	0
69	42E9	18	2	9082	5600	197	20	0
71	41F0	4	2	9737	188	1324	0	0
79	40F2	18	0	20521	543	46	2	0
80	40F1	4	0	4132	362	0	0	4
81	40F0	6	2	29249	3146	0	4	84
82	40F0	6	6	29533	318	288	0	0
87	39E8	380	10	3894	3634	92	183	0
88	39E9	60	4	3048	1168	257	8	0
90	38E9	8	10	800	318	122	2	0
103	39F2	2	0	0	0	0	16	12
105	39F4	507	0	2	28	0	25447	6
106	38F4	7030	0	2	186	0	31384	2
104	39F3	0	0	2	2	0	9	0
119	40F3	86	0	18	317	0	106	0
120	40F4	202	0	14	166	0	337	0
123	41F5	1875	0	4	82	4	114742	0
121	41F4	9603	0	6	110	2	161603	0
131	43F9	629	2	0	481	0	167	0