DTU Aqua

Cruise Report

R/V Dana

Cruise 01/2021

”DK IBTS 1Q 2021”

Vessel: R/V DANA

Cruise dates: 1/2 – 19/2 2021

Cruise number: 01/21

Cruise name: DK IBTS 1Q 2021

Port of departure:	Hirtshals	**Date:**	2 February
Port of return:	Hirtshals	**Date:**	19 February
Other ports:		**Date and justification:**	

Participants

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
Dirk Tijssen	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 Koehler	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 standardized 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. 2020. Manual for the North Sea International Bottom Trawl Surveys. Series of ICES Survey Protocols SISP 10-IBTS 10, Revision 11. 102 pp. http://doi.org/10.17895/ices.pub.7562 , and ICES. 2013. Manual for the Midwater Ring Net sampling during IBTS Q1. Series of ICES Survey Protocols SISP 2-MIK 2. 18 pp. http://doi.org/10.17895/7578.

The area to be covered by Denmark with RV Dana in the 1st quarter 2021 (Fig. 1) was allocated during the most recent IBTS Working Group meeting in April 2020. The survey area consisted of 43 ICES statistical rectangles located in the Skagerrak and the North Sea. In 41 of these rectangles, one GOV/CTD station and two MIK stations were planned whereas in two of the rectangles in which Denmark was the only country sampling intensity should have been doubled.

Itinerary

Embarkation was on 1st February in the morning for a mandatory final pre-survey Covid-19 test.

R/V Dana left Hirtshals on Tuesday 2nd February at 7:15 local time and field work began in the Skagerrak the same day in the early afternoon. Heavy easterly winds prevailed during the first part of the survey, which were followed by strong southerly and southwesterly winds in the central part of the working area and only short interruption with calm conditions in the end of the survey period (Fig. 2). Nonetheless, at least two fishing stations were conducted each day whereas in no plankton work was possible in several nights. However, almost all field work were completed and R/V Dana returned to Hirtshals on Friday 19th February at 6:45 local time.

Achievements

Due to missing dispensation for bottom trawling in UK Marine Protected Areas, rectangles 38F1 and 38F2 were not fished and only be covered with plankton sampling. Due to the delay with MIK sampling caused by rough weather, the plankton sampling in rectangles 44F4, 43F4 and 42F4 had to be reduced. This had been announced to the coordinator during the survey and the sampling was carried out by other countries.

The following activities were carried out (Fig. 1):

43 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).

44 CTD profiles (with additional sensors for dissolved oxygen) at standard GOV stations.

92 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 1 case no valid sample was received from the small net. Flowmeter calibration was conducted at two additional stations.

Results

Routine sampling

The trawl parameters for the standard GOV tows (vertical net opening and door spread) as monitored 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 and bottom conditions.
Marport distance sensors were used for measuring wingspread during the second part of the survey when the weather conditions had been improved but reliable results were only obtained for some of the stations, predominantly in deeper waters. The obtained data however showed a close correlation with door spread (r^2 = 0.945. p = < 0.001) and a reasonable relationship with vertical opening (Fig. 3b).

In total, 78 different species of fish and invertebrates were found in catches. The total weight of the catches from the 43 valid tows has been 7.5 tons (Tab. 1). Total catch of fish, cephalopods and shellfish and species richness in the standard tows ranged from 20 to 1038 kg and from 8 to 31 different fish and IBTS invertebrate species. Low and species-poor catches were predominantly recorded in the central 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). For cod, liver parasites were recorded and genetic samples from fish in or close to spawning condition were taken. For haddock, the number of gill parasites (*Lernaeocera branchialis*) and growth deformations were recorded. Preliminary age 1 abundance indices were calculated for IBTS target species (Tab. 3) based on 1st quarter length splits and reported to the coordinator during the survey.

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 32.1 kg, which included one lobster/crab trap weighting 23.7 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.

Others

A cruise summary report has been delivered online to

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

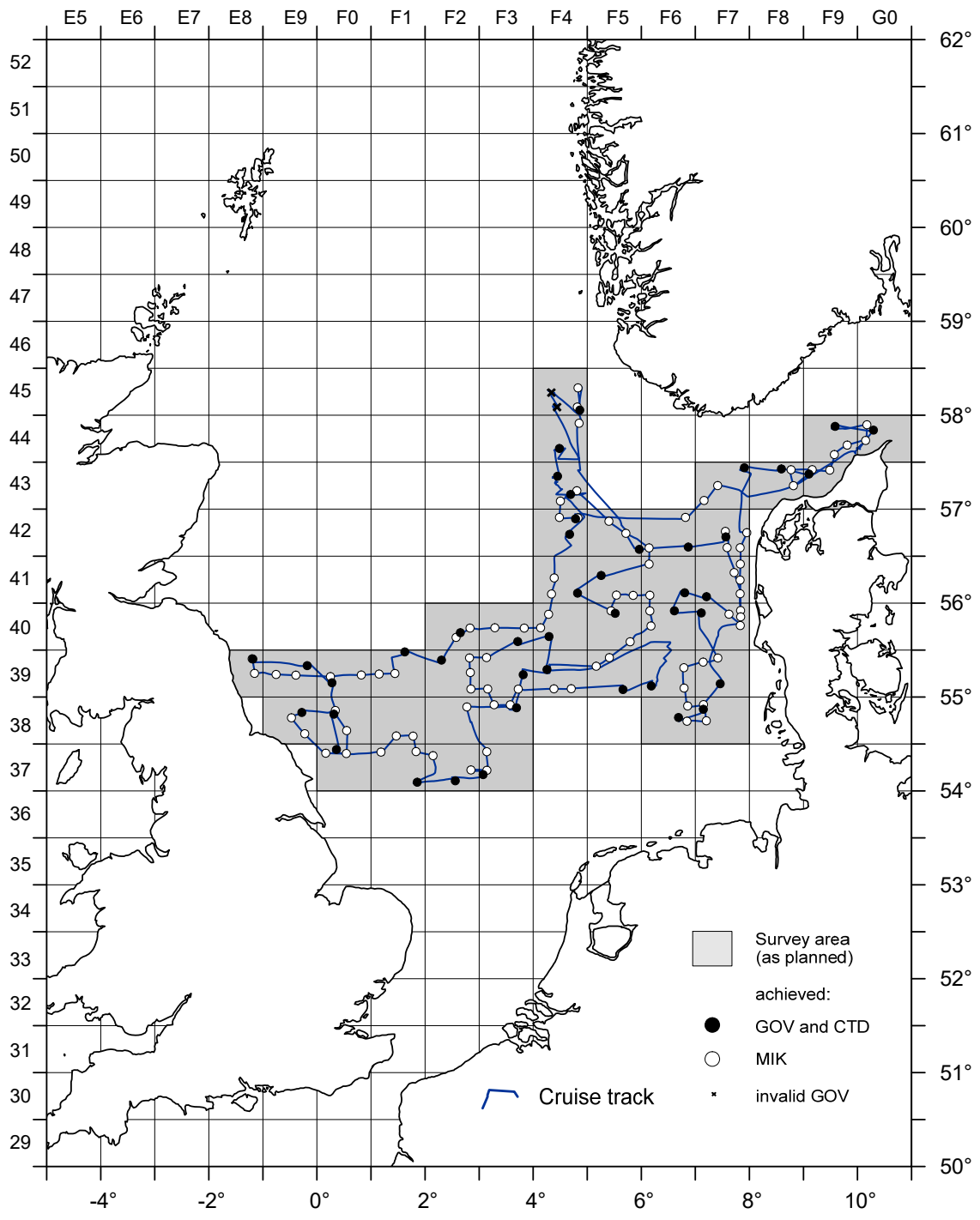

Fig. 1: Survey map with cruise track and sampling locations, Dana DK IBTS 1Q 2021.

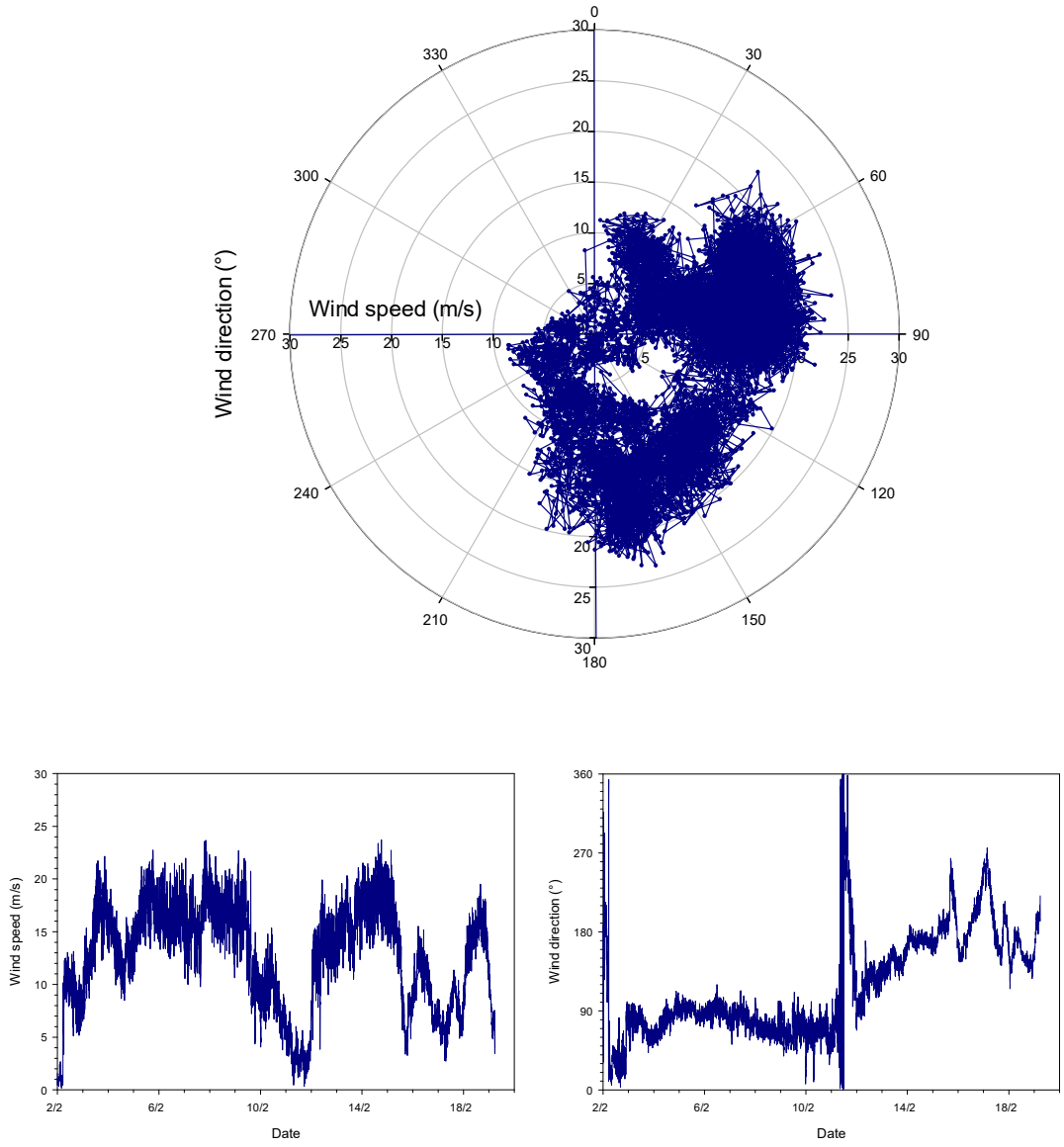

Fig. 2. Wind speed (m/s) and wind direction (°) recorded along the cruise track, Dana DK IBTS 1Q 2021.

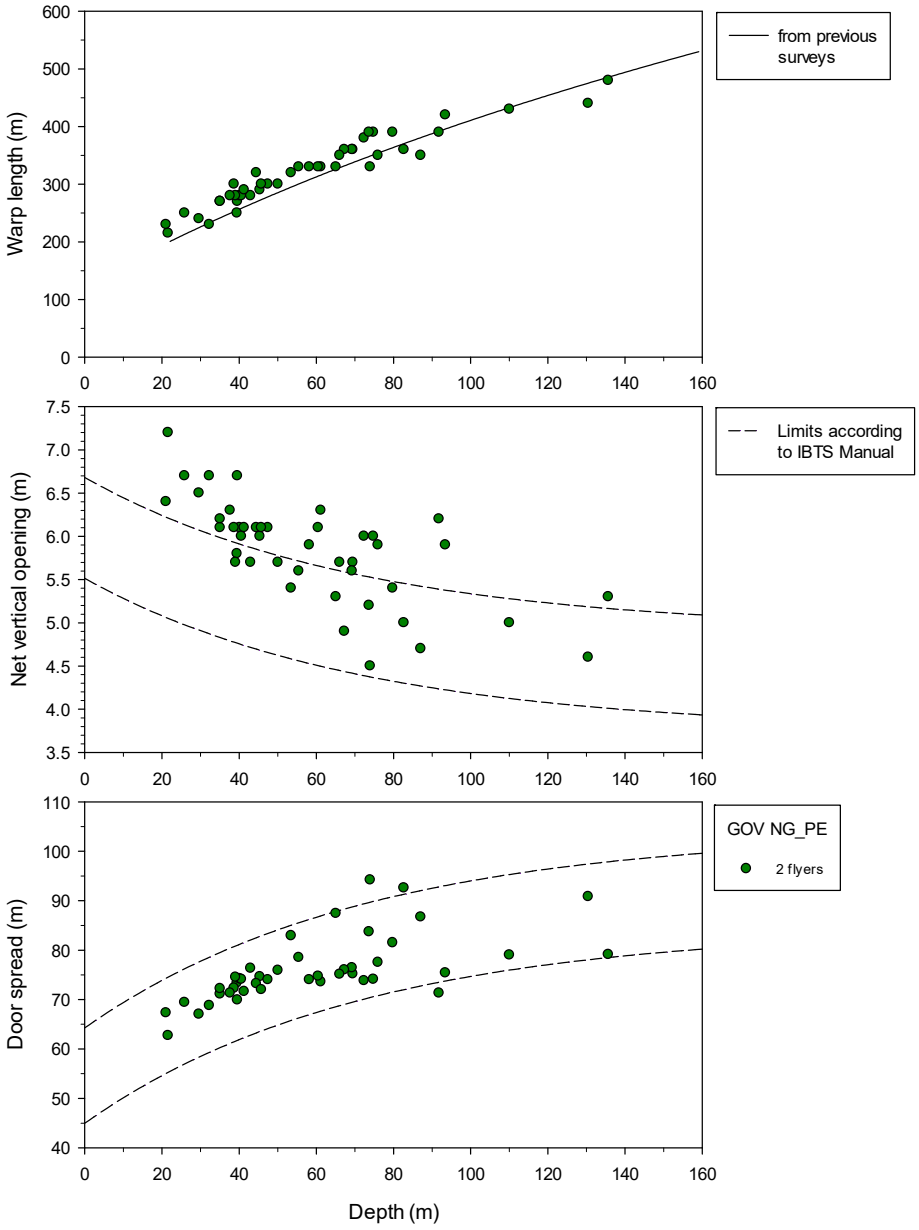

Fig. 3a: Warp length, net opening and door spread in relation to depth, Dana DK IBTS 1Q 2021.

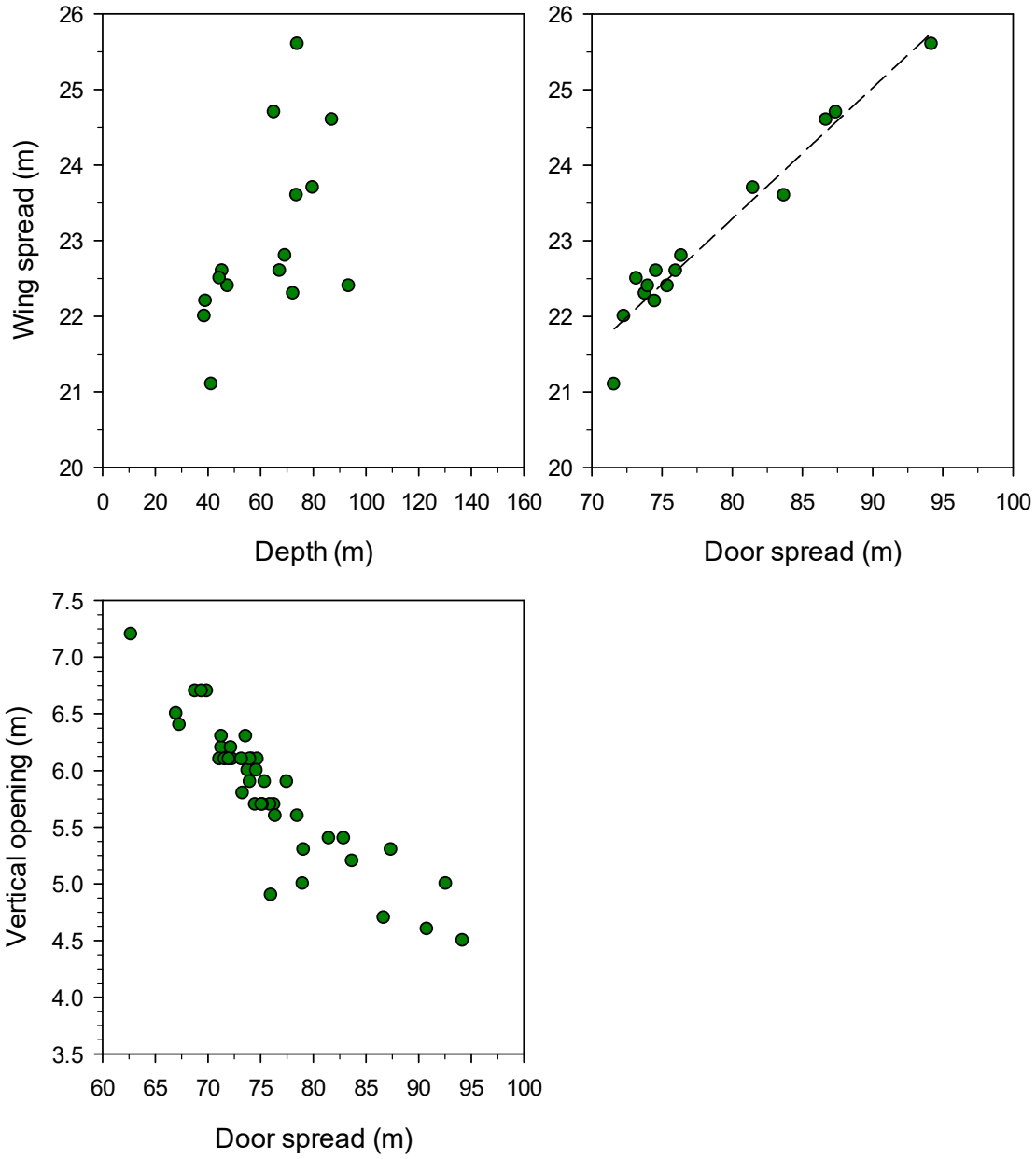

Fig. 3b: Wing spread in relation to depth, door spread and vertical opening, Dana DK IBTS 1Q 2021.

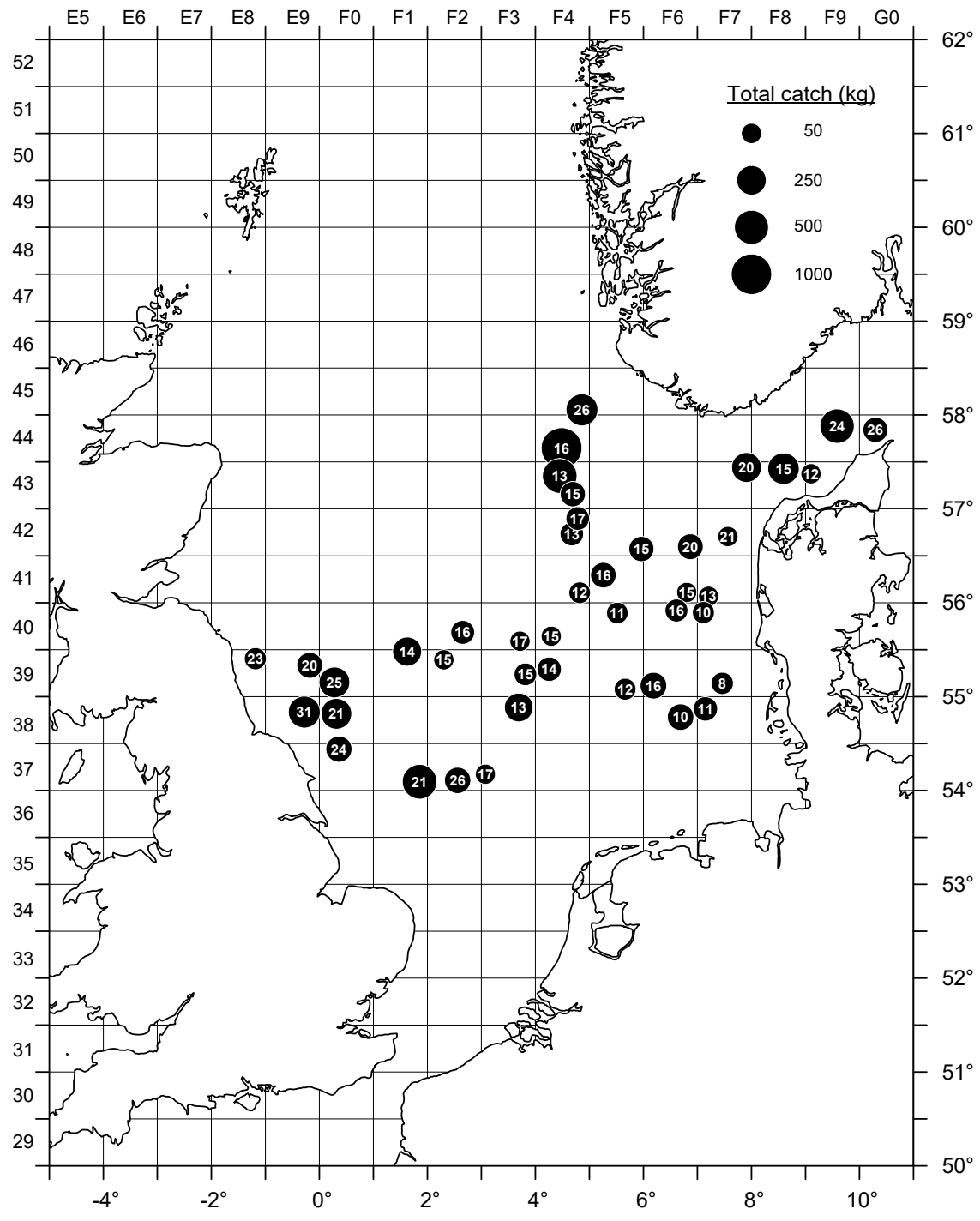

Fig. 4: Total catch (symbols) and species richness (numbers), Dana DK IBTS 1Q 2021.

Tab. 1: Species list, Dana DK IBTS 1Q 2021 (L: total length in cm below (fish); ML: mantle length (cephlapods); CPL or CPW: carapace length or width (crusteaceans).

Latin name	English name	Danish name	Weight (kg)	Number	L_{min} (cm)	L_{max} (cm)	Remark
Aequipecten opercularis	Queen scallop	Jomfruøsters	0.264	4	-	-	
Agonus cataphractus	Pogge	Panser ulk	0.115	7	7.0	15.0	
Alloteuthis subulata	European common squid	Dværgblæksprutte	55.214	15583	2.0	11.0	ML
Alosa alosa	Allis shad	Majsild	0.434	3	22.0	25.0	
Amblyraja radiata	Starry ray	Tærbe	6.386	23	8.0	44.0	
Ammodytes marinus	Lesser sandeel	Tobis-hav	0.347	76	9.0	17.5	
Anguilla anguilla	Eel	Ål	1.648	1	91.0	91.0	
Argentina	Argentines	*Argentina spp.	0.560	33	9.0	21.0	
Arnoglossus laterna	Scaldfish	Tungehvarre	0.362	33	6.0	15.0	
Buglossidium luteum	Solenette	Glastunge	0.293	29	6.0	12.0	
Callionymus lyra	Common dragonet	Stribet fløjfisk	0.664	21	5.0	23.0	
Callionymus maculatus	Spotted dragonet	Plettet fløjfisk	0.027	13	3.0	14.0	
Cancer pagurus	Edible crab	Taskekrabbe	19.049	37	10.1	20.2	CPW
Chelidonichthys cuculus	Red gurnard	Tværstribet knurhane	0.160	1	26.0	26.0	
Chelidonichthys lucerna	Tub gurnard	Rød knurhane	0.446	1	36.0	36.0	
Clupea harengus	Herring	Sild	617.285	32300	7.5	31.5	
Cyclopterus lumpus	Lumpfish	Stenbider	10.764	6	17.0	46.0	
Eledone cirrhosa	Horned octopus	Eledone Blæksprutte	0.184	1	-	-	
Enchelyopus cimbrius	Four-bearded rockling	Firetrådet havkvabbe	1.602	26	17.0	29.0	
Engraulis encrasicolus	Anchovy	Ansjos	0.177	23	8.0	16.0	
Entelurus aequoreus	Snake pipefish	Snippe	0.015	2	33.0	37.0	
Eutrigla gurnardus	Grey gurnard	Grå knurhane	455.549	6272	8.0	37.0	
Gadus morhua	Cod	Torsk	241.344	365	12.0	96.0	
Gasterosteus aculeatus	Three-spined stickleback	Trepigget hundestejle	0.001	1	5.0	5.0	
Glyptocephalus cynoglossus	Witch flounder	Skærising	4.623	15	24.0	42.0	
Helicolenus dactylopterus	Blackbelly rosefish	Blåkjeft	0.234	2	18.0	20.0	
Hippoglossoides platessoides	American plaice	Håising	53.905	1499	4.0	31.0	
Homarus gammarus	European lobster	Almindelig hummer	1.370	1	3.8	3.8	CPL
Hyperoplus lanceolatus	Greater sandeel	Tobiskonge	0.052	2	22.5	23.0	
Illex coindetii	Southern shortfin squid	Illex coindetii	1.324	51	5.0	14.0	ML
Leucoraja naevus	Cuckoo ray	Pletrokke	0.540	1	44.0	44.0	
Limanda limanda	Common dab	Ising	900.887	14568	5.0	32.0	
Lithodes maja	Norway king crab	Troldkrabbe	6.823	13	6.0	17.9	CPW
Loliginidae		Loliginidae	0.006	1	5.0	5.0	ML
Loligo forbesii	Northern squid	Loligo forbesii	10.395	86	5.0	35.0	ML
Loligo vulgaris	European squid	Loligo vulgaris	4.730	17	13.0	31.0	ML
Lophius piscatorius	Monk	Havtaske	1.156	5	13.0	31.0	
Lumpenus lampretaeformis	Snake blenny	Spidshalet langebarn	0.018	1	30.0	30.0	
Lycodes gracilis	Vahls eelpout	Ålebromse	0.091	5	16.0	20.0	
Maurolicus muelleri	Pearlside	Laksesild	0.003	2	4.0	6.0	
Melanogrammus aeglefinus	Haddock	Kuller	2026.260	26428	11.0	42.0	
Merlangius merlangus	Whiting	Hvilling	2080.789	28576	7.0	48.0	
Merluccius merluccius	Hake	Kulmule	0.425	1	40.0	40.0	
Microstomus kitt	Lemon sole	Rødtunge	32.560	240	15.0	35.0	
Molva molva	Ling	Lange	1.830	2	49.0	58.0	
Mullus surmuletus	Striped red mullet	Stribet rød Mulle	1.147	24	11.0	22.0	
Mustelus asterias	Starry smooth-hound	Stjernehaj	3.277	9	37.0	66.0	
Mustelus mustelus	Smooth hound	Glathaj	1.156	3	40.0	55.0	
Myoxocephalus scorpius	Sculpin	Ulk	2.900	24	12.0	26.0	
Myxine glutinosa	Hagfish	Slimål	0.063	2	27.0	32.0	
Nephrops norvegicus	Norway lobster	Jomfruhummer	24.311	544	2.2	5.6	CPL
Pecten maximus	Great scallop	Stor kammusling	0.434	1	-	-	
Phrynorhombus norvegicus	Norwegian topknot	Småhvarre	0.009	1	8.0	8.0	
Platichthys flesus	Flounder	Skrubbe	2.269	9	25.0	32.0	
Pleuronectes platessa	Plaice	Rødspætte	146.599	1126	13.0	44.0	
Pollachius pollachius	Pollack	Lyssej	9.135	3	62.0	68.0	
Pollachius virens	Saithe	Sej	44.198	14	18.0	105.0	
Pomatoschistus.sp	Sand gobies	Sand kutlinger	0.008	12	3.0	6.0	
Raja montagui	Spotted Ray	Storplettet Rokke	1.290	2	42.0	50.0	
Rossia macrosoma	Stout bobtail squid	Ross's blæksprutte	0.391	70	-	-	
Sardina pilchardus	Pilchard	Sardin	0.092	3	9.0	21.0	
Scomber scombrus	Mackerel	Makrel	22.784	521	16.0	29.0	
Scophthalmus maximus	Turbot	Pighvarre	4.584	6	27.0	44.0	
Scophthalmus rhombus	Brill	Slethvarre	2.812	2	43.0	46.0	
Scyliorhinus canicula	Lesser-spotted dogfish	Småplettet rødhaj	21.370	37	22.0	63.0	
Sepiola atlantica	Atlantic bobtail squid	Sepiola atlantica	0.010	6	-	-	
Solea solea	Sole	Tunge	0.660	4	20.0	29.0	
Sprattus sprattus	Sprat	Brisling	570.678	105922	5.0	14.5	
Squalus acanthias	Spurdog	Pighaj	1.225	2	47.0	58.0	
Syngnathidae	Pipefishes and seahorses	*tangnål	0.001	1	10.0	10.0	
Syngnathus rostellatus	Lesser pipefish	Lille tangnål	0.001	1	13.0	13.0	
Todarodes sagittatus	European flying squid	Flyveblæksprutte	0.116	15	5.0	9.0	ML
Todaropsis eblanae	Lesser flying squid	Todaropsis eblanae	0.778	66	3.0	13.0	ML
Trachinus draco	Greater weever fish	Fjæsing	0.217	1	31.0	31.0	
Trachurus trachurus	Horse mackerel	Hestemakrel	1.977	15	11.0	38.0	
Trisopterus esmarkii	Norway pout	Sperling	75.640	5428	7.0	19.0	
Trisopterus luscus	Bib	Skægtorsk	0.331	4	17.0	26.0	
Trisopterus minutus	Poor cod	Glyse	3.200	83	7.0	22.0	
Zeus faber	John dory	Sct. Peter fisk	0.368	1	30.0	30.0	

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 2021 (*: single weight and maturity, no age reading; MSS: Marine Science Scotland).

Species	Total	
Herring (Clupea harengus)	664	
Sprat (Sprattus sprattus)	170	
Cod (Gadus morhua)	164	liver parasites recorded; genetics (for MSS)
Haddock (Melanogrammus aeglefinus)	407	parasites and growth deformation recorded
Whiting (Merlangius merlangus)	693	
Saithe (Pollachius virens)	14	
Norway pout (Trisopterus ermarkii)	118	
Mackerel (Scomber scombrus)	31	
Plaice (Pleuronectes platessa)	409	
Witch flounder (Glyptocephalus cynoglossus)	15	
Dab (Limanda limanda)	370	
Lemon sole (Microstomus kitt)	108	
Hake (Merluccius merluccius)	1	otolith taken but not read
Grey gurnard (Eutrigla gurnardus)*	201	
Sum:	3365	

Tab. 3: Preliminary age 1 abundance indices (number per hour trawling) for commercial IBTS species per rectangle, Dana DK IBTS 1Q 2021.

Station	Rectangle	Herring	Cod	Haddock	Whiting	Norway pout	Sprat	Mackerel
2	44G0	1088	2	64	924	177	149	0
3	44F9	39	38	92	427	301	6	0
14	43F9	168	0	0	166	0	3538	0
15	43F8	12507	2	0	730	0	4208	2
17	43F7	36	22	618	10	2066	193	0
27	41F7	237	0	0	197	0	3145	0
28	40F7	794	2	0	78	0	567	0
30	40F6	3283	0	8	133	0	1157	0
32	41F6	654	0	0	321	0	4972	0
43	38F6	9021	0	0	1807	0	7668	0
45	38F7	594	0	0	38	0	19646	2
46	39F7	4001	0	0	20	0	14847	0
54	42F7	303	0	0	100	0	712	0
55	42F6	1475	2	407	165	0	88	0
57	42F5	2246	0	2	117	8	28	0
63	45F4	1062	26	489	19	1062	0	2
67	44F4	14	6	10142	118	0	0	369
69	43F4	0	0	18046	536	32	0	619
72	43F4	82	0	137	14	10	0	4
73	42F4	0	2	588	195	0	0	2
84	40F2	1192	4	50	327	0	0	0
85	39F2	144	0	4	54	0	48	0
87	39F1	26	2	1156	8767	2	2	0
98	39E8	88	0	146	979	1159	182	0
99	39E9	198	2	416	227	407	507	4
101	39F0	1349	0	1175	150	2525	508	4
110	38E9	8	2	1183	275	74	4	0
112	38F0	217	4	932	1436	1772	4	8
113	37F0	2	4	411	520	251	18	12
121	37F1	50	0	108	5383	14	46	0
122	37F2	313	0	10	329	14	136	0
124	37F3	183	0	6	162	0	32	0
131	38F3	570	0	4	66	0	61625	0
132	39F3	1018	0	4	56	0	4457	0
135	39F6	12822	2	130	478	0	2046	0
136	39F5	398	0	128	255	0	14356	0
148	40F3	142	2	8	34	0	721	0
151	40F4	161	0	4	12	0	898	0
152	39F4	2924	0	2	76	0	5290	0
164	40F5	351	0	26	138	4	188	0
165	41F4	258	0	54	88	0	0	0
167	41F5	2707	2	115	191	14	0	0
179	42F4	0	0	104	56	130	0	0
	mean:	1459	3	855	609	233	3535	24