

R/V Dana

Cruise 07/2017

"DK IBTS 3Q 2017"



Vessel: R/V DANA
Cruise number: 07/17

Cruise dates (planned): 17/7 – 3/8 2017
Cruise name: Danish IBTS 3Q 2017

Port of departure:	Hirtshals	Date:	17 July
Port of return:	Hirtshals	Date:	2 August
Other ports:	Esbjerg	Date and justification:	25 July Scheduled exchange of scientific staff and crew

Participants

Leg 1: Hirtshals – Esbjerg		
Name	Institute and Department	Function and main tasks
Helle Rasmussen	DTU Aqua, Monitoring and Data Hirtshals	Cruise leader, Fish lab
Kai Wieland	DTU Aqua, Monitoring and Data Hirtshals	Project leader, Fish lab
Jane Gudmandsen	DTU Aqua, Monitoring and Data Charlottenlund	Technician, Fish lab
Reinhardt Jensen	DTU Aqua, Monitoring and Data Hirtshals	Technician, Fish lab
Thomas Noack	DTU Aqua, Fisheries technology Hirtshals	Biologist , Fish lab
Christian Petersen	DTU Aqua, Monitoring and Data Hirtshals	Technician, CTD, Maintenance

Leg 2: Esbjerg – Hirtshals		
Name	Institute and Department	Function and main tasks
Kai Wieland	DTU Aqua, Monitoring and Data Hirtshals	Cruise leader, Fish lab
Stina B. Hansen	DTU Aqua, Monitoring and Data Charlottenlund	Technician, Fish lab
Maria Jarnum	DTU Aqua, Monitoring and Data Hirtshals	Technician, Fish Lab
Tom Svoldgaard	DTU Aqua, Monitoring and Data Hirtshals	Technician, Fish lab
Farivar Azour	DTU Aqua, Monitoring and Data Charlottenlund	Technician, Fish lab
Christian Petersen	DTU Aqua, Monitoring and Data Hirtshals	Technician, CTD, Maintenance

Objectives

The survey is part of the 3rd quarter International Bottom Trawl Survey (IBTS) in the North Sea, which is coordinated by the ICES International Bottom Trawl Survey Working Group and has been conducted with standard fishing gear in the 3rd quarter since 1991.

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 3rd 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 collect information of the amount and distribution of marine litter

The area to be covered by Denmark with RV Dana in the 3rd quarter 2017 was allocated during the IBTS Working Group meeting in April 2017. 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 10-IBTS IX. 86 pp.). Additional requests from the IBTS WG for the 3Q survey in 2017 were to collect information on the trawl setting and retrieval duration of the standard 30 min tows and to conduct so called zero-minute tows in order to estimate the catch obtained outside the nominal tow duration of the standard tows in respect to depth.

Itinerary

R/V Dana left Hirtshals on Monday 17th July at 12:00 local time, and the field work started in the afternoon in the western Skagerrak (testing trawl rigging but no valid standard tow) (Fig. 1). The vessel stayed in the port of Esbjerg on Tuesday 25th July from 8:30 to 13:00 for the scheduled exchange of scientific staff and crew. Moderate to weak winds with variable directions prevailed at the vessel locations during the entire survey period (Fig. 2), and R/V Dana returned to Hirtshals on Wednesday 2nd August at 14:00 local time after the last remaining mandatory standard tows in the western Skagerrak had been completed.

Achievements

The main working area consisted of 41 ICES statistical rectangles located in IBTS North Sea roundfish areas 2, 4, 5, 6 and 7 with two stations in rectangles 42F7, 41F7, 41F6, 33F3, 33F2 and 35F1, and 2 additional rectangles in the western part of roundfish area 8 in the Skagerrak (Fig. 1). At the second positions in rectangle 41F7 no acceptable net geometry was achieved and this tow was repeated on a nearby position. At the first location in rectangle 35F1 the trawl was damaged, probably due to a high amount of seaweed on the track, and there was no alternative nearby clear tow position available to repeat this station. Nominal tow duration of all of these standard hauls was

30 min and fishing time outside the nominal tow duration (Deployment of the trawl doors until stable towing speed and net geometry is obtained and start pulling the net back until retrieval of the trawl doors is finished) was recorded for all of these tows.

In addition, several so called zero-minute tows in which the trawl is pulled backed immediately after stable towing speed and net geometry is obtained were carried. The first trial resulted in a seriously damaged trawl when it hit a large stone off the clear tow track. This tow was repeated after a trawl change close to the proceeded standard tow track, and another single zero-minute tow was conducted following a standard in rectangle 41F1. Other zero-minute tows were conducted at three different locations (rectangles 39F1, 41F4 and 43F7) where 3 subsequent tows were made parallel to standard tow track within a distance of about 500 m (Fig. 3).

The following successful activities were carried out:

50 valid trawl hauls with the GOV 36/47 (chalut á Grande Overture Verticale) all with standard groundgear A and 60 m sweep length (see IBTS Manual for specifications).

50 CTD/O₂ profiles on valid trawl positions.

11 valid zero-minute trawl hauls with the GOV 36/47 at 4 locations with different depths.

Results

The trawl parameters for the standard tows (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, except for GOV 3 which showed almost unacceptable net geometry in all tows and urgently requires a reset before it can be used again (Fig. 4). 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. The actual facilities on DANA, however, do not allow to measure adequately current strength and direction in the near bottom layer. Reasonable values of wing spread were recorded for all tows showing the usual linear relationship with door spread (Fig. 5) whereas the sensor for vertical net opening did not work properly at 3 stations and needs to be exchanged prior to the next survey.

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 7.5 to 16 min and 4 to 9 min, respectively, which is positively correlated to depth and hence also to warp length (Fig. 6).

70 different species of fish and selected invertebrates (see Manual for list of candidate species) were found (Tab. 1). Length measurements were made for all of the listed species. Sharks, skates and rays and the listed shellfish species were measured separately by sex (weight and length composition). Total catch and species richness in the standard tows ranged from 50 to 2707 kg and from 12 to 36 different fish and IBTS invertebrate species (Fig. 7).

Single fish data (length, weight, sex and, for a few species also maturity) and otoliths were collected for the IBTS target species cod, haddock, whiting, Norway pout, saithe, herring, sprat, mackerel and plaice as well as for hake and witch flounder in order to fulfil requirements of the national DCF (Data Collection Framework of the European Union) sampling requirements (Tab. 2). For these species, a maximum of one individual per cm length group were taken from a single haul except for herring and sprat for which two

individuals per semi-centimeter group per haul were collected. The collection of individual fish data for the IBTS target species herring and sprat commenced when the maximum number of 8 per length group and roundfish area had been achieved. Collection of age samples of herring and sprat from the Skagerrak had not been requested for Denmark since this area is extensively covered by Sweden.

Genetic samples were taken from sole (n=25), turbot (n=16) and witch flounder (n=5). Furthermore, cod livers were taken (n=23, from 5 different stations) and samples of juvenile (< 14 cm) herring were frozen for later analyses on stock identification (n=120, from 4 different stations).

According to a decision of the IBTS WG, preliminary abundance indices for the main commercial species (Tab. 3) are no longer reported to the coordinator of the 3rd quarter IBTS. The indices for 0-group cod, however, appear to be low but a representative estimate of cod recruitment can first be given when the information from all the other countries have been combined. Similarly, the abundance indices for small herring appeared to be low compared to the last year. On the other hand, mackerel and plaice as well as whiting were again recorded in most of all hauls.

Marine litter was recorded in each GOV catch using four main categories: plastic, glass, metals and miscellaneous, which were subdivided in several minor categories as specified in the IBTS manual. The total weight of marine litter recorded in the standard tows amounted to about 5 kg.

Catches of zero-minute tows ranged from 19 to 68 kg which corresponds to about 4 to 19 % of the catch obtained by the nearest standard tow. This proportion appeared to be independent of depth and the number of different species caught in the zero minute tows was about 30 % lower than in the neighboring standard tow conducted at a similar depth (Tab. 4).

Others

A cruise summary report has been delivered online to

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

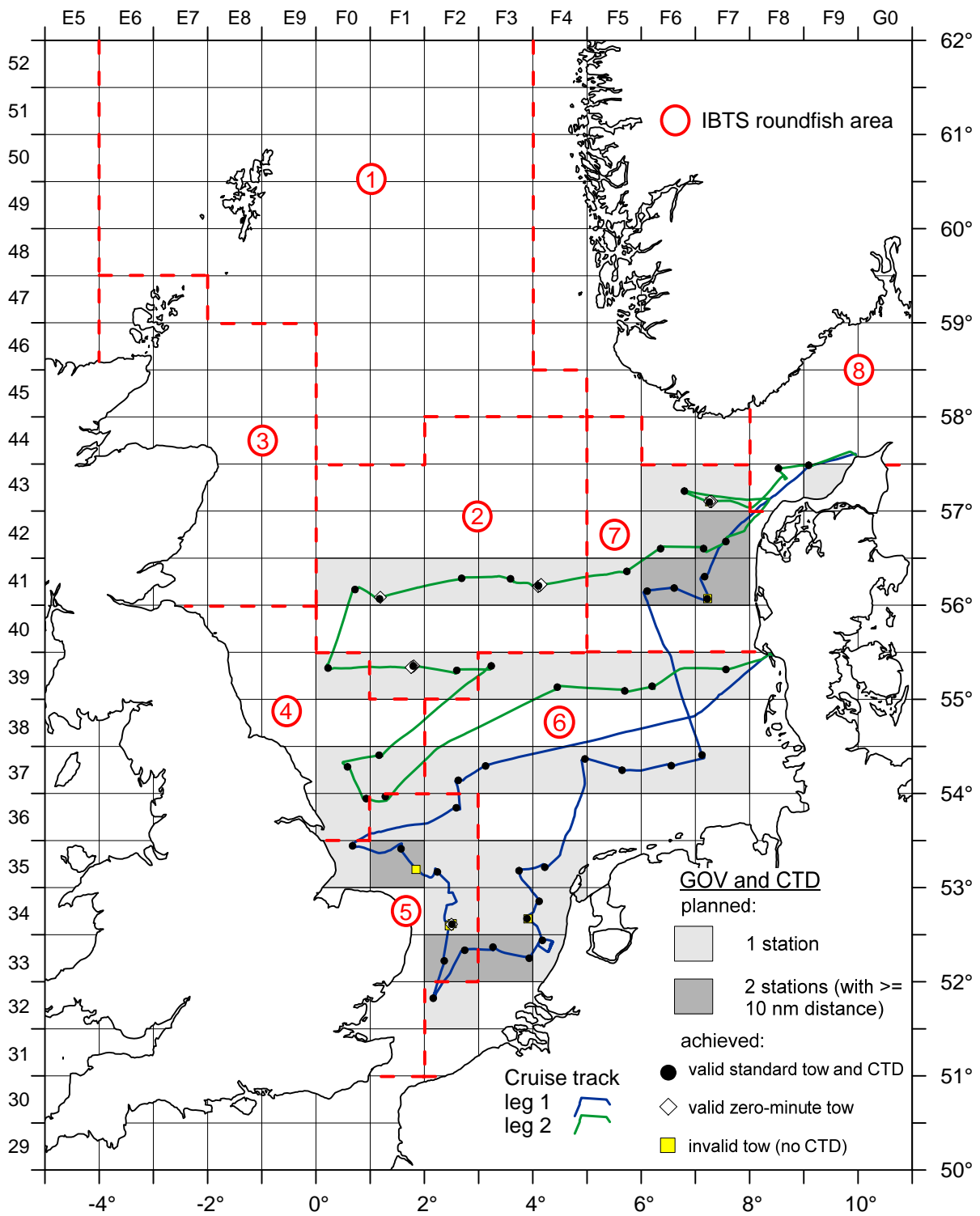


Fig. 1: Survey map with cruise track and sampling locations, Dana 3Q IBTS 2017.

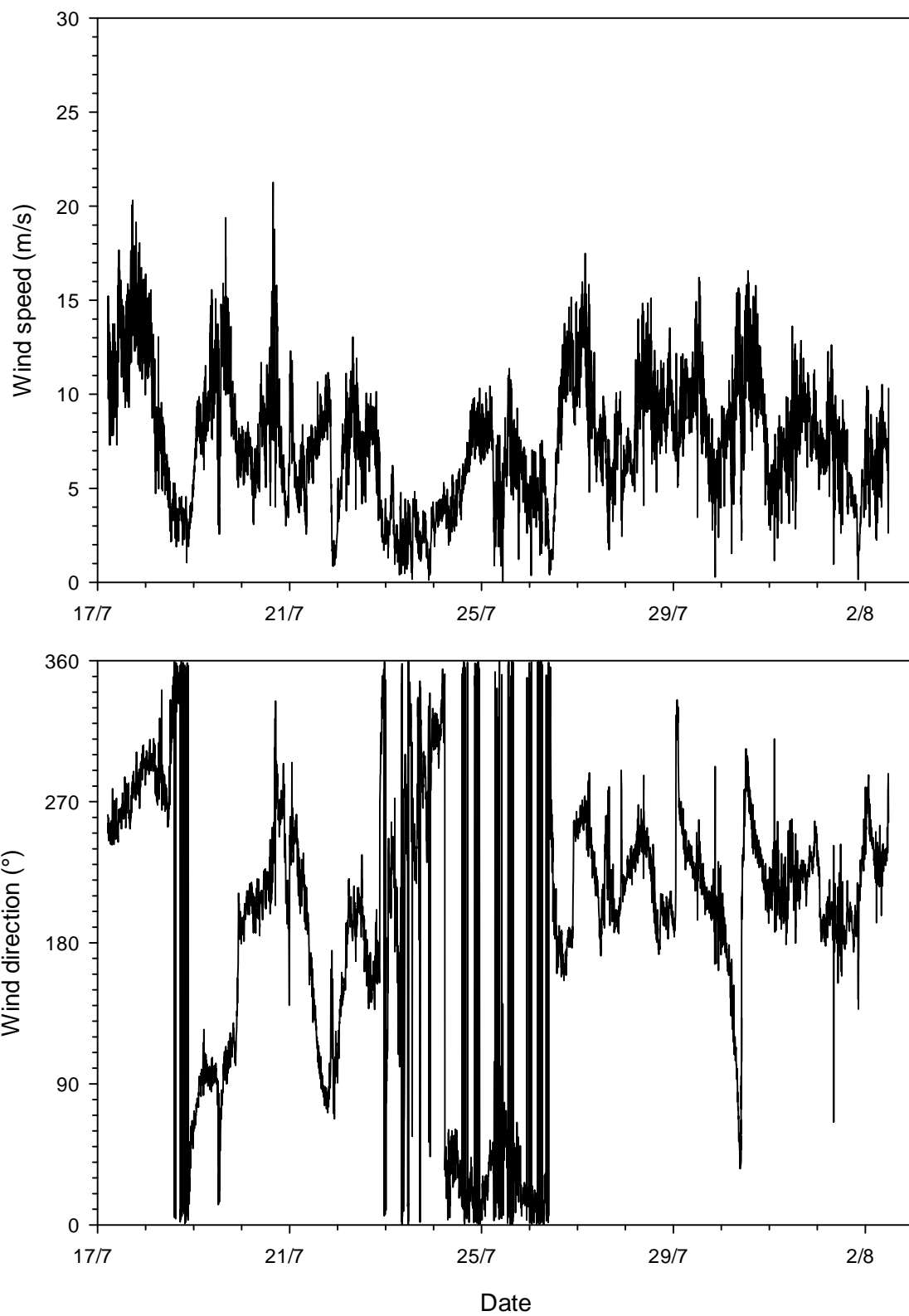


Fig. 2: Wind speed (m/s) and direction recorded along the cruise track, Dana 3Q IBTS 2017.

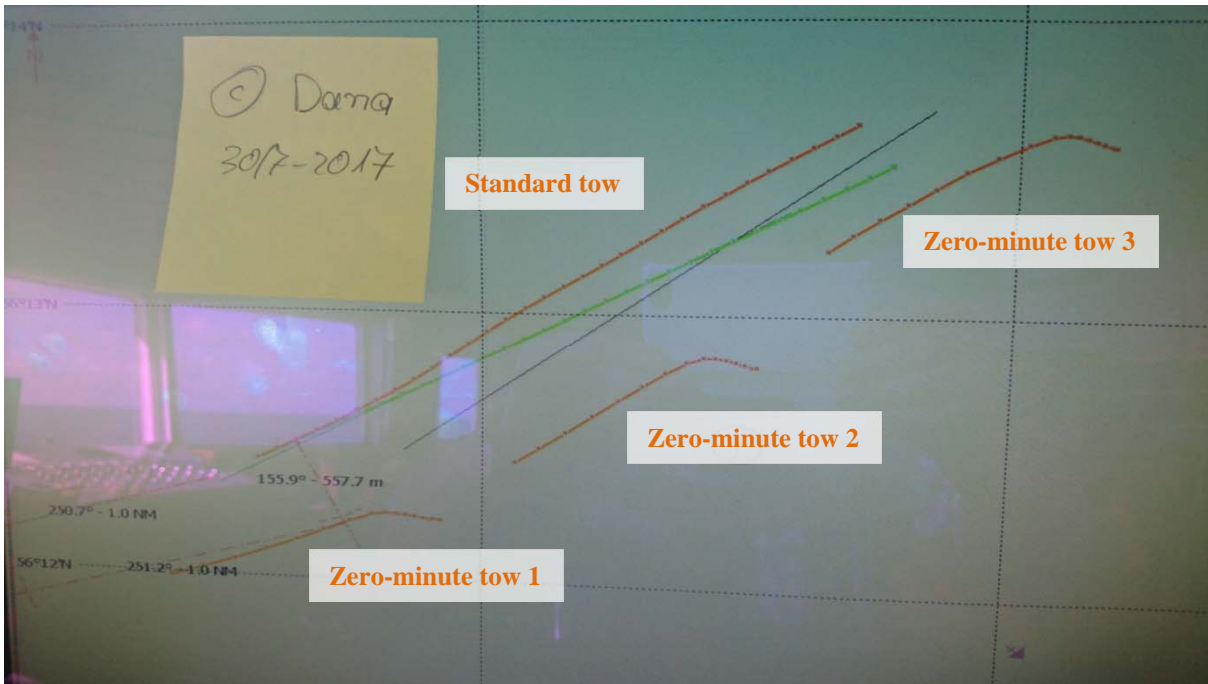


Fig. 3: Example for the layout of subsequent zero-minute tows for comparison with a preceding standard tow tow (track recording for standard for nominal tow duration only, track recording for zero-minute tows from deployment of trawl doors until retrieval finished; tow direction from southwest to northeast for all tows).

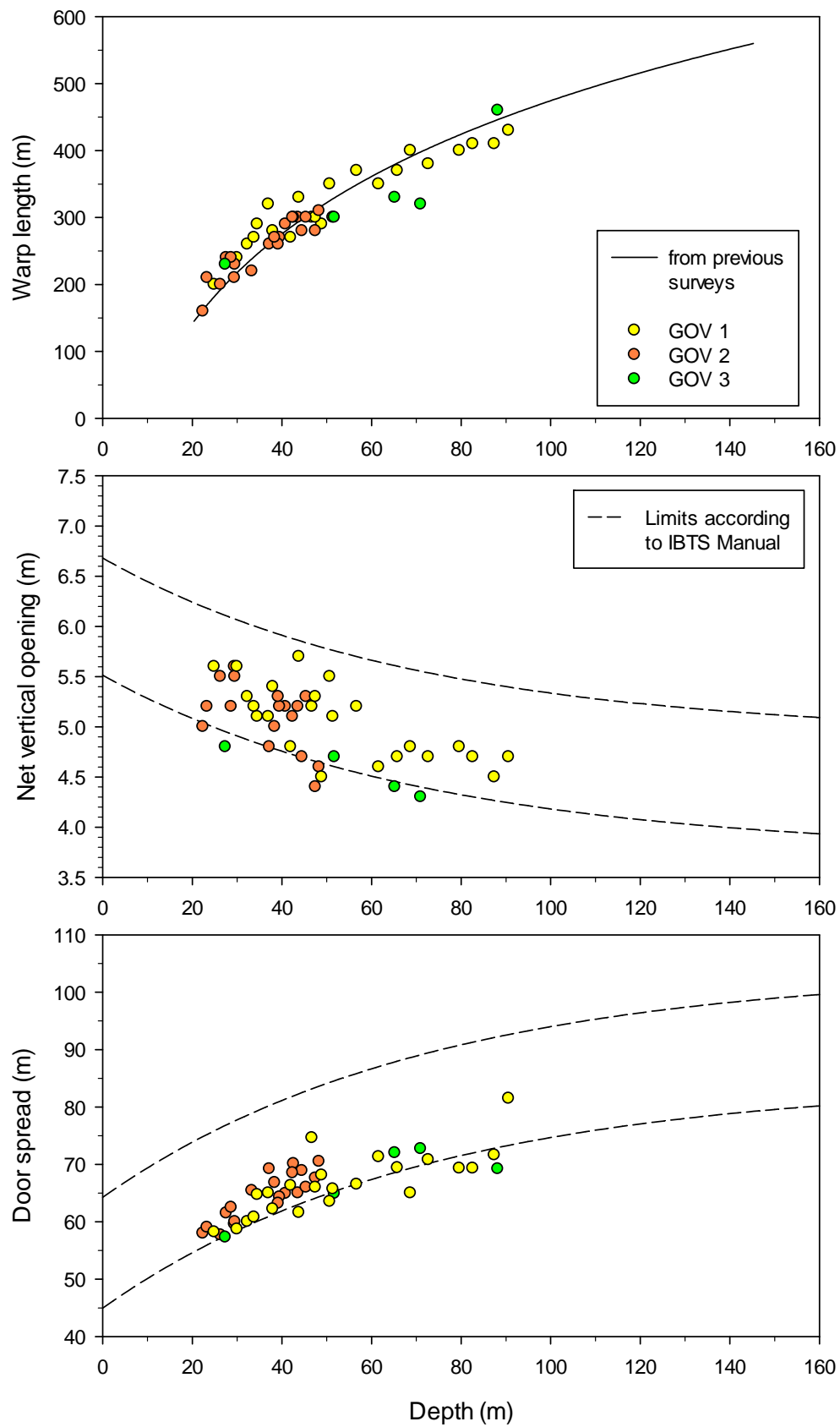


Fig. 4: Warp length, net opening and door spread in relation to depth, Dana 3Q IBTS 2017.

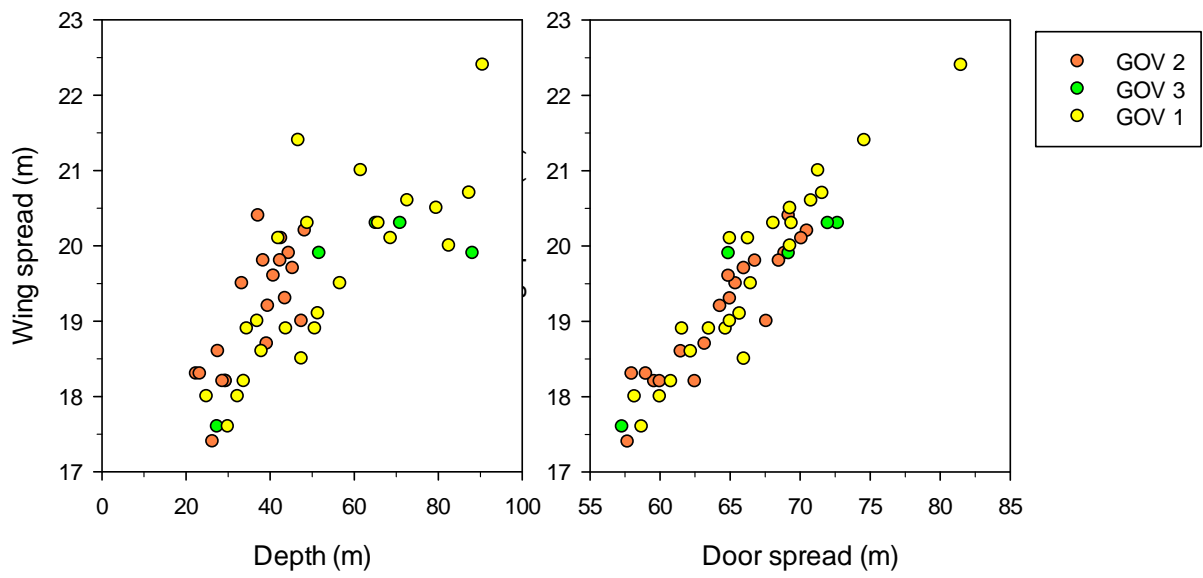


Fig. 5: Wing spread in relation to depth and door spread, Dana 3Q IBTS 2017.

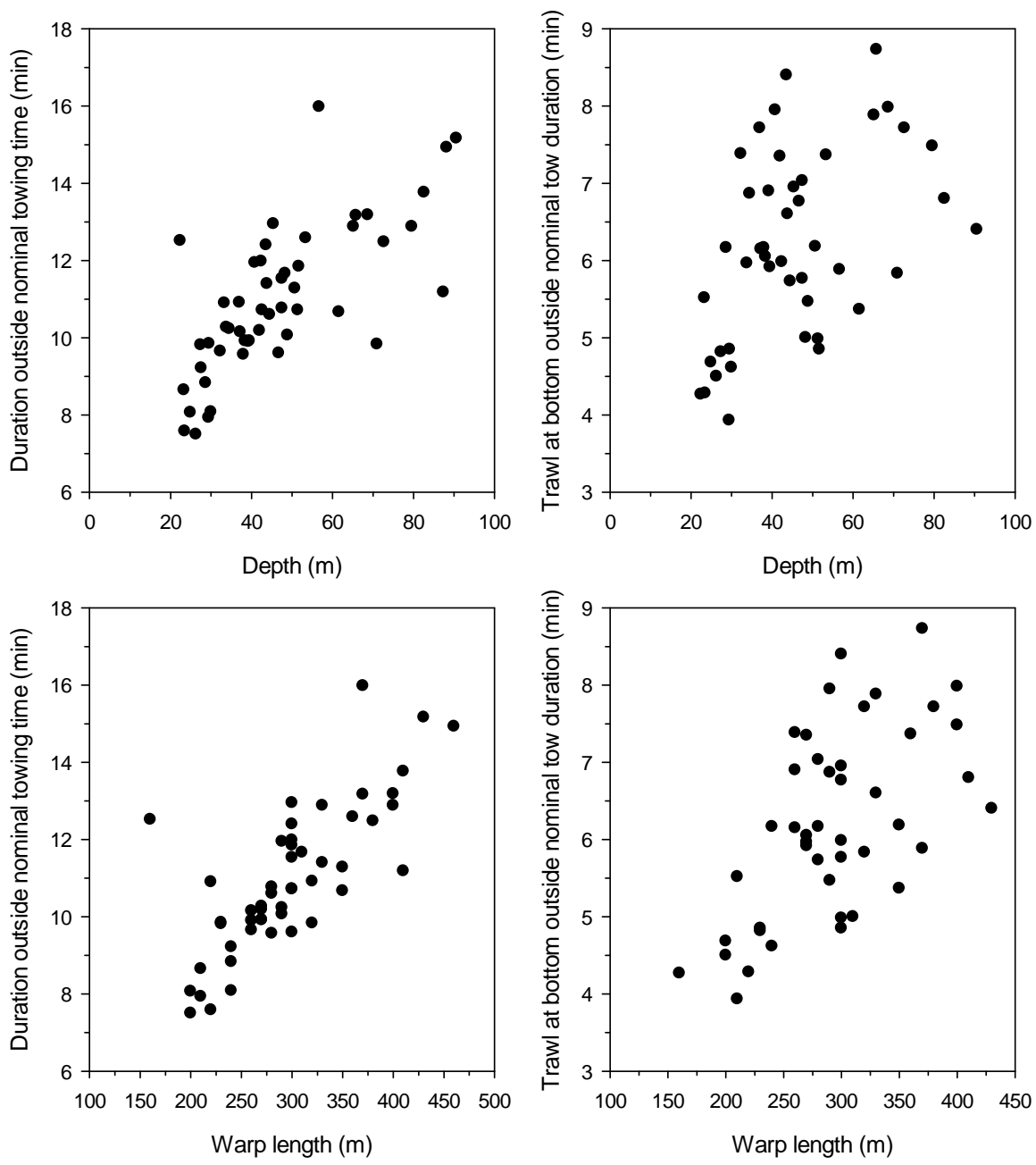


Fig. 6: Total fishing time and trawling time at bottom outside the nominal tow duration, standard tows, Dana 3Q IBTS 2017.

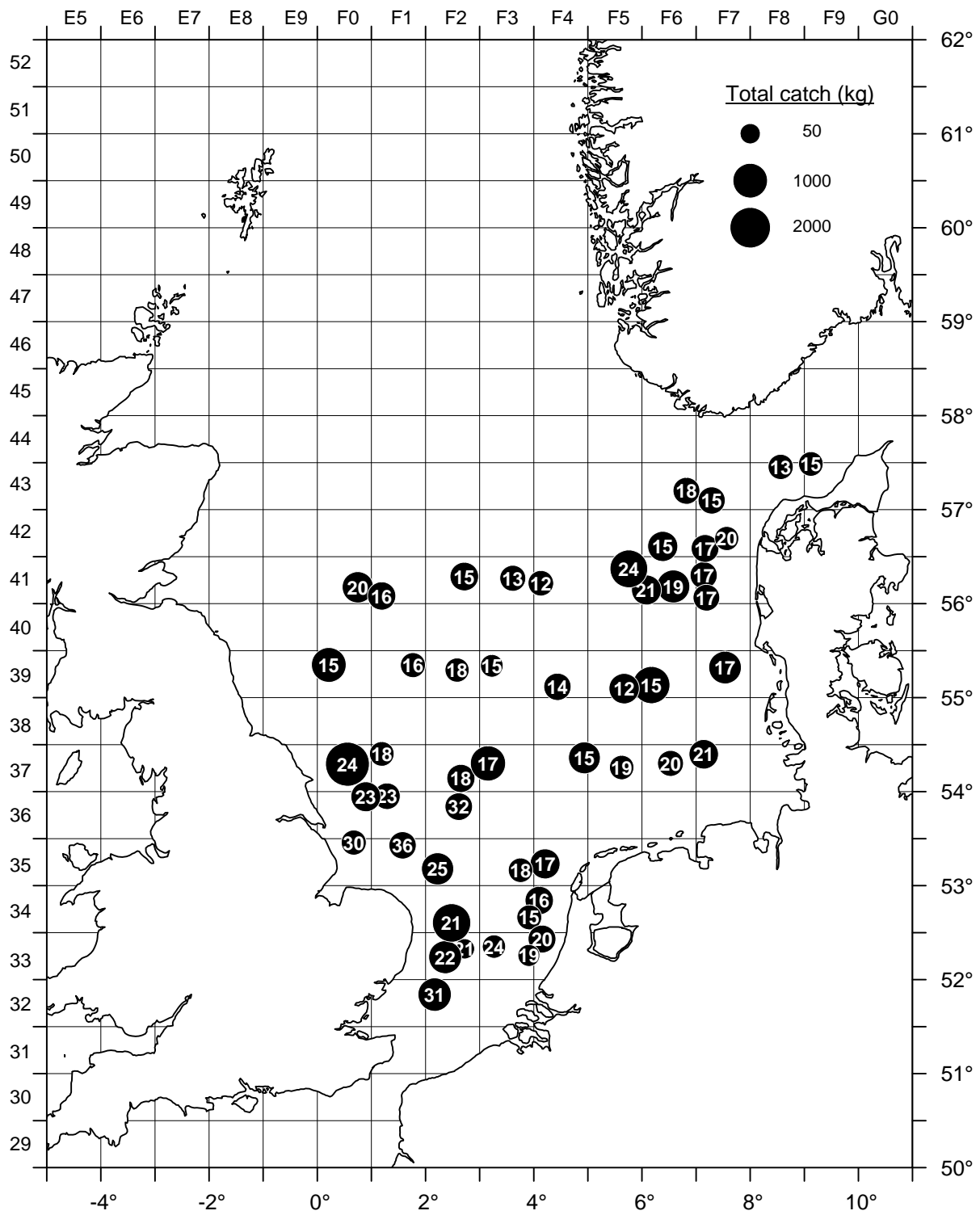


Fig. 7: Total catch (symbols) and species richness (numbers) in the standard tows, Dana 3Q 2017.

Tab. 1: Species list with total weight (kg), total number and size range (mm), Dana 3Q 2017.

Latin name	English name	Danish name	Weight	Number	L _{min}	L _{max}	Remark
<i>Aequipecten opercularis</i>	Queen scallop	Jomfrustøsters	0.371	10			
<i>Agonus cataphractus</i>	Pogge	Panser ulk	0.521	44	80	150	
<i>Alloteuthis subulata</i>	European common squid	Dværgblæksprutte	11.637	2436	20	160	ML
<i>Alosa fallax</i>	Twaited shad	Stavsild	2.155	4	380	450	
<i>Amblyraja radiata</i>	Starry ray	Tærbe	14.391	23	80	490	
<i>Ammodytes marinus</i>	Lesser sandeel	Tobis-hav	204.168	21232	90	200	
<i>Anarhichas lupus</i>	Wolf fish	Stribet havkat	13.400	4	640	790	
<i>Arnoglossus laterna</i>	Scaldfish	Tungeharre	2.206	216	60	150	
<i>Buglossidium luteum</i>	Solenette	Gløstunge	5.762	644	50	130	
<i>Callionymus lyra</i>	Common dragonet	Stribet fløffisk	6.055	174	50	250	
<i>Cancer pagurus</i>	Edible crab	Taskekrabbe	38.422	67	21	1910	CPW
<i>Chelidonichthys cuculus</i>	Red gurnard	Tværtribet knurhane	0.846	6	170	290	
<i>Chelidonichthys lucerna</i>	Tub gurnard	Rød knurhane	17.097	41	210	560	
<i>Clupea harengus</i>	Herring	Sild	1803.329	69584	70	290	
<i>Dicentrarchus labrax</i>	Sea bass	Havbars	4.946	6	330	580	
<i>Echiiichthys vipera</i>	Lesser weever	Fjæsing lille	30.591	1611	50	170	
<i>Eledone cirrhosa</i>	Horned octopus	Eldone Blæksprutte	0.139	1			
<i>Enchelyopus cimbrius</i>	Four-bearded rockling	Firetrådet havkvabbe	7.236	259	110	230	
<i>Engraulis encrasicolus</i>	Anchovy	Ansjos	0.121	4	150	170	
<i>Entelurus aequoreus</i>	Snake pipefish	Snippe	0.016	1	440	440	
<i>Eutrigla gurnardus</i>	Grey gurnard	Grå knurhane	833.182	8184	100	380	
<i>Gadus morhua</i>	Cod	Torsk	65.647	233	170	600	
<i>Gaidropsarus vulgaris</i>	Three-bearded rockling	Tretrådet havkvabbe	0.199	4	170	190	
<i>Galeorhinus galeus</i>	Tope	Gråhaj	36.580	3	940	1520	
<i>Glyptocephalus cynoglossus</i>	Witch	Skærsing	1.573	6	240	380	
<i>Gymnammodytes semisquamatus</i>	Smoothed sandeel	Tobis-nøgen	5.560	432	135	195	
<i>Hippoglossoides platessoides</i>	American plaice	Håising	83.955	2059	100	260	
<i>Homarus gammarus</i>	Lobster	Almindelig hummer	24.002	36	51	152	CPL
<i>Hyperoplus lanceolatus</i>	Greater sandeel	Tobiskonge	249.100	12010	120	340	
<i>Illex coindetii</i>	Southern shortfin squid		8.690	79	80	240	ML
<i>Lampetra fluviatilis</i>	River lamprey	Flodlampret	0.043	1	290	290	
<i>Limanda limanda</i>	Common dab	Ising	3230.203	53300	80	330	
<i>Lithodes maja</i>	Norway king crab	Troldkrabbe	1.847	5	65	110	CPL
<i>Loligo forbesii</i>	Northern squid		60.100	1438	20	360	ML
<i>Loligo vulgaris</i>	European squid		2.309	7	150	280	ML
<i>Lophius piscatorius</i>	Monk	Havtaske	25.434	11	200	770	
<i>Melanogrammus aeglefinus</i>	Haddock	Kuller	1176.973	3648	70	500	
<i>Merlangius merlangus</i>	Whiting	Hvilling	9160.450	114804	30	1100	
<i>Merluccius merluccius</i>	Hake	Kulmule	48.078	29	340	840	
<i>Microstomus kitt</i>	Lemon sole	Rødtunge	127.430	890	120	390	
<i>Mullus surmuletus</i>	Striped red mullet	Stribet (rød) Mulle	15.461	146	140	280	
<i>Mustelus asterias</i>	Starry smooth-hound	Stjernehaj	200.540	125	440	1070	
<i>Mustelus mustelus</i>	Smooth hound	Glathaj	85.122	55	440	1090	
<i>Myoxocephalus scorpius</i>	Sculpin	Ulke	2.364	38	50	230	
<i>Myxine glutinosa</i>	Hagfish	Slimål	0.068	1	350	350	
<i>Nephrops norvegicus</i>	Norway lobster	Jomfruhummer	20.797	717	18	61	CPL
<i>Pholis gunnellus</i>	Butter fish	Tangspræl	0.206	9	90	190	
<i>Platichthys flesus</i>	Flounder	Skrubbe	1.635	8	200	300	
<i>Pleuronectes platessa</i>	Plaice	Rødsprætte	569.271	3064	120	550	
<i>Pollachius virens</i>	Saithe	Sej	2.228	12	240	310	
<i>Raja brachyura</i>	Blonde ray	Blond rokke	12.538	6	470	900	
<i>Raja clavata</i>	Thornback ray	Sømrøkke	55.398	24	250	1920	
<i>Raja montagui</i>	Spotted Ray	Storpletet Rokke	13.861	18	340	560	
<i>Rossia macrosoma</i>	Stout bobtail squid	Ross's blæksprutte	0.074	5			
<i>Sardina pilchardus</i>	Pilchard	Sardin	89.619	1019	190	250	
<i>Scomber scombrus</i>	Mackerel	Makrel	1112.849	8175	190	390	
<i>Scophthalmus maximus</i>	Turbot	Pighvarre	21.274	19	200	490	
<i>Scophthalmus rhombus</i>	Brill	Sløthvarre	4.426	5	340	480	
<i>Scyliorhinus canicula</i>	Lesser spotted dogfish	Småpletet rødhaj	230.458	421	210	670	
<i>Sepiolla atlantica</i>	Atlantic bobtail squid		0.004	1			
<i>Solea solea</i>	Sole	Tunge	7.480	42	180	390	
<i>Sprattus sprattus</i>	Sprat	Brisling	4269.229	441401	60	150	
<i>Squalus acanthias</i>	Picked dogfish	Pighaj	2.300	13	250	580	
<i>Todaropsis eblanae</i>	Lesser flying squid		1.386	8	100	170	ML
<i>Trachinus draco</i>	Greater weever fish	Fjæsing	19.335	110	200	410	
<i>Trachurus trachurus</i>	Horse mackerel	Hestemakrel	470.893	9235	20	370	
<i>Trisopterus esmarkii</i>	Norway pout	Sperling	2.855	74	70	190	
<i>Trisopterus luscus</i>	Whiting pout	Skægtorsk	20.492	159	160	250	
<i>Trisopterus minutus</i>	Poor-cod	Glyse	6.555	126	130	190	
<i>Zeus faber</i>	John dory	Sct. peter fisk	0.419	2	220	230	

CPL: Carapace length, CPW: Carapace width, ML: Mantle length

Tab. 2: List of species for which single fish data (length, weight and sex; maturity for hake) were recorded and number of samples collected for ageing, standard tows, Dana 3Q 2017.

Species	IBTS roundfish area						Total
	2	4	5	6	7	8	
Herring (<i>Clupea harengus</i>)	9	45	80	164	103	not	401
Sprat (<i>Sprattus sprattus</i>)	4	29	41	143	51	requested	268
Cod (<i>Gadus morhua</i>)	not stratified by roundfish area (1 fish per cm per haul)						106
Haddock (<i>Melanogrammus aeglefinus</i>)							92
Whiting (<i>Merlangius merlangus</i>)							551
Norway pout (<i>Trisopterus ermarkii</i>)							22
Mackerel (<i>Scomber scombrus</i>)							252
Saithe (<i>Pollachius virens</i>)							8
Plaice (<i>Pleuronectes platessa</i>)							760
Hake (<i>Merluccius merluccius</i>)							29
Witch flounder (<i>Glyptocephalus cynoglossus</i>)							6
						Sum:	2495

Tab. 3: Preliminary abundance indices (number per hour trawling) for IBTS target species, standard tows, Dana 3Q 2017.

St No	Rect	COD			HADDOCK			WHITING			NORWAY POUT			HERRING			SPRAT		MACKEREL			SAITHE			PLAICE		
		Age: 0	1	2+	0	1	2+	0	1	2+	0	1	2+	0	1	2+	1	2+	0	1	2+	0	1	2+	0	1	2+
Length:		<18	18-37	≥38	<17	17-29	≥30	<17	17-23	≥24	<13	13-15	≥16	<15.5	5.5-22.5	≥23	<13	≥13	<17	17-29	≥30	<22	22-32	≥33	<10	10-18	≥19
2	41F7							239	84					2596	953		26	48								40	96
4	41F7		16					30	235	2					6		4			12	16					28	44
6	41F6							666	48	2				23132	5822		42097	739								68	509
8	41F6	4	4					35	471	60				8342	10152		28461									12	178
11	37F7							42	58	2				6	2		38			744	47					84	176
12	37F6							217	240								985			421						50	143
14	37F5							392	86							2			26	2						28	84
16	37F4							960	5444	306				1094	431		77774	2509		12	8					4	68
19	35F4								66					7498	17		56539	1450		72	2					32	40
20	35F3								8								18			364	24					42	24
22	34F4							6	52											3232						40	12
24	34F3							6		2										38						30	22
28	33F4		2					8	20					1211			70151			20						78	28
29	33F3								10								52	54		34	6					82	52
31	33F3							2	2	4					22	2	6			10						6	88
33	33F2							2	8	34										18						2	32
36	32F2		156	6					9286	3700	4				4	4				10	14					6	86
38	33F2		18						3927	3356					93	18				670	108						26
40	34F2		10					831	38451	3325					24	8										4	22
45	35F2		30						8162	1708							2			86	56					4	116
47	35F1		2					6	38	4					2		2			46						258	309
49	35F0		4						539	1048			6		12	2	8				16						
52	36F2							192	2620	346				76			1054									22	74
53	37F2							673	5181	1076				48			137	4								2	36
55	37F3							2152	9249	1363				195	72		113917	1356		2	2						107
57	39F7							24	2	2				8377	10		132290			76	103					60	14
60	39F6							10396	18385					66	8		183797									6	70
61	39F5							34	36					9350	13621		31785	467								42	206
63	39F4		6					526	2323	126				110	80		15153	152									189
66	36F1							38	84	22				404	12		18884			6						44	187
68	36F0							38	6411	2659					2	2	756	155		2	10					21	152
69	37F0		6			2	2	175	43488	14147					2	2	2	6		3	119					8	56
71	37F1							22	157	98				4	147		6327	1527		161	48					10	44
74	39F3							126	4											76						2	44
75	39F2							8	80	4					2		8			16	2						
77	39F1					2		6	12	4						2											68
83	39F0		4	4		140	2873		1028	3747		8	52			6	91			2	4						28
84	41F0		18	2		629	623	8	2614	2657		2	34						2		8	401		2			42
86	41F1		2			385	992		766	966		6	20								8						48
88	41F1					151	274		241	466			12														29
90	41F2		12			995	116		875	481		4			2	2											146
91	41F3		6		4	42	8		80	52		2															76
93	41F4		2			4		152	1917	87					8	2											50
99	41F5		8	24			2	83	2087	1100			2	4670	35531		84452	7038			2						78
100	42F6			8				38	12	8				2	12		14	2		4280	18						54
102	42F7		6					58	44	16					4		4	2		3816	2					16	156
104	42F7							42	106	2					20		28	10		591	28					30	98
107	43F6			57		24	207	22	18	207	111				4586	51							22				95
109	43F7		16						102	20					6					12							96
115	43F8		8						4	2	4									72	68					4	261
116	43F9								4						2					245	18					4	167

Tab. 4: Comparison of zero minute tow catches with catch of the neighbouring standard tow (cv: coefficient of variation).

Rectangle	Depth (m)	standard tow	Catch (kg)				mean	cv	mean catch of zero minute tow in % of standard tow catch
			zero minute tow						
			1	2	3				
34F2	48 - 49	1604.00	67.00					4.18	
39F1	47 - 48	154.75	30.82	21.46	28.40	26.89	0.18	17.38	
41F1	83	352.31	67.79					19.24	
41F4	69	179.84	19.01	33.97	26.87	26.61	0.28	14.80	
43F7	34 - 39	276.19	30.01	26.50	32.22	29.57	0.10	10.71	

Rectangle	Depth (m)	standard tow	Number of different species caught		
			zero minute tow		
			1	2	3
34F2	48 - 49	21	16		
39F1	47 - 48	16	12	10	10
41F1	83	16	11		
41F4	69	12	7	8	8
43F7	34 - 39	15	12	9	10