

**R/V Dana**

**Cruise 02/2015**

**"DK IBTS 1Q 2015"**



Vessel: R/V DANA  
Cruise number: 02/15

Cruise dates (planned): 4/2 – 21/2 2015  
Cruise name: DK IBTS 1Q 2015

<b>Port of departure:</b>	Hirtshals	<b>Date:</b>	04 Feb
<b>Port of return:</b>	Hirtshals	<b>Date:</b>	18 Feb
<b>Other ports:</b>	Esbjerg	<b>Date and justification:</b>	13 Feb Scheduled exchange of scientific staff and crew

## Participants

<b>Leg 1: Hirtshals – Esbjerg</b>		
<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
Tom Svoldgaard	DTU Aqua, Monitoring	Technician, Fish lab
Aage Thaarup	DTU Aqua, Monitoring	Technician, Fish lab
Emilie Klitlund	DTU Aqua, Monitoring	Technician, Fish lab
Per Christensen	DTU Aqua, Monitoring	Technician, Fish larvae
Thyge Dyrnesli	DTU Aqua, Monitoring	Technician, CTD, Maintenance
Bastian Huwer	DTU Aqua, Marine Living Resources	Scientist, Fish larvae
Hans Erik Tjelum	DTU Aqua, Monitoring	Technician, CTD, Maintenance
Simone Strandvad	Aarhus University	Guest

<b>Leg 2: Esbjerg – Hirtshals</b>		
<b>Name</b>	<b>Institute</b>	<b>Function and main tasks</b>
Helle Rasmussen	DTU Aqua, Monitoring	Cruise leader, Fish lab
Lise Sindahl	DTU Aqua, Monitoring	Technician, Fish lab
René Erlandsen	DTU Aqua, Monitoring	Technician, Fish lab
Reinhardt Jensen	DTU Aqua, Monitoring	Technician, Fish lab
Tommy Henriksen	DTU Aqua, Monitoring	Technician, Fish lab
Gert Holst	DTU Aqua, Monitoring	Technician, Fish larvae
Thyge Dyrnesli	DTU Aqua, Monitoring	Technician, CTD, Maintenance
Bastian Huwer	DTU Aqua, Marine Living Resources	Scientist, Fish larvae
Simone Strandvad	Aarhus University	Guest

## Objectives

The survey is part of the 1<sup>st</sup> 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 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;

The area to be covered by Denmark with RV Dana in the 1<sup>st</sup> quarter 2015 was allocated during the most recent IBTS Working Group meeting. Technical details are described in the current version of the survey manual (ICES 2014: Manual for the International Bottom Trawl Surveys. Series of ICES Survey Protocols. SISP 1-IBTS IX (draft). SISP 2 – MIK2. <http://datras.ices.dk/Documents/Manuals/>).

## **Itinerary**

R/V Dana left Hirtshals on Wednesday 4 February at 13:00 local time and the field work started in the afternoon in the western Skagerrak (Fig. 1). Favorable weather conditions (Fig. 2) allowed intense sampling during the 1<sup>st</sup> cruise leg. The vessel stayed in the port of Esbjerg on Friday 13 February from 6:45 to 13:15 for the scheduled exchange of scientific staff and crew. R/V Dana returned to Hirtshals already on Wednesday 18 February at 15:30 local time. The exceptional good weather conditions for this time of the year made it possible to complete the sampling program 2.5 days ahead the original schedule.

## **Achievements**

The original working area consisted of 39 ICES statistical rectangles located in IBTS roundfish areas 2, 4, 6 and 7 (Fig. 1). In addition, one rectangle in roundfish area 8 which otherwise would not have been covered by another country was sampled on the first day of the survey. The following activities were carried out:

40 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). These standard tows were made with 60 m sweeps irrespectively of water depth. 6 additional test tows were made with 110 m sweeps to collect information on the relationship between door spread and wing spread also for the longer sweeps which have been at depths > 70 m in previous surveys at which no sensor for wing spread measurements had been available.

40 CTD profiles (with additional sensors for dissolved oxygen and fluorescence).

76 valid standard hauls with a 2 m ring net (MIK, see IBTS manual for specification). All

of these tows with one 20 cm fine-meshed ringnet (Mini-MIK) attached. Technical problems resulted in 2 invalid tows. 4 additional tows were conducted for flowmeter calibration.

## 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). 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. Sensors for wing spread were used the second time but did not work properly during all standard tows. However, for 26 stations reasonable data were obtained which indicate a highly significant linear correlation with door spread (Fig. 4) from which the missing values can be estimated. A significant relationship between door and wing spread was also found for the test tows with the 110 m sweeps (60 m plus 50 m extension), and the results confirmed the expectation that the relationships between door and wing spread differ considerably the two sweep lengths (Fig 4).

In total, about 70 different species of fish and invertebrates were found in catches. The total weight of the catches from the 40 standard tows has been 14.7 tons (Tab. 1), and compared to previous years, anchovy was more numerous and widely distributed in the surveyed area. 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 monkfish, turbot, brill, witch flounder, sole and lemon sole (Tab. 2). For all of these species, a maximum of three individuals per cm or scm length group were taken from a single haul. The preliminary abundance indices for the main commercial species (Tab. 3) were reported to the coordinator of the 1<sup>st</sup> quarter IBTS.

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 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. Fig. 5 gives an overview about the number of larvae caught per ICES rectangle. Overall, a total number of 433 herring larvae have been caught, which is considerably lower than in the two previous years 2013 and 2014, where total numbers of 2394 and 4558 herring larvae had been caught, respectively.

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 at IMR Bergen in Norway.

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, and the temperature and salinity values will be submitted to the ICES DATRAS database together with the GOV catch results.

### ***Additional activities***

Selected mixed fish and shellfish species collections were taken for education and an open ship arrangement on Dana in Hirtshals in April.

Single individuals of fish species were collected for eDNA analysis, and herring samples were taken for toxicological analysis (Dioxin).

Lesser-spotted dogfish, *Scylliorhinus canicula*, was used for testing stress physiology associated with trawling. The sharks were kept out of water for approximately 20 minutes, starting from the time the trawl net was on deck. Blood samples were taken via caudal puncture after the 20 minutes of air exposure and then again after 24 hours. After every blood samples reflexes and responses to touching and restrain were checked. This work was carried out on 9 individuals.

### **Others**

A cruise summary report has been delivered online to

[http://seadata.bsh.de/csr/online/V1\\_index.html](http://seadata.bsh.de/csr/online/V1_index.html).

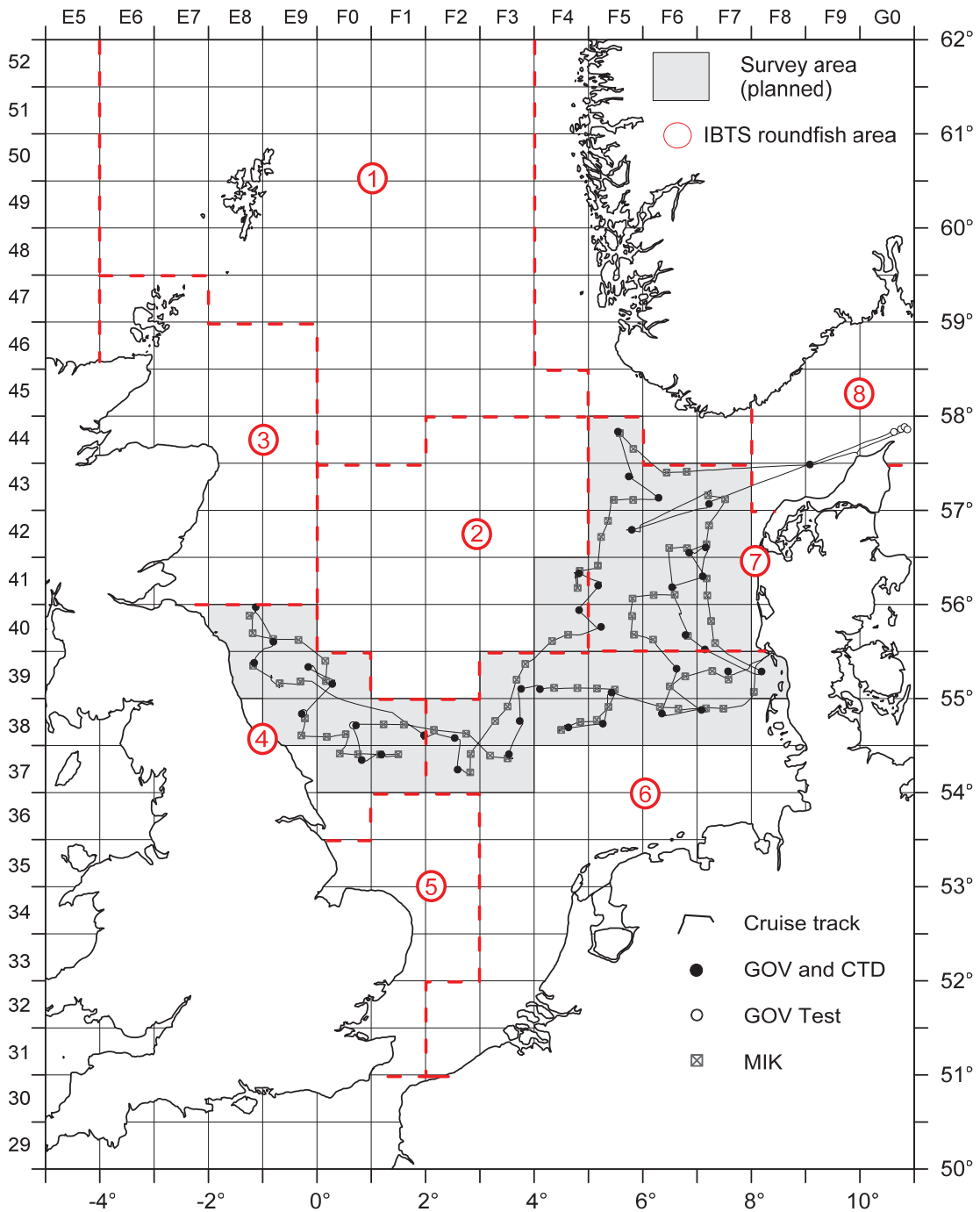


Fig. 1: Survey map with cruise track and sampling locations, Dana DK IBTS 1Q 2015.

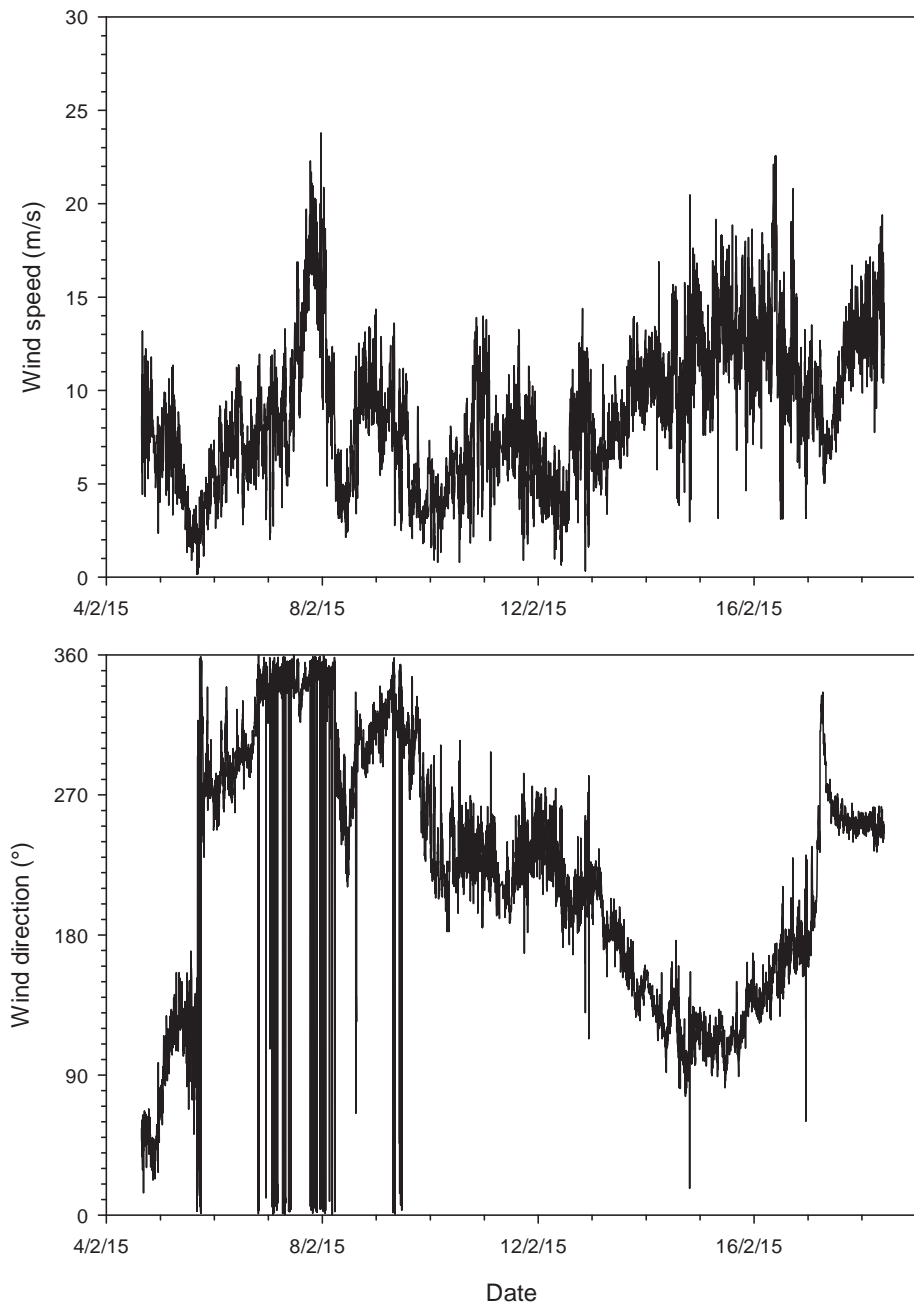


Fig. 2. Wind speed (m/s) and wind direction (°) recorded along the cruise track, Dana DK IBTS 1Q 2015.

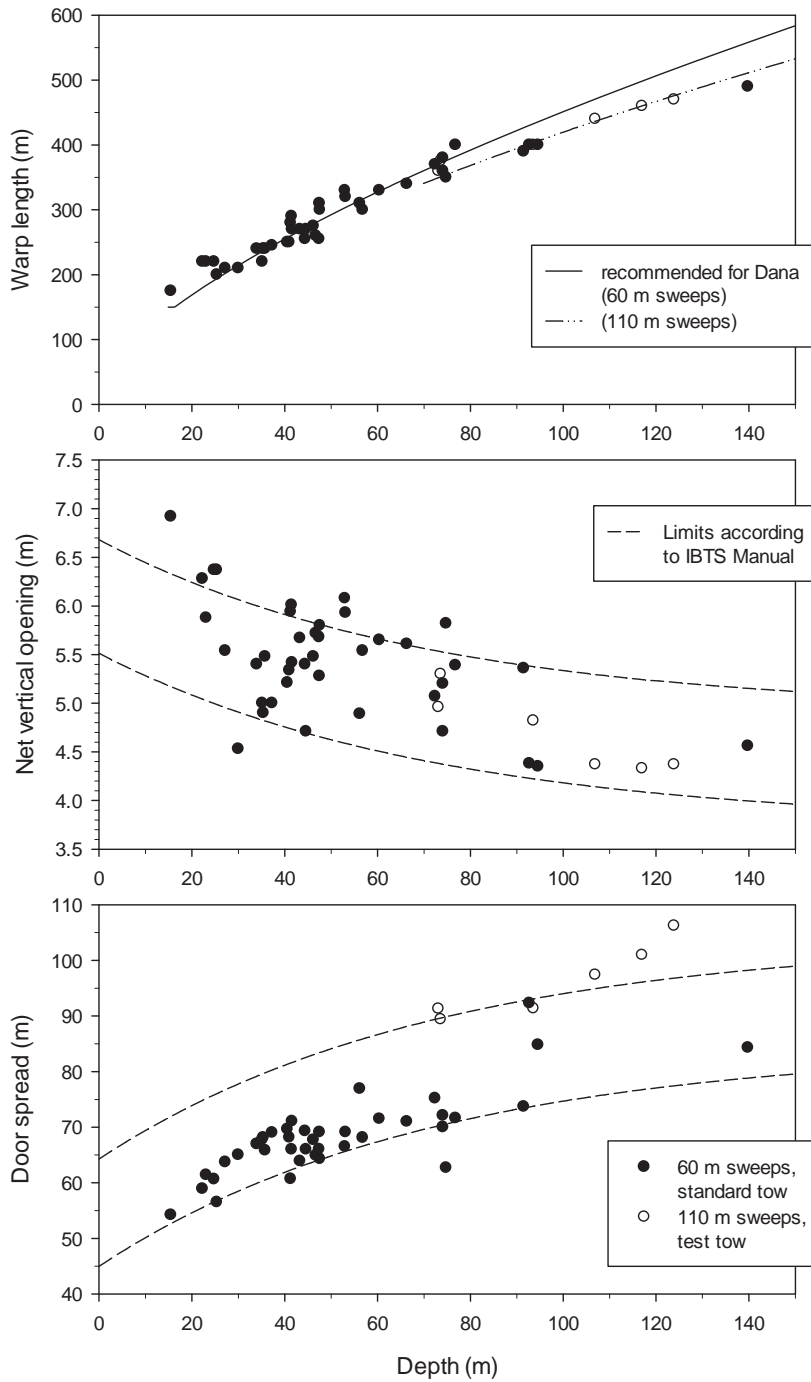


Fig. 3: Warp length, net opening and door spread in relation to depth, Dana DK IBTS 1Q 2015



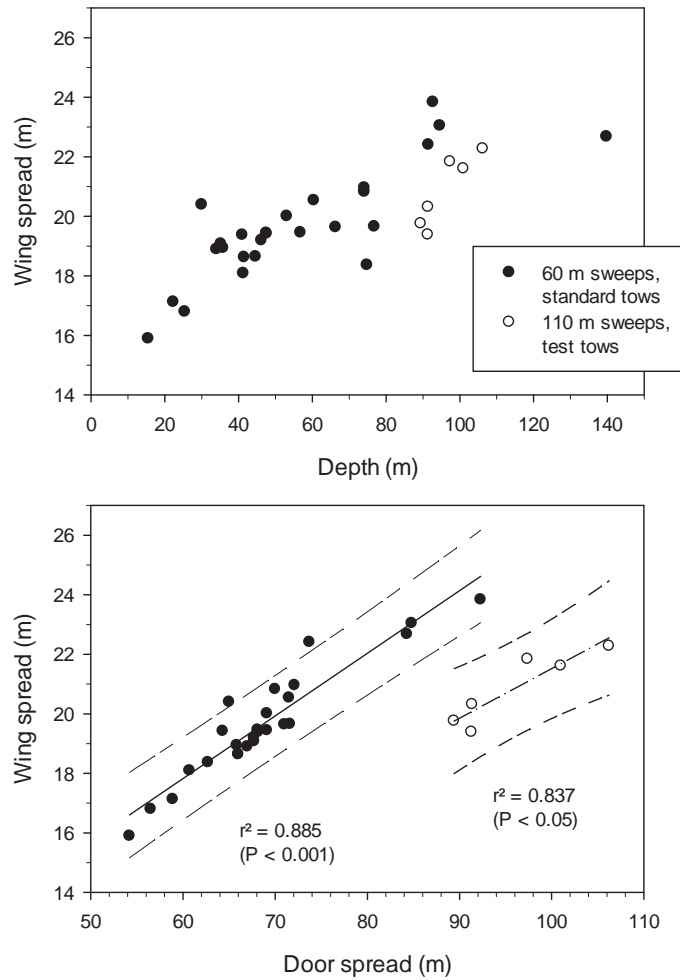


Fig. 4: Wing spread in relation to depth (no limits specified in the IBTS Manual) and wing spread in relation to door spread (linear regressions with 95 % prediction limits for 60 m and 110 m sweeps), Dana DK IBTS 1Q 2015.

<b>2015</b>	<b>E8</b>	<b>E9</b>	<b>F0</b>	<b>F1</b>	<b>F2</b>	<b>F3</b>	<b>F4</b>	<b>F5</b>	<b>F6</b>	<b>F7</b>	<b>F8</b>
<b>44</b>								<b>0</b>			
<b>43</b>								<b>20</b>	<b>3</b>	<b>8</b>	
<b>42</b>								<b>36</b>	<b>10</b>	<b>10</b>	
<b>41</b>							<b>41</b>	<b>6</b>	<b>7</b>	<b>1</b>	
<b>40</b>	<b>187</b>	<b>16</b>					<b>11</b>	<b>1</b>	<b>0</b>	<b>0</b>	
<b>39</b>	<b>26</b>	<b>10</b>	<b>12</b>			<b>10</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>38</b>		<b>4</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>0</b>	
<b>37</b>			<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>					
<b>36</b>											

Fig. 5: Number of herring larvae per ICES rectangle caught in MIK hauls, Dana DK IBTS 1Q 2015 (black numbers = sum of larvae from 2 MIK hauls, red numbers = number of larvae from 1 MIK haul).

Tab. 1: Species list, Dana DK IBTS 1Q 2015.

Latin name	Uk name	Danish name	Number	Weight (kg)	Type of registration	
<i>Aequipecten opercularis</i>	Queen scallop	Jomfruesters	6	0.62	-	:-: not measured
<i>Agonus cataphractus</i>	Pogge (Armed bullhead)	Panserulsk	35	0.66	*	*: length
<i>Alloteuthis subulata</i>	European common squid	Dværgblæksprutte	886	5.04	*	**: length by sex
<i>Alosa fallax</i>	Twaited shad	Stavsild	1	0.20	*	***: single fish data
<i>Amblyraja radiata</i>	Starry ray	Tærbe	45	17.84	**	(length, weight, sex, age)
<i>Ammodytes marinus</i>	Sandeel	Tobis-hav	1664	4.97	*	+: maturity
<i>Argentina sphyraena</i>	Lesser silver smelt	Strømsild	5	0.28	*	
<i>Arnoglossus laterna</i>	Scaldfish	Tungehvarre	37	0.62	*	
<i>Buglossidium luteum</i>	Solenette	Glastunge	35	0.33	*	
<i>Callionymus lyra</i>	Common dragonet	Fløjfisk (str)	32	0.75	*	
<i>Callionymus maculatus</i>	Spotted dragonet	Fløjfisk (pl)	9	0.05	*	
<i>Callionymus reticulatus</i>	Reticulated dragonet	Kortfinnet fløjfisk	2	0.03	*	
<i>Cancer pagurus</i>	Edible crab	Taskekrabbe	21	15.64	**	
<i>Clupea harengus</i>	Herring	Sild	279992	5279.56	***	
<i>Cyclopterus lumpus</i>	Lumpfish	Stenbider	2	3.20	*	
<i>Echiichthys vipera</i>	Lesser weever	Fjæsing lille	5	0.13	*	
<i>Eledone cirrhosa</i>	Horned octopus	Eledone Blæksprutte	3	0.20	*	
<i>Enchelyopus cimbrius</i>	Four-bearded rockling	Havkvæbde (4tr)	20	0.46	*	
<i>Engraulis encrasicolus</i>	Anchovy	Ansjos	2646	33.27	*	
<i>Eutrigla gurnardus</i>	Grey gurnard	Knurhane (grå)	8707	674.59	*	
<i>Gadus morhua</i>	Cod	Torsk	158	253.75	***+	
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	Hundestejle 3 p	7	0.02	*	
<i>Glyptocephalus cynoglossus</i>	Witch	Skærsing	3	0.54	***+	
<i>Hippoglossoides platessoides</i>	American plaice	Håising	1450	62.86	*	
<i>Homarus gammarus</i>	Lobster	Hummer (alm.)	1	0.46	**	
<i>Hyperoplus lanceolatus</i>	Greater sandeel	Tobiskonge	18	0.63	*	
<i>Illex coindetii</i>	Southern shortfin squid	Illex coindetii	1	0.06	*	
<i>Limanda limanda</i>	Common dab	Ising	36729	2047.34	*	
<i>Lithodes maja</i>	Norway king crab	Troldekrabbe	25	10.24	**	
Loliginidae			623	2.18	*	
<i>Loligo forbesii</i>	Northern squid	Loligo forbesii	21	3.55	*	
<i>Loligo vulgaris</i>	European squid	Loligo vulgaris	30	8.54	*	
<i>Lophius piscatorius</i>	Monk	Havtaske	1	0.11	***+	
<i>Lumpenus lumpretaeformis</i>	Snake blenny	Langebarn sph.	7	0.15	*	
<i>Lycodes vahlii</i>	Vahls eelpout	Ålebromse	1	0.05	*	
<i>Maurulius muelleri</i>	Pearlside	Lakesild	9	0.02	*	
<i>Melanogrammus aeglefinus</i>	Haddock	Kuller	6236	388.23	***+	
<i>Merlangius merlangus</i>	Whiting	Hvilling	22499	1577.24	***+	
<i>Merluccius merluccius</i>	Hake	Kulmule	64	19.21	***+	
<i>Micromesistius poutassou</i>	Blue whiting	Blåhvilling	1	0.02	*	
<i>Microstomus kitt</i>	Lemon sole	Rødtunge	308	37.76	***+	
<i>Molva molva</i>	Ling	Lange	1	1.89	*	
<i>Mullus surmuletus</i>	Striped red mullet	Stribet (rød) Mulle	461	16.12	*	
<i>Mustelus asterias</i>	Starry smooth hound	Stjernehaj	2	0.85	**	
<i>Mustelus mustelus</i>	Smooth hound	Glathaj	3	1.13	**	
<i>Myoxocephalus scorpius</i>	Sculpin	Ulk	23	2.90	*	
<i>Myxine glutinosa</i>	Hagfish	Slimål	3	0.11	*	
<i>Nephrops norvegicus</i>	Norway lobster	Jomfruhummer	191	9.37	**	
Ommastrephidae			1	0.01	*	
<i>Osmerus eperlanus</i>	European smelt	Smelt	1	0.00	*	
<i>Pholis gunnellus</i>	Butter fish	Tangspræl	1	0.02	*	
<i>Platichthys flesus</i>	Flounder	Skrubbe	45	10.95	*	
<i>Pleuronectes platessa</i>	Plaice	Rødspætte	4444	699.84	***+	
<i>Pollachius virens</i>	Saithe	Sej	41	31.50	***+	
<i>Pomatoschistus spp.</i>	Sand gobies	Sand kutling	17	0.03	*	
<i>Raja clavata</i>	Thornback ray	Sømrøkke	2	5.02	**	
<i>Raja montagui</i>	Spotted Ray	Storpletlet Rokke	4	5.53	**	
<i>Rossia macrosoma</i>	Stout bobtail squid		8	0.03	-	
<i>Sardina pilchardus</i>	Pilchard	Sardin	50	0.86	*	
<i>Scomber scombrus</i>	Mackerel	Makrel	27	2.20	***+	
<i>Scophthalmus maximus</i>	Turbot	Pighvarre	5	10.07	***+	
<i>Scophthalmus rhombus</i>	Brill	Slethvarre	7	6.81	*	
<i>Scyliorhinus canicula</i>	Lesser spotted dogfish	Rødhaj (smp)	6	3.65	**	
<i>Sepiella atlantica</i>	Atlantic bobtail squid		9	0.03	-	
<i>Solea solea</i>	Sole	Tunge	14	3.20	***+	
<i>Sprattus sprattus</i>	Sprat	Brisling	594030	2971.64	***	
<i>Squalus acanthias</i>	Picked dogfish	Pighaj	2	1.68	**	
Syngnathidae sp.	Pipe-fishes	*tangnål	16	0.01	*	
<i>Trachinus draco</i>	Greater weever fish	Fjæsing	28	6.48	*	
<i>Trachurus trachurus</i>	Horse mackerel	Hestemakrel	64	2.12	*	
<i>Trisopterus esmarkii</i>	Norway pout	Sperling	34256	414.60	***+	
<i>Trisopterus minutus</i>	Poor-cod	Glyse	17	0.70	*	
<i>Zeus faber</i>	John dory	Sct. peter fisk	1	0.45	*	

Tab. 2: Number of single fish data (length, weight, sex and maturity) and samples for ageing, Dana DK IBTS 1Q 2015.

Species	IBTS Roundfish area					Total
	2	4	6	7	8	
Herring ( <i>Clupea harengus</i> )	69	300	343	302	40	1054
Sprat ( <i>Sprattus sprattus</i> )	47	179	222	191	33	672
Cod ( <i>Gadus morhua</i> )	6	47	22	87	-	162
Haddock ( <i>Melanogrammus aeglefinus</i> )	1	126	-	34	-	161
Whiting ( <i>Merlangius merlangus</i> )	31	227	179	181	0	618
Norway pout ( <i>Trisopterus ermarkii</i> )	-	60	-	38	-	98
Mackerel ( <i>Scomber scombrus</i> )	-	7	15	3	-	25
Saithe ( <i>Pollachius virens</i> )	-	-	-	30	-	30
Plaice ( <i>Pleuronectes platessa</i> )	82	128	209	214	31	664
Hake ( <i>Merluccius merluccius</i> )						48
Monkfish ( <i>Lophius piscatorius</i> )						1
Turbot ( <i>Psetta maxima</i> )		not stratified				5
Brill ( <i>Scophthalmus rhombus</i> )						7
Witch flounder ( <i>Glyptocephalus cynoglossus</i> )		by roundfish area				2
Sole ( <i>Solea solea</i> )						14
Lemon sole ( <i>Microstomus kitt</i> )						152
					Sum:	3713
-: not caught						

Tab. 3: Preliminary abundance indices (number per hour trawling) for commercial IBTS species and number of valid MIK hauls per rectangle, Dana DK IBTS 1Q 2015.

standard haul	Rectangle	Herring < 20 cm	Cod < 25 cm	Haddock < 20 cm	Whiting < 20 cm	Norway pou < 15 cm	Sprat < 10 cm	Mackerel < 25 cm	Number of valid MIK hauls
1	43F9	1306	0	0	3	0	1782	0	*
2	44F5	0	10	10	0	7284	0	0	2
3	43F5	13837	14	84	256	108	0	5	2
4	43F6	19777	4	0	100	12	14	0	2
5	41F4	10374	0	0	34	26	22104	0	2
6	41F5	57469	2	0	34	4	149040	2	2
7	40F4	79	2	0	18	0	590	0	2
8	40F5	87239	2	0	235	20	142490	0	2
9	37F2	986	0	0	757	0	86328	0	2
10	38F2	816	0	0	12	0	923	0	2
11	38F1	437	2	0	579	0	7214	0	2
12	39E8	138	2	52	4634	857	202	0	1
13	40E9	195	14	36	6393	9248	26	0	2
14	40E8	5397	16	8259	1549	8120	1555	0	2
15	39E9	778	2	18	2034	3524	18	14	2
16	39F0	45	0	734	33	19350	218	0	2
17	38E9	2	4	58	1213	2103	2	0	2
18	37F1	463	0	0	1221	827	320	0	2
19	37F0	52	2	0	1726	0	0	0	2
20	38F0	3453	0	16	792	16186	184	0	2
21	37F3	10639	0	0	4601	0	30919	0	2
22	38F3	32426	0	0	841	0	87544	0	2
23	39F3	36857	2	0	486	0	79831	2	2
24	39F4	59549	0	0	511	0	97949	0	2
25	38F4	114441	0	0	64	2	149122	22	2
26	38F5	9086	0	0	80	4	2932	0	2
27	39F5	3125	0	0	36	0	31892	0	2
28	39F7	3549	2	0	22	0	26662	0	2
29	38F7	1296	0	0	118	0	19418	0	2
30	38F6	44292	0	0	87	0	6123	0	2
31	39F6	23871	0	0	117	0	1393	0	2
32	40F6	2784	0	0	12	0	1401	0	2
33	40F7	2630	2	0	2	0	3071	0	2
34	39F8	576	0	0	14	0	5096	0	1
35	41F6	738	0	0	58	2	800	0	2
36	41F7	300	0	0	22	0	93	0	2
37	42F7	168	0	0	16	0	121	0	2
38	42F6	241	0	0	113	0	129	0	2
39	42F5	1034	2	0	28	147	4	0	2
40	43F7	34	2	0	28	0	8	0	2
*: no MIK planned									