DTU Aqua

Cruise Report

Vessel: R/V DANA
Cruise number: 06/10
Cruise dates (planned): 10 – 27 August 2010
Cruise name: IBTS 3Q 2010

Port of departure:	Hirtshals	**Date:**	10 Aug 2010
Port of return:	Hirtshals	**Date:**	26 Aug 2010
Other ports:	Esbjerg	**Date and justification:**	19 Aug 2010, Exchange of crew and scientific staff

Participants

Leg 1: Hirtshals-Esbjerg		
Name	**Institute**	**Function and main tasks**
Kai Wieland	DTU Aqua	Cruise leader, Fish Lab, CTD
Jan Pedersen	DTU Aqua	Technician, Fish Lab
Tom Svoldgaard	DTU Aqua	Technician, Fish Lab
Dirk Tijssen	DTU Aqua	Technician, Fish Lab
Ib Bang	DTU Aqua	Technician, Fish Lab
Mie Hylstofte Sichlau	DTU Aqua	Scientist, Zooplankton
Sara Ceballos	DTU Aqua	Scientist, Zooplankton
Jan Heuschele	DTU Aqua	Scientist, Zooplankton

Leg 2: Esbjerg-Hirtshals		
Name	**Institute**	**Function and main tasks**
Helle Rasmussen	DTU Aqua	Cruise leader, Fish Lab, CTD
Maria Jarnum	DTU Aqua	Technician, Fish Lab
Tom Svoldgaard	DTU Aqua	Technician, Fish Lab
Stina B.S. Hansen	DTU Aqua	Technician, Fish Lab
Thomas Møller	DTU Aqua	Technician, Fish Lab

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 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 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;

The area to be covered by Denmark with RV Dana in the 3rd quarter 2010 was allocated during the most recent IBTS Working Group meeting. Technical details are described in the current version of the survey manual (ICES 2010: Addendum 1, IBTS Manual – Revision VIII. http://datras.ices.dk/Documents/Manuals/.

Sampling of water and zooplankton for experimental on the mating behaviour of copepods was added to the routine program of the 1st leg of the survey. This additional sampling was conducted at regular fishing positions without extra vessel costs.

Itinerary

R/V Dana left Hirtshals as scheduled on Tuesday 10 August at 15:00 local time. The vessel arrived in Esbjerg on 19 August in the morning to exchange crew and scientific staff and left port the same day in the evening. Fishing was stopped on 24 Aug due to bad weather and could not be resumed thereafter due to technical reasons. R/V Dana arrived back in Hirtshals on 26 August at 10:00 local time and the coordinator of the 3rd quarter IBTS was immediately informed that Denmark had to terminate its survey earlier than scheduled and without completion of the survey area.

Achievements

The following activities were carried out in the working area (Fig. 1), which consisted of 49 ICES rectangles:

40 valid trawl hauls (standard GOV 36/47 (chalut á Grande Overture Verticale) trawl with groundgear A,
45 CTD profiles,
Continuous recording of surface temperature and salinity along the cruise track (Fig. 1),
Continuous recording of meteorological data and water depth,
25 tows with WP2 net.

Results

IBTS

Sorting and analyses of the trawl catches were conducted as specified according to the IBTS manual. About 65 different species of fish and selected invertebrates were found (Tab. 1). Length measurements were made for all of the listed species. Sharks, rays and the listed shellfish species were measured separately by sex (length composition and weight). Single fish data (length and weight) and otoliths were collected for the main commercial species (cod, haddock, whiting, Norway pout, saithe, herring, sprat and mackerel) as well as for hake and witch flounder (Tab. 2). The preliminary abundance indices for the main commercial species (Tab. 3) were reported to the coordinator of the 3rd quarter IBTS.

Copepod mating behaviour

The aim of our experiments was to determine natural mating rates in different species and populations of copepods in the North Sea area. We conducted three different kind of incubations onboard: (1) Estimation of the maximal mating capacity of males by means of 24 hour incubation of 1 male and 10 females. We determined the mating rate using free and attached spermatophores as a proxy. (2) The effect of the adult sex ratio and density on the mating behavior and the strength of sexual selection. We incubated different numbers of males and females for 24 hours, and recorded the mating rates. (3) Incubation of single females to get the natural proportion of fertilized females, which will then be related to the male mating capacity.
The species we tested were: *Temora longicornis*, *Pseudocalanus elongates*, *Centropages typicus*, *Centropages hamatus*. Copepods were sampled using a WP2 net at 6 different stations, hauling it from the bottom to the surface. Water for the incubations was taken from the depth of maximal fluorescence using an oceanographic rosette. Additional water samples were taken from the surface and maximum fluorescence to measure phytoplankton biomass and species composition. One WP2 haul was directly transferred to a PVC bottle and fixed in formalin. This sample will be analyzed in the lab to get the copepod adult density and sex ratio, as well as the fraction of females with spermatophores and the number of attached spermatophores. Throughout the cruise we collected females with multiple spermatophores attached to determine the sperm content.

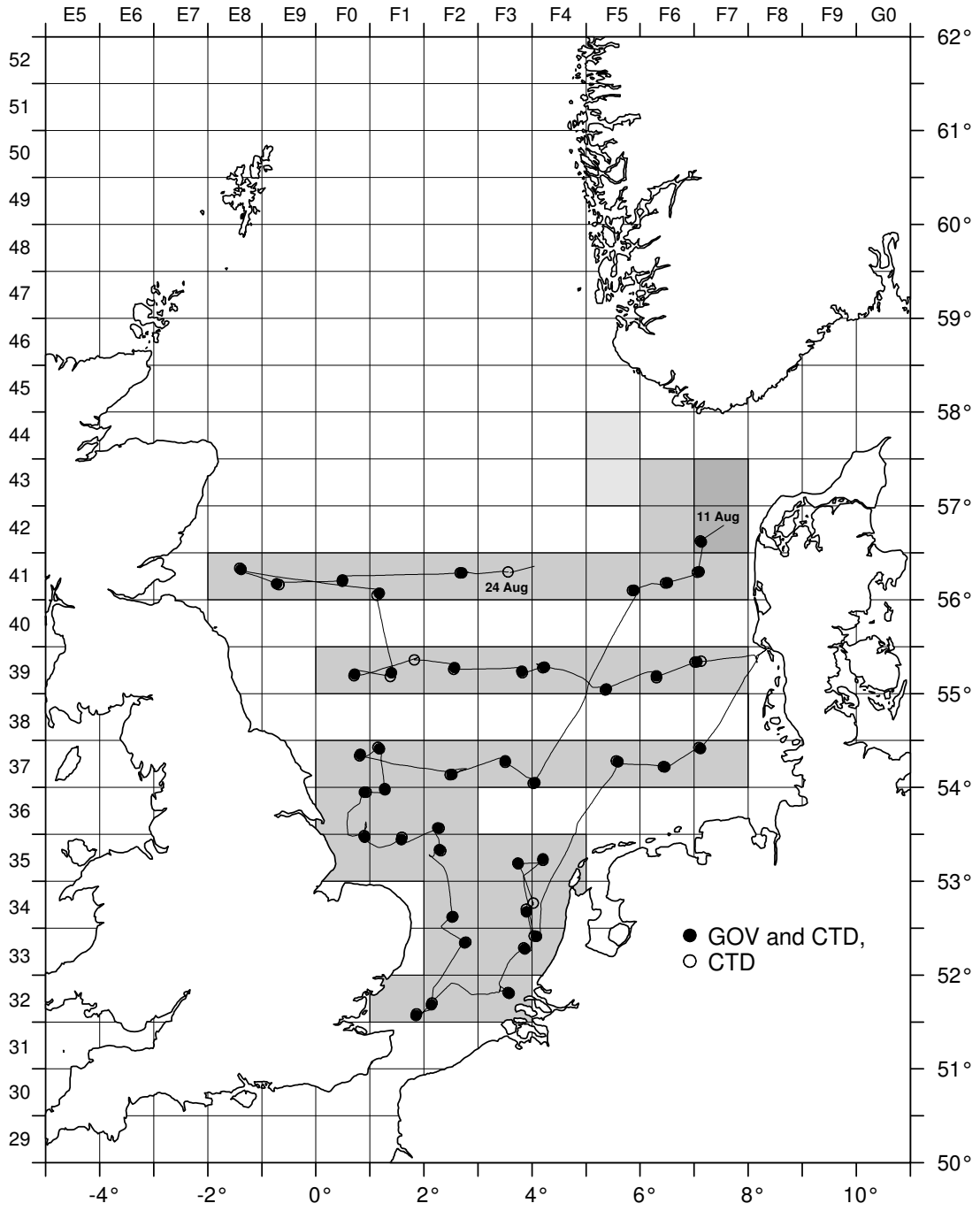

Fig. 1: Survey map with cruise track and sampling locations, Dana 3Q IBTS 2010.

Tab. 1: Species list, Dana 3Q IBTS 2010

Fish		Invertebrates	
Danish name	Latin name	Danish name	Latin name
Ansjos	Engraulis encrasicolus	Hummer (alm.)	Homarus gammarus
Blåhvilling	Micromesistius poutassou	Jomfruhummer	Nephrops norvegicus
Brisling	Sprattus sprattus	Taskekrabbe	Cancer pagurus
Fjæsing lille	Trachinus vipera	Troldkrabbe	Lithodes maja
Flodlampret	Lampetra fluviatilis		
Fløjfisk (pl)	Callionymus maculatus	Eledone Blæksprutte	Eledone cirrhosa
Fløjfisk (str)	Callionymus lyra	Loligo Blæksprutte	Loligo forbesi
Glastunge	Buglossidium luteum	-	Loligo subulata
Glathaj	Mustelus mustelus	-	Loligo vulgaris
Glyse	Trisopterus minutus	-	Sepiolidae
Havbars	Dicentrarchus labrax	-	Teuthoidea
Havkvabbe (3tr)	Gaidropsarus vulgaris		
Havkvabbe (4tr)	Enchelyopus cimbrius	Stor kammusling	Pecten maximus
Havtaske	Lophius piscatorius		
Hestemakrel	Trachurus trachurus		
Hvilling	Merlangius merlangus		
Håising	Hippoglossoides platessoides		
Ising	Limanda limanda		
Knurhane (grå)	Eutrigla gurnardus		
Knurhane (rød)	Trigla lucerna		
Knurhane (tvst)	Aspitrigla cuculus		
Kuller	Melanogrammus aeglefinus		
Kulmule	Merluccius merluccius		
Kutling-sand	Pomatoschistus minutus		
Lange	Molva molva		
Makrel	Scomber scombrus		
Multe (tyklæbet)	Mugil cephalus		
Pighaj	Squalus acanthias		
Pighvarre	Psetta maxima		
Pletrokke	Leucoraja naevus		
Rødhaj (smpl)	Scyliorhinus canicula		
Rødspætte	Pleuronectes platessa		
Rødtunge	Microstomus kitt		
Sej	Pollachius virens		
Sild	Clupea harengus		
Skrubbe	Platichthys flesus		
Skægtorsk	Trisopterus luscus		
Skærising	Glyptocephalus cynoglossus		
Slethvarre	Scophthalmus rhombus		
Sperling	Trisopterus esmarkii		
Stavsild	Alosa fallax		
Stenbidder	Cyclopterus lumpus		
Stjernehaj	Mustelus asterias		
Storplettet Rokke	Raja montagui		
Stribet Mulle	Mullus surmuletus		
Strømsild	Argentina sphyraena		
Sømrokke	Raja clavata		
Tangspræl	Pholis gunnellus		
Tobis-hav	Ammodytes marinus		
Tobiskonge	Hyperoplus lanceolatus		
Torsk	Gadus morhua		
Tunge	Solea solea		
Tungehvarre	Arnoglossus laterna		
Tærbe	Amblyraja radiata		
Ulk	Myoxocephalus scorpius		
Panserulk	Agonus cataphractus		

Tab. 2: Number of single fish data and samples for ageing, Dana 3Q IBTS 2010.

	IBTS roundfish area						Total
Species	2	3	4	5	6	7	area
Herring	35	131	42	43	215	116	582
Sprat	4	71	67	111	190	82	525
Cod	24	4	18	15	32	5	98
Haddock	130	112	78	-	-	29	349
Whiting	130	97	126	118	185	49	705
Norway pout	29	-	-	-	-	1	30
Hake	2	-	5	-	-	3	10
Saithe	1	1	-	-	-	-	2
Mackerel	43	67	13	76	91	25	315
Witch flounder	3	-	-	-	1	-	4
						Sum:	2620

Tab. 3: Preliminary abundance indices (number per hour trawling) for commercial species, Dana 3Q 2010.

HL: NO:	ST SQ	COD			HADDOCK			WHITING			NORWAY POUT			HERRING			SPRAT			MACKEREL			SAITHE			PLAICE		
		0 <18	1 18-37	2+ ≥38	0 <17	1 17-29	2+ ≥30	0 <17	1 17-23	2+ ≥24	0 <13	1 13-15	2+ ≥16	0 <15.5	1 15.5-22.5	2+ ≥23	0 -	1 <13	2+ ≥13	0 <17	1 17-29	2+ ≥30	0 <22	1 22-32	2+ ≥33	0 <10	1 10-18	2+ ≥19
1	42F7	0	2	2	212	0	0	6	10	2	0	0	0	8	6	0		0	112	0	94	10	0	0	0	0	22	168
2	41F7	0	2	0	0	0	0	4	58	4	2	0	0	361	1907	0		3939	281	0	2	0	0	0	0	0	2	186
3	41F6	0	2	0	22	0	0	32	4	8	0	0	0	0	0	0		4	2	0	0	0	0	0	0	0	0	238
4	41F5	0	2	0	48	0	0	24	12	4	0	0	0	62	79330	0		3291	214	0	0	0	0	0	0	0	0	162
5	37F4	0	0	0	0	0	0	15856	535	20	0	0	0	858	0	0		20562	0	0	0	0	0	0	0	0	2	202
6	37F3	0	0	0	0	0	0	10	356	30	0	0	0	26	3523	0		96865	6380	0	0	0	0	0	0	0	32	206
7	37F2	0	2	8	0	0	0	4263	390	52	0	0	0	18	3	0		184	0	0	0	0	0	0	0	0	0	30
8	37F0	0	0	0	0	0	2	4589	318	24	0	0	0	0	16	1		0	6	0	0	10	0	0	0	0	0	46
9	37F1	0	0	0	0	0	0	238	38	4	0	0	0	0	10	0		11356	4401	0	0	0	0	0	0	0	4	100
10	36F1	0	0	0	0	0	0	608	80	16	0	0	0	8	1620	8		24039	10965	0	146	272	0	0	0	4	44	14
11	36F0	0	0	0	0	0	0	561	302	20	0	0	0	0	14	44		1286	260	0	2	10	0	0	0	0	6	68
12	*35F0*														*invalid tow*													
13	35F1	0	0	0	0	0	0	68	336	22	0	0	0	4	2	6		4622	1401	0	22	134	0	0	0	0	6	34
14	36F2	0	0	0	0	0	0	12	4	0	0	0	0	0	2	0		6980	329	0	0	0	0	0	0	0	4	52
15	35F1	0	0	0	0	0	0	8	0	0	0	0	0	6	4	0		25847	562	0	0	0	0	0	0	0	22	176
16	34F2	0	0	0	0	0	0	45	4678	5480	0	0	0	3	616	3		8	4	0	4	8	0	0	0	0	0	58
17	33F2	0	6	18	0	0	0	0	8	24	0	0	0	0	4	2		4	2	0	26	46	0	0	0	0	14	8
18	32F2	0	20	18	0	0	0	2	44	252	0	0	0	0	0	0		0	2	0	2	28	0	0	0	0	0	82
19	32F1	0	0	0	0	0	0	252	132	27	0	0	0	21	0	0		24621.2	0	0		6	0	0	0	0	0	312
20	32F3	0	0	0	0	0	0	1798	57	11	0	0	0	7671	2	2		8	22	0	0	14	0	0	0	0	20	14
21	33F3	0	0	0	0	0	0	2	4	0	0	0	0	44	0	0		166	393	0	2	2	0	0	0	0	14	76
22	35F4	0	0	0	0	0	0	4742	30	2	0	0	0	0	1743	0		72741	4321	0	40	2	0	0	0	0	108	74
23	35F3	2	0	0	0	0	0	1924	16	2	0	0	0	0	5016	0		109857	2817	0	10	6	0	0	0	0	24	92
24	*34F4*														*invalid tow*													
25	34F3	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0		0	0	0	15	168	0	0	0	0	21	51
26	33F4	0	0	0	0	0	0	6	4	2	0	0	0	0	0	0		4	0	0	10	0	0	0	0	0	38	116
27	37F5	0	0	0	0	0	0	3288	80	2	0	0	0	8007	0	0		91955	0	0	0	6	0	0	0	0	20	176
28	37F5	0	0	0	0	0	0	456	38	0	0	0	0	94211	0	0		106523	386	0	16	16	0	0	0	0	78	186
29	37F7	6	0	0	0	0	0	2974	89	26	0	0	0	3036	2237	0		31720	0	0	8	14	0	0	0	0	32	50
30	39F7	0	0	0	0	0	0	0	6	0	0	0	0	0	8	0		30	0	0	0	0	0	0	0	0	484	290
31	39F6	0	0	2	0	0	0	2654	598	75	0	0	0	70859	256	0		27784	0	0	8	12	0	0	0	0	6	62
32	39F5	0	0	2	0	0	0	140	48	2	0	0	0	0	6	0		0	0	0	0	0	0	0	0	0	4	531
33	39F4	0	4	0	0	0	0	144	30	0	0	0	0	0	0	0		4	10	0	0	0	0	0	0	0	0	68
34	39F3	0	0	0	0	0	0	947	10	0	0	0	0	0	0	0		70	34	0	0	0	0	0	0	0	4	46
35	39F2	0	0	0	0	2	2	23	30	0	0	0	0	0	0	0		0	0	0	4	0	0	0	0	0	0	50
-	*39F1*														*invalid tow*													
36	39F0	0	30	6	0	693	590	443	573	1969	0	0	13	0	2	8		0	4	0	0	4	0	0	0	0	0	170
37	39F1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		20	26	0	0	0	0	0	0	0	0	48
38	41F1	0	30	6	0	362	237	0	49	282	0	0	152	0	0	0		0	0	0	10	22	0	2	0	0	0	64
39	41E8	0	4	0	0	5958	808	0	122	120	0	0	0	0	2	2		0	0	0	2	164	0	0	0	0	20	232
40	41E9	0	4	0	8	2083	947	0	1286	585	0	0	0	0	274	3614		899	8990	0	14	110	0	2	0	0	0	158
41	41F0	0	4	0	2	487	487	2	14	215	0	0	0	0	28	42		0	0	0	10	88	0	0	0	0	0	22
42	41F2	0	6	2	22	37	576	71	322	204	0	4	24	0	4	0		0	14	0	0	0	0	0	0	0	0	24
														Survey terminated due to technical problems														