

R/V Dana

Cruise 07/2021

"DK/DE IBTS 3Q 2021"



Vessel: R/V DANA

Cruise dates (planned): 19/8 – 12/9 2021

Cruise number: 07/21

Cruise name: DK/DE IBTS 3Q 2021

Port of departure:	Hirtshals	Date:	19 August
Port of return:	Hirtshals	Date:	12 September
Other ports:	Esbjerg	Date and justification:	30 August: Scheduled exchange of scientific staff and crew

Participants

Leg 1: Hirtshals – Esbjerg		
Name	Institute	Function and main tasks
Helle Rasmussen	DTU Aqua, Monitoring	Cruise leader, Technician, Fish lab
Maria Jarnum	DTU Aqua, Monitoring	Technician, Fish lab
Tom Svoldgaard	DTU Aqua, Monitoring	Technician, Fish lab
Flemming Thaarup	DTU Aqua, Monitoring	Technician, Fish lab
Brian W. Thomsen	DTU Aqua, Monitoring	Technician, Fish lab
Finn Werner	Thünen-Institut für Seefischerei	Technician, Fish lab
Christian Petersen	DTU Aqua, Monitoring	Technician, CTD, Maintenance
Bastian Huwer	DTU Aqua, Marine Living Resources	Scientist, Fish eggs and larvae
Louise Køhler	DTU Aqua, Marine Living Resources	Scientist, Jellyfish
Kasper Schaltz	DTU Aqua, Monitoring	Technician, Fish lab

Leg 2: Esbjerg – Hirtshals		
Name	Institute	Function and main tasks
Kai Wieland	DTU Aqua, Monitoring	Cruise leader, Scientist, Fish lab
Stina B. Hansen	DTU Aqua, Monitoring	Technician, Fish lab
Jesper Knudsen	DTU Aqua, Monitoring	Technician, Fish lab
Mads Jensen *	DTU Aqua, Monitoring	Technician, Fish lab
Samira Kadhim	Thünen-Institut für Seefischerei	Technician, Fish lab
Sakis Kroupis	Thünen-Institut für Seefischerei	Technician, Fish lab
Ronny Sørensen	DTU Aqua, Monitoring	Technician, CTD, Maintenance
Andriy Martynenko	Thünen-Institut für Seefischerei	Technician, Maintenance, Fish eggs and larvae (part time)
Louise Køhler	DTU Aqua, Marine Living Resources	Scientist, Jellyfish
Anne Sell	Thünen-Institut für Seefischerei	Co-Cruise leader, Scientist, Fish lab

*: disembarked 31/8

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, mackerel and plaice) 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 captured 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

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>).

Additional midwater sampling with a MIK net for fish larvae and jellyfish was conducted during night for a national Danish project.

The area to be covered by Denmark with RV Dana in the 3rd quarter 2020 was allocated initially during the IBTS Working Group meeting in April 2020. However, due to a breakdown of the German vessel RV Walter Herwig III, it was decided to carry out a combined Danish/German survey with RV Dana extending the survey period by 7 days and include the core survey area initially allocated to Germany in the sampling program. A few rectangles originally allocated to Germany were taken over by other survey partners. The final working area for the GOV/CTD sampling consisted of 55 ICES statistical rectangles located in the Skagerrak and the North Sea and in 20 of these rectangles two stations were planned (Fig. 1). In this area, 50 and 26 standard GOV/CTD stations were allocated to Denmark and Germany, respectively, by the 3rd quarter North Sea coordinator in advance of the survey.

Furthermore, some additional GOV tows were planned for a national German small-scale study in the German Bight.

Itinerary

R/V Dana left Hirtshals on Thursday 19th August at 11:05 local time. The field work started in the western Skagerrak (Fig. 1). The vessel stayed in the port of Esbjerg on Monday 30th August from 9:10 to 12:55 for a scheduled exchange of scientific staff and crew. Sailing towards the first station in the German Bight was aborted during the night for

disembarkation of a member of the scientific crew with a pilot boat off Esbjerg. Field work resumed on Tuesday 31st August in the morning. R/V Dana returned to Hirtshals on Sunday 12th September at 15:15 local time.

Favorable weather conditions prevailed during most of the survey, in particular during the 2nd cruise leg (Fig. 2). While northerly winds with up to 18 m/s occurred during a few days during the 1st leg wind direction changed to south and east/northeast during the main part of the 2nd leg with wind speeds below 13 m/s.

Achievements

All trawl hauls were carried out with a 36/47 polyethylene GOV (chalut á Grande Overture Verticale) with the standard groundgear A (see IBTS Manual for specifications), 60 m sweeps and Vonin flyers replacing the standard kite, representing the standard rigging used for the IBTS on DANA since 2019.

The following activities were achieved:

78 valid standard GOV hauls and 9 invalid (trawl damage or unacceptable net geometry) GOV hauls on standard positions. 5 of the valid GOV hauls were shorter than 15 min. The reason for the invalidity of the GOV hauls or the short nominal tow duration were either a mass occurrence of bryozoans (Rectangles 35F3, 35F4, 34F3 and 34F4; see Annex 1) or adverse bottom conditions (two tracks in rectangle 32F2). No alternative tracks for the invalid or short tows in rectangles 35F3-F4 and 34F3-F4 were available whereas a replacement track was successfully fished in rectangle 32F2 (Fig. 1).

3 additional GOV hauls for small-scale study in rectangle 37F7.

85 CTD profiles (with additional sensor for dissolved oxygen).

86 valid MIK hauls, performed during night time.

Results

Routine sampling

The trawl parameters for the standard 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 from flume tank experiments can likely be attributed to the high sensibility of the GOV to current effects and bottom type. Marport sensors for wing spread did not work properly on all stations. The obtained data, however, indicate a sufficiently close relationship door spread (Fig. 3b) so that the missing wing spread observations can easily be estimated through linear regression.

In total, about 80 different species of fish, cephalopods and crustaceans were found in catches. The total weight of the catches 34.5 tons (Tab. 1). Total catch and species richness

in the standard tows ranged from 35 kg to 1.4 tons per haul and from 8 to 33 different fish and IBTS mandatory invertebrate species. Large and species-rich catches were predominantly recorded in the southern and southwestern 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 (including genetic samples), witch flounder and dab in order to fulfil requirements of the national DCF (Data Collection Framework of the European Union) sampling requirements (Tab. 2). Additional samples were taken from 25 turbot and 6 brill (individual length and weight, otolith and stomach contents) and from 28 anchovy (individual length and weight, genetics). Furthermore, genetic samples from 15 smoothhounds were taken together with individual length and weight as well as photo ID's in order to investigate whether the morphological characteristics currently used for separating *Mustelus mustelus* and *M. asterias* are adequate or not.

Preliminary abundance indices for the main commercial species indicate that e.g. whiting but also sprat, mackerel and plaice were widely distributed in the survey area whereas cod was quite rare and it appears noteworthy that only very few 0-group cod were caught (Tab. 3).

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 ICES Working Group for Marine Litter. The total amount of marine litter sorted from the catches retained in the codend was 25.8 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 and measurements of surface and bottom currents (speed and direction) at the trawl stations to DATRAS, and the complete CTD profiles will be submitted to the ICES hydrographical data center.

Special observations

In addition to the mass occurrence of bryozoans in the south-eastern part of the survey area (see Annex 1) the most striking observations compared to previous years were relative high catches of anchovy and 0-group (5 – 7 cm) sardine in the German Bight and the occurrence of 0-group (4 – 6 cm) striped red mullet in the southern part of the survey area.

Miscellaneous

Results of the plankton sampling for in particular sprat larvae and jellyfish conducted during night will be reported later elsewhere.

A cruise summary report has been delivered online to <http://seadata.bsh.de/csr/online>.

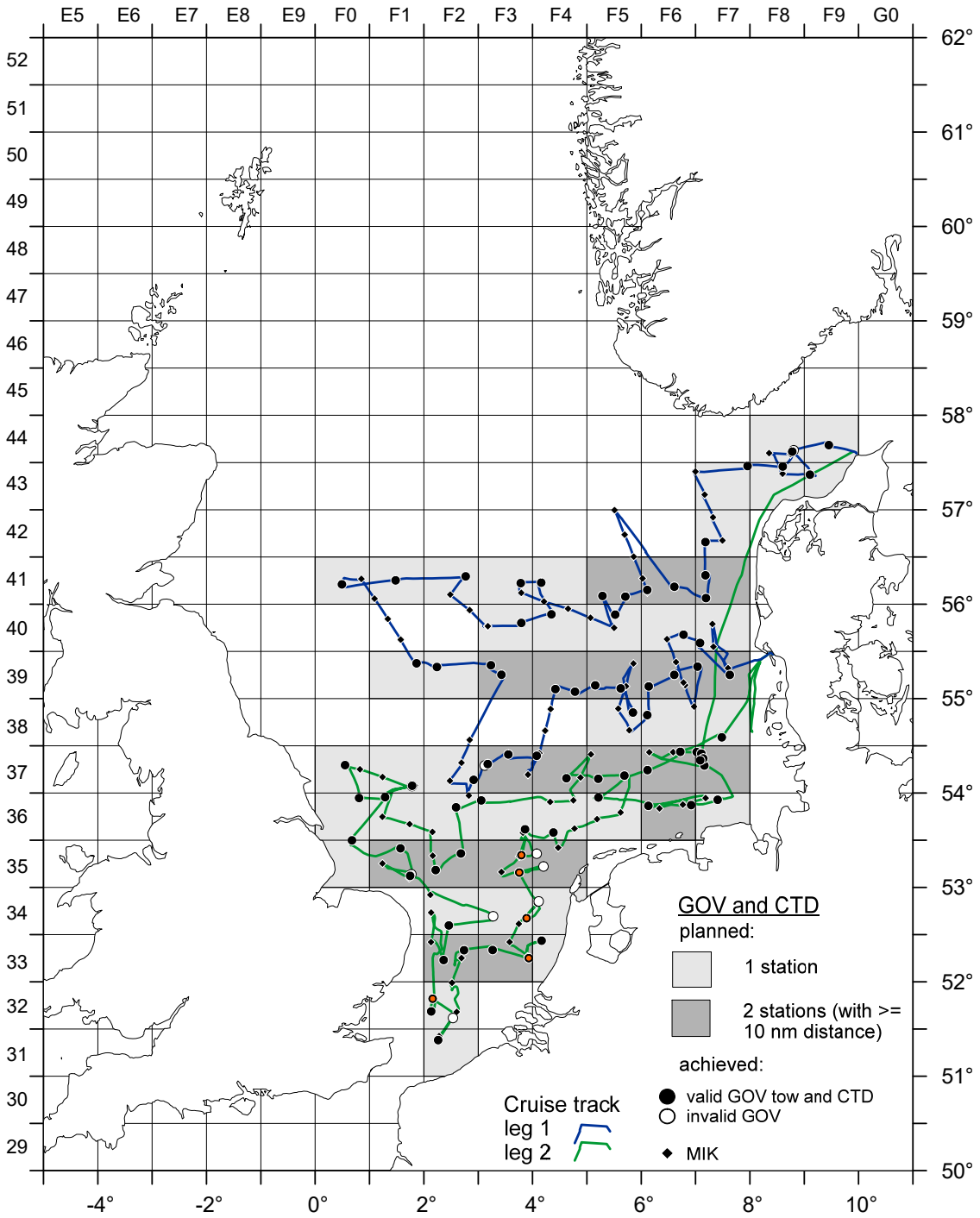


Fig. 1: Survey map with cruise track and sampling locations, RV Dana DK/DE IBTS 3Q 2021 (orange circles: nominal tow duration between 5 and 13 min only).

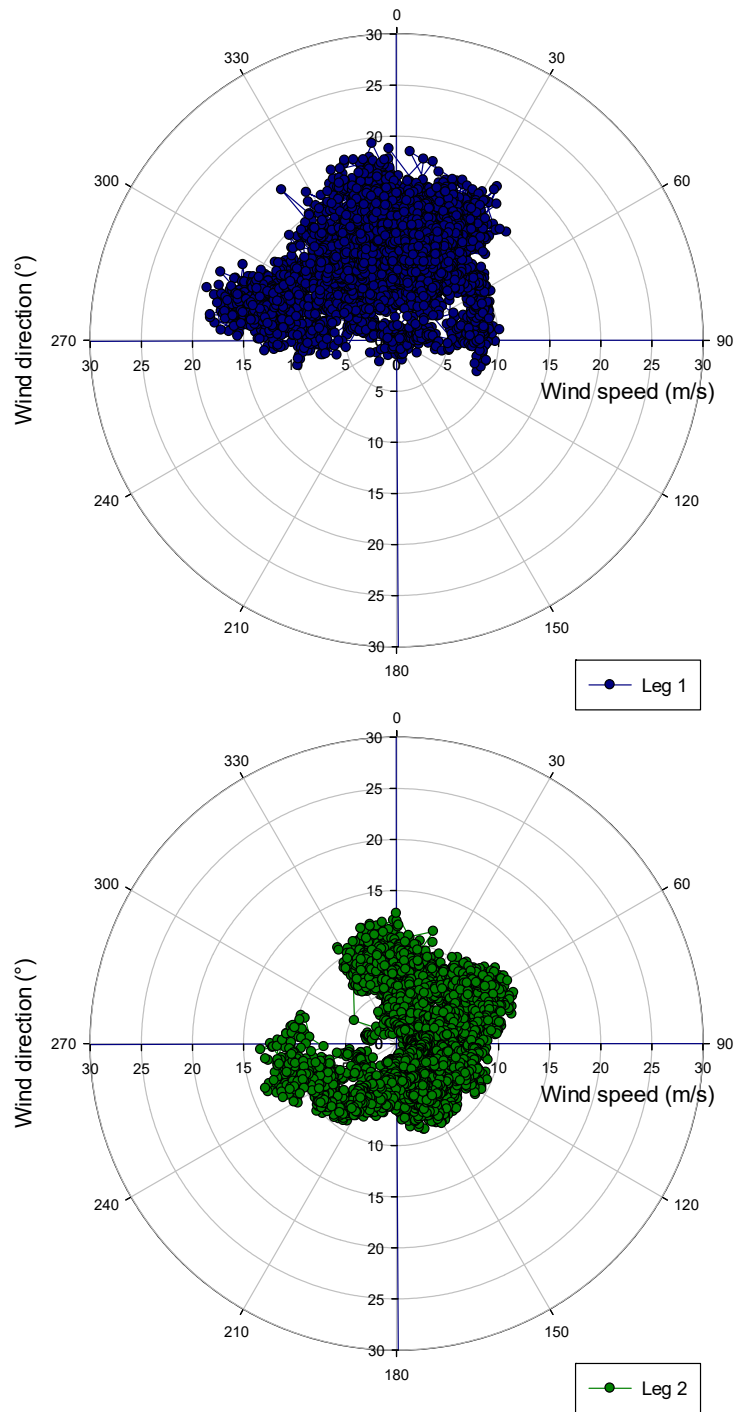


Fig. 2. Wind speed (m/s) and wind direction ($^{\circ}$) recorded along the cruise track, RV Dana DK/DE IBTS 3Q 2021.

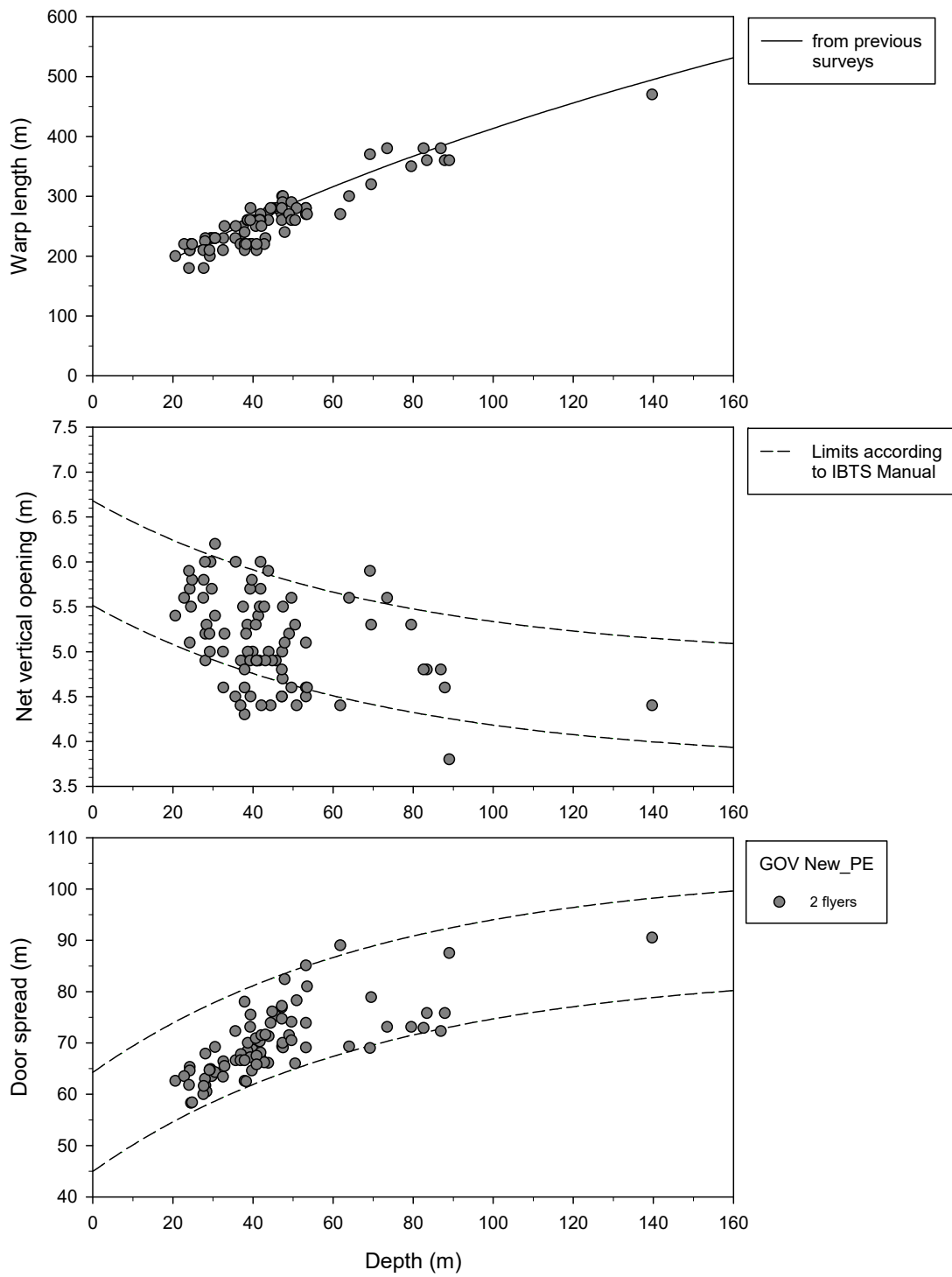
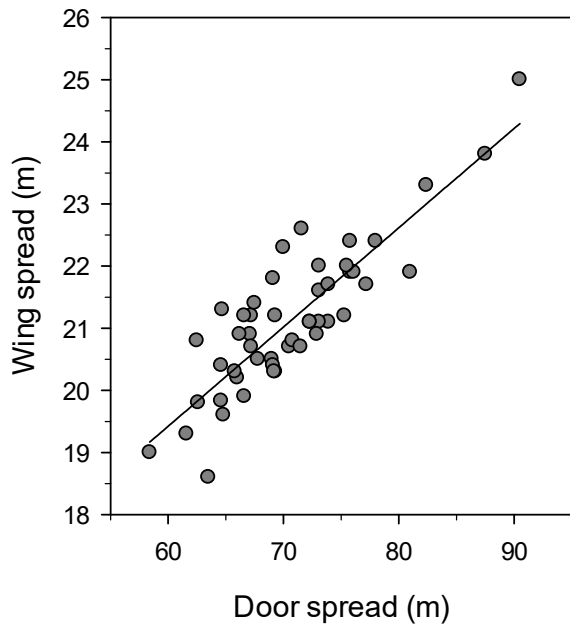


Fig. 3a: Warp length, net opening and door spread in relation to depth, RV Dana DK/DE IBTS 3Q 2021.



Linear Regression

Data source: Data 1 in DanaTrawlGeometry_3Q2021.JNB

wing spread = 9.841 + (0.160 * door spread)

N = 49 Missing Observations = 33

R = 0.864 Rsqr = 0.747 Adj Rsqr = 0.742

Standard Error of Estimate = 0.594

	Coefficient	Std. Error	t	P
Constant	9.841	0.962	10.230	<0.001
door spread	0.160	0.0136	11.786	<0.001

Analysis of Variance:

	DF	SS	MS	F	P
Regression	1	49.037	49.037	138.909	<0.001
Residual	47	16.592	0.353		
Total	48	65.629	1.367		

Normality Test (Shapiro-Wilk) Passed (P = 0.174)

Fig. 3b: Relationship between door and wing spread, RV Dana DK/DE IBTS 3Q 2021.

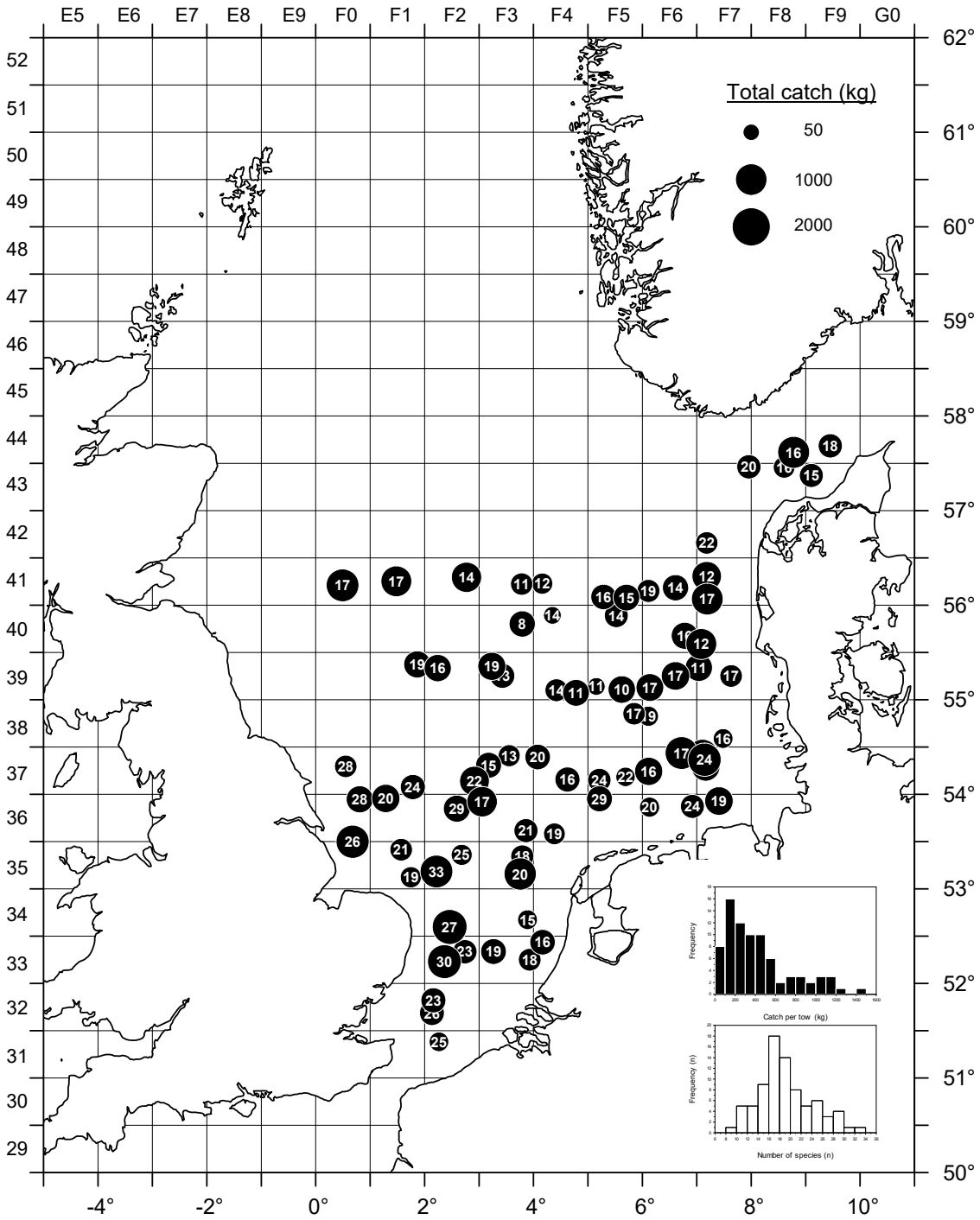


Fig. 4: Total catch of fish and shellfish (symbol size) and species richness (numbers within the circles) per tow (Note: catch in kg per tow, i.e. not adjusted for differences in tow duration and swept area fished), Dana DK/DE IBTS 3Q 2021.

Tab. 1: Species list, Dana DK/DE IBTS 3Q 2021 (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
Aequipecten opercularis	Queen scallop	Jomfrusters	0.541	28	-	-	
Agonus cataphractus	Pogge	Panser ulk	0.256	34	4.0	14.0	
Alloteuthis subulata	European common squid	Dværgblæksprutte	30.760	4568	1.0	15.0	ML
Amblyraja radiata	Starry ray	Tærbe	6.867	15	10.0	46.0	
Ammodytes marinus	Lesser sandeel	Havtobis	219.591	14760	7.5	21.0	
Arnoglossus laterna	Scaldfish	Tungehvarre	2.456	218	4.0	16.0	
Buglossidium luteum	Solenette	Glastunge	5.623	661	2.0	12.0	
Callionymus lyra	Common dragonet	Stribet fløjfisk	9.718	246	11.0	26.0	
Callionymus reticulatus	Reticulated dragonet	Kortfinnet fløjfisk	0.006	1	9.0	9.0	
Cancer pagurus	Edible crab	Taskekrabbe	160.560	503	1.7	22.3	CPW
Chelidonichthys cuculus	Red gurnard	Tværstribet knurhane	0.567	12	5.0	24.0	
Chelidonichthys lucerna	Tub gurnard	Rød knurhane	14.821	55	21.0	47.0	
Clupea harengus	Herring	Sild	1843.935	173459	4.0	32.5	
Dicentrarchus labrax	Bass	Havbars	12.330	10	41.0	54.0	
Echiichthys vipera	Lesser weever	Fjæsing lille	15.929	766	6.0	18.0	
Eledone cirrhosa	Horned octopus	Eledone Blæksprutte	0.080	1	5.0	5.0	ML
Enchelyopus cimbrius	Four-bearded rockling	Firetrådet havkvabbe	5.362	158	8.0	26.0	
Engraulis encrasicolus	Anchovy	Ansjos	49.348	9308	6.0	18.0	
Entelurus aequoreus	Snake pipefish	Snippe	0.044	10	7.0	46.0	
Eutrigla gurnardus	Grey gurnard	Grå knurhane	584.657	8499	8.0	35.0	
Gadus morhua	Cod	Torsk	101.788	268	8.0	91.0	
Galeorhinus galeus	Tope	Gråhaj	67.197	8	48.0	154.0	
Glyptocephalus cynoglossus	Witch	Skærsing	3.277	15	15.0	43.0	
Gymnammodytes semisquamatus	Smoothed sandeel	Nægentobis	3.115	196	15.0	19.0	
Helicolenus dactylopterus	Blue-mouth redfish	Blåkaft	0.691	8	16.0	20.0	
Hippoglossoides platessoides	American plaice	Håising	94.560	1978	9.0	25.0	
Homarus gammarus	European lobster	Hummer	24.388	41	6.1	15.3	CPL
Hyperoplus lanceolatus	Greater sandeel	Plettet tobiskonge	27.567	869	11.5	32.0	
Illex coindetii	Southern shortfin squid	Rød blæksprutte	3.247	24	10.0	22.0	ML
Lampetra fluviatilis	River lamprey	Flodlampret	0.095	2	25.0	30.0	
Leucoraja naevus	Cuckoo ray	Pletrokke	0.856	1	51.0	51.0	
Limanda limanda	Common dab	Ising	3751.152	75447	4.0	36.0	
Lithodes maja	Norway king crab	Troldkrabbe	1.365	3	7.1	12.5	CPL
Loliginidae		*Loligoblæksprutter	40.822	3750	1.5	13.0	ML
Loligo forbesii	Northern squid	Loligoblæksprutte	48.794	535	2.0	33.0	ML
Loligo sp	Loligo sp	*Loligoblæksprutter	9.712	1443	1.5	11.5	ML
Lophius piscatorius	Monk	Havtaske	11.529	9	20.0	62.0	
Lumpenus lampretaeformis	Snake blenny	Spidshalet langebarn	0.028	1	27.0	27.0	
Maja squinado	Common spider crab	Edderkoppekabbe	0.830	2	6.1	8.7	CPL
Melanogrammus aeglefinus	Haddock	Kuller	3038.003	26726	7.0	43.0	
Merlangius merlangus	Whiting	Hvilling	11616.152	191546	4.0	42.0	
Merluccius merluccius	Hake	Kulmule	12.985	17	35.0	61.0	
Microchirus variegatus	Thickback sole	Båndet tunge	0.187	6	12.0	15.0	
Micromesistius poutassou	Blue whiting	Blåhvilling	54.242	1642	13.0	36.0	
Microstomus kitt	Lemon sole	Rødtunge	137.599	1264	8.0	40.0	
Molva molva	Ling	Lange	3.302	3	58.0	64.0	
Mullus surmuletus	Striped red mullet	Stribet rød Mulle	26.479	430	4.0	27.0	
Mustelus asterias	Starry smooth-hound	Stjernehaj	225.297	128	29.0	118.0	
Mustelus mustelus	Smooth hound	Glathaj	117.690	67	41.0	107.0	
Myoxocephalus scorpius	Sculpin	Almindelig ulk	0.805	5	16.0	25.0	
Myxine glutinosa	Hagfish	Slimål	0.031	1	30.0	30.0	
Nephrops norvegicus	Norway lobster	Jomfruhummer	24.534	741	1.7	5.3	CPL
Pecten maximus	Great scallop	Stor kammusling	2.338	48	-	-	
Phrynorhombus norvegicus	Norwegian topknot	Småhvarre	0.019	2	9.0	9.0	
Platichthys flesus	Flounder	Skrubbe	1.713	6	22.0	36.0	
Pleuronectes platessa	Plaice	Rødspætte	502.754	4276	7.0	59.0	
Pollachius virens	Saithe	Sej	4.803	12	16.0	49.0	
Pomatoschistus.sp	Sand gobies	*Sandkutlinger	0.183	283	2.0	7.0	
Raja brachyura	Blonde ray	Blond rokke	37.398	27	34.0	91.0	
Raja clavata	Thornback ray	Sømrrokke	37.762	23	35.0	80.0	
Raja montagui	Spotted Ray	Storpletlet Rokke	7.925	13	26.0	57.0	
Rossia macrosoma	Stout bobtail squid	Ross's blæksprutte	0.056	6	-	-	
Sarda sarda	Atlantic bonito	Rygstribet Pelamide	2.180	1	56.0	56.0	
Sardina pilchardus	Pilchard	Sardin	47.324	3970	5.0	25.0	
Scomber scombus	Mackerel	Makrel	3683.874	23520	11.0	42.0	
Scophthalmus maximus	Turbot	Pighvarre	33.847	30	21.0	63.0	
Scophthalmus rhombus	Brill	Slethvarre	7.150	12	25.0	47.0	
Scyliorhinus canicula	Lesser-spotted dogfish	Småpletlet rødhaj	427.502	872	26.0	67.0	
Sepia officinalis	Common cuttlefish	Sepiablæksprutte	0.074	1	8.0	8.0	ML
Sepioida atlantica	Atlantic bobtail squid	Sepioida atlantica	0.010	6	-	-	
Solea solea	Sole	Tunge	6.056	71	14.0	34.0	
Spondyliosa cantharus	Black sea bream	Almindelig havrude	0.072	1	16.0	16.0	
Sprattus sprattus	Sprat	Brisling	6294.036	790962	4.0	14.5	
Squalus acanthias	Spurdog	Pighaj	7.794	6	34.0	102.0	
Syngnathidae	Pipefishes and seahorses	*Tangnåle	0.008	14	7.0	12.0	
Syngnathus acus	Great pipefish	Stor tangnål	0.002	2	13.0	14.0	
Taurulus bubalis	Sea scorpion	Langtornet ulk	0.972	19	12.0	22.0	
Trachinus draco	Greater weever fish	Fjæsing	18.278	89	16.0	43.0	
Trachurus trachurus	Horse mackerel	Hestemakrel	654.049	105770	2.0	39.0	
Trisopterus esmarkii	Norway pout	Sperling	174.649	23412	5.0	19.0	
Trisopterus luscus	Bib	Skægtorsk	108.603	997	3.0	32.0	
Trisopterus minutus	Poor-cod	Glyse	58.502	1404	7.0	22.0	
Zeus faber	John dory	Sanktpetersfisk	0.411	1	27.0	27.0	

Tab. 2: Number of single fish data (length, individual weight, and sex; maturity for herring, sprat and hake; infestation with liver parasites for cod) and samples for ageing (hake: otoliths just stored but not read), Dana DK/DE IBTS 3Q 2021.

a) Stations allocated to Denmark (otoliths to be read at DTU Aqua):

Species	Total
Herring (<i>Clupea harengus</i>)	498
Sprat (<i>Sprattus sprattus</i>)	303
Cod (<i>Gadus morhua</i>)	71
Haddock (<i>Melanogrammus aeglefinus</i>)	307
Whiting (<i>Merlangius merlangus</i>)	599
Saithe (<i>Pollachius virens</i>)	11
Norway pout (<i>Trisopterus ermarkii</i>)	23
Mackerel (<i>Scomber scombrus</i>)	255
Plaice (<i>Pleuronectes platessa</i>)	608
Witch flounder (<i>Glyptocephalus cynoglossus</i>)	13
Dab (<i>Limanda limanda</i>)	33
Hake (<i>Merluccius merluccius</i>)	16
Sum:	2737

b) Stations allocated to Germany (otoliths to be read at Thünen Institut für Seefischerei):

Species	Total
Herring (<i>Clupea harengus</i>)	144
Sprat (<i>Sprattus sprattus</i>)	95
Cod (<i>Gadus morhua</i>)	8
Haddock (<i>Melanogrammus aeglefinus</i>)	41
Whiting (<i>Merlangius merlangus</i>)	245
Saithe (<i>Pollachius virens</i>)	-
Norway pout (<i>Trisopterus ermarkii</i>)	-
Mackerel (<i>Scomber scombrus</i>)	92
Plaice (<i>Pleuronectes platessa</i>)	307
Witch flounder (<i>Glyptocephalus cynoglossus</i>)	not
Dab (<i>Limanda limanda</i>)	requested
Hake (<i>Merluccius merluccius</i>)	1
Sum:	933

Tab. 3: Preliminary abundance indices (number per hour trawling) for commercial IBTS species per tow, Dana DK/DE IBTS 3Q 2021.

St No	Rect	COD			HADDOCK			WHITING			NORWAY POULT			HERRING			SPRAT			MACKEREL			SAITHE			PLAICE			
		0	1	2+	0	1	2+	0	1	2+	0	1	2+	0	1	2+	0	1	2+	0	1	2+	0	1	2+	0	1	2+	
		<18	18-37	≥38	<17	17-29	≥30	<17	17-23	≥24	<13	13-15	≥16	<15.5	15.5-22.5	≥23	<13	≥13	<17	17-29	≥30	<22	22-32	≥33	<10	10-18	≥19		
2	44P9	0	0	0	0	0	0	0	24	0	0	0	2	72	20	0	0	897	175	0	0	0	0	0	0	2	124		
9	43F9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2169	103	0	0	0	0	0	0	0	128	270	
10	44F8	48	302	12	85	979	1602	37	95	577	18883	2653	312	36	8177	606	0	0	0	0	0	0	0	0	0	0	12		
12	43F8	0	2	0	1117	92	12	0	237	8	0	0	0	0	2086	13	8	8	146	26	0	2	0	0	0	0	58		
14	43F7	0	46	64	0	376	81	0	2	78	142	4595	1149	2	387	44	0	0	2	42	0	2	6	0	0	0	2		
21	42F7	0	0	0	4	68	0	4	29	0	0	0	0	0	657	13	22	4	0	300	7	0	0	0	0	0	32	209	
22	41F7	0	0	0	0	0	0	624	130	0	0	0	0	0	322	10	2381	401	0	5565	99	0	0	0	0	0	96	131	
25	41F7	0	0	0	0	0	0	113	14	2	0	0	0	0	10	4	216	16	0	11112	93	0	0	0	0	0	107	36	
26	41F6	0	0	0	0	12	0	80	18	0	0	0	0	1139	895	0	14227	1223	0	2603	0	0	0	0	0	0	46	176	
34	41F6	0	2	0	6	584	0	48	347	65	0	0	0	110	1929	0	2270	811	0	2	2	0	0	0	0	0	10	34	
35	41F5	0	0	0	102	114	4	199	1938	477	0	0	0	0	1759	5962	0	25608	439	0	2	4	0	0	0	0	2	12	
38	40F5	0	0	2	252	0	0	38	32	4	0	0	0	278	201	2	27314	2731	0	0	0	0	0	0	0	0	8	32	
39	41F5	0	0	0	348	10	0	10	6	0	0	0	0	0	258	4	14	4	0	0	0	0	0	0	0	0	0	16	
49	41F3	0	0	0	299	199	0	18	62	42	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	34	
50	41F4	0	0	0	1091	30	0	12	16	42	2	0	0	0	104	2	0	0	0	0	0	0	0	0	0	0	2	8	
52	40F4	0	0	0	386	14	0	0	0	0	0	0	0	0	8	0	2	2	0	0	0	0	0	0	0	0	0	8	
54	40F3	0	0	0	891	292	0	174	8451	174	0	0	0	0	6	4	0	0	0	0	0	0	0	0	0	0	0	82	
64	41P2	0	0	0	42	7499	541	30	1121	602	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	
65	41F1	0	0	2	64	6039	642	0	639	684	312	2	0	0	114	516	4	38	0	784	18	0	0	0	0	0	0	36	
67	41F0	0	4	2	0	5692	727	0	4118	4421	18430	0	0	0	0	0	0	0	6	0	0	2	4	0	0	0	0	36	
74	39F1	0	0	0	729	1231	11	0	5721	889	0	0	0	0	2	18	8	18	0	54	4	0	0	0	0	0	2	209	
76	39F2	0	0	0	8259	18	2	0	5503	31	0	0	0	0	8	2	0	0	0	3352	55	0	0	0	0	0	0	69	
77	39F3	0	0	0	8896	289	0	30	4383	176	0	0	0	0	4	0	0	0	0	3873	0	2	0	0	0	0	0	48	
79	39F3	0	0	0	22	0	0	0	596	32	0	0	0	0	0	0	0	0	0	2623	20	0	0	0	0	0	0	24	
86	37F2	0	0	0	0	1096	26	396	12233	1762	0	0	0	0	2	0	10	4	0	2	2	0	0	0	0	0	2	120	
88	37F3	0	0	0	6	8	6	83	4703	1306	0	0	0	0	12	8	0	58	2	0	0	0	0	0	0	0	0	230	
90	37F3	0	0	0	4	162	8	58	1561	285	0	0	0	0	20	22	0	966	9	0	0	0	0	0	0	0	26	110	
92	37F4	0	2	0	2	14	0	373	6265	467	0	0	0	0	1202	110	2	6928	0	0	0	0	0	0	0	0	4	387	
100	39F4	0	2	0	18	102	2	41	1162	200	0	0	0	0	14	24	2	1977	20	0	0	0	0	0	0	0	0	141	
102	39F4	0	0	0	0	2	0	140	329	3	0	0	0	0	989	285	0	64484	4104	0	0	0	0	0	0	0	0	43	
103	39F5	0	0	0	0	4	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	18
105	39F5	0	0	0	12	0	0	144	134	6	0	0	0	0	3893	3496	0	41016	3729	0	0	0	0	0	0	0	0	10	72
107	39F5	0	0	0	0	2	0	603	154	0	0	0	0	0	1509	53	0	17376	0	0	10	0	0	0	0	0	0	48	126
114	39F6	0	0	0	0	0	0	334	22	0	0	0	0	0	310	8	2	1550	32	0	18	0	0	0	0	0	0	38	152
115	39F6	0	0	0	2	0	0	3868	3057	0	0	0	0	0	10815	157	0	42695	0	0	0	0	0	0	0	0	0	76	177
118	39F6	0	0	0	0	0	0	66	10	0	0	0	0	0	8491	716	0	83483	0	0	10	0	0	0	0	0	0	18	69
119	39F7	0	0	0	0	0	0	0	26	18	0	0	0	0	120	0	0	183	0	0	0	0	0	0	0	0	0	44	6
130	40F6	0	0	0	0	0	0	152	46	0	0	0	0	0	3165	2329	0	29823	753	0	270	4	0	0	0	0	0	186	160
132	40F7	0	0	0	0	0	0	214	70	0	0	0	0	0	1717	4507	2	89659	11969	0	90	2	0	0	0	0	0	22	32
133	39F7	0	0	0	0	0	0	250	4	0	0	0	0	0	0	0	0	0	1167	0	2	0	0	0	0	0	12	24	0
138	39F7	8	0	0	0	0	0	3243	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	4	18	19
140	37F6	0	0	0	0	0	0	349	20	0	0	0	0	0	42475	10	0	42789	0	0	973	0	0	0	0	0	2	10	16
142	37F6	0	0	0	0	0	0	14901	269	0	0	0	0	0	19392	2	2	60636	1144	0	70	4	0	0	0	0	0	10	30
148	39F4	0	0	0	0	0	0	1499	0	0	0	0	0	0	120	0	0	183	0	0	0	0	0	0	0	0	243	201	134
150	39F3	0	0	0	0	0	0	5122	151	0	0	0	0	0	619	0	0	126	0	0	0	0	0	0	0	0	0	138	601
153	39F3	0	0	0	0	0	0	1765	54	4	0	0	0	0	5492	43	0	33325	0	0	0	0	0	0	0	0	27	244	148
160	39F3	0	0	0	0	0	0	1249	127	10	0	0	0	0	7980	118	0	1012917	27562	20	10	0	0	0	0	0	0	68	78
164	34F3	0	0	0	0	0	0	136	39	0	0	0	0	0	0	0	0	76	0	0	777	0	0	0	0	0	0	69	69
171	33F4	0	0	0	0	0	0	6606	306	0	0	0	0	0	8054	0	0	21	0	2	214	4	0	0	0	0	2	23	10
172	33F3	0	0	0	0	0	0	233	12	0	0	0	0	0	12	0	0	0	0	47	0	0	0	0	0	0	47	233	35
174	33F3	0	0	0	0	0	0	7	31	0	0	0	0	0	2	2	0	16289	27878	0	18	0	0	0	0	0	0	2	10
176	33F2	0	0	0	0	0	0	81	21	29	0	0	0	0	2053	0	0	52847	285	0	38	12	0	0	0	0	0	6	16
183	31F2	0	0	0	0	0	0	2	5	2	0	0	0	0	0	0	0	0	0	11	18	0	0	0	0	0	0	7	32
186	32F2	0	0	0	0	5	9	72	3037	4339	0	0	0	0	5	0	0	686	5	0	192	14	0	0	0	0	0	33	56
187	32F2	0	0	0	0	0	0	431	2516	0	0	0	0	0	6	0	0	10	0	0	50	4	0	0	0	0	0	4	24
192	33F2	0	0	2	0	6	0	0	7182	9025	0	0	0	0	24	36	154	10	0	257	158	0	0	0	0	0	0	10	42
193	34F2	0	4	0	0	2	0	0	23384	7265	0	0	0	0	0	24	4	2	2	15	29	0	0	0	0	0	0	11	117
202	39F1	0	0	0	0	5	0	0	833	397	0	0	0	0	0	0	0	6	0	0	28	2	0	0	0	0	0	2	17
203	39F1	0	0	0	0	2	0	0	4	10	0	0	0	0															

Annex 1: Mass occurrence of bryozoans

An unusual, high amount of bryozoans, microscopically identified as *Electra pilosa*, caused invalidity or extreme shortage of GOV tows in rectangles 35F3, 35F4, 34F3 and 34F4, an area located in southern Dutch coastal waters and extending almost half the way across the English Channel (Fig. A1). The catch of bryozoans was not quantified in every case e.g. because several times the tow was aborted prior to the start of the nominal tow duration based on indication of unacceptable net geometry recorded by the door and trawl sensors. However, the quantity must have been immense as indicated by the catch from one of the stations at which the GOV had bottom contact for less than two minutes only (Fig. A.2).

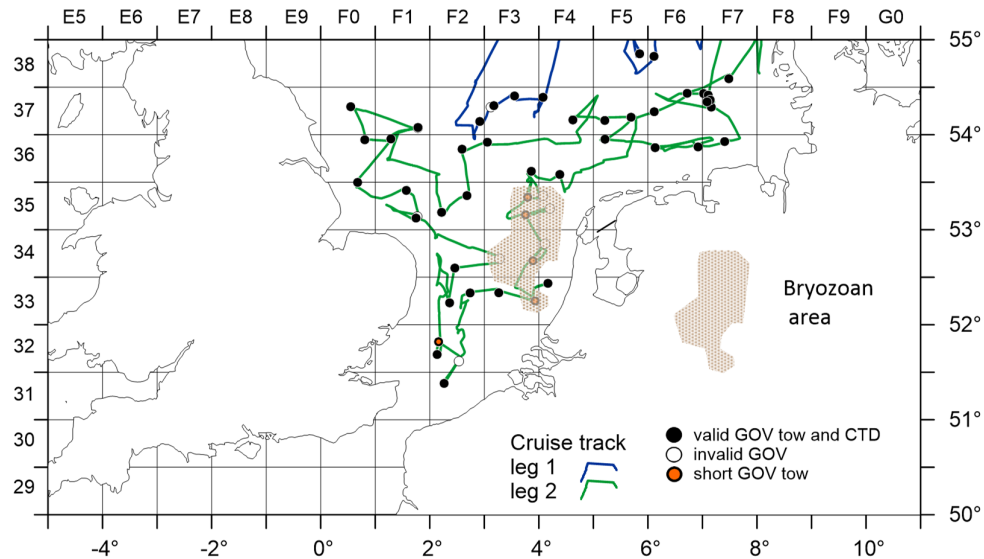


Fig. A.1. Area in which a mass occurrence of bryozoan prevented the conduction of standard GOV tows, Dana DK/DE IBTS 3Q 2021.



Fig. A.2. Catch obtained prior to nominal tow duration in the western part of rectangle 34F3 (Invalid tow, aborted almost immediately after touchdown of the trawl), Dana DK/DE IBTS 3Q 2021.