

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>.

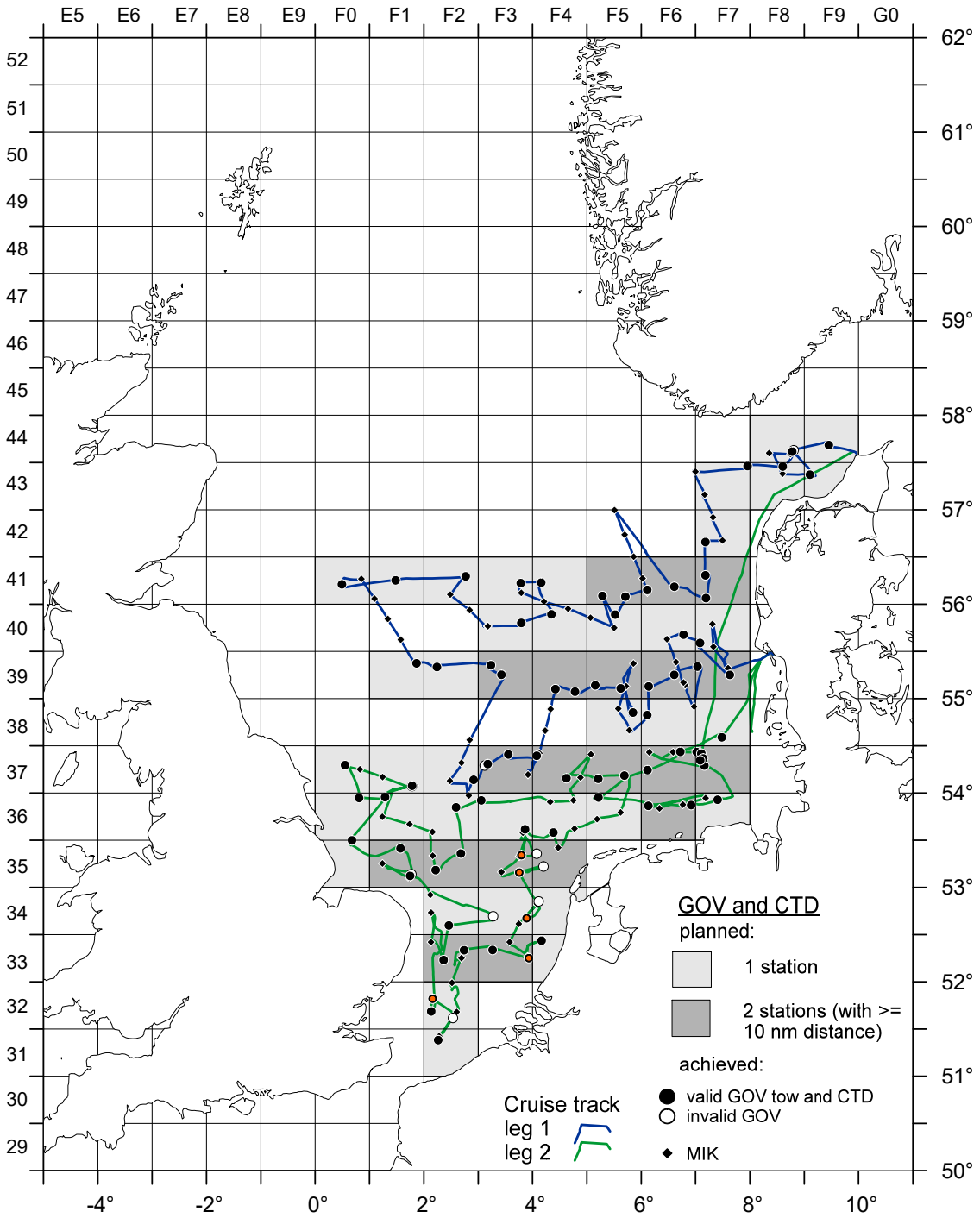


Fig. 1: Survey map with cruise track and sampling locations, RV Dana DK/DE IBTS 3Q 2021 (orange circles: nominal tow duration between 5 and 13 min only).

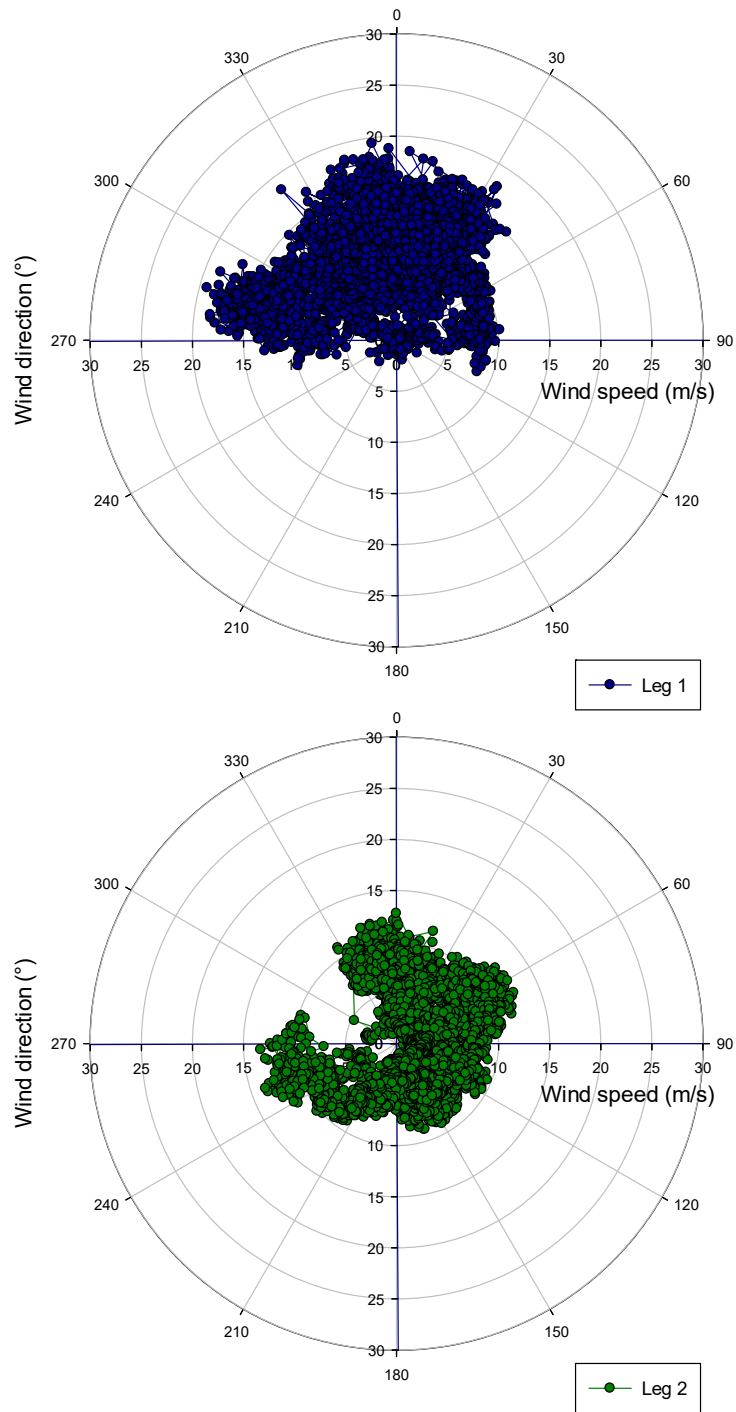


Fig. 2. Wind speed (m/s) and wind direction ($^{\circ}$) recorded along the cruise track, RV Dana DK/DE IBTS 3Q 2021.

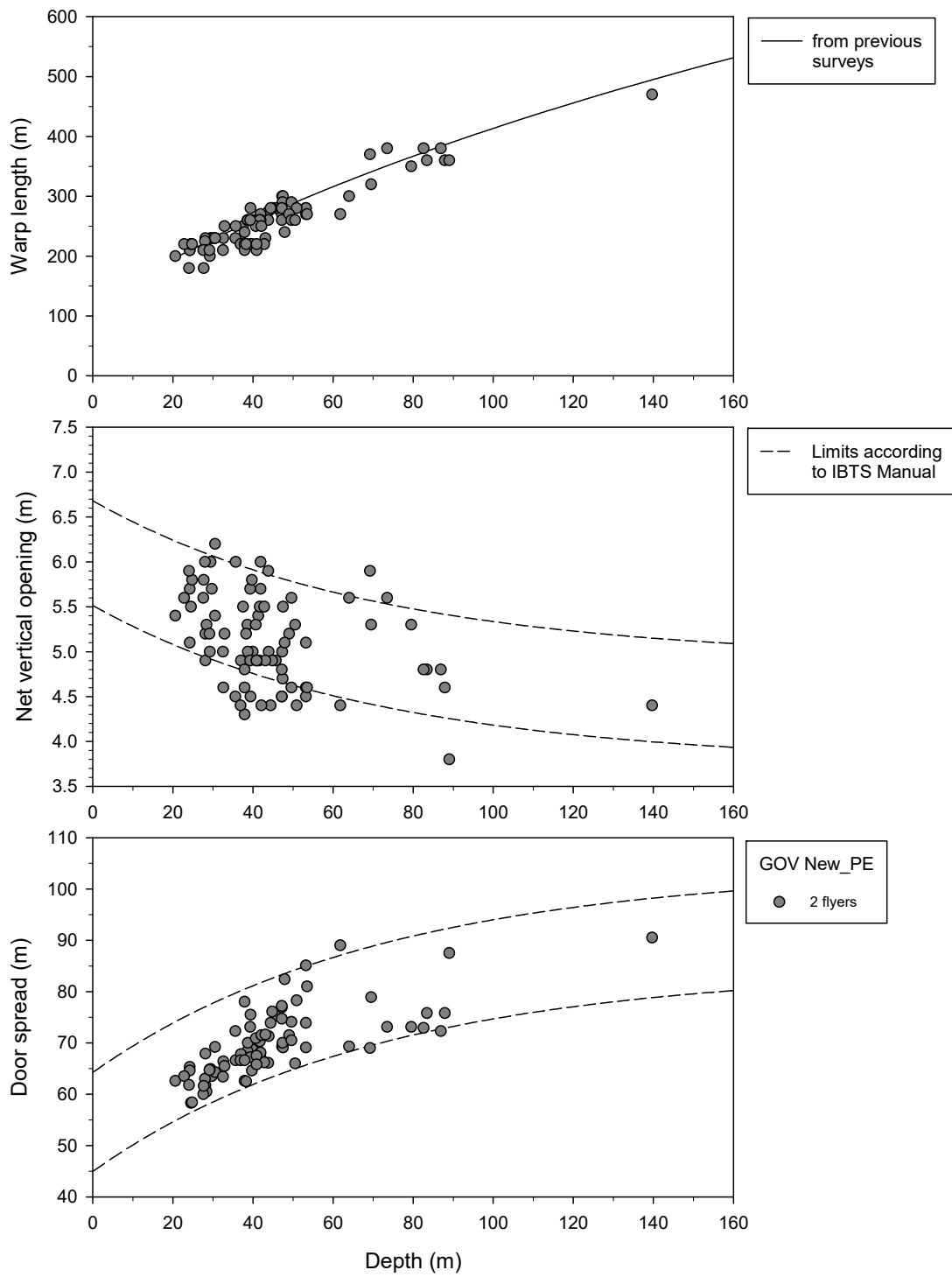
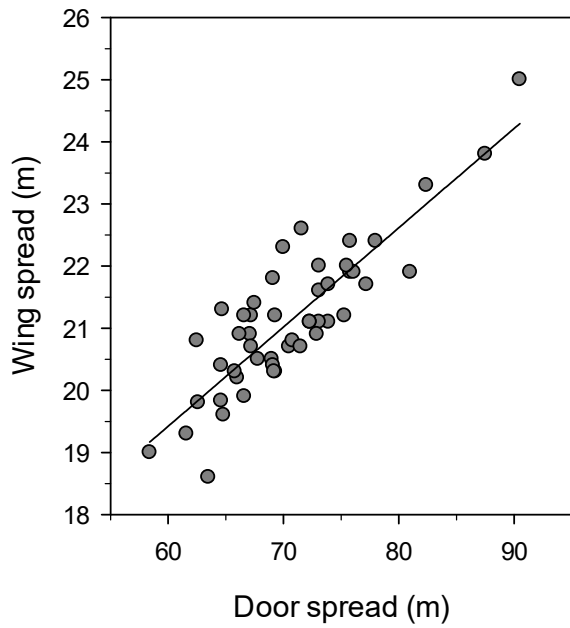


Fig. 3a: Warp length, net opening and door spread in relation to depth, RV Dana DK/DE IBTS 3Q 2021.



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.

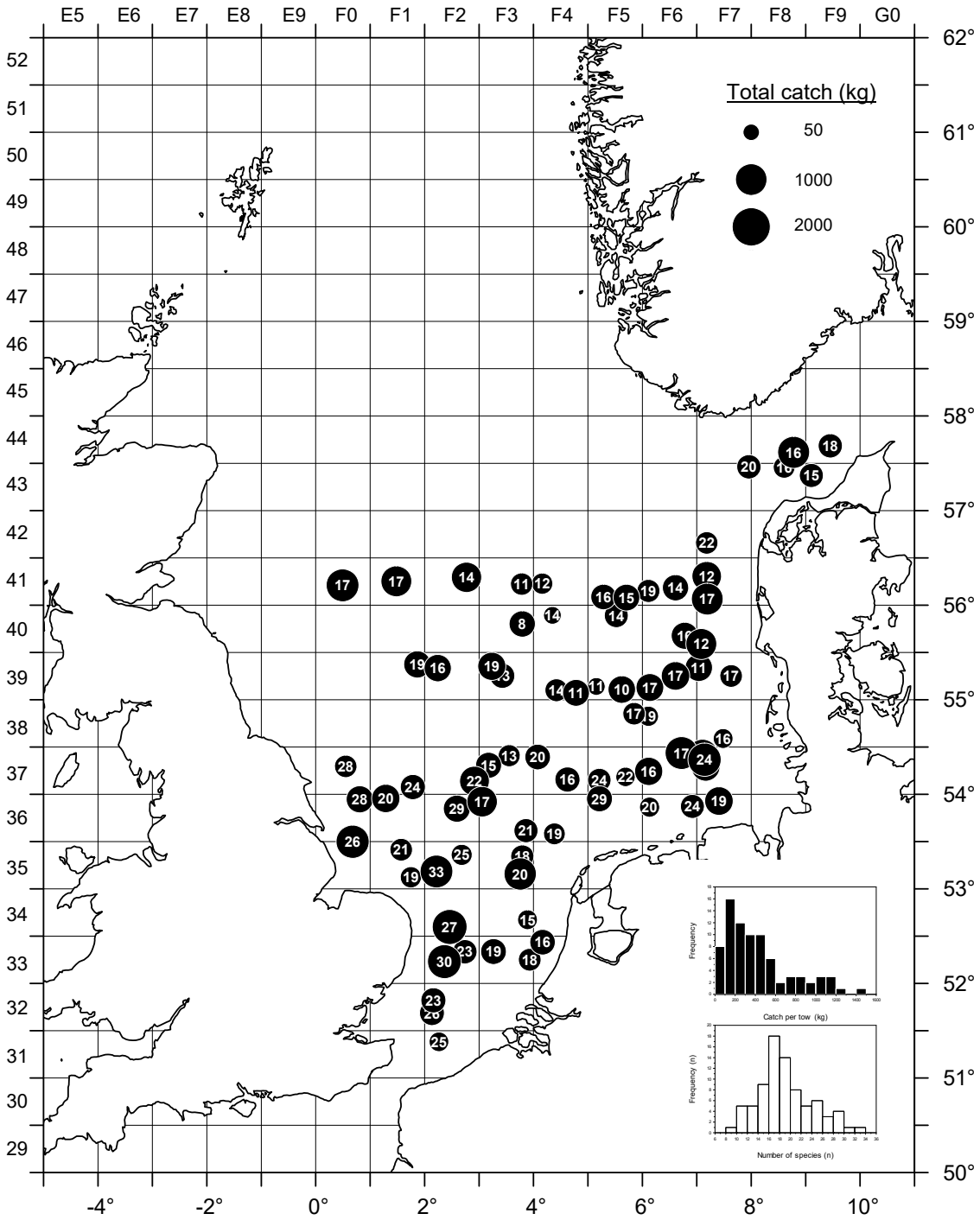


Fig. 4: Total catch of fish and shellfish (symbol size) and species richness (numbers within the circles) per tow (Note: catch in kg per tow, i.e. not adjusted for differences in tow duration and swept area fished), Dana DK/DE IBTS 3Q 2021.

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 |
|-------------------------------------|--------------------------|----------------------|-------------|--------|-----------------------|-----------------------|--------|
| <i>Aequipecten opercularis</i> | Queen scallop | Jomfrusters | 0.541 | 28 | - | - | |
| <i>Agonus cataphractus</i> | Pogge | Panser ulk | 0.256 | 34 | 4.0 | 14.0 | |
| <i>Alloteuthis subulata</i> | European common squid | Dværgblæksprutte | 30.760 | 4568 | 1.0 | 15.0 | ML |
| <i>Amblyraja radiata</i> | Starry ray | Tærbe | 6.867 | 15 | 10.0 | 46.0 | |
| <i>Ammodytes marinus</i> | Lesser sandeel | Havtobis | 219.591 | 14760 | 7.5 | 21.0 | |
| <i>Arnoglossus laterna</i> | Scaldfish | Tungehvarre | 2.456 | 218 | 4.0 | 16.0 | |
| <i>Buglossidium luteum</i> | Solenette | Glastunge | 5.623 | 661 | 2.0 | 12.0 | |
| <i>Callionymus lyra</i> | Common dragonet | Stribet fløjfisk | 9.718 | 246 | 11.0 | 26.0 | |
| <i>Callionymus reticulatus</i> | Reticulated dragonet | Kortfinnet fløjfisk | 0.006 | 1 | 9.0 | 9.0 | |
| <i>Cancer pagurus</i> | Edible crab | Taskekrabbe | 160.560 | 503 | 1.7 | 22.3 | CPW |
| <i>Chelidonichthys cuculus</i> | Red gurnard | Tværstribet knurhane | 0.567 | 12 | 5.0 | 24.0 | |
| <i>Chelidonichthys lucerna</i> | Tub gurnard | Rød knurhane | 14.821 | 55 | 21.0 | 47.0 | |
| <i>Clupea harengus</i> | Herring | Sild | 1843.935 | 173459 | 4.0 | 32.5 | |
| <i>Dicentrarchus labrax</i> | Bass | Havbars | 12.330 | 10 | 41.0 | 54.0 | |
| <i>Echiichthys vipera</i> | Lesser weever | Fjæsing lille | 15.929 | 766 | 6.0 | 18.0 | |
| <i>Eledone cirrhosa</i> | Horned octopus | Eledone Blæksprutte | 0.080 | 1 | 5.0 | 5.0 | ML |
| <i>Enchelyopus cimbrius</i> | Four-bearded rockling | Firetrådet havkvabbe | 5.362 | 158 | 8.0 | 26.0 | |
| <i>Engraulis encrasicolus</i> | Anchovy | Ansjos | 49.348 | 9308 | 6.0 | 18.0 | |
| <i>Entelurus aequoreus</i> | Snake pipefish | Snippe | 0.044 | 10 | 7.0 | 46.0 | |
| <i>Eutrigla gurnardus</i> | Grey gurnard | Grå knurhane | 584.657 | 8499 | 8.0 | 35.0 | |
| <i>Gadus morhua</i> | Cod | Torsk | 101.788 | 268 | 8.0 | 91.0 | |
| <i>Galeorhinus galeus</i> | Tope | Gråhaj | 67.197 | 8 | 48.0 | 154.0 | |
| <i>Glyptocephalus cynoglossus</i> | Witch | Skærsing | 3.277 | 15 | 15.0 | 43.0 | |
| <i>Gymnammodytes semisquamatus</i> | Smoothed sandeel | Nægentobis | 3.115 | 196 | 15.0 | 19.0 | |
| <i>Helicolenus dactylopterus</i> | Blue-mouth redfish | Blåkaft | 0.691 | 8 | 16.0 | 20.0 | |
| <i>Hippoglossoides platessoides</i> | American plaice | Håising | 94.560 | 1978 | 9.0 | 25.0 | |
| <i>Homarus gammarus</i> | European lobster | Hummer | 24.388 | 41 | 6.1 | 15.3 | CPL |
| <i>Hyperoplus lanceolatus</i> | Greater sandeel | Pletlet tobiskonge | 27.567 | 869 | 11.5 | 32.0 | |
| <i>Illex coindetii</i> | Southern shortfin squid | Rød blæksprutte | 3.247 | 24 | 10.0 | 22.0 | ML |
| <i>Lampetra fluviatilis</i> | River lamprey | Flodlampret | 0.095 | 2 | 25.0 | 30.0 | |
| <i>Leucoraja naevus</i> | Cuckoo ray | Pletrokke | 0.856 | 1 | 51.0 | 51.0 | |
| <i>Limanda limanda</i> | Common dab | Ising | 3751.152 | 75447 | 4.0 | 36.0 | |
| <i>Lithodes maja</i> | Norway king crab | Troldkrabbe | 1.365 | 3 | 7.1 | 12.5 | CPL |
| Loliginidae | | *Loligoblæksprutter | 40.822 | 3750 | 1.5 | 13.0 | ML |
| <i>Loligo forbesii</i> | Northern squid | Loligoblæksprutte | 48.794 | 535 | 2.0 | 33.0 | ML |
| <i>Loligo sp</i> | Loligo sp | *Loligoblæksprutter | 9.712 | 1443 | 1.5 | 11.5 | ML |
| <i>Lophius piscatorius</i> | Monk | Havtaske | 11.529 | 9 | 20.0 | 62.0 | |
| <i>Lumpenus lampretaeformis</i> | Snake blenny | Spidshalet langebarn | 0.028 | 1 | 27.0 | 27.0 | |
| <i>Maja squinado</i> | Common spider crab | Edderkoppekabbe | 0.830 | 2 | 6.1 | 8.7 | CPL |
| <i>Melanogrammus aeglefinus</i> | Haddock | Kuller | 3038.003 | 26726 | 7.0 | 43.0 | |
| <i>Merlangius merlangus</i> | Whiting | Hvilling | 11616.152 | 191546 | 4.0 | 42.0 | |
| <i>Merluccius merluccius</i> | Hake | Kulmule | 12.985 | 17 | 35.0 | 61.0 | |
| <i>Microchirus variegatus</i> | Thickback sole | Båndet tunge | 0.187 | 6 | 12.0 | 15.0 | |
| <i>Micromesistius poutassou</i> | Blue whiting | Blåhvilling | 54.242 | 1642 | 13.0 | 36.0 | |
| <i>Microstomus kitt</i> | Lemon sole | Rødtunge | 137.599 | 1264 | 8.0 | 40.0 | |
| <i>Molva molva</i> | Ling | Lange | 3.302 | 3 | 58.0 | 64.0 | |
| <i>Mullus surmuletus</i> | Striped red mullet | Stribet rød Mulle | 26.479 | 430 | 4.0 | 27.0 | |
| <i>Mustelus asterias</i> | Starry smooth-hound | Stjernehaj | 225.297 | 128 | 29.0 | 118.0 | |
| <i>Mustelus mustelus</i> | Smooth hound | Glathaj | 117.690 | 67 | 41.0 | 107.0 | |
| <i>Myoxocephalus scorpius</i> | Sculpin | Almindelig ulk | 0.805 | 5 | 16.0 | 25.0 | |
| <i>Myxine glutinosa</i> | Hagfish | Slimål | 0.031 | 1 | 30.0 | 30.0 | |
| <i>Nephrops norvegicus</i> | Norway lobster | Jomfruhummer | 24.534 | 741 | 1.7 | 5.3 | CPL |
| <i>Pecten maximus</i> | Great scallop | Stor kammusling | 2.338 | 48 | - | - | |
| <i>Phrynorhombus norvegicus</i> | Norwegian topknot | Småhvarre | 0.019 | 2 | 9.0 | 9.0 | |
| <i>Platichthys flesus</i> | Flounder | Skrubbe | 1.713 | 6 | 22.0 | 36.0 | |
| <i>Pleuronectes platessa</i> | Plaice | Rødspætte | 502.754 | 4276 | 7.0 | 59.0 | |
| <i>Pollachius virens</i> | Saithe | Sej | 4.803 | 12 | 16.0 | 49.0 | |
| <i>Pomatoschistus.sp</i> | Sand gobies | *Sandkutlinger | 0.183 | 283 | 2.0 | 7.0 | |
| <i>Raja brachyura</i> | Blonde ray | Blond rokke | 37.398 | 27 | 34.0 | 91.0 | |
| <i>Raja clavata</i> | Thornback ray | Sømrrokke | 37.762 | 23 | 35.0 | 80.0 | |
| <i>Raja montagui</i> | Spotted Ray | Storpletlet Rokke | 7.925 | 13 | 26.0 | 57.0 | |
| <i>Rossia macrosoma</i> | Stout bobtail squid | Ross's blæksprutte | 0.056 | 6 | - | - | |
| <i>Sarda sarda</i> | Atlantic bonito | Rygstribet Pelamide | 2.180 | 1 | 56.0 | 56.0 | |
| <i>Sardina pilchardus</i> | Pilchard | Sardin | 47.324 | 3970 | 5.0 | 25.0 | |
| <i>Scomber scombus</i> | Mackerel | Makrel | 3683.874 | 23520 | 11.0 | 42.0 | |
| <i>Scophthalmus maximus</i> | Turbot | Pighvarre | 33.847 | 30 | 21.0 | 63.0 | |
| <i>Scophthalmus rhombus</i> | Brill | Slethvarre | 7.150 | 12 | 25.0 | 47.0 | |
| <i>Scyliorhinus canicula</i> | Lesser-spotted dogfish | Småpletlet rødhaj | 427.502 | 872 | 26.0 | 67.0 | |
| <i>Sepia officinalis</i> | Common cuttlefish | Sepiablæksprutte | 0.074 | 1 | 8.0 | 8.0 | ML |
| <i>Sepioida atlantica</i> | Atlantic bobtail squid | Sepioida atlantica | 0.010 | 6 | - | - | |
| <i>Solea solea</i> | Sole | Tunge | 6.056 | 71 | 14.0 | 34.0 | |
| <i>Spondyliosa cantharus</i> | Black sea bream | Almindelig havrude | 0.072 | 1 | 16.0 | 16.0 | |
| <i>Sprattus sprattus</i> | Sprat | Brisling | 6294.036 | 790962 | 4.0 | 14.5 | |
| <i>Squalus acanthias</i> | Spurdog | Pighaj | 7.794 | 6 | 34.0 | 102.0 | |
| Syngnathidae | Pipefishes and seahorses | *Tangnåle | 0.008 | 14 | 7.0 | 12.0 | |
| <i>Syngnathus acus</i> | Great pipefish | Stor tangnål | 0.002 | 2 | 13.0 | 14.0 | |
| <i>Taurulus bubalis</i> | Sea scorpion | Langtornet ulk | 0.972 | 19 | 12.0 | 22.0 | |
| <i>Trachinus draco</i> | Greater weever fish | Fjæsing | 18.278 | 89 | 16.0 | 43.0 | |
| <i>Trachurus trachurus</i> | Horse mackerel | Hestemakrel | 654.049 | 105770 | 2.0 | 39.0 | |
| <i>Trisopterus esmarkii</i> | Norway pout | Sperling | 174.649 | 23412 | 5.0 | 19.0 | |
| <i>Trisopterus luscus</i> | Bib | Skægtorsk | 108.603 | 997 | 3.0 | 32.0 | |
| <i>Trisopterus minutus</i> | Poor-cod | Glyse | 58.502 | 1404 | 7.0 | 22.0 | |
| <i>Zeus faber</i> | 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 | |
| 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 | 0 | 146 | 26 | 0 | 2 | 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 | 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 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | 10 | |
| 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 | 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 | |
| 52 | 40F4 | 0 | 0 | 0 | 386 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 2 | 2 | 0 | 3723 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 48 | |
| 79 | 39F3 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 596 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2625 | 20 | 0 | 0 | 0 | 0 | 0 | 24 | |
| 86 | 37F2 | 0 | 0 | 0 | 0 | 1096 | 28 | 396 | 12233 | 1762 | 0 | 0 | 0 | 0 | 2 | 0 | 10 | 4 | 0 | 2 | 2 | 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 | 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 | 20 | |
| 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 | |
| 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 | 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 | 43 | |
| 103 | 39F5 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 8 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | |
| 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 | 10 | |
| 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 | 48 | |
| 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 | 38 | |
| 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 | 76 | |
| 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 | 18 | |
| 119 | 39F7 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 14 | 0 | 0 | 0 | 0 | 0 | 120 | 0 | 0 | 183 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | |
| 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 | 180 | |
| 132 | 40F7 | 0 | 0 | 0 | 0 | 0 | 0 | 214 | 70 | 0 | 0 | 0 | 0 | 0 | 1717 | 4507 | 2 | 89599 | 11969 | 0 | 90 | 2 | 0 | 0 | 0 | 0 | 22 | |
| 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 | 12 | | |
| 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 | 4 | | |
| 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 | 2 | | |
| 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 | 10 | |
| 148 | 39F4 | 0 | 0 | 0 | 0 | 0 | 0 | 1459 | 0 | 0 | 0 | 0 | 0 | 0 | 120 | 0 | 0 | 183 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 243 | |
| 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 | 138 | |
| 153 | 35F3 | 0 | 0 | 0 | 0 | 0 | 0 | 1765 | 54 | 4 | 0 | 0 | 0 | 0 | 5492 | 43 | 0 | 33325 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | | |
| 160 | 35F3 | 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 | 68 | |
| 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 | 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 | 2 | | |
| 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 | 233 | |
| 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 | 2 | |
| 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 | 8 | |
| 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 | 7 | |
| 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 | 33 | |
| 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 | 4 | |
| 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 | 10 | |
| 193 | 34F2 | 0 | 4 | 0 | 0 | 2 | 0 | 0 | 23384 | 7265 | 0 | 0 | 0 | 0 | 0 | 24 | 4 | 2 | 2 | 15 | 26 | 0 | 0 | 0 | 0 | 0 | 11 | |
| 202 | 35F1 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 833 | 397 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 28 | 2 | 0 | 0 | 0 | 0 | 3 | |
| 203 | 35F1 | 0 | 0 | 0 | 2 | 2 | 0 | 4 | 10 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | |
| 205 | 35F0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 696 | 10180 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 30 | 0 | 0 | 84 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 211 | 37F0 | 0 | 4 | 2 | 9 | 455 | 15 | 0 | 578 | 241 | 0 | 0 | 0 | 0 | 16 | 0 | 26 | 22 | 8 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 82 | |
| 212 | 36F0 | 2 | 10 | 0 | 208 | 1387 | 15 | 0 | 3550 | 482 | 0 | 0 | 0 | 0 | 10 | 2 | | | | | | | | | | | | |

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).

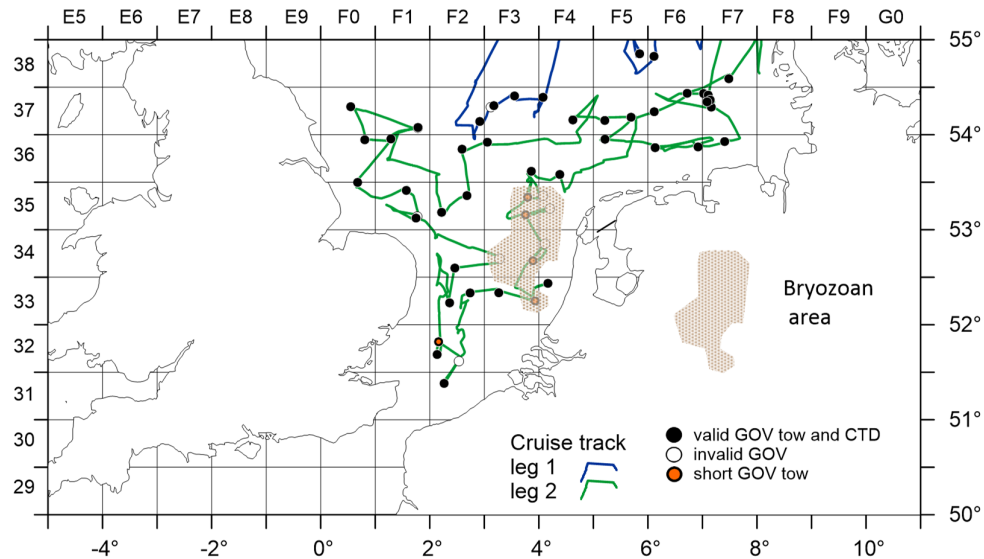


Fig. A.1. Area in which a mass occurrence of bryozoan prevented the conduction of standard GOV tows, Dana DK/DE IBTS 3Q 2021.



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.