DTU Aqua - Cruise report

Danish Sole Survey 4Q 2025

HAVFISKEN, SG25

Denmark

From 02-11-2025 to 21-11-2025

DTU Aqua
Kemitorvet, Building 202
2800 Kgs. Lyngby
Denmark

DTU Aqua
National Institute of Aquatic Resources

Contents

Cruise summary

General information

Cruise	Danish Sole Survey
Cruise leader	Marie Storr-Paulsen
Reseach vessel(s)	HAVFISKEN, SG25
Year and quarter	4Q 2025
Country	Denmark

Participants and time

Trip no.	Start date and time	End date and time	Ship
2	02-11-2025 14:00	06-11-2025 00:00	SG25
1	05-11-2025 15:00	21-11-2025 08:00	HAVFISKEN
4	09-11-2025 00:00	14-11-2025 00:00	SG25
6	16-11-2025 00:00	21-11-2025 00:00	SG25

Name	Institute	Function tasks	Leg
Marie Storr-Paulsen	DTU-Aqua	Cruise-leader	1
Stina B. S. Hansen	DTU-Aqua	Assistant cruise-leader	1
Dennis Andersen	DTU-Aqua	Individual fish measurements	1
Anne-Mette Kroner	DTU-Aqua	Individual fish measurements	1
Angu	DTU-Aqua	Individual fish measurements	1
Eik	DTU-Aqua	CTD	1
Hans Jakob Olesen	DTU-Aqua	Cruise-leader	2
Helle Rasmussen	DTU-Aqua	Assistant cruise-leader	2
Dennis Andersen	DTU-Aqua	Maturity estimates	2
Marie Villefrance	DTU-Aqua	Individual fish measurements	2
Svend-Erik Levinsky	DTU-Aqua	Individual fish measurements	2

Esin	DTU-Aqua	Night assistant cruise leader	1
Bastian Huwer	DTU-Aqua	Night assistant cruise leader	1
Bodil	DTU-Aqua	CTD	2

Introduction

The "Tunge Survey" (Sole Survey) is an annual survey carried out every autumn in the Kattegat, Skagerrak and Western Belt area. The purpose of the cruise is to provide CPUE data for sole. The results are used for maintaining a time series used in the annually assessment of sole from Kattegat. From 2016 and onwards the survey is carried out by a commercial fishing vessel and the research vessel"Havfisken" owned by DTU Aqua. The gear used is a demersal otter tween trawl.

Gear

Trawl: Twin "Icelandic-sole-trawl" with 140 mm mesh and rockhopper type ground gear with 150 mm rubber discs. Mesh size in the cod end: 55 mm stretch mesh Otter boards: 66' ' "Thyborøn". Warp: 13 mm.

The otter boards are mounted directly on the tips of the wings without bridles. Wing spread (otter board spread) is app. 44 m.

Trawl procedure

Towing time is 30 min.

Before 2016 the towing time was 60 min but towing time down to 20 min has been accepted if no circumstances disqualified the haul.

In 2016 towing time was reduced to 30 min on 25% of the traditional stations and in 2017 the towing time was reduced to 30 on 50% of the stations. Towing time was 30 min on all new stations in Jammerbugt and Storebælt.

Towing speed: 2.5 kn. over the seabed.

Hauls start: when the trawl is considered going stable on the bottom.

Haul end: when hauling starts.

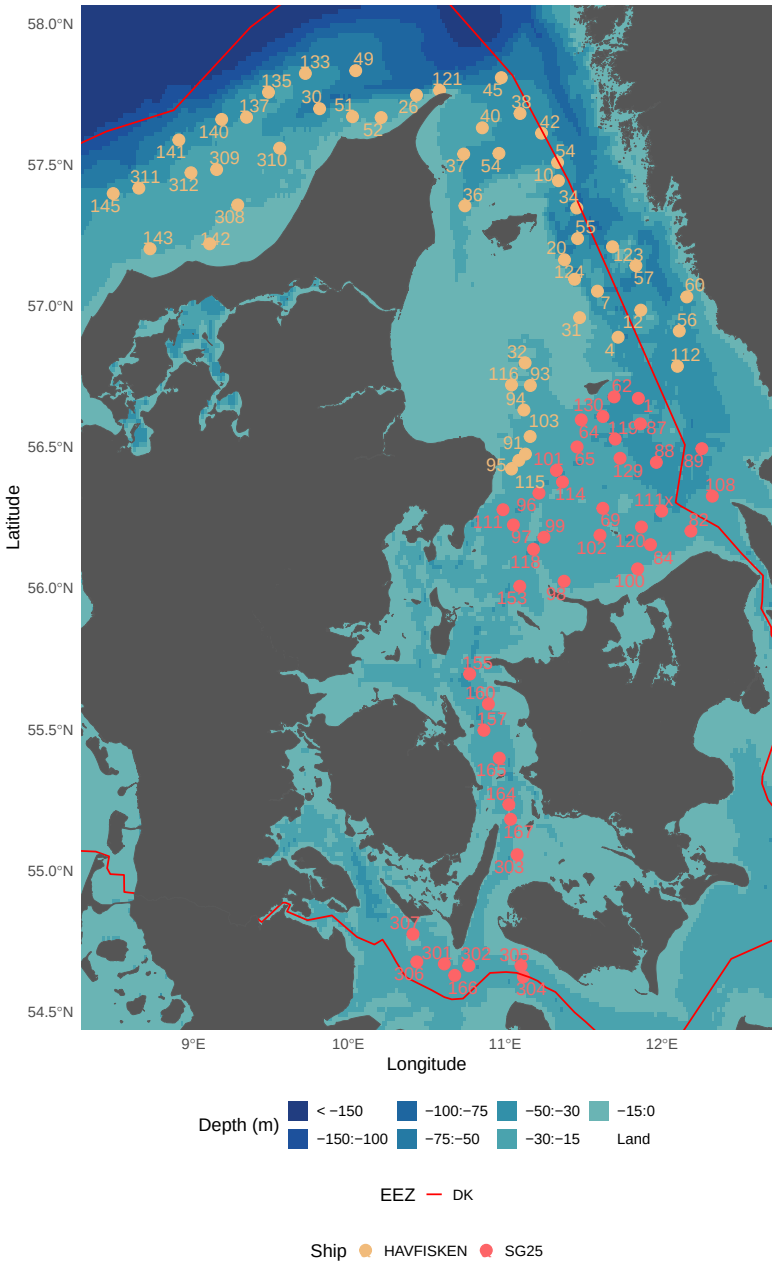
Warp length: The depth varies from station to station and so does the warp length. The warp length was recorded at each station in 2004 and this warp length is used at the station in 2005 and onwards.

Each station is fished in the same direction each year if wind and current allows.

Fishing takes place only during night time from app. 5 pm to 7 am.

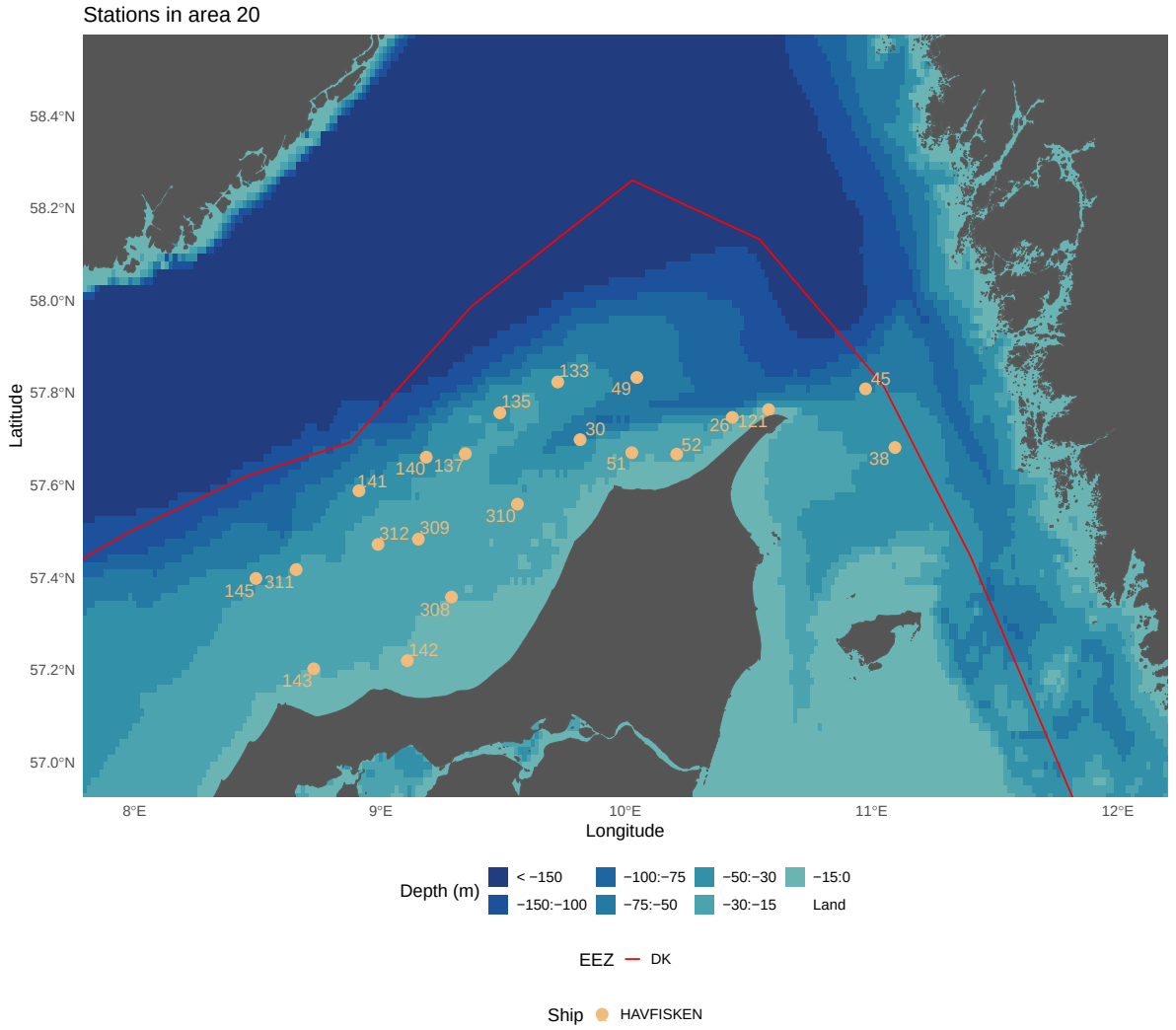
Stations

90 hauls were conducted during the survey. The positions off all hauls are presented in the map in Fig. 1 and hauls per ICES area are plotted in the maps in Fig. 2-4.


58.0°N
57.5°N
57.0°N
56.5°N
56.0°N
55.5°N
55.0°N
54.5°N
Latitude
9°E
10°E
11°E
12°E
Longitude
Depth (m)
< −150
−150:−100
−100:−75
−75:−50
−50:−30
−30:−15
−15:0
Land
EEZ
DK
Ship
HAVFISKEN
SG25

Stations by ICES area

Area 20

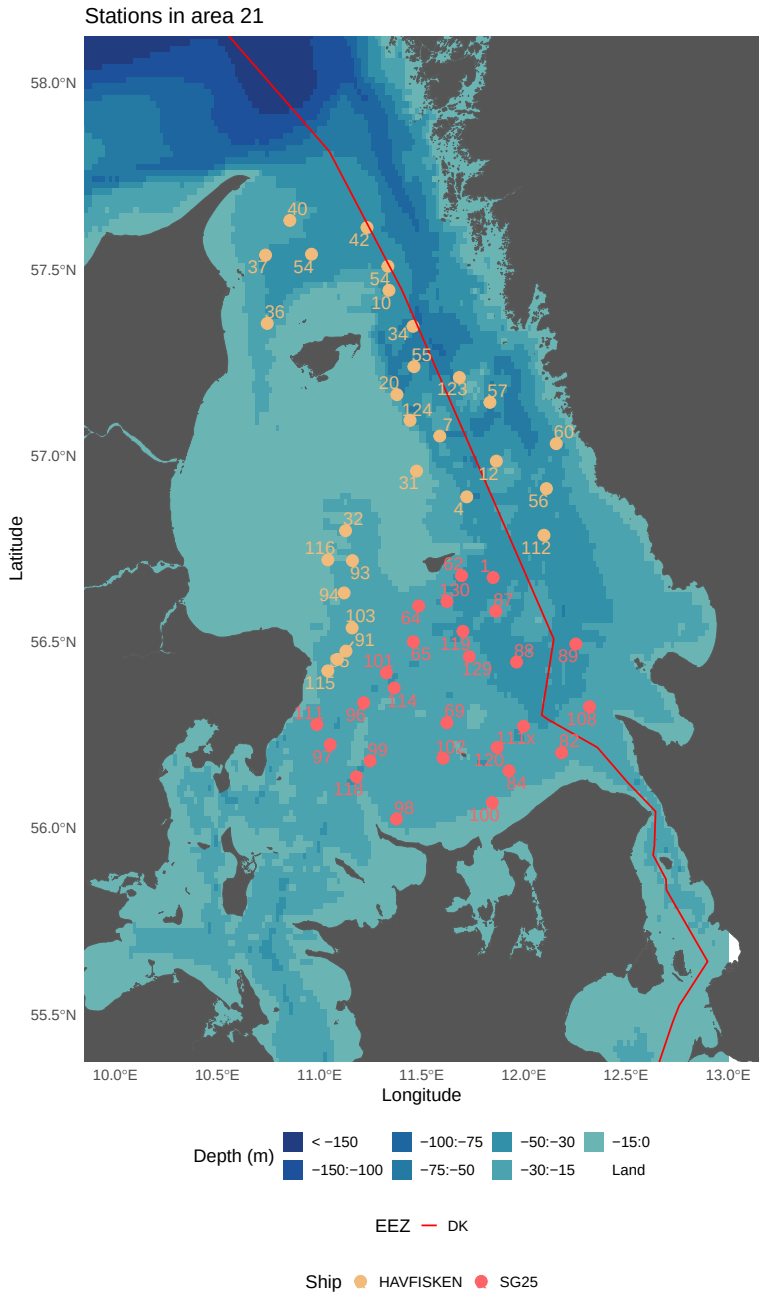


Area: 20, Geartype: DTU55, GearQuality: V

Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
121	57.763800	10.581900	57.45.8280 N	010.34.9140 E	HAVFISKEN
26	57.747100	10.434500	57.44.8260 N	010.26.0700 E	HAVFISKEN

Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
52	57.667433	10.209183	57.40.0460 N	010.12.5510 E	HAVFISKEN
140	57.660900	9.192183	57.39.6540 N	009.11.5310 E	HAVFISKEN
141	57.588133	8.919216	57.35.2880 N	008.55.1530 E	HAVFISKEN
311	57.417333	8.664116	57.25.0400 N	008.39.8470 E	HAVFISKEN
145	57.398116	8.500683	57.23.8870 N	008.30.0410 E	HAVFISKEN
143	57.202516	8.735583	57.12.1510 N	008.44.1350 E	HAVFISKEN
142	57.220100	9.115433	57.13.2060 N	009.06.9260 E	HAVFISKEN
308	57.357833	9.294816	57.21.4700 N	009.17.6890 E	HAVFISKEN
312	57.471833	8.996383	57.28.3100 N	008.59.7830 E	HAVFISKEN
309	57.483266	9.160116	57.28.9960 N	009.09.6070 E	HAVFISKEN
310	57.559016	9.562333	57.33.5410 N	009.33.7400 E	HAVFISKEN
137	57.668366	9.350850	57.40.1020 N	009.21.0510 E	HAVFISKEN
135	57.756916	9.491083	57.45.4150 N	009.29.4650 E	HAVFISKEN
133	57.823666	9.725866	57.49.4200 N	009.43.5520 E	HAVFISKEN
30	57.698800	9.816783	57.41.9280 N	009.49.0070 E	HAVFISKEN
51	57.670516	10.026650	57.40.2310 N	010.01.5990 E	HAVFISKEN
49	57.833533	10.046966	57.50.0120 N	010.02.8180 E	HAVFISKEN
45	57.808866	10.975516	57.48.5320 N	010.58.5310 E	HAVFISKEN
38	57.681766	11.094800	57.40.9060 N	011.05.6880 E	HAVFISKEN

Area 21



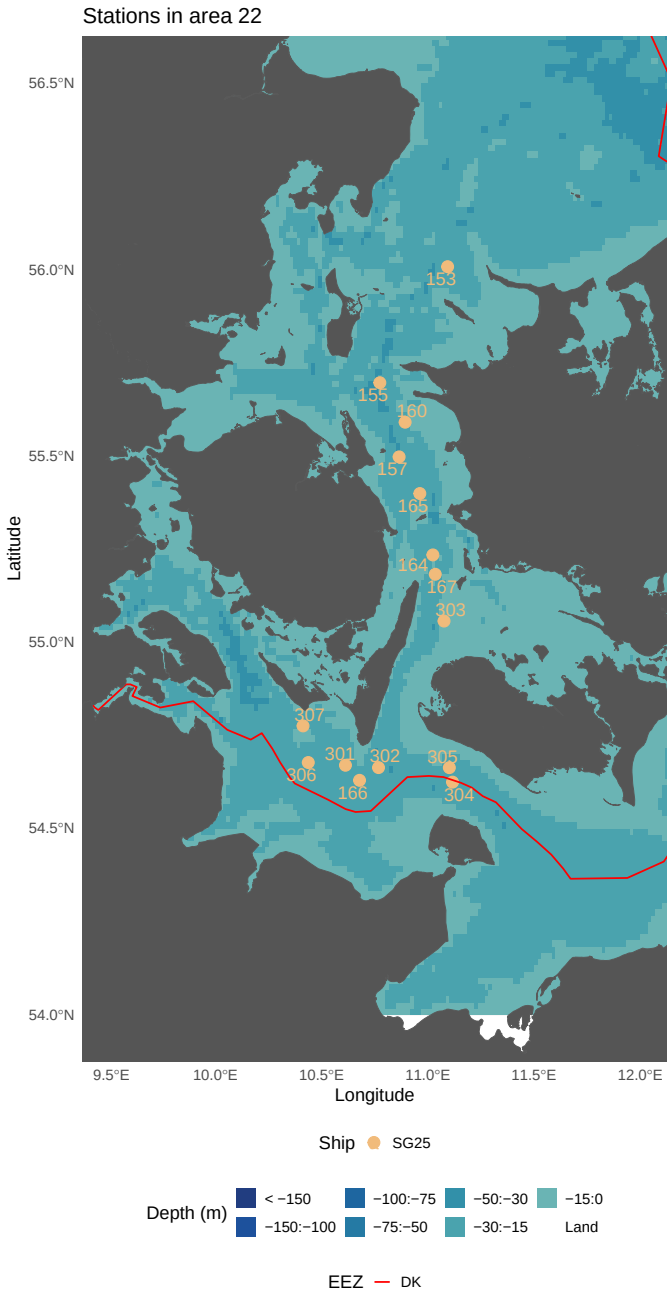
Area: 21, Geartype: DTU55, GearQuality: V

Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
100	56.068633	11.844916	56.04.1180 N	011.50.6950 E	SG25
101	56.417233	11.326716	56.25.0340 N	011.19.6030 E	SG25
102	56.187833	11.604850	56.11.2700 N	011.36.2910 E	SG25

Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
108	56.326066	12.320983	56.19.5640 N	012.19.2590 E	SG25
1	56.672716	11.849516	56.40.3630 N	011.50.9710 E	SG25
111	56.278116	10.986416	56.16.6870 N	010.59.1850 E	SG25
111x	56.273450	11.998216	56.16.4070 N	011.59.8930 E	SG25
114	56.376283	11.365516	56.22.5770 N	011.21.9310 E	SG25
118	56.137966	11.180083	56.08.2780 N	011.10.8050 E	SG25
119	56.528383	11.701533	56.31.7030 N	011.42.0920 E	SG25
120	56.216866	11.868866	56.13.0120 N	011.52.1320 E	SG25
129	56.460466	11.732700	56.27.6280 N	011.43.9620 E	SG25
130	56.608233	11.623566	56.36.4940 N	011.37.4140 E	SG25
123	57.209633	11.684150	57.12.5780 N	011.41.0490 E	HAVFISKEN
57	57.142866	11.833716	57.08.5720 N	011.50.0230 E	HAVFISKEN
12	56.985166	11.865100	56.59.1100 N	011.51.9060 E	HAVFISKEN
112	56.786183	12.098383	56.47.1710 N	012.05.9030 E	HAVFISKEN
60	57.032050	12.158333	57.01.9230 N	012.09.5000 E	HAVFISKEN
62	56.677866	11.694566	56.40.6720 N	011.41.6740 E	SG25
56	56.911350	12.110216	56.54.6810 N	012.06.6130 E	HAVFISKEN
4	56.889250	11.720350	56.53.3550 N	011.43.2210 E	HAVFISKEN
54	57.508100	11.334266	57.30.4860 N	011.20.0560 E	HAVFISKEN
42	57.612100	11.232083	57.36.7260 N	011.13.9250 E	HAVFISKEN
40	57.631150	10.854333	57.37.8690 N	010.51.2600 E	HAVFISKEN
37	57.538083	10.735500	57.32.2850 N	010.44.1300 E	HAVFISKEN
36	57.354700	10.743600	57.21.2820 N	010.44.6160 E	HAVFISKEN
54	57.540500	10.960300	57.32.4300 N	010.57.6180 E	HAVFISKEN
10	57.443600	11.339450	57.26.6160 N	011.20.3670 E	HAVFISKEN
34	57.347033	11.457016	57.20.8220 N	011.27.4210 E	HAVFISKEN
55	57.238683	11.461766	57.14.3210 N	011.27.7060 E	HAVFISKEN
20	57.163533	11.378550	57.09.8120 N	011.22.7130 E	HAVFISKEN
124	57.094600	11.442850	57.05.6760 N	011.26.5710 E	HAVFISKEN
7	57.052400	11.588366	57.03.1440 N	011.35.3020 E	HAVFISKEN
31	56.958566	11.474600	56.57.5140 N	011.28.4760 E	HAVFISKEN
115	56.422216	11.040266	56.25.3330 N	011.02.4160 E	HAVFISKEN
95	56.453100	11.087366	56.27.1860 N	011.05.2420 E	HAVFISKEN
91	56.475283	11.129066	56.28.5170 N	011.07.7440 E	HAVFISKEN
103	56.537516	11.159300	56.32.2510 N	011.09.5580 E	HAVFISKEN
64	56.596550	11.485050	56.35.7930 N	011.29.1030 E	SG25
94	56.631333	11.119733	56.37.8800 N	011.07.1840 E	HAVFISKEN

Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
116	56.720150	11.040516	56.43.2090 N	011.02.4310 E	HAVFISKEN
93	56.718216	11.160566	56.43.0930 N	011.09.6340 E	HAVFISKEN
32	56.798483	11.127100	56.47.9090 N	011.07.6260 E	HAVFISKEN
65	56.500600	11.458416	56.30.0360 N	011.27.5050 E	SG25
69	56.283100	11.623000	56.16.9860 N	011.37.3800 E	SG25
82	56.202400	12.184516	56.12.1440 N	012.11.0710 E	SG25
84	56.154283	11.926733	56.09.2570 N	011.55.6040 E	SG25
87	56.582200	11.862566	56.34.9320 N	011.51.7540 E	SG25
88	56.445833	11.964066	56.26.7500 N	011.57.8440 E	SG25
89	56.494383	12.254400	56.29.6630 N	012.15.2640 E	SG25
96	56.336733	11.215600	56.20.2040 N	011.12.9360 E	SG25
97	56.224283	11.052233	56.13.4570 N	011.03.1340 E	SG25
98	56.024733	11.375966	56.01.4840 N	011.22.5580 E	SG25
99	56.180500	11.247166	56.10.8300 N	011.14.8300 E	SG25

Area 22



Area: 22, Geartype: DTU55, GearQuality: V

Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
153	56.007000	11.093083	56.00.4200 N	011.05.5850 E	SG25
155	55.695600	10.773916	55.41.7360 N	010.46.4350 E	SG25
157	55.496566	10.864633	55.29.7940 N	010.51.8780 E	SG25

Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
160	55.589566	10.893033	55.35.3740 N	010.53.5820 E	SG25
164	55.233383	11.023750	55.14.0030 N	011.01.4250 E	SG25
165	55.398166	10.962216	55.23.8900 N	010.57.7330 E	SG25
166	54.628450	10.678333	54.37.7070 N	010.40.7000 E	SG25
167	55.181500	11.034866	55.10.8900 N	011.02.0920 E	SG25
301	54.668883	10.612016	54.40.1330 N	010.36.7210 E	SG25
302	54.662616	10.767650	54.39.7570 N	010.46.0590 E	SG25
303	55.055933	11.076166	55.03.3560 N	011.04.5700 E	SG25
304	54.623550	11.116183	54.37.4130 N	011.06.9710 E	SG25
305	54.662450	11.101133	54.39.7470 N	011.06.0680 E	SG25
306	54.676250	10.436966	54.40.5750 N	010.26.2180 E	SG25
307	54.774533	10.412333	54.46.4720 N	010.24.7400 E	SG25

Handling of the catch

After each haul the catch is sorted by species and weighed to nearest 0.1 kg and the number of specimens recorded. Most fish species are measured as total length (TL) to 1.0 cm below. Norway lobster is measured in mm carapace length.

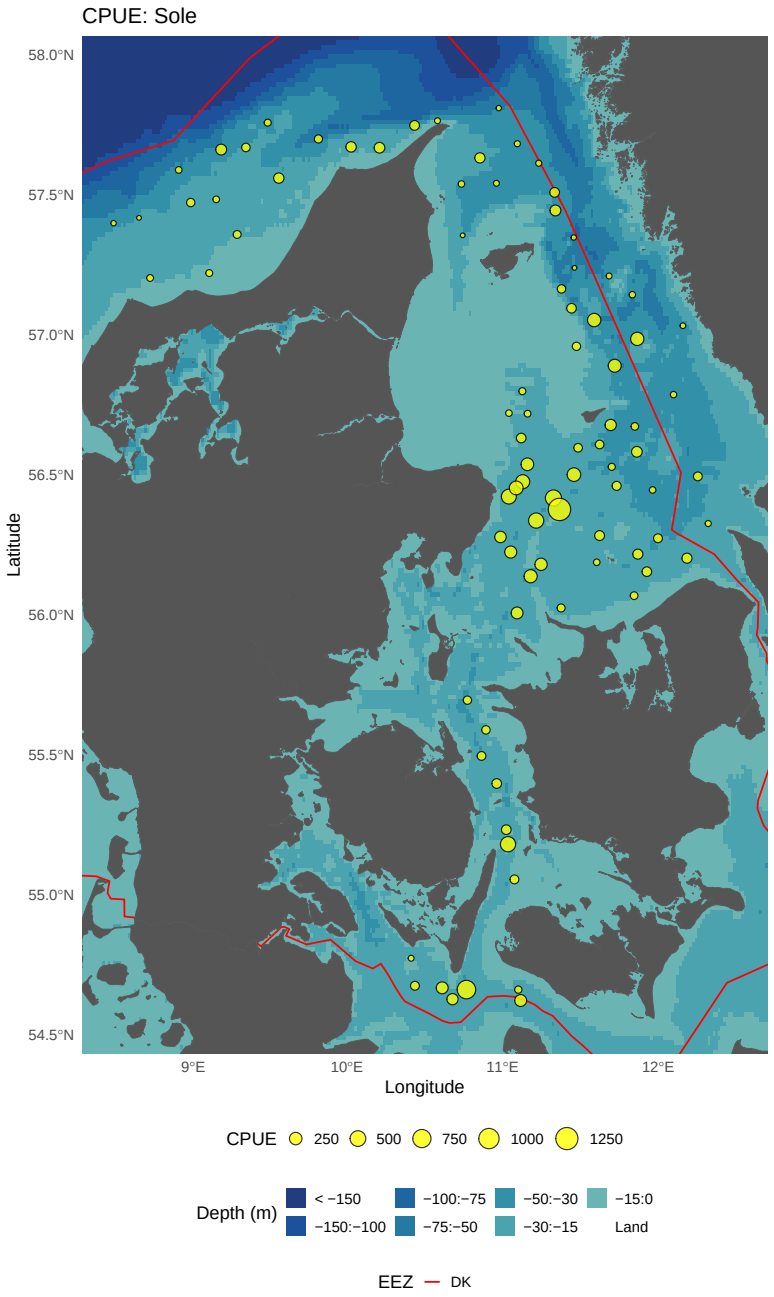
Processing of the results

CPUE

CPUE for sole, cod, plaice and Norway lobster is estimated as mean catch (kg or numbers) per hour with Standard Error based on the Standard Stations (i.e. not including the stations in Jammerbugt and Storebælt).

CPUE is in the following map estimated with the equation:

$$CPUE_{station} = \frac{\sum Sole_{station}}{FishingTime_{station}} * 60$$



Biomass and abundance

The traditional survey area has been stratified in ICES squares (Fig 3, Table 4).

Biomass and abundance estimates is obtained by applying the swept area method (estimated trawling speed * wing spread * trawling time) using the recorded speed, wing spread and trawling time and the stratum area as weighting factor. The catchability coefficient is assumed to be 1.0.

All catches are standardized to 1 km^2 swept prior to further calculations.

Over all S.E. is estimated using the stratum area as weighting factor. In strata with one haul only STD=biomass (or abundance).

Catch

The total catch of all species, cod, plaice and sole are presented below. The total catch per species per ICES area are presented in table 1-3.

	Weight (kg)	Number
Total catch	34616.5	473885
Cod	186.5	801
Plaice	6180.1	94511
Sole	884.4	5928

Sole

Total kgs of sole catched:	884
Total number of sole measured:	5378
Total number of sole otoliths collected:	1083

Sole

Total kgs of sole catched: 884
Total number of sole measured: 5378
Total number of sole otoliths collected: 1083

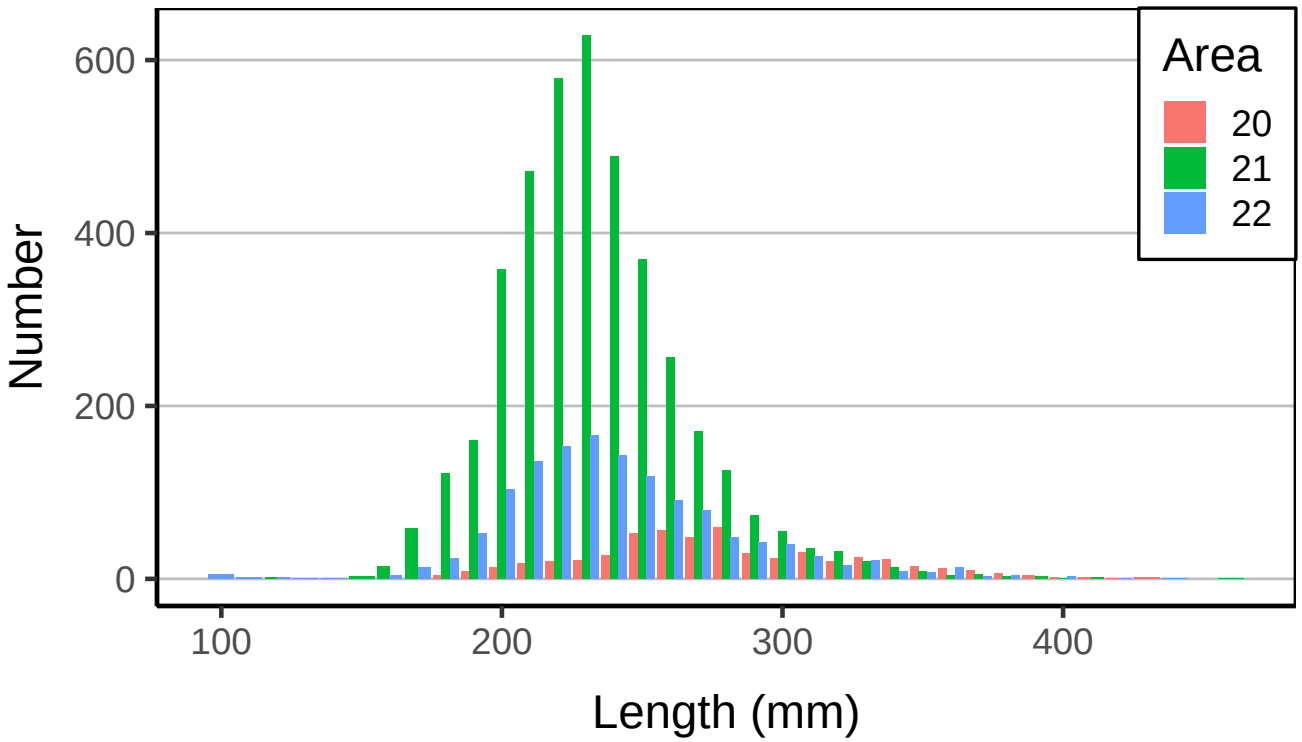


Figure 1: Length distribution per area for sole, Sole Survey 2025