
DTU Aqua - Cruise report

Danish Sole Survey 4Q 2022

SG25

Denmark

From 13-11-2022 to 03-12-2022

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Cruise summary

General information

<i>Cruise</i>	Danish Sole Survey
<i>Cruise leader</i>	NA
<i>Research vessel(s)</i>	SG25
<i>Year and quarter</i>	4Q 2022
<i>Country</i>	Denmark

Participants and time

Trip no.	Start date and time	End date and time	Ship
2	13-11-2022 14:00	03-12-2022 06:00	SG25

Name	Institute	Function tasks	Leg
Nikolaj K. Pedersen	DTU-Aqua	Cruise-leader	1
Peter Vingaard	DTU-Aqua	Assistant cruise-leader	1
Niels Lyse	DTU-Aqua	Length measurements	1

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 tweek 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.

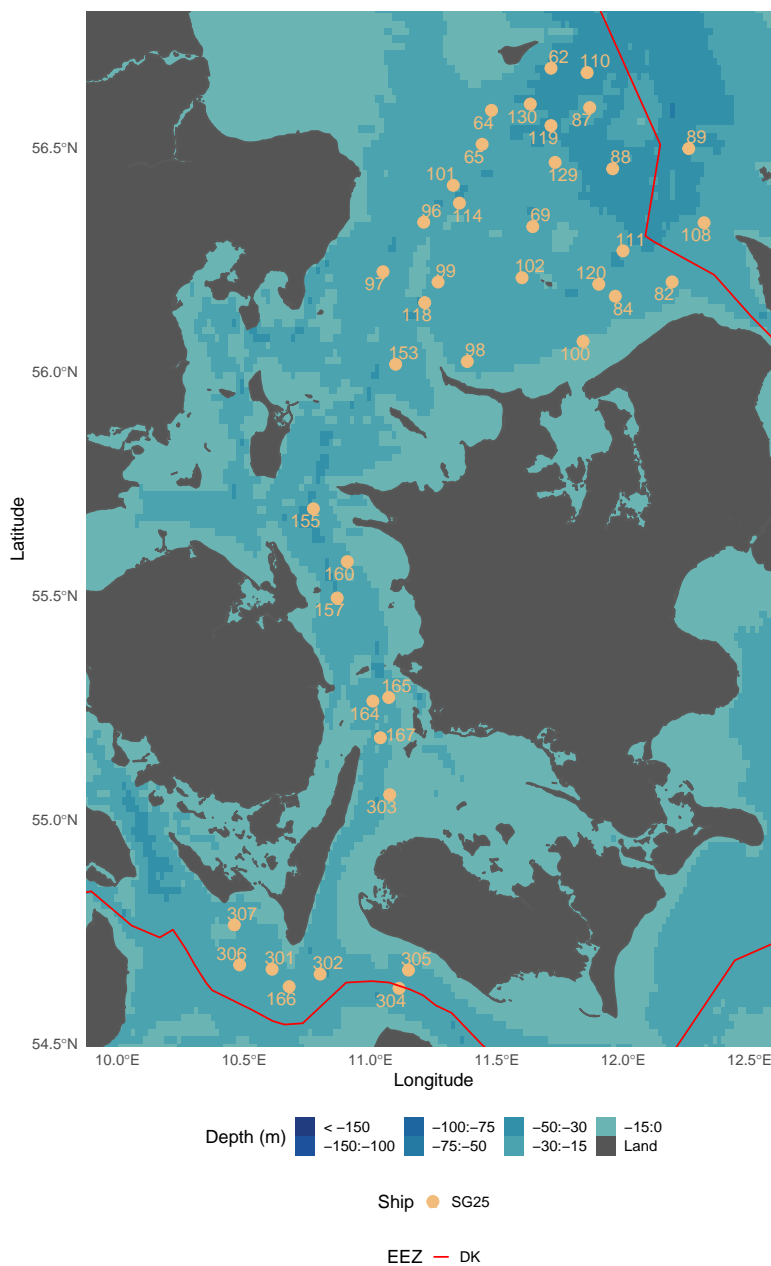
Warp length: The depth varies from station to station and so does the warp length. The warp length was recorded at each station in 2004 and this warp length is used at the station in 2005 and onwards.

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.

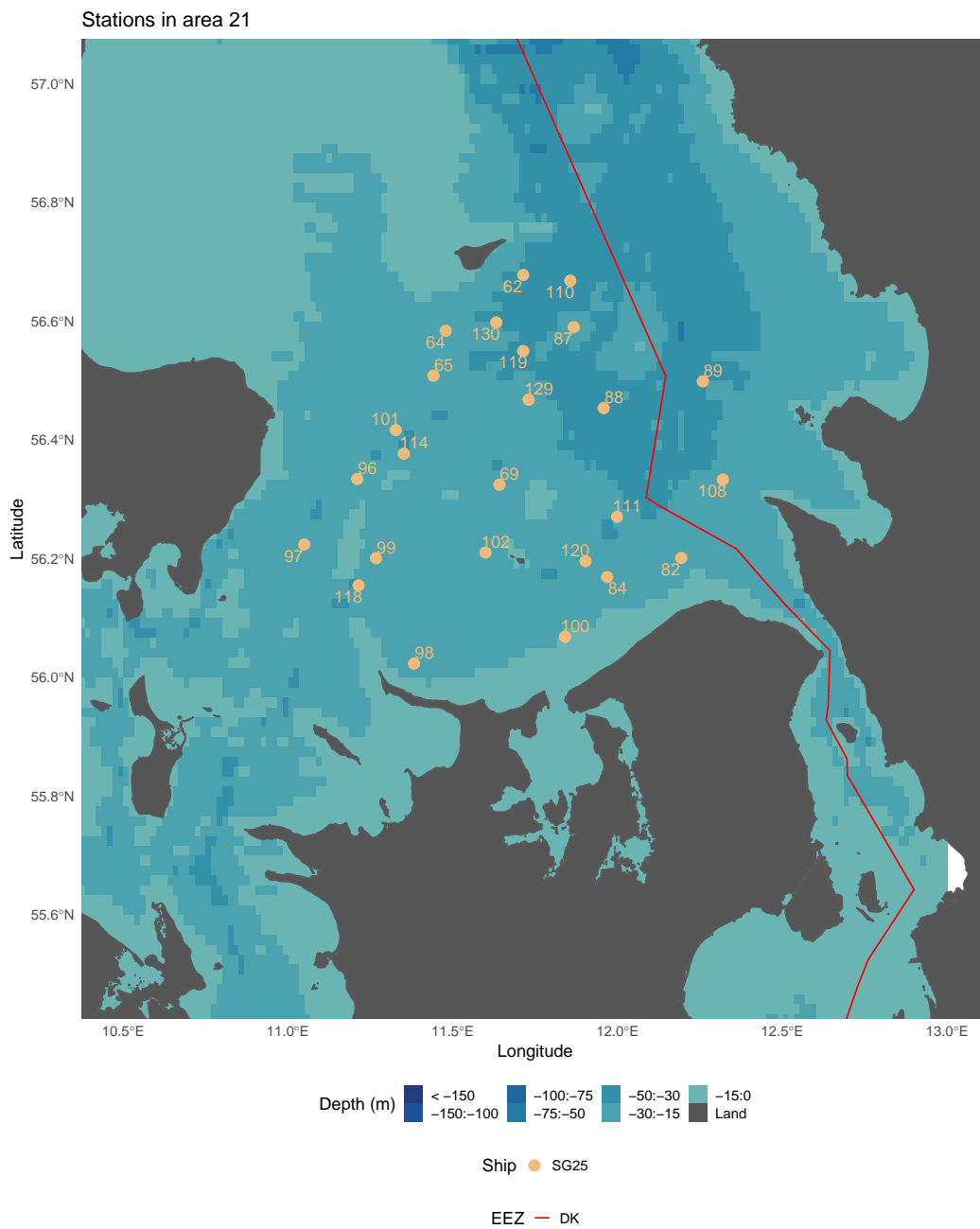
Stations

40 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. 2-3.



Stations by ICES area

Area 21



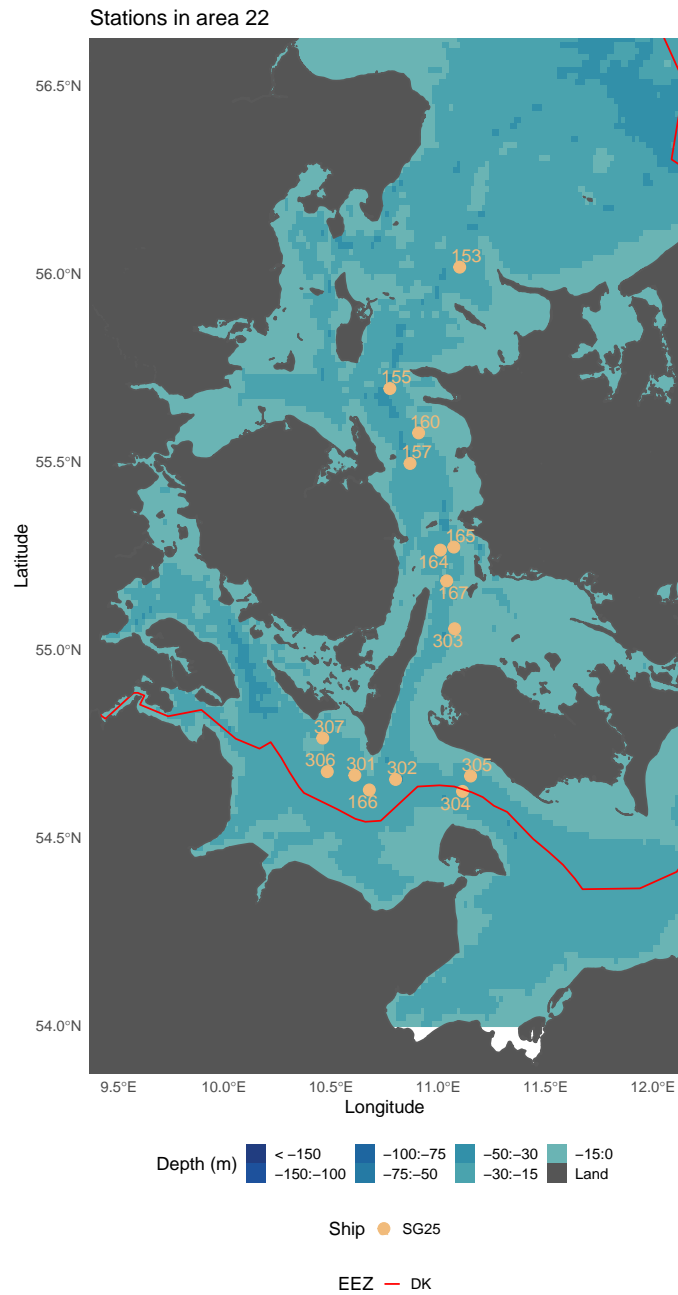
Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
99	56.200766	11.267083	56.12.0460 N	011.16.0250 E	SG25

Area: 21, Geartype: DTU55, GearQuality: I

Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
62	56.678050	11.713833	56.40.6830 N	011.42.8300 E	SG25
64	56.584033	11.478533	56.35.0420 N	011.28.7120 E	SG25
65	56.508233	11.441366	56.30.4940 N	011.26.4820 E	SG25
69	56.324500	11.641583	56.19.4700 N	011.38.4950 E	SG25
82	56.201066	12.193000	56.12.0640 N	012.11.5800 E	SG25
84	56.169050	11.968283	56.10.1430 N	011.58.0970 E	SG25
87	56.590083	11.867050	56.35.4050 N	011.52.0230 E	SG25
88	56.453666	11.957833	56.27.2200 N	011.57.4700 E	SG25
89	56.498700	12.258766	56.29.9220 N	012.15.5260 E	SG25
96	56.334283	11.210266	56.20.0570 N	011.12.6160 E	SG25
97	56.223816	11.049333	56.13.4290 N	011.02.9600 E	SG25
98	56.023266	11.382550	56.01.3960 N	011.22.9530 E	SG25
100	56.068250	11.840716	56.04.0950 N	011.50.4430 E	SG25
101	56.416650	11.327166	56.24.9990 N	011.19.6300 E	SG25
102	56.210366	11.599300	56.12.6220 N	011.35.9580 E	SG25
108	56.333200	12.319500	56.19.9920 N	012.19.1700 E	SG25
110	56.668333	11.856750	56.40.1000 N	011.51.4050 E	SG25
111	56.270383	11.998483	56.16.2230 N	011.59.9090 E	SG25
114	56.376933	11.351683	56.22.6160 N	011.21.1010 E	SG25
118	56.154866	11.214266	56.09.2920 N	011.12.8560 E	SG25
119	56.549933	11.713866	56.32.9960 N	011.42.8320 E	SG25
120	56.195800	11.902900	56.11.7480 N	011.54.1740 E	SG25
129	56.467883	11.730166	56.28.0730 N	011.43.8100 E	SG25
130	56.598033	11.631966	56.35.8820 N	011.37.9180 E	SG25

Area: 21, Geartype: DTU55, GearQuality: V

Area 22



Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
153	56.017216	11.099433	56.01.0330 N	011.05.9660 E	SG25
160	55.576716	10.907850	55.34.6030 N	010.54.4710 E	SG25
307	54.765633	10.461100	54.45.9380 N	010.27.6660 E	SG25

Area: 22, Geartype: DTU55, GearQuality: I

Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
155	55.694633	10.773916	55.41.6780 N	010.46.4350 E	SG25
157	55.495566	10.868000	55.29.7340 N	010.52.0800 E	SG25
164	55.265300	11.009283	55.15.9180 N	011.00.5570 E	SG25
165	55.273383	11.072000	55.16.4030 N	011.04.3200 E	SG25
166	54.628000	10.678000	54.37.6800 N	010.40.6800 E	SG25
167	55.183583	11.038916	55.11.0150 N	011.02.3350 E	SG25
301	54.666833	10.610600	54.40.0100 N	010.36.6360 E	SG25
302	54.655900	10.800633	54.39.3540 N	010.48.0380 E	SG25
303	55.056416	11.075816	55.03.3850 N	011.04.5490 E	SG25
304	54.624116	11.112700	54.37.4470 N	011.06.7620 E	SG25
305	54.664950	11.150133	54.39.8970 N	011.09.0080 E	SG25
306	54.676666	10.482000	54.40.6000 N	010.28.9200 E	SG25

Area: 22, Geartype: DTU55, GearQuality: V

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.

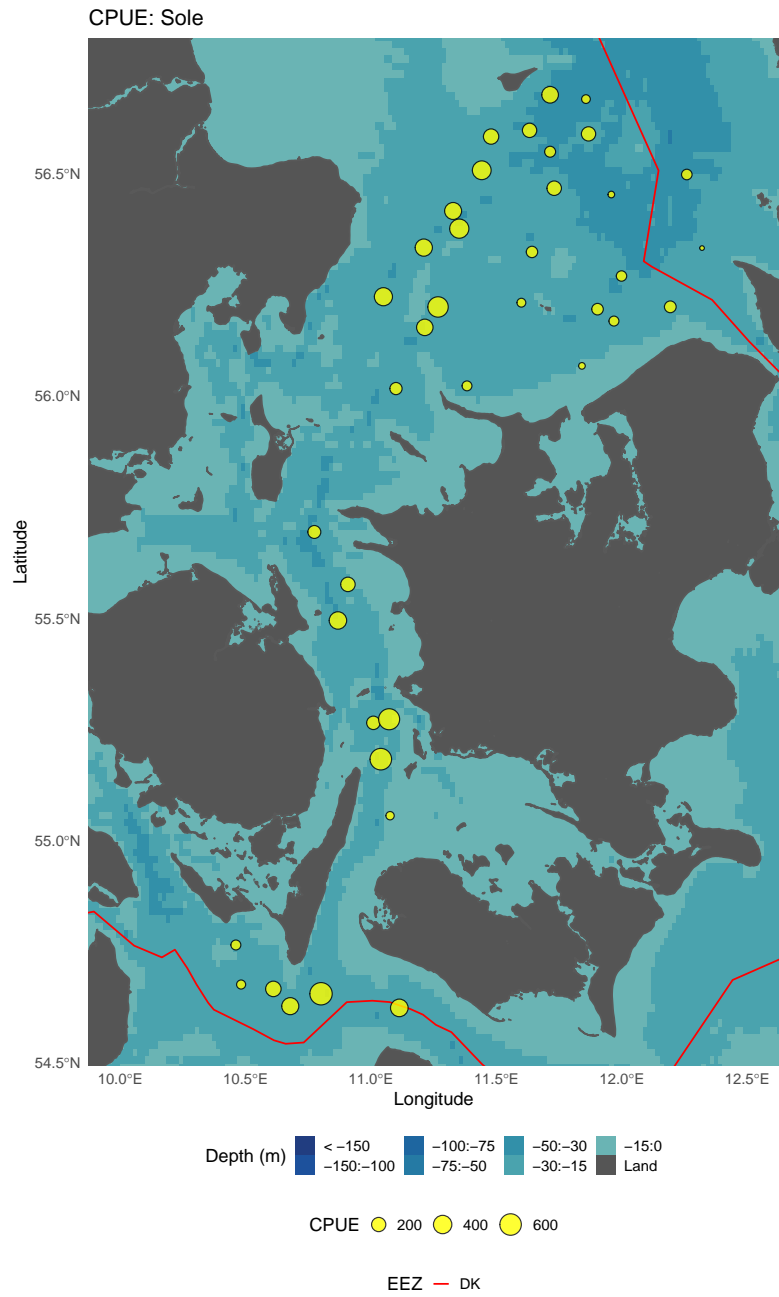
Processing of the results

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 km² 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 1-2.

	Weight (kg)	Number
Total catch	11566.9	173328
Cod	134.5	1860
Plaice	1852.6	31022
Sole	621.2	4216

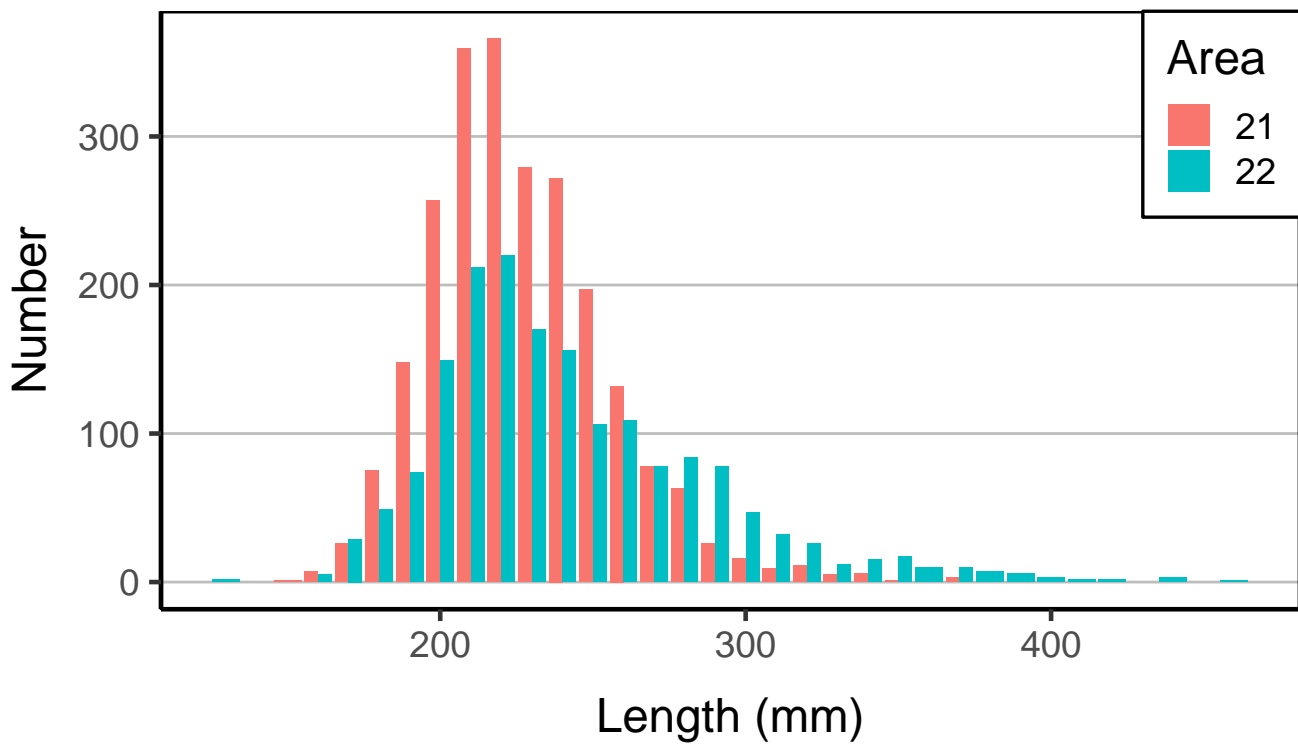


Figure 1: Length distribution per area for sole, Sole Survey 2022