
DTU Aqua - Cruise report

Danish Sole Survey 4Q 2023

SG25

Denmark

From 05-11-2023 to 23-11-2023

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Cruise summary

General information

<i>Cruise</i>	Danish Sole Survey
<i>Cruise leader</i>	Marie Storr-Paulsen
<i>Research vessel(s)</i>	SG25
<i>Year and quarter</i>	4Q 2023
<i>Country</i>	Denmark

Participants and time

Trip no.	Start date and time	End date and time	Ship
2	05-11-2023 13:00	09-11-2023 00:00	SG25
4	12-11-2023 14:00	16-11-2023 00:00	SG25
6	19-11-2023 11:00	23-11-2023 04:00	SG25

Name	Institute	Function tasks	Leg
Peter Vingaard	DTU-Aqua	Cruise-leader	1
Gert	DTU-Aqua	Skipper	1
Niels Lyse	DTU-Aqua	Bestman	1
Peter Vingaard	DTU-Aqua	Cruise-leader	2
Thomas Møller	DTU-Aqua	Bestman	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 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.

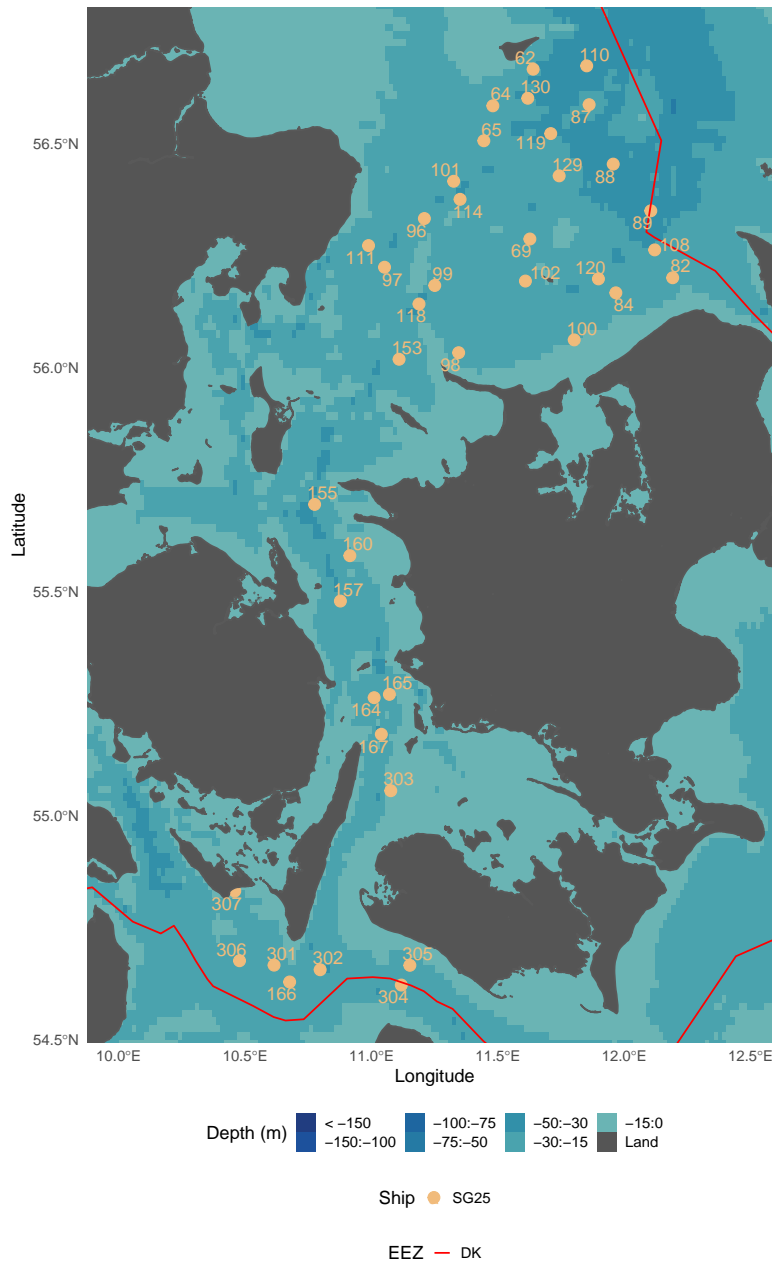
Warp length: The depth varies from station to station and so does the warp length. The warp length was recorded at each station in 2004 and this warp length is used at the station in 2005 and onwards.

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.

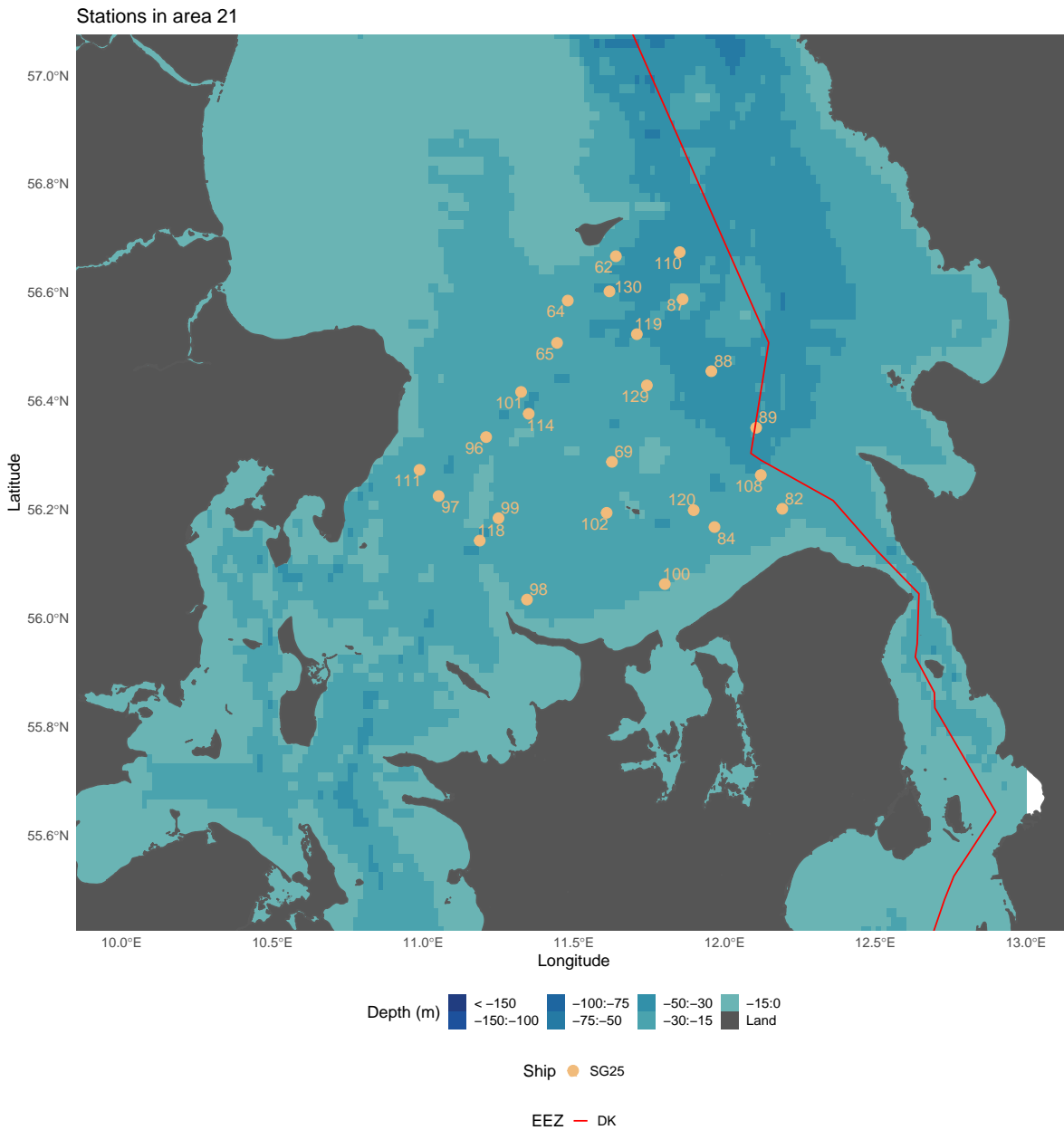
Stations

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

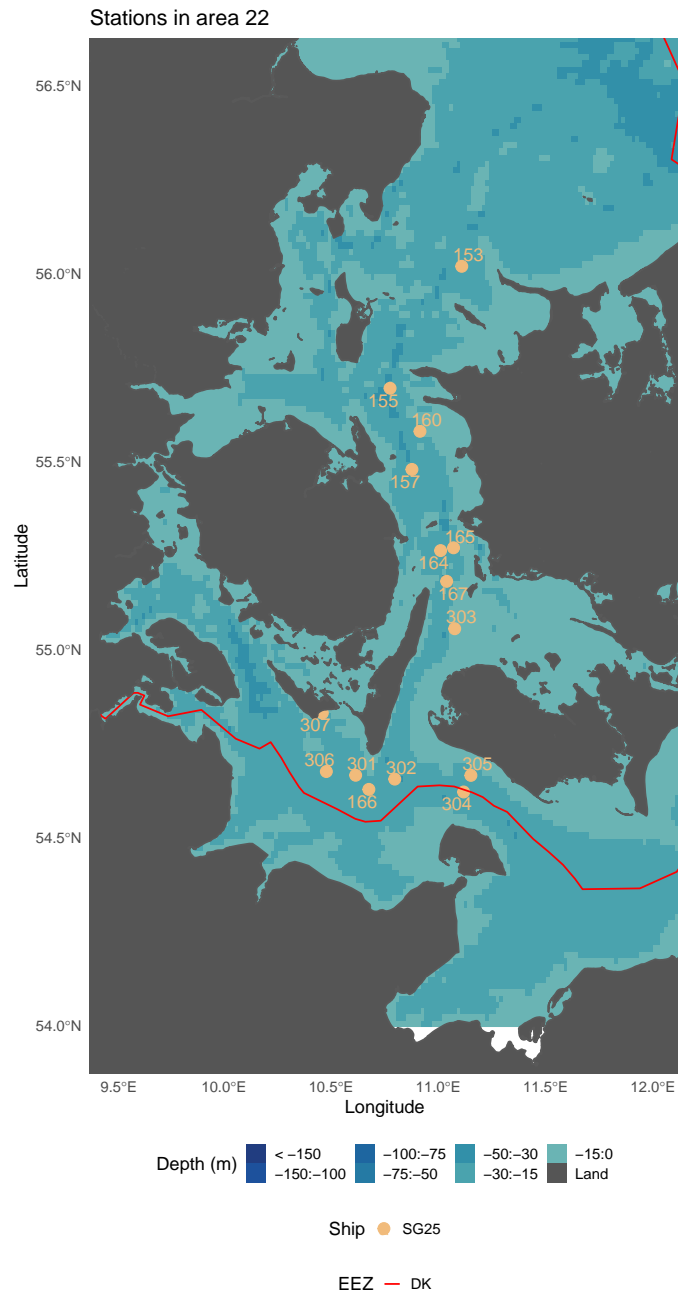


Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
62	56.666916	11.639366	56.40.0150 N	011.38.3620 E	SG25
64	56.585166	11.479816	56.35.1100 N	011.28.7890 E	SG25
65	56.507166	11.444216	56.30.4300 N	011.26.6530 E	SG25

Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
69	56.287916	11.626300	56.17.2750 N	011.37.5780 E	SG25
82	56.201400	12.191266	56.12.0840 N	012.11.4760 E	SG25
84	56.167766	11.966433	56.10.0660 N	011.57.9860 E	SG25
87	56.587700	11.860700	56.35.2620 N	011.51.6420 E	SG25
88	56.455000	11.956016	56.27.3000 N	011.57.3610 E	SG25
89	56.350800	12.104700	56.21.0480 N	012.06.2820 E	SG25
96	56.333616	11.208983	56.20.0170 N	011.12.5390 E	SG25
97	56.224883	11.051283	56.13.4930 N	011.03.0770 E	SG25
98	56.034116	11.344533	56.02.0470 N	011.20.6720 E	SG25
99	56.184133	11.249933	56.11.0480 N	011.14.9960 E	SG25
100	56.062733	11.801716	56.03.7640 N	011.48.1030 E	SG25
101	56.416800	11.324883	56.25.0080 N	011.19.4930 E	SG25
102	56.194033	11.608700	56.11.6420 N	011.36.5220 E	SG25
108	56.263616	12.120066	56.15.8170 N	012.07.2040 E	SG25
110	56.674416	11.851133	56.40.4650 N	011.51.0680 E	SG25
111	56.273183	10.988083	56.16.3910 N	010.59.2850 E	SG25
114	56.376516	11.350200	56.22.5910 N	011.21.0120 E	SG25
118	56.142800	11.187733	56.08.5680 N	011.11.2640 E	SG25
119	56.523200	11.708866	56.31.3920 N	011.42.5320 E	SG25
120	56.198883	11.897500	56.11.9330 N	011.53.8500 E	SG25
129	56.428866	11.742183	56.25.7320 N	011.44.5310 E	SG25
130	56.602116	11.618133	56.36.1270 N	011.37.0880 E	SG25

Area: 21, Geartype: DTU55, GearQuality: V

Area 22



Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
153	56.019483	11.108916	56.01.1690 N	011.06.5350 E	SG25
155	55.695450	10.774733	55.41.7270 N	010.46.4840 E	SG25
157	55.479733	10.876750	55.28.7840 N	010.52.6050 E	SG25
160	55.581016	10.914150	55.34.8610 N	010.54.8490 E	SG25
164	55.264066	11.010350	55.15.8440 N	011.00.6210 E	SG25

Station Name	Latitude dec.	Longitude dec.	Latitude deg.	Longitude deg.	Ship
165	55.271466	11.070600	55.16.2880 N	011.04.2360 E	SG25
166	54.629500	10.675950	54.37.7700 N	010.40.5570 E	SG25
167	55.182383	11.038616	55.10.9430 N	011.02.3170 E	SG25
301	54.667050	10.614316	54.40.0230 N	010.36.8590 E	SG25
302	54.656800	10.796666	54.39.4080 N	010.47.8000 E	SG25
303	55.056400	11.076066	55.03.3840 N	011.04.5640 E	SG25
304	54.622616	11.117683	54.37.3570 N	011.07.0610 E	SG25
305	54.666683	11.151533	54.40.0010 N	011.09.0920 E	SG25
306	54.676933	10.477633	54.40.6160 N	010.28.6580 E	SG25
307	54.832500	10.458916	54.49.9500 N	010.27.5350 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.

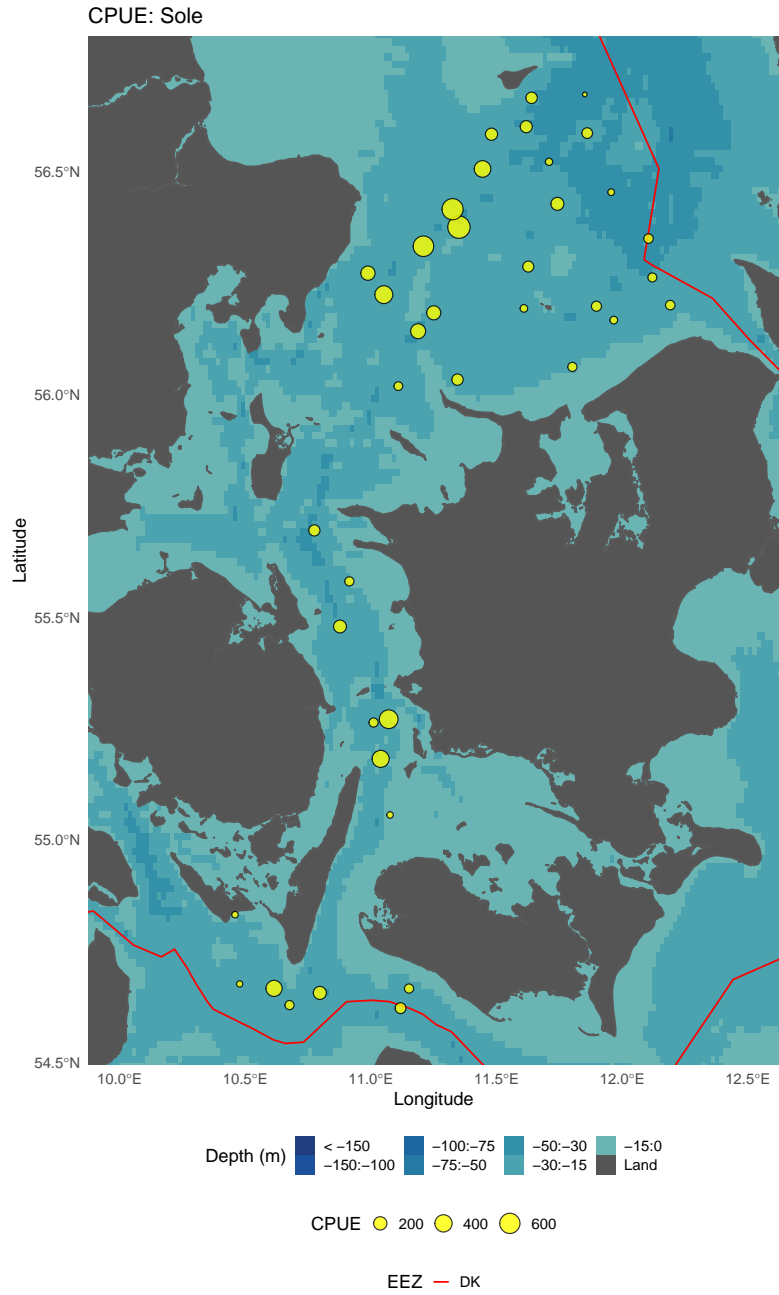
Processing of the results

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	11635.3	178733
Cod	162.6	1158
Plaice	2494.4	30883
Sole	554.2	3730

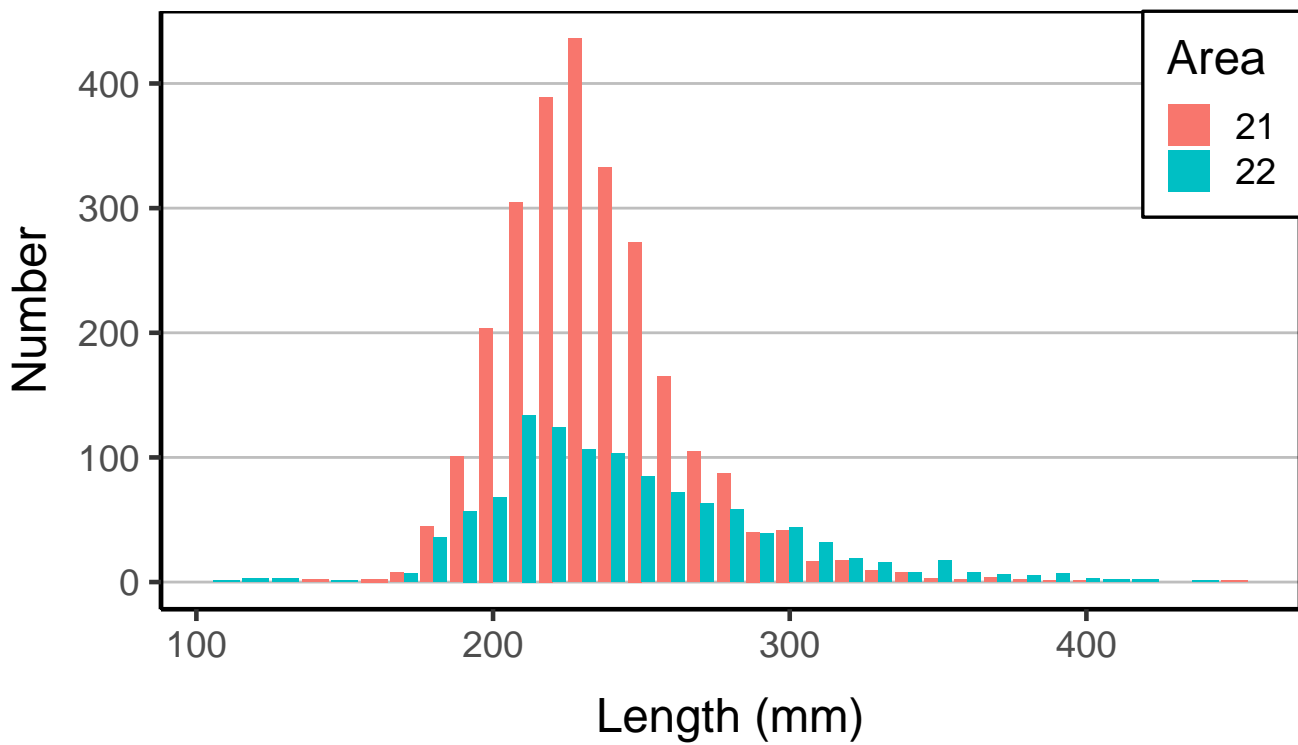


Figure 1: Length distribution per area for sole, Sole Survey 2023