Cruise report

RV “DANA” - Cruise 04/2024

Herring Acoustic Survey in the North Sea, Kattegat and Skagerrak (HERAS)

24 June – 8 July 2024

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Section for Monitoring and Data

Cruise summary

Total days	16
Days of monitoring	12
Number of nautical miles monitored	1844nm monitoring track + 205nm for test of new towed body + 266nm transit
Number of trawl hauls	38
Number of CTD stations	44
Number of WP2 plankton stations	38
Number of WP2 mackerel egg stations	24
Fish catch in kg	34 503
Number of measured herring	14 245
Number of measured mackerel	3 420
Number of measured sprat	2 109
Number of species recorded	35
Total number of measured fish	23 929
Number of herring frozen for age and stock-split	2 965
Number of sprat frozen for age	642
Number of lumpsuckers collected	24

1 Background

This cruise is part of an international hydro acoustic survey for herring and sprat (HERAS) coordinated by the ICES Working Group of International Pelagic Surveys (WGIPS). The survey is carried out annually by national fisheries institutes from Scotland, Germany, Netherlands, Norway, Ireland and Denmark within the last week of June and the first 3 weeks of July. Geographically it covers most of the continental shelf north of 52°N in the North Sea and to the west of Scotland and Ireland to a northern limit of 62°N. The eastern edge of the survey area is bounded by the Norwegian, Danish, Swedish and German coastline and to the west by the shelf edge at around 200 m depth.
The DTU National Institute of Aquatic Resources (DTU AQUA) has participated in the herring acoustic survey of the North Sea and adjacent waters with the responsibility for surveying the Skagerrak and Kattegat area since 1991. The 2024 cruise with R/V DANA, was conducted in the period 24 June to 8 July 2024, while the period 22-23 June 2024 was spent testing new equipment to improve the survey in the future.

2 Objectives

The objective of the survey is to provide age aggregated abundance and biomass estimates as well as maturity levels and weight at age for the herring and sprat stocks covered by the survey.
These indices are used in the assessments of sprat and herring stocks carried out in the ICES Herring Assessment Working Group (HAWG) and underpin the management of North Sea herring, Western Baltic Spring Spawning herring, Malin Shelf herring as well as sprat in the North Sea and Skagerrak.
In addition to hydro-acoustic estimates of sprat and herring abundance, the survey also collects information on hydrography and plankton abundance in the survey area to facilitate studies into drivers of herring and sprat abundance and distribution.

The following standard objectives were planned for cruise 04/2024 on Dana:

- Collect continuous hydro-acoustic measurements along pre-defined transects
- Carry out trawl sampling with bottom and pelagic trawls to verify species and size composition of acoustic registrations
- Collect biological samples of herring and sprat for further analysis of age, stock and maturity composition as well as individual lengths and weights
- Carry out hydrographic sampling along transects (Thermo-Salinograph measurements) and associated with fishing stations (CTD casts) for pelagic habitat description
- Collect plankton samples for water-column integrated dry weight estimates for pelagic habitat description
- Collect WP2 samples to detect mackerel eggs and investigate the extension of spawning mackerel into Skagerrak and Kattegat.

Additional objectives in 2024:

- Collect WP2 samples to detect mackerel eggs and investigate the extension of spawning mackerel into Skagerrak and Kattegat.
- Collect lumpsucker specimens for DTU Aqua Lumpsucker project.

3 Survey Description and Results

3.1 Time table

22/6 kl 06:00	Departure from Hirtshals for equipment tests
22/6 kl 08:00	Start equipment tests
24/6 kl 11:00	Arrive Hirtshals for fitting of new autopilot
24/6 kl 15:00	Change of crew in Hirtshals
24/6 kl 16:00	Departure Hirtshals for acoustic monitoring part
25/6 kl 08:30	Start monitoring in Stratum 151S
26/6 kl 19:18	Start monitoring in Stratum 151N/152
29/6 kl 23:30	Start monitoring in Stratum 41/42
2/7 kl 21:04	Start monitoring in Stratum 31
4/7 kl 09:45	Start monitoring in Stratum 21
6/7 kl 20:38	End monitoring work
8/7 kl 08:00	Arrive Hirtshals - end of trip

All times in DK summertime

3.2 Survey participants

During equipment test 22/6 – 24/6 2024

Name	Section	Function
Susan Mærsk Lusseau	DTU Aqua, Monitoring Hirtshals	Cruise leader
Eik Ehlert Britsch	DTU Aqua, Monitoring Hirtshals	Technician
Christian Skou Petersen	DTU Aqua, Monitoring Hirtshals	Technician
Anders Mads Nielsen*	DTU Aqua, Monitoring Hirtshals	Technician

*kun 22/6

During acoustic monitoring 24/6 - 8/7-2024

Name	Section	Function
Susan Mærsk Lusseau	DTU Aqua, Monitoring Hirtshals	Cruise leader
Gert Holst	DTU Aqua, Monitoring Hirtshals	Acoustics, CTD
Luisa de Sousa Machado	DTU Aqua, Monitoring Hirtshals	Acoustics, CTD
Christian Skou Petersen	DTU Aqua, Monitoring Hirtshals	Technician
Maria Jarnum	DTU Aqua, Monitoring Hirtshals	Fish lab, WP2
Thomas Møller	DTU Aqua, Monitoring Lyngby	Fish lab, WP2
Johan Hauser Jacobsen	DTU Aqua, Monitoring Lyngby	Fish lab, WP2
Sebastian Thomas Kjelstrup	DTU Aqua, Monitoring Lyngby	Fish lab, WP2
Rasmus Frydenlund Jensen	DTU Aqua, Monitoring Hirtshals	Fish lab, WP2
Kasper Nygaard Schaltz	DTU Aqua, Monitoring Hirtshals	Fish lab, WP2

3.3 Cruise Narrative

The survey on R/V Dana started on June 22th at 06:00 from Hirtshals heading for Tannis Bugten to carry out tests on the new towed body that is being developed for the survey. The test were concluded on June 24th at 11:00 when Dana returned to Hirtshals to have a new autopilot fitted. The crew for the monitoring part boarded at 15:00 same day.

Dana left Hirtshals at 16:00 on June 24th and steamed towards the start of the first transect (56° 12.00'N, 07° 56.40'E). Immediately before the start position for the first transect a stop was made in water depths characteristic of the survey area and the CTD was deployed to determine the environmental settings for the EK60. A test the of the pelagic trawl and the associated trawl monitoring sensors was also carried out before arriving at the first transect. Monitoring was started on June 25 at 08.30.

The survey progressed according to plan with only a short break from 21:00 on 28th June to 06:00 on 29th June due to inclement weather and to preserve data quality.

The North Sea (strata 151 and 152) was covered during the period June 25 – June 29.

The outer Skagerrak (strata 41 and 42) was covered during June 29th - July 2nd. The Inner Skagerrak (Strata 31) and Kattegat (Strata 21) was covered in the period July 2 to 6th.

The acoustic integration was ended July 6 at 56° 20.96' N, 012° 05.17' E at 20.38 whereafter Dana proceeded to drop anchor at 56° 29.90' N, 010° 57.85'E seeking shelter from severe weather. Dana left the anchorage at 16:15 on July 7th and arrived back in Hirtshals at 06:00 on July 08 2024.

All primary objectives of the cruise were achieved apart from all sections of transects within Swedish territorial waters in strata 31 and 21 (Figure 1). Dana was denied use of acoustic equipment on transects as well as trawling along transects planned inside Swedish territorial waters (12 nm boundary) mere days before the start of the survey. This meant a large section of strata 21 and 31 was left uncovered towards the Swedish coast (reduction of 137nm). The reduction in survey area jeopardises the integrity of the survey estimate in these two areas and will have an unknown effect on especially the index calculation for Western Baltic Spring spawning herring. It is imperative that this situation is resolved before next years survey.

This reduction in mileage for the survey allowed Dana to complete the rest of the transects as well as achieve good coverage of fishing stations in unaffected areas as well as collect ekstra WP2 samples for the mackerel egg investigation objective.

3.4 Calibration

The echosounders were not calibrated immediately prior to this survey. The time normally allocated to calibration was instead dedicated to carrying out necessary tests on new acoustic equipment that is being developed to replace the presently used aging equipment.
The echosounders had however been successfully calibrated a few months prior in preparation for the Norwegian Sea cruise in April 2024. At this point a successful calibration was carried out on the 38kHz split-beam transducer on both the primary towed body used for integration for abundance estimation as well as the three hull-mounted split-beam transducers at 18, 38 and 120 kHz. Electrical impedance and phase shift measurements were carried out immediately prior to the survey to rule out any electrical issues in the transducers and the survey was carried out using calibration results from the last calibration in April 2024.
The calibration and setup data for the EK60 38 kHz used during the survey are shown in Table 1.

3.5 Acoustic data collection

The survey track of 1844 nautical miles resulted in 1026 nautical miles of integrated transect track for use in stock size calculation (Figure 1). Data for use in the abundance estimation were recorded using the 38 kHz transducer mounted in a towed paravane running at depths of 4 – 6 m, the depth depending on the sea state and sailing direction relative to the waves, and at a standard ship speed of 8 to 9.5 kn. Simultaneously, data from the 120 kHz and 18 kHz echosounders using hull-mounted transducers were also recorded. During trawling operations the paravane was secured on deck and acoustic data was recorded from hull-mounted transducers at 18, 38 and 120 kHz. Data recorded during trawling operations are not included in the abundance estimation process, it is collected to aid echotrace species verification.

The acoustic data were processed during the survey in Echoview to prepare the echograms for further scrutinization and analysis on shore. This included removing interference from surface turbulence, bottom structures and scattering layers from the echogram as well as removing the sections such as trawling and passage between transects (inter-transects) not used in the abundance estimate.

Some species aggregations cannot be assigned to one species based on the acoustic signal alone. This is particularly true for herring and sprat (or indeed all the clupeids) as well as aggregations including gadoids schooling pelagically (haddock and whiting in larger schools). Such aggregations are assigned a mixed category assignment initially and the final separation to species level is carried out in the StoX software also used for the abundance estimation. The acoustic energy is allocated to species based on the species composition in targeted trawls and the size distribution of the species involved.

Herring was distributed in a pattern typical for the survey (Figure 9). The largest aggregations were encountered in in the southern part in mid Skagerrak and then further to the north in the outer part of Skagerrak and the North Sea. There was almost no herring encountered in the north of the inner Skagerrak. In Kattegat herring was seen throughout the area and in higher concentrations than in recent years. Herring was encountered at the ends of many of the transect ends towards Sweden indicating that the full distribution was not covered this year with the truncated transects in Swedish national waters.

Sprat distribution was restricted to two main areas this year (Figure 10). Some smaller aggregations were encountered throughout stratum 151_S but the largest aggregations this year were seen in the northern Kattegat, in stratum 21, in the area between Skagen and Læsø. Sprat was encountered throughout Kattegat with some sizeable aggregations also in the deeper channels to the north of Anholt.

3.6 Biological Data – Trawl sampling

During the 2024 survey 38 trawl hauls were conducted, 27 with the Fotø pelagic trawl (average netopening 23m) and 11 hauls with the smaller Expo midwater/bottom trawl (average net opening 12m).

The total catch for the survey was 34.5 tons of fish giving an average of 908kg per haul. This result was driven up by one extremely large incidental catch of 7.3 tons mackerel at station 74 (Figure 7). The largest component of the catches were mackerel, herring and sprat with 44.3, 40.2 and 8.9% of the total catch respectively (Table 3). Haddock also contributed significantly to the catches at some stations in strata 151_N and 42 in contrast to previous years (Figure 8). At high abundance, haddock forms schools in the water column that acoustically can be mistaken for herring schools. This increased the importance of trawling for verification of species composition of acoustically detected fish aggregations in these areas. Krill and spurdog also contributed with a few large significant catches (Spurdog, station 29, 296kg and Krill, station 88, 357kg).

A total of 38 different species were registered in the catches from the survey, but beyond those mentioned above most were present in low amounts (Table 3).

Herring was caught in 33 hauls with a total catch of 13.9 tons or 40.2 % of the total catch. Catches of herring ranged from 6g to 2.9 tons (Table 3). Totally 14245 herring were measured and 2965 frozen for age and stock splitting analysis back in the laboratory. Herring lengths measured ranged from 6 to 31.5cm (Table 4). Herring was caught primarily in the northern part of the outer Skagerrak, southern part of the inner Skagerrak and all throughout Kattegat (Figure 5). Absence of herring in the North Sea in strata 151_S was noted. Small herring were encountered mainly in the North Sea in the southern part of the area and in the northern part of Kattegat between Skagen and Læsø. The largest herring were in the outer Skagerrak, but there were also larger herring in most hauls all the way to the bottom of Kattegat this year.

Sprat were present in 13 hauls with a total catch of 3.1 tons and 9 % of the total catch. Catches ranged from 9g to 1.1 tons (Table 3). Sprat was mainly caught in Kattegat between Skagen and Læsø and in the southern part of the area in the North Sea (Figure 6). Totally 2109 sprat were measured and 642 were frozen for age, sex and maturity determination back in the laboratory. Sprat sizes ranged from 7.5 to 15cm, with the larger sprat found in the Kattegat (Table 5).

Mackerel were present in 33 hauls with a total catch of 15.3 ton and 44 % of the total catch. Catch weights ranged from 0.3kg to 7.3 tons (Table 3). Mackerel was caught throughout the entire survey area with the largest catches in the Skagerrak and northern Kattegat (Figure 7). Spawning mackerel was observed in 17 of the catches and was seen throughout the survey area (Figure 7). A total of 3420 mackerel were measured and weighed individually. Age readings are not carried out for mackerel in this survey. Mackerel caught in the survey ranged in size between 20 and 43cm with no apparent trend in distribution of sizes over the survey area (Table 6).

Sardines were completely absent in the 2024 survey and anchovies were only represented by a few individuals caught at station 101 in strata 21 in Kattegat (Table 3).

Additionally, 24 lumpsuckers were collected and frozen for a DTU Aqua lumpsucker project.

3.7 Zooplankton and mackerel eggs

A total of 38 WP2 stations were completed for the purpose of estimating zooplanktong dry weight biomass (Figure 4). Dry weight will be measured ashore for each of the three fractions 2000 µm, 1000 µm and 180 µm.

This year an additional 24 WP2 stations were carried out in surface waters with the purpose of detecting mackerel eggs and make inferences about mackerel spawning activity in the Skagerrak and Kattegat during summer months (Figure 4). These samples were stored in formalin for later analysis.

3.8 Hydrography

During the survey 44 CTD stations were completed (Figure 3). Data from the CTD stations will be uploaded to the ICES hydrography database once quality control checks have been carried out.

3.9 Biomass estimates

Biomass estimates for herring (spring and autumn spawners) and sprat will be produced based on scrutiny of the acoustic integration, catch data and genetic stock split of herring. The estimates will be finalised at the Post Cruise Meeting for the International Acoustic Survey in the North Sea, West of Scotland and Malin Shelf in Bergen, November 2024 and reported in the combined report from the Working Group for International Pelagic Surveys (WGIPS) in Aberdeen in January 2025. Due to the lack of access for acoustic monitoring in the Swedish territorial waters in strata 21 and 31 it is already anticipated that the index of abundance for particularly Western Baltic spring spawners will be negatively impacted.

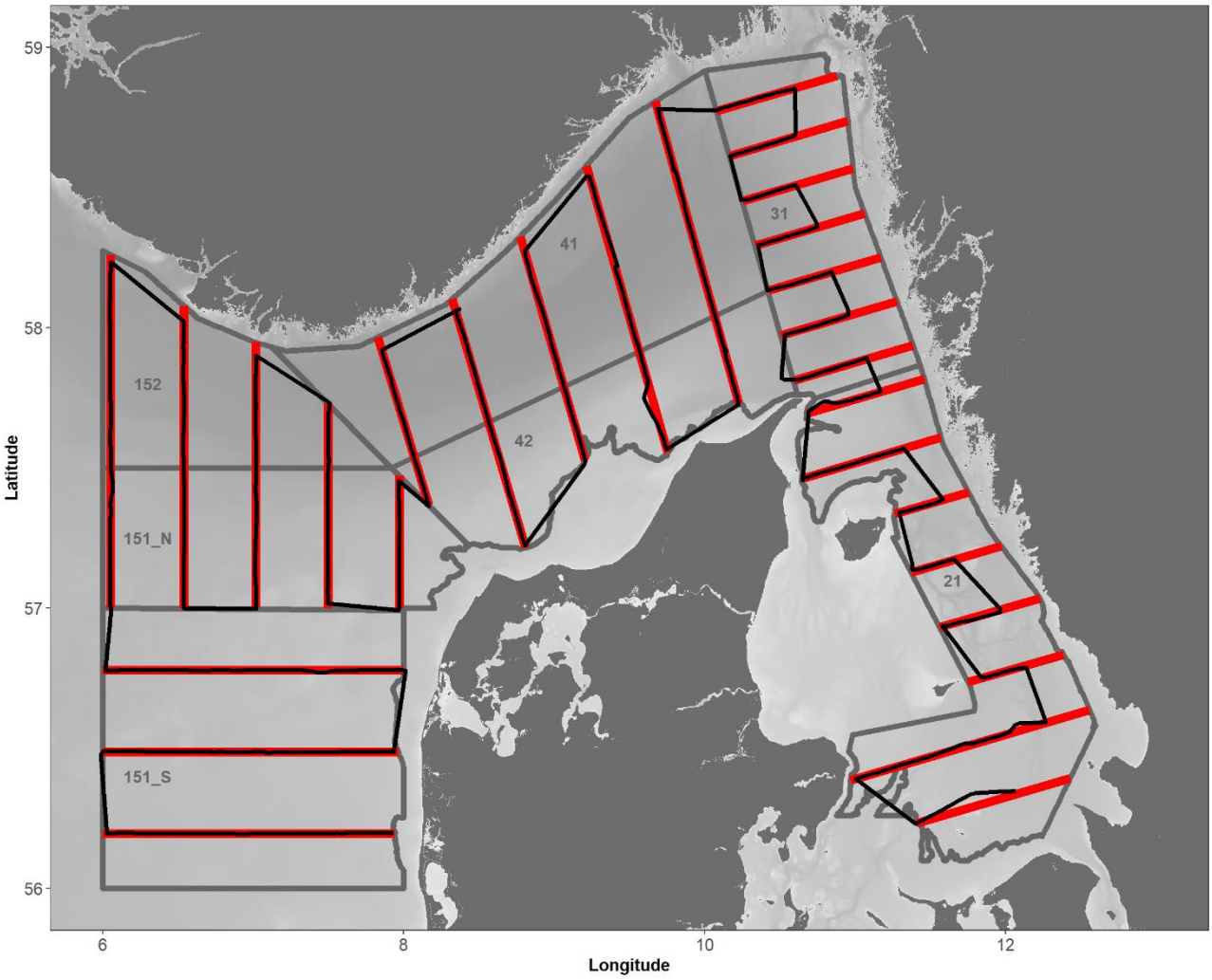

Figure 1. Survey track for the Danish acoustic survey with R/V Dana in June-July 2024. The numbered subareas indicates the strata used in the abundance estimation, the thick red lines the planned transects and the black line is the route completed and the acoustic data coverage used in the abundance estimation. Notice the survey track is truncated towards the Swedish coast compared to the planned transects. This was due to a lack of permission to use acoustic instruments inside Swedish Territorial waters (12nm limits).

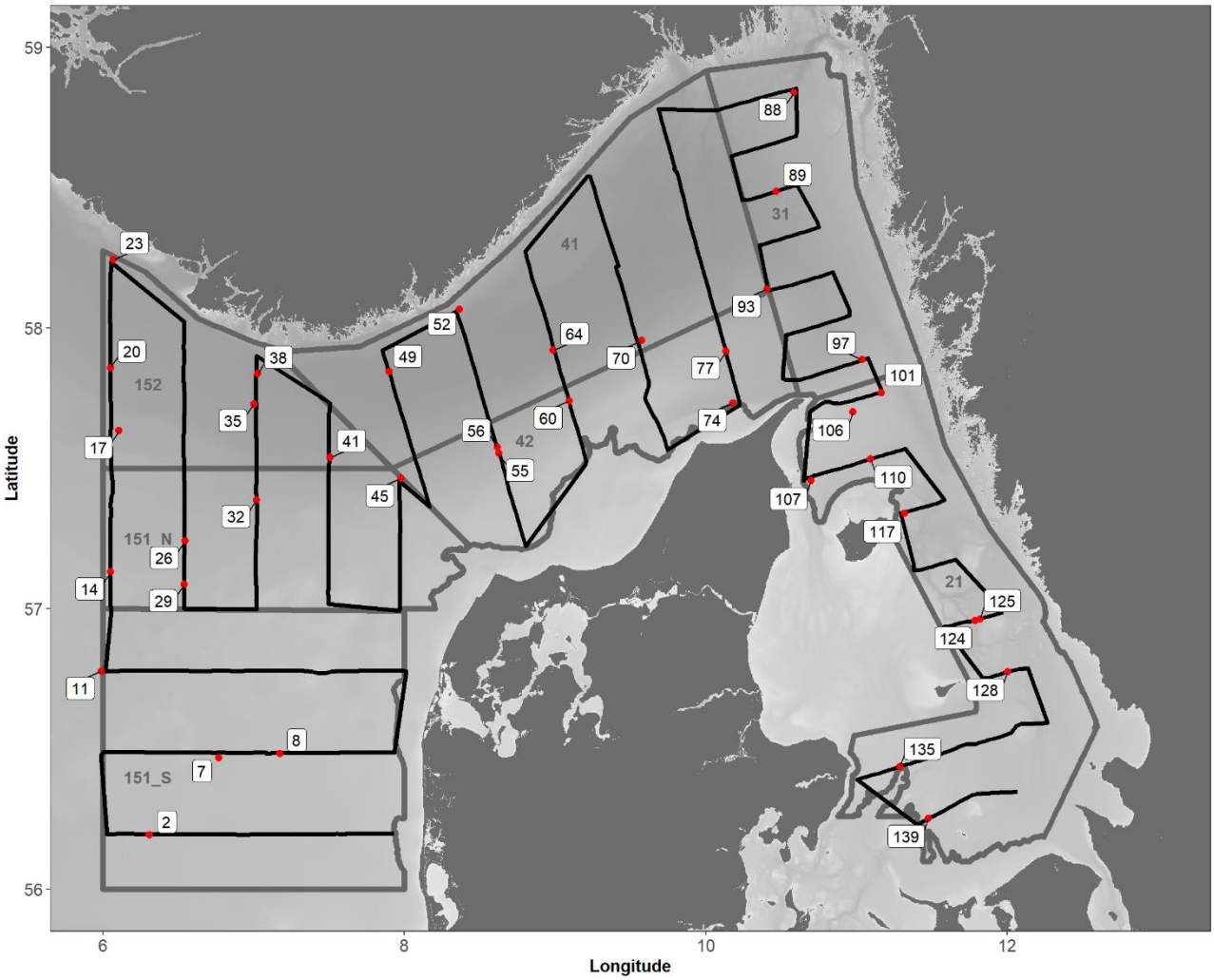

Figure 2. Vessel track and trawl stations during the Danish acoustic survey with R/V Dana in June-July 2024.

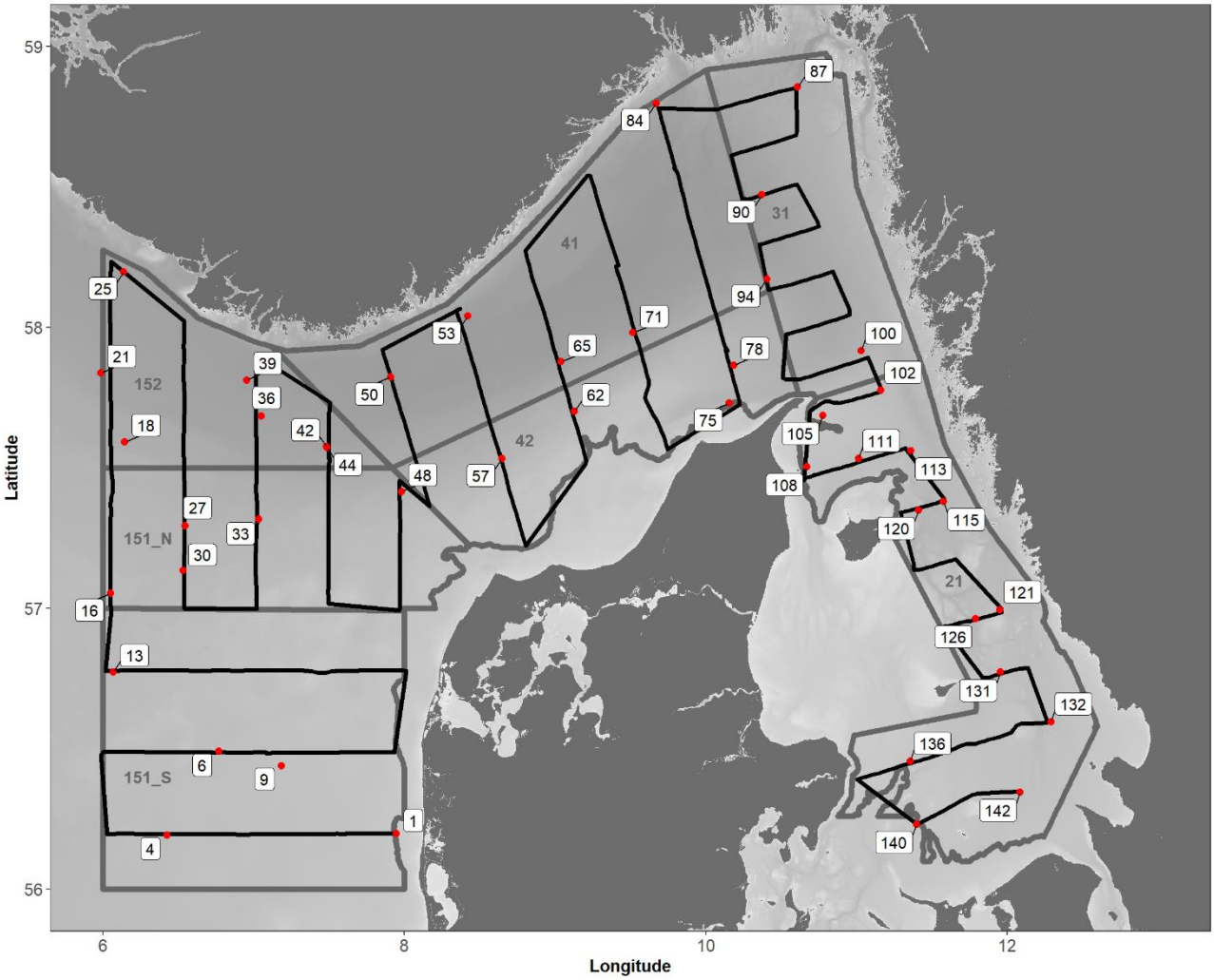

Figure 3. CTD stations during the Danish acoustic survey with R/V Dana in June-July 2024.

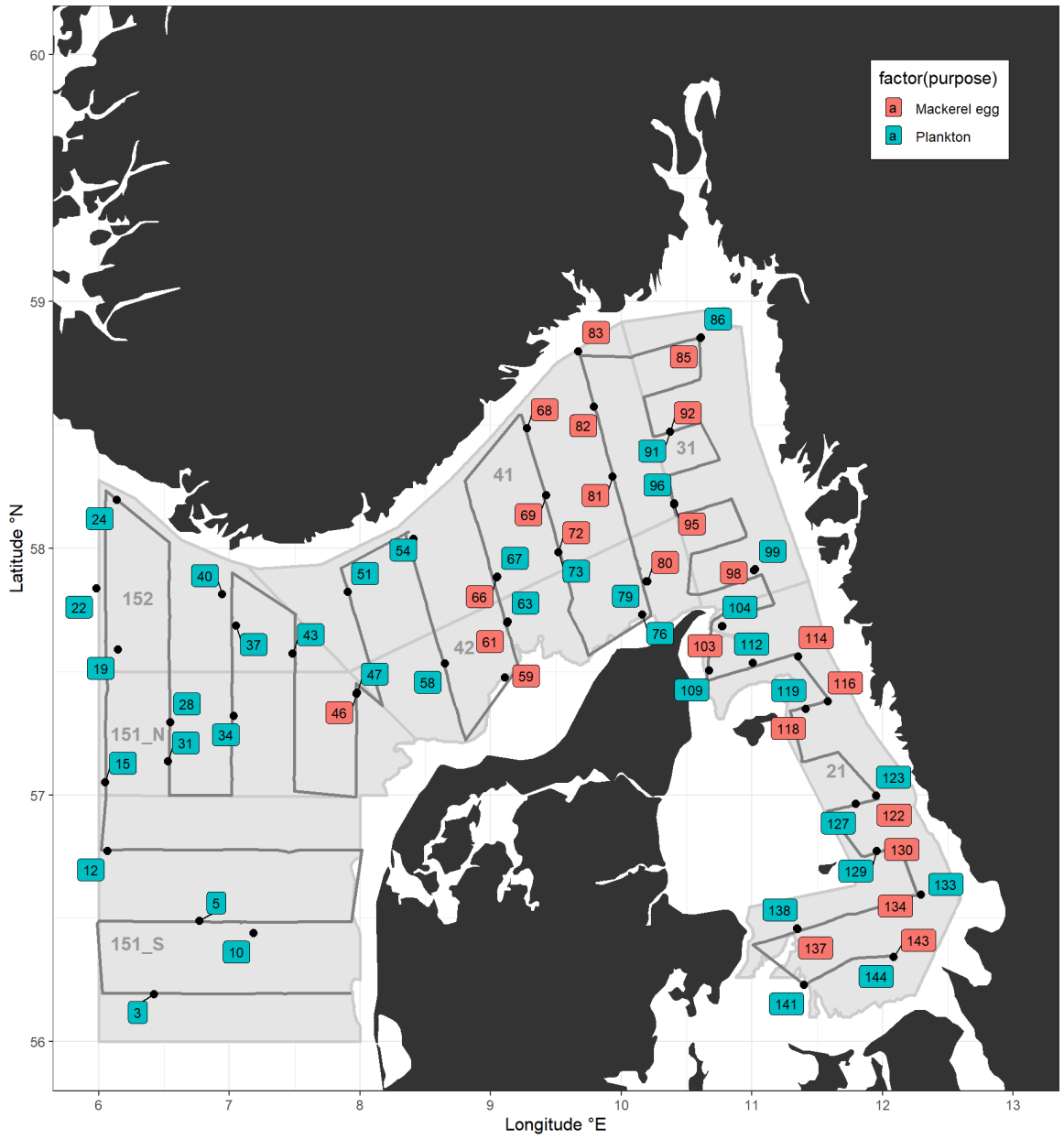

Figure 4. WP2 stations for plankton and mackerel egg during the Danish acoustic survey with R/V Dana in June-July 2024.

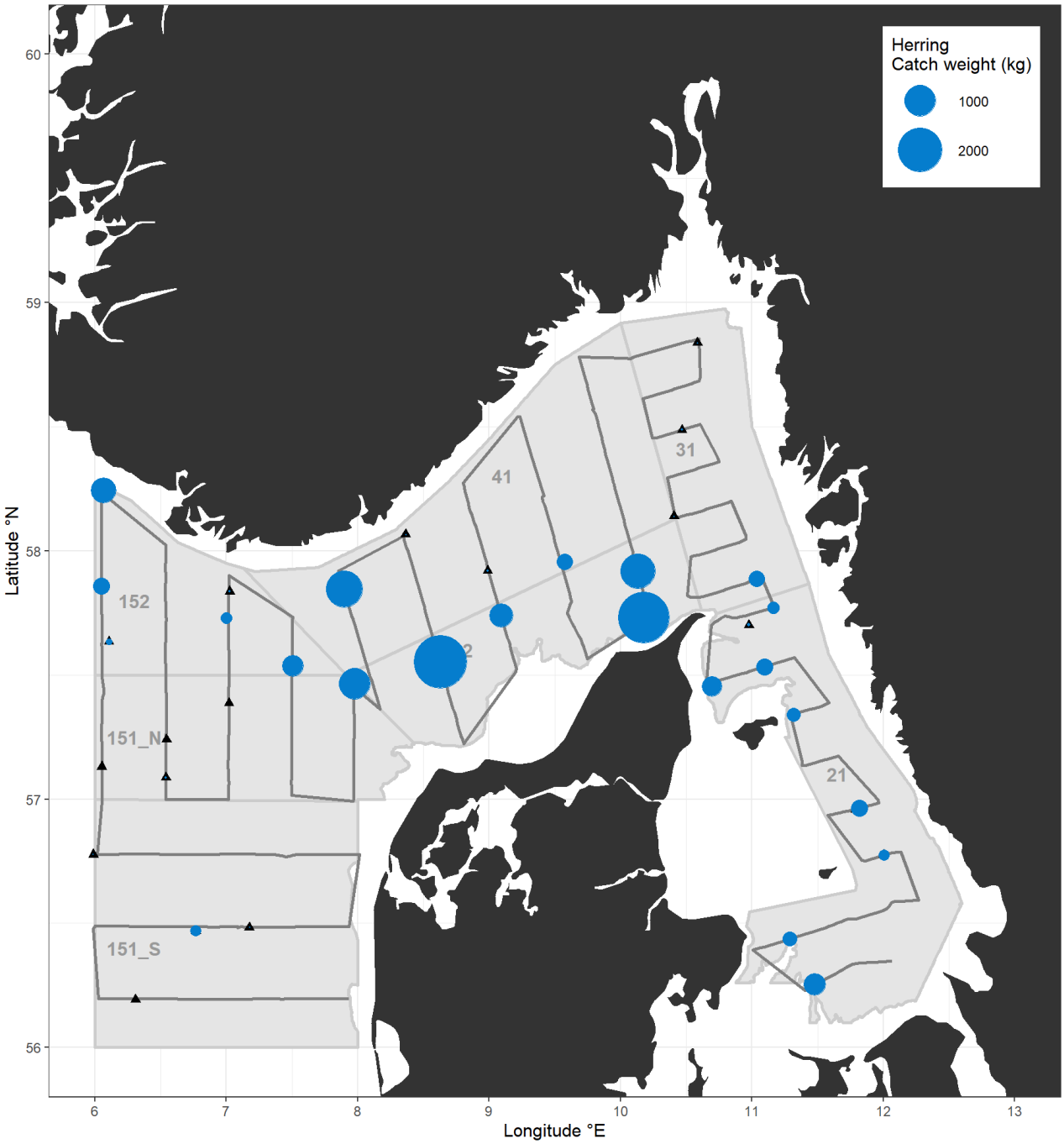

Figure 5. Catches of herring during the Danish acoustic survey with R/V Dana in June-July 2024.

Figure 6. Catches of sprat during the Danish acoustic survey with R/V Dana in June-July 2024.

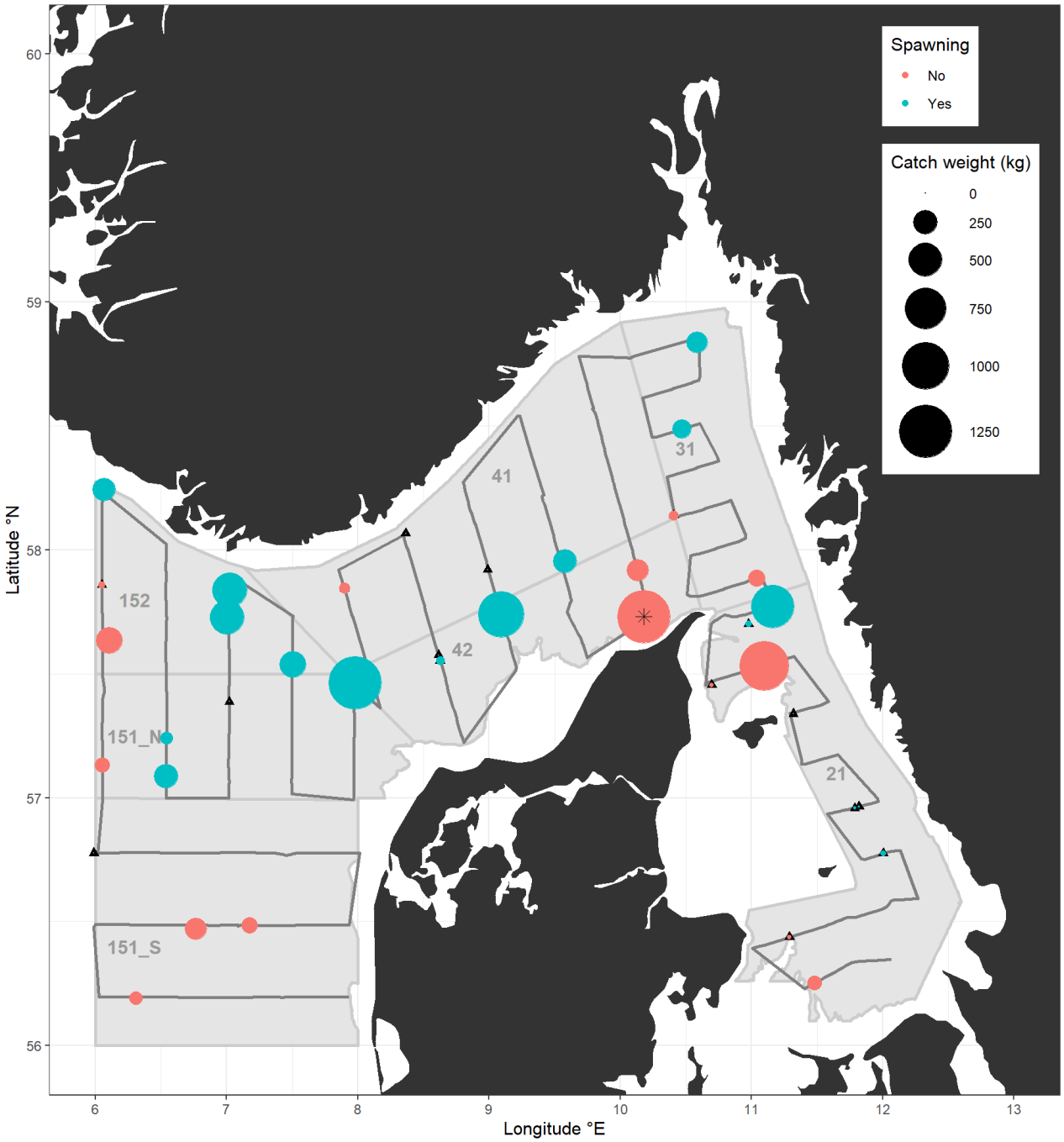

Figure 7. Catches of mackerel during the Danish acoustic survey with R/V Dana in June-July 2024. *catch at this station not represented to scale as it was disproportionately large at 7326kg.

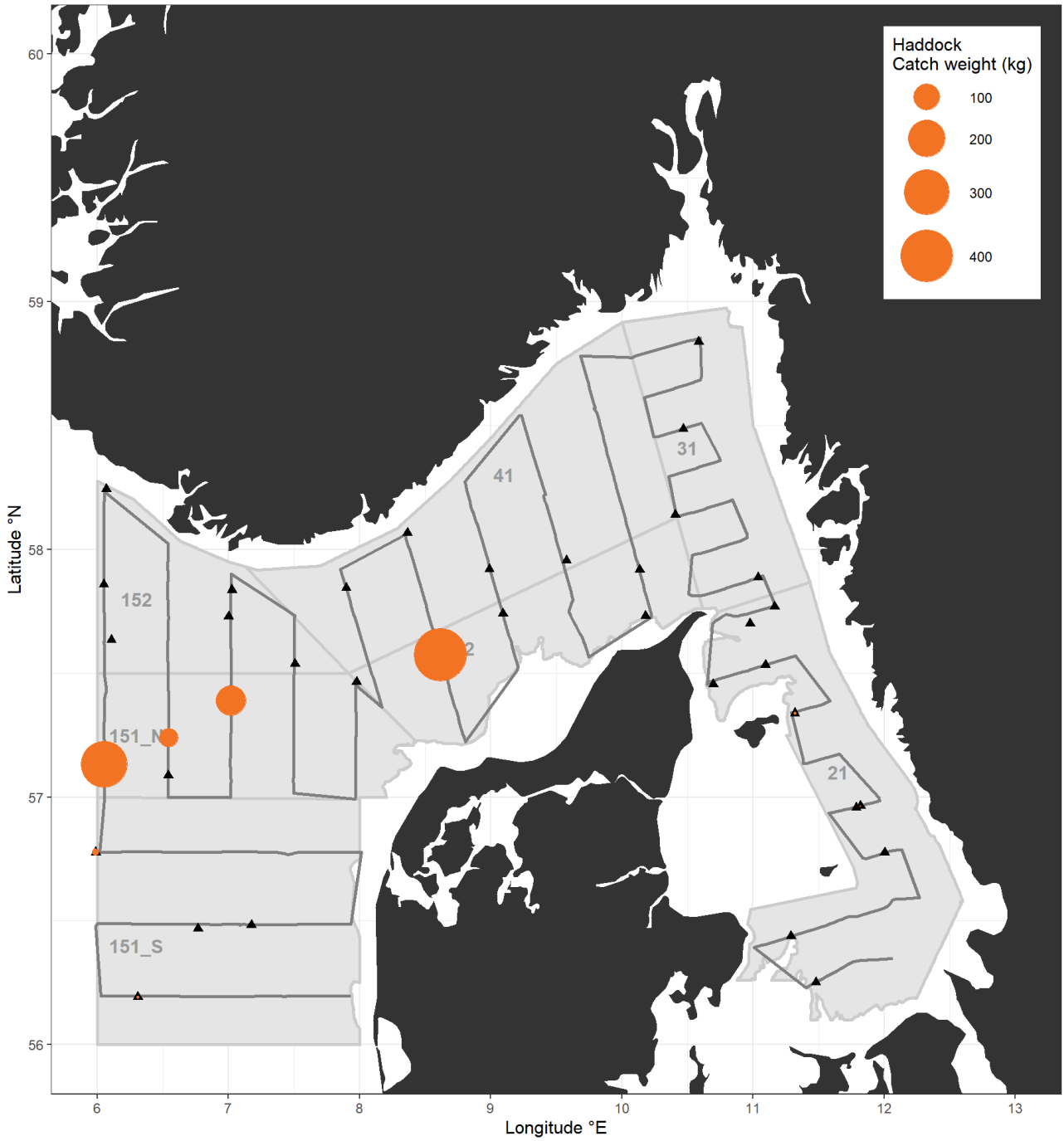

Figure 8. Catches of haddock during the Danish acoustic survey with R/V Dana in June-July 2024.

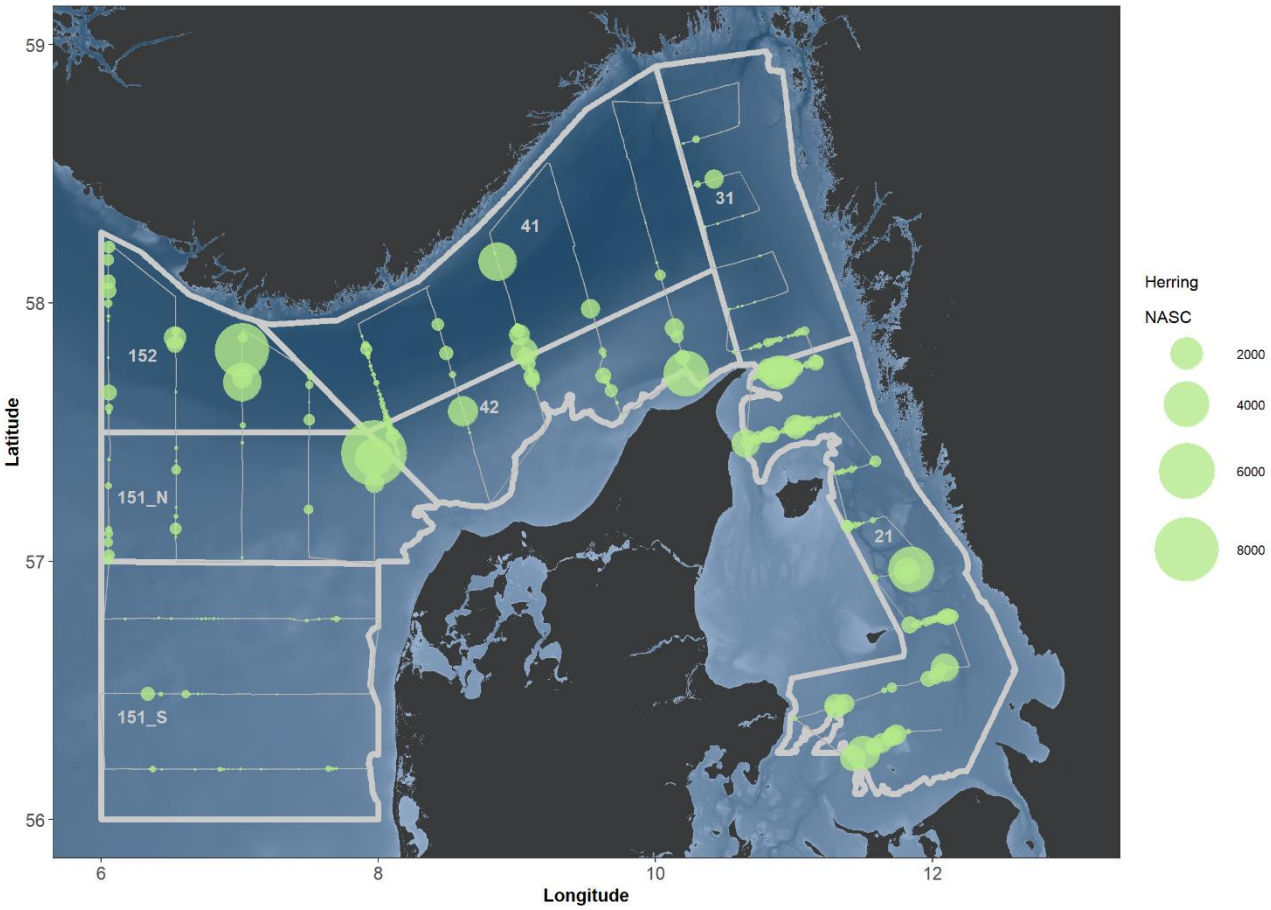

Figure 9. Distribution and size of acoustic registrations attributed to herring during the Danish acoustic survey with R/V Dana in June-July 2024.

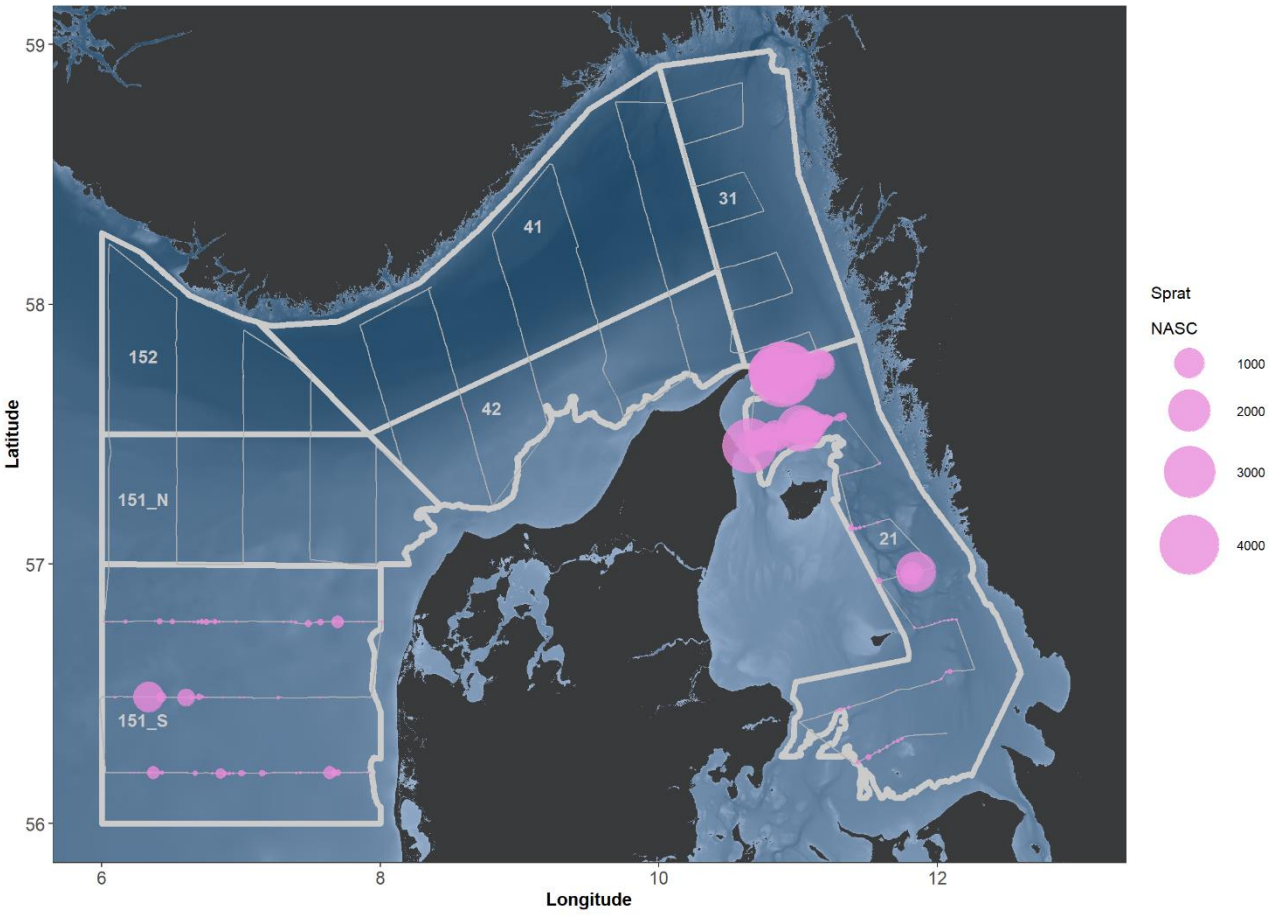

Figure 10. Distribution and size of acoustic registrations attributed to sprat during the Danish acoustic survey with R/V Dana in June-July 2024.

Table 1: Acoustic instruments and settings used for abundance estimation during HERAS 2024 on R/V Dana. Settings supported by calibration April 2024.

Echo sounder	Simrad EK60
Frequency (kHz)	38
Primary transducer	ES38BP
Transducer installation	Towed body
Transducer depth (m)	4-6
Upper integration limit (m)	7 -9m (3m range exclusion)
Absorption coeff. (dB/km)	9.8
Pulse length (ms)	1.024
Band width (kHz)	2.425
Transmitter power (W)	2000
Ping rate	0.6 in strata 151_S and 21. 1.0 s^{-1} in all other strata
Angle sensitivity (dB)	21.9
2-way beam angle (dB)	-20.5
Sv Transducer gain (dB)	
Ts Transducer gain (dB)	25.35
sA correction (dB)	-0.55
3 dB beam width (dg)	
alongship:	6.94
athw. ship:	6.98
Maximum range (m)	500
Post processing software	Echoview 14.0

Table 2. Trawl station details for the Danish acoustic survey with R/V Dana in June-July 2024.

Station	Date and Time	Latitude	Longitude	ICES Square	Trawl type	Trawl direction (deg)	Trawl duration (min)	Headline depth (m)	Seabed depth (m)	Wire Length (m)	Trawl Height (m)	Wing Spread (m)	Trawl Speed (kn)	Wind Speed (m/s)	Sea state (Beaufort)
2	25/06/2024 13:31	56.11.566 N	006.18.603 E	41F6	FOTØ	87	45	11	45	370	22	37	4.0	3	1
7	25/06/2024 22:00	56.28.152 N	006.46.076 E	41F6	FOTØ	224	30	0	43	300	20	31	4.2	3	1
8	26/06/2024 00:58	56.28.996 N	007.10.472 E	41F7	FOTØ	153	30	0	34	270	25	33	4.5	4	1
11	26/06/2024 14:49	56.46.604 N	005.59.356 E	42F5	EXPO	90	30	33	55	290	12		4.1	3	1
14	26/06/2024 18:45	57.07.836 N	006.03.171 E	43F6	FOTØ	182	54	22	50	310	20	35	4.1	5	1
17	27/06/2024 00:26	57.38.053 N	006.06.492 E	44F6	FOTØ	133	30	0	151	300	23	33	4.1	10	3
20	27/06/2024 04:29	57.51.473 N	006.03.035 E	44F6	FOTØ	215	30	9	262	300	30	36	4.0	10	3
23	27/06/2024 09:06	58.14.581 N	006.04.109 E	45F6	FOTØ	138	45	5	267	300	23	35	4.1	16	3
26	27/06/2024 19:09	57.14.440 N	006.32.768 E	43F6	FOTØ	181	31	28	74	440	20	36	4.1	9	4
29	27/06/2024 22:49	57.05.234 N	006.32.458 E	43F6	FOTØ	356	30	6	60	300	24	36	4.0	5	3
32	28/06/2024 06:22	57.23.257 N	007.01.218 E	43F7	FOTØ	180	60	26	94	400	21	34	4.0	9	4
35	28/06/2024 12:28	57.43.757 N	007.00.109 E	44F7	FOTØ	161	31	5	340	300	24	30	4.3	14	5
38	28/06/2024 18:31	57.50.187 N	007.01.632 E	44F7	FOTØ	248	30	9	418	300	34		4.5	14	5
41	29/06/2024 06:54	57.32.287 N	007.30.502 E	44F7	FOTØ	333	30	4	254	320	17	33	3.9	12	5
45	29/06/2024 18:28	57.27.836 N	007.58.595 E	43F7	FOTØ	185	35	6	130	300	24	30	3.8	6	3
49	30/06/2024 01:42	57.50.707 N	007.53.858 E	44F7	FOTØ	161	38	5	514	300	20	33	4.0	7	
52	30/06/2024 06:38	58.03.982 N	008.21.883 E	45F8	FOTØ	110	30	0	358	300	18	31	4.2	2	1
55	30/06/2024 12:29	57.33.145 N	008.37.591 E	44F8	FOTØ	343	30	6	85	300	25	33	4.0	3	2
56	30/06/2024 14:26	57.34.504 N	008.36.963 E	44F8	EXPO	165	30	67	79	420	10	35	4.1	7	2
60	30/06/2024 23:58	57.44.394 N	009.05.603 E	44F9	FOTØ	165	30	0	92	300	21		4.1	13	5
64	01/07/2024 04:10	57.55.203 N	008.59.329 E	44F8	FOTØ	160	30	0	420	300	23		4.2	12	5
70	01/07/2024 17:45	57.57.285 N	009.34.586 E	44F9	FOTØ	292	31	8	182	290	26	31	3.5	13	5
74	02/07/2024 02:24	57.43.891 N	010.10.822 E	44G0	FOTØ	62	30	10	240	300	15	32	0.9	15	5
77	02/07/2024 07:01	57.55.043 N	010.08.126 E	44G0	FOTØ	172	35	10	75	300	32	31	4.4	5	5
88	02/07/2024 22:53	58.50.315 N	010.35.135 E	46G0	FOTØ	206	29	0	133	300	22	31	4.0	6	2
89	03/07/2024 04:45	58.29.236 N	010.28.109 E	45G0	FOTØ	251	30	8	289	300	23	39	4.3	4	2
93	03/07/2024 12:39	58.08.317 N	010.24.456 E	45G0	FOTØ	353	15	6	181	300	22	33	4.0	10	4
97	03/07/2024 23:56	57.53.229 N	011.02.279 E	44G1	FOTØ	303	31	0	75	300	21	32	3.6	10	4
101	04/07/2024 05:16	57.46.198 N	011.09.844 E	44G1	FOTØ	341	33	22	46	510	18	36	3.9	12	4
106	04/07/2024 12:53	57.42.079 N	010.58.653 E	44G0	EXPO	247	30	24	32	240	6	26	3.2	12	4
107	04/07/2024 17:06	57.27.295 N	010.41.778 E	43G0	EXPO	343	30	12	28	200	12	23	4.2	12	4
110	04/07/2024 21:23	57.32.004 N	011.05.674 E	44G1	EXPO	254	20	10	41	240	15	22	4.4	12	3
117	05/07/2024 06:26	57.20.300 N	011.19.112 E	43G1	EXPO	54	30	28	47	435	13	26	4.0	16	4
124	05/07/2024 15:35	56.57.485 N	011.47.214 E	42G1	EXPO	72	23	12	43	220	13	23	4.1	11	4
125	05/07/2024 16:51	56.57.820 N	011.49.173 E	42G1	EXPO	266	27	23	46	230	14	23	3.6	13	4
128	05/07/2024 22:22	56.46.519 N	012.00.200 E	42G2	EXPO	250	21	10	38	200	13	20	4.0	12	5
135	06/07/2024 07:54	56.26.270 N	011.17.316 E	41G1	EXPO	74	30	6	20	230	12	48	3.8	10	2
139	06/07/2024 14:24	56.15.134 N	011.28.723 E	41G1	EXPO	244	38	9	23	190	11	22	3.9	6	1

TABLE 3. CATCH COMPOSITION IN TRAWL HAULS FOR THE DANISH ACOUSTIC SURVEY WITH R/V DANA IN JUNE –JULY 2024

			Station	2	7	8	11	14	17	20	23	26	29	32	35	38
			Stratum	151_S	151_S	151_S	151_S	151_N	152	152	152	151_N	151_N	151_N	152	152
			ICES Sq	41F6	41F6	41F7	42F5	43F6	44F6	44F6	45F6	43F6	43F6	43F7	44F7	44F7
			Trawl type	Fotø	Fotø	Fotø	Expo	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø
			Headline depth	11	0	0	33	22	0	8.8	5	28	6.4	26	5	9
			Seabed depth	44.6	42.9	34.3	55.4	50	151.4	261.8	267.4	73.8	60.3	94.2	339.7	417.6
			Day/Night	Day	Night	Night	Day	Day	Night	Day	Day	Day	Night	Day	Day	Day
% of catches	**Common Name**	**Scientific Name**	**Total Catch (kg)**	**105.281**	**659.991**	**117.585**	**16.574**	**542.983**	**337.570**	**293.407**	**883.990**	**131.648**	**589.007**	**162.391**	**649.011**	**540.013**
44.33	Mackerel	*Scomber scombrus*	15289.589	71.061	211.240	110.530		90.280	301.326	15.122	224.036	65.253	257.298		523.398	537.627
40.19	Herring	*Clupea harengus*	13864.637		100.538	0.227	0.006		30.585	268.923	654.888		2.088		121.804	1.500
8.92	Sprat	*Sprattus sprattus*	3075.946	0.009	335.821	0.087										
2.63	Haddock	*Melanogrammus aeglefinus*	908.840	0.400			5.220	317.802				49.640		126.840		
1.03	Krill	*Euphausiidae*	356.897						0.044							
1.03	Spurdog	*Squalus acanthias*	355.085							2.746		0.875	295.830	1.960		0.196
0.60	Whiting	*Merlangius merlangus*	206.357	0.184		0.008	0.418	59.792	0.014	0.006		1.620	0.106	5.175		
0.52	Grey gurnard	*Eutrigla gurnardus*	178.682	23.136	0.270	1.214	0.262	75.027	0.376			14.260	31.615	28.216		
0.29	Scyphozoans	*Scyphozoa*	100.213	10.400	10.360	5.345	10.500		0.990	2.384	3.074		0.870	0.035	2.671	0.450
0.23	Greater weever fish	*Trachinus draco*	78.950												0.060	
0.06	Lumpfish	*Cyclopterus lumpus*	22.147			0.080			1.782	4.226	1.992		0.480			
0.05	Hake	*Merluccius merluccius*	17.970													
0.02	Greater sandeel	*Hyperoplus lanceolatus*	8.431													
0.02	Garfish	*Belone belone*	8.222		1.450				0.458						0.797	0.240
0.02	Common dab	*Limanda limanda*	6.286				0.166									
0.01	Southern shortfin squid	*Illex coindetii*	4.394	0.092	0.312	0.094							0.720	0.165		
0.01	Plaice	*Pleuronectes platessa*	4.126													
0.00	Blue whiting	*Micromesistius poutassou*	1.172						1.172							
0.00	Saithe	*Pollachius virens*	1.010													
0.00	Cod	*Gadus morhua*	0.804													
0.00	Lemon sole	*Microstomus kitt*	0.624													
0.00	Lesser sandeel	*Ammodytes marinus*	0.558													
0.00	Horse mackerel	*Trachurus trachurus*	0.548												0.282	
0.00	Norway lobster	*Nephrops norvegicus*	0.484													
0.00	European squid	*Loligo vulgaris*	0.464					0.022	0.285							
0.00	American plaice	*Hippoglossoides platessoides*	0.384													
0.00	Northern squid	*Loligo forbesii*	0.367					0.060	0.307							
0.00	Norway pout	*Trisopterus esmarkii*	0.336													
0.00	Lesser flying squid	*Todaropsis eblanae*	0.225						0.225							
0.00	European common squid	*Alloteuthis subulata*	0.116													
0.00	Sculpin	*Myoxocephalus scorpius*	0.072													
0.00	Common dragonet	*Callionymus lyra*	0.052													
0.00	Scaldfish	*Arnoglossus laterna*	0.046													
0.00	Anchovy	*Engraulis encrasicolus*	0.025													
0.00	Spotted dragonet	*Callionymus maculatus*	0.020													
0.00	Black goby	*Gobius niger*	0.008													
0.00	Pearlside	*Maurolicus muelleri*	0.006						0.006							
0.00	Transparent goby	*Aphia minuta*	0.002				0.002									
100.00		**Total Catch (kg)**	**34494.095**	**105.281**	**659.991**	**117.585**	**16.574**	**542.983**	**337.570**	**293.407**	**883.990**	**131.648**	**589.007**	**162.391**	**649.011**	**540.013**

TABLE 3. CONTINUED.

			Station	41	45	49	52	55	56	60	64	70	74	77	88	89
			Stratum	152	151_N	41	41	42	42	42	41	41	42	42	31	31
			ICES Sq	44F7	43F7	44F7	45F8	44F8	44F8	44F9	44F8	44F9	44G0	44G0	46G0	45G0
			Trawl type	Fotø	Fotø	Fotø	Fotø	Fotø	Expo	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø
			Headline depth	4.2	5.7	5	0	5.6	66.9	0	0	7.7	9.7	10	0	8
			Seabed depth	253.8	129.8	514.2	358.1	85.3	79.2	91.9	420.2	181.7	239.7	75.4	132.5	288.5
			Day/Night	Day	Day	Night	Day	Day	Day	Night	Day	Day	Night	Day	Night	Day
% of catches	**Common Name**	**Scientific Name**	**Total Catch (kg)**	**768.890**	**2242.009**	**1398.020**	**7.033**	**2910.021**	**483.930**	**1520.997**	**5.855**	**493.984**	**9999.992**	**1428.005**	**556.004**	**158.619**
44.33	Mackerel	*Scomber scombrus*	15289.589	309.509	1250.503	46.846		26.106		949.939	0.320	242.500	7325.935	202.589	197.804	153.864
40.19	Herring	*Clupea harengus*	13864.637	445.987	990.080	1344.991	0.342	2883.914	37.196	569.957	1.451	251.203	2673.463	1224.986	0.229	1.023
8.92	Sprat	*Sprattus sprattus*	3075.946						4.829							
2.63	Haddock	*Melanogrammus aeglefinus*	908.840						408.519							
1.03	Krill	*Euphausiidae*	356.897												356.853	
1.03	Spurdog	*Squalus acanthias*	355.085	3.238		2.280									0.900	
0.60	Whiting	*Merlangius merlangus*	206.357	0.008		0.008	0.015		26.460	0.001	0.014			0.002	0.060	0.002
0.52	Grey gurnard	*Eutrigla gurnardus*	178.682		1.031				0.262							
0.29	Scyphozoans	*Scyphozoa*	100.213	1.502		2.895	6.550		0.122	0.203	4.070	0.281		0.428		2.984
0.23	Greater weever fish	*Trachinus draco*	78.950				0.126						0.257			
0.06	Lumpfish	*Cyclopterus lumpus*	22.147	8.130		1.000										0.673
0.05	Hake	*Merluccius merluccius*	17.970						2.470							
0.02	Greater sandeel	*Hyperoplus lanceolatus*	8.431													
0.02	Garfish	*Belone belone*	8.222	0.516						0.748			0.337			
0.02	Common dab	*Limanda limanda*	6.286						1.130							
0.01	Southern shortfin squid	*Illex coindetii*	4.394							0.150					0.158	0.073
0.01	Plaice	*Pleuronectes platessa*	4.126													
0.00	Blue whiting	*Micromesistius poutassou*	1.172													
0.00	Saithe	*Pollachius virens*	1.010						1.010							
0.00	Cod	*Gadus morhua*	0.804						0.608							
0.00	Lemon sole	*Microstomus kitt*	0.624						0.624							
0.00	Lesser sandeel	*Ammodytes marinus*	0.558													
0.00	Horse mackerel	*Trachurus trachurus*	0.548		0.238											
0.00	Norway lobster	*Nephrops norvegicus*	0.484													
0.00	European squid	*Loligo vulgaris*	0.464		0.157											
0.00	American plaice	*Hippoglossoides platessoides*	0.384						0.366							
0.00	Northern squid	*Loligo forbesii*	0.367													
0.00	Norway pout	*Trisopterus esmarkii*	0.336						0.336							
0.00	Lesser flying squid	*Todaropsis eblanae*	0.225													
0.00	European common squid	*Alloteuthis subulata*	0.116													
0.00	Sculpin	*Myoxocephalus scorpius*	0.072													
0.00	Common dragonet	*Callionymus lyra*	0.052													
0.00	Scaldfish	*Arnoglossus laterna*	0.046													
0.00	Anchovy	*Engraulis encrasicolus*	0.025													
0.00	Spotted dragonet	*Callionymus maculatus*	0.020													
0.00	Black goby	*Gobius niger*	0.008													
0.00	Pearlside	*Maurolicus muelleri*	0.006													
0.00	Transparent goby	*Aphia minuta*	0.002													
100.00		**Total Catch (kg)**	**34494.095**	**768.890**	**2242.009**	**1398.020**	**7.033**	**2910.021**	**483.930**	**1520.997**	**5.855**	**493.984**	**9999.992**	**1428.005**	**556.004**	**158.619**

TABLE 3. CONTINUED.

			Station	93	97	101	106	107	110	117	124	125	128	135	139
			Stratum	31	31	21	21	21	21	21	21	21	21	21	21
			ICES Sq	45G0	44G1	44G1	44G0	43G0	44G1	43G1	42G1	42G1	42G2	41G1	41G1
			Trawl type	Fotø	Fotø	Fotø	Expo	Expo	Expo	Expo	Expo	Expo	Expo	Expo	Expo
			Headline depth	6	0	22	23.9	12	10	27.6	12	23	10	5.8	9
			Seabed depth	180.9	74.5	45.7	32	27.6	41	47.1	43.2	45.6	38.4	19.5	23
			Day/Night	Day	Night	Day	Day	Day	Night	Day	Day	Day	Night	Day	Day
% of catches	**Common Name**	**Scientific Name**	**Total Catch (kg)**	**36.030**	**374.997**	**2007.022**	**420.336**	**1525.001**	**1510.011**	**199.560**	**52.710**	**441.420**	**128.001**	**231.574**	**564.623**
44.33	Mackerel	*Scomber scombrus*	15289.589	34.220	112.927	816.707	11.756	5.604	1093.256		3.396	1.384	9.096	5.097	83.061
40.19	Herring	*Clupea harengus*	13864.637	0.120	246.599	137.188	6.238	399.420	265.808	177.599		258.024	104.617	197.975	465.667
8.92	Sprat	*Sprattus sprattus*	3075.946			1044.955	270.129	1117.019	132.198	1.869		158.150	3.650	0.111	7.121
2.63	Haddock	*Melanogrammus aeglefinus*	908.840							0.398		0.021			
1.03	Krill	*Euphausiidae*	356.897												
1.03	Spurdog	*Squalus acanthias*	355.085		8.940	4.000	34.120								
0.60	Whiting	*Merlangius merlangus*	206.357		0.060	0.083	67.207		12.639	7.770	0.164	18.112	1.474	4.954	
0.52	Grey gurnard	*Eutrigla gurnardus*	178.682			0.026	2.580							0.056	0.352
0.29	Scyphozoans	*Scyphozoa*	100.213	0.318	2.840	1.050			1.023		10.640	1.553	8.416	3.475	4.784
0.23	Greater weever fish	*Trachinus draco*	78.950			1.321	3.400	1.950	4.380	11.905	36.904	4.160	0.748	10.719	3.020
0.06	Lumpfish	*Cyclopterus lumpus*	22.147	1.372				0.806			1.606				
0.05	Hake	*Merluccius merluccius*	17.970				15.500								
0.02	Greater sandeel	*Hyperoplus lanceolatus*	8.431											8.431	
0.02	Garfish	*Belone belone*	8.222		1.670	1.614			0.392						
0.02	Common dab	*Limanda limanda*	6.286				4.880							0.110	
0.01	Southern shortfin squid	*Illex coindetii*	4.394		1.961	0.053	0.100	0.202	0.314						
0.01	Plaice	*Pleuronectes platessa*	4.126				3.960							0.104	0.062
0.00	Blue whiting	*Micromesistius poutassou*	1.172												
0.00	Saithe	*Pollachius virens*	1.010												
0.00	Cod	*Gadus morhua*	0.804				0.196								
0.00	Lemon sole	*Microstomus kitt*	0.624												
0.00	Lesser sandeel	*Ammodytes marinus*	0.558									0.016		0.542	
0.00	Horse mackerel	*Trachurus trachurus*	0.548				0.028								
0.00	Norway lobster	*Nephrops norvegicus*	0.484												0.484
0.00	European squid	*Loligo vulgaris*	0.464												
0.00	American plaice	*Hippoglossoides platessoides*	0.384							0.018					
0.00	Northern squid	*Loligo forbesii*	0.367												
0.00	Norway pout	*Trisopterus esmarkii*	0.336												
0.00	Lesser flying squid	*Todaropsis eblanae*	0.225												
0.00	European common squid	*Alloteuthis subulata*	0.116				0.116								
0.00	Sculpin	*Myoxocephalus scorpius*	0.072												0.072
0.00	Common dragonet	*Callionymus lyra*	0.052				0.052								
0.00	Scaldfish	*Arnoglossus laterna*	0.046				0.046								
0.00	Anchovy	*Engraulis encrasicolus*	0.025			0.025									
0.00	Spotted dragonet	*Callionymus maculatus*	0.020				0.020								
0.00	Black goby	*Gobius niger*	0.008				0.008								
0.00	Pearlside	*Maurolicus muelleri*	0.006												
0.00	Transparent goby	*Aphia minuta*	0.002												
100.00		**Total Catch (kg)**	**34494.095**	**36.030**	**374.997**	**2007.022**	**420.336**	**1525.001**	**1510.011**	**199.560**	**52.710**	**441.420**	**128.001**	**231.574**	**564.623**

Table 4. Raised length distribution of herring by haul for the Danish acoustic survey with R/V Dana in June-July 2024.

Station	7	8	11	17	20	23	29	35	38	41	45	49	52	55	56	60	64
Stratum	151_S	151_S	151_S	152	152	152	151_N	152	152	152	151_N	41	41	42	42	42	41
ICES Sq	41F6	41F7	42F5	44F6	44F6	45F6	43F6	44F7	44F7	44F7	43F7	44F7	45F8	44F8	44F8	44F9	44F8
Trawl type	Fotø	Fotø	Expo	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Expo	Fotø	Fotø
Headline depth (m)	0	0	33	0	9	5	6	5	9	4	6	5	0	6	67	0	0
Seabed depth (m)	43	34	55	151	262	267	60	340	418	254	130	514	358	85	79	92	420
Day/Night	Night	Night	Day	Night	Day	Day	Night	Day	Day	Day	Day	Night	Day	Day	Day	Night	Day
Total Catch	659.991	117.585	16.574	337.57	293.407	883.99	589.007	649.011	540.013	768.89	2242.009	1398.02	7.033	2910.021	483.93	1520.997	5.855
Total weight herring (kg)	100.538	0.227	0.006	30.585	268.923	654.888	2.088	121.804	1.5	445.987	990.08	1344.991	0.342	2883.914	37.2	569.957	1.451
Subsample weight herring (kg)	6.778	0.227	0.006	30.585	68.099	46.502	2.088	60.061	1.5	56.198	59.867	49.682	0.342	63.479	23.1	46.113	1.451
6	30																
6.5	133																
7	504		1														
7.5	1528	1															
8	1928														52		
8.5	2358	1	1												734		
9	1824	1													1403		
9.5	920														579		
10	623														39		
10.5	445														13		
11	74																
11.5	44																
12	44														1		
12.5	178														1		
13	475														6		
13.5	519																
14	475	3													4	12	
14.5	311	2					3								3	12	
15	208	2					6								4	37	
15.5	44	2					13								4		
16							16							45	6	111	
16.5	30						10			8	33			45	10	358	
17							9							45	3	593	
17.5				1			4			8	17			318	4	803	
18	15							4			33	27		363	4	828	
18.5								4		16	50	27		591	2	1224	
19				1				8		32	132			909	9	1149	
19.5						14		12		63	232	298		1726	4	1273	
20					47	28	1	39	2	167	281	948		2953	8	1063	
20.5				3	134	113		95		278	513	1706		5543	15	853	
21				1	292	422		144	1	238	728	2328		5951	35	420	3
21.5				8	300	732		183	3	421	1125	2436	1	6088	37	358	1
22				21	257	873		168	3	452	1422	2409		2908	38	148	3
22.5				31	186	634		146	1	302	1075	1624		1999	36	62	2
23				20	194	732		138	2	357	1141	948	1	1408	15	37	2
23.5				57	178	535		112	1	405	893	866		772	15	37	2
24				28	154	549		59		349	678	298		500	3	37	
24.5				22	146	465		47	1	238	447	217		136		12	1
25				29	115	253		26	2	175	265	108		182			
25.5				6	75	197		8		95	132	54		91	1	25	
26				4	36	70		12		40	33			91	1		
26.5				8	39	70		2		16	66	54		136			
27				3	43	28		4		48					1		
27.5				4	47	42		2		63	33		1				
28				2	36	28		2		48	33						
28.5				3	24	14				40	33			45			
29				1	32	14		2		24	17	27					
29.5				1	8	14				16	33						
30					12	14				16							
30.5																	
31																	
31.5					4												
Number measured	857	12	2	254	597	415	62	600	16	493	571	531	3	723	489	765	14
Raised Number	12712	12	2	254	2358	5844	62	1217	16	3912	9443	14375	3	32847	3089	9455	14
Mean Length	9.5	13.1	7.8	23.8	23.1	23	16.1	22.2	22.4	22.9	22.4	21.7	24	21.1	10	19.1	22.4

Table 4. continued

Station	70	74	77	88	89	93	97	101	106	107	110	117	125	128	135	139
Stratum	41	42	42	31	31	31	31	21	21	21	21	21	21	21	21	21
ICES Sq	44F9	44G0	44G0	46G0	45G0	45G0	44G1	44G1	44G0	43G0	44G1	43G1	42G1	42G2	41G1	41G1
Trawl type	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Fotø	Expo	Expo	Expo	Expo	Expo	Expo	Expo	Expo
Headline depth (m)	8	10	10	0	8	6	0	22	24	12	10	28	23	10	6	9
Seabed depth (m)	182	240	75	133	289	181	75	46	32	28	41	47	46	38	20	23
Day/Night	Day	Night	Day	Night	Day	Day	Night	Day	Day	Day	Night	Day	Day	Night	Day	Day
Total Catch	493.984	9999.992	1428.005	556.004	158.619	36.03	374.997	2007.022	420.336	1525.001	1510.011	199.56	441.42	128.001	231.574	564.623
Total weight herring (kg)	251.203	2673.463	1224.986	0.229	1.023	0.12	246.599	137.2	6.2	399.4	265.8	177.599	258	105	197.975	465.667
Subsample weight herring (kg)	69.24	23.478	40.103	0.229	1.023	0.12	37.643	20.6	4.8	13.8	32.8	24.332	8.8	3.6	21.929	30.15
6																
6.5								78		573				336		
7								155		7738				336		
7.5								388		22640				1092		
8								777		22926				1303		
8.5								1088	15	15762				1303		
9								2175	45	7165	73	7		1807		
9.5								3263	110	5732	146			2563		
10				1				3884	101	7165	1465	7	2903	2647		
10.5								2952	62	2006	4541		11197	2983		
11								1398	45	860	5351		12026	1807		
11.5								466	31		3003		2765	378		
12		228							7		659		276	84		
12.5		683							3		146					
13		1708						4	14	2	73					
13.5		3530						88	19	16	59					
14		2164						27	22	41	238		6			
14.5		3530						15	12	68	477	22	3	2		
15		2391						20	8	96	742	29	10	5		
15.5		2164						41	4	79	1050	219	14	7		
16		3302						80	7	32	716	365	13	8	18	46
16.5		2847						95	4	19	290	723	18	5	9	170
17		4669					33	67	3	5	114	467	19	1	99	510
17.5		5352	61				92	63	4	4	40	445	11		605	2070
18		5238	31				118	55	3	4	26	562	4	2	1192	3027
18.5		7288	580				328	52	7	4	26	540	5		1291	1977
19	7	6035	733				301	36	5	2	18	299	3		497	803
19.5	44	4099	1313				387	12	1	3		190	2		99	170
20	134	3188	1802		1		380	8	1	5		73	1		81	402
20.5	287	1139	3482	1	1		432	16		3	4	36	4	1	135	432
21	457	683	2841	1	1		557	13	1	2	4	80	8	1	144	247
21.5	497	569	1802	1	2		393	9	1	4		29	4	2	36	108
22	399	114	1283		3		249	8		11		15	9		36	
22.5	356	342	703		3		223	1		3		7	7		27	77
23	232		428		1		59						3			15
23.5	145		275				39		1	1			1		9	
24	58		214				46						1			
24.5	54		31				7						1			
25	11		92				7									
25.5	4						7									
26	7															
26.5	7		31			1										
27	7		31													
27.5	4															
28																
28.5																
29																
29.5																
30																
30.5																
31																
31.5																
Number measured	747	538	515	4	12	1	558	689	347	727	1229	564	358	430	474	651
Raised Number	2710	61263	15731	4	12	1	3655	17336	535	92970	19262	4117	29314	16674	4279	10055
Mean Length	21.8	17.2	20.8	18.3	21.8	26.5	20.4	10	11.2	8.3	11.8	17.6	10.8	9.5	18.5	18.4

Table 5. Raised length distribution of sprat by haul for the Danish acoustic survey with R/V Dana in June-July 2024.

Station	2	7	8	56	101	106	107	110	117	125	128	135	139
Stratum	151_S	151_S	151_S	42	21	21	21	21	21	21	21	21	21
ICES Sq	41F6	41F6	41F7	44F8	44G1	44G0	43G0	44G1	43G1	42G1	42G2	41G1	41G1
Trawl type	Fotø	Fotø	Fotø	Expo	Fotø	Expo	Expo	Expo	Expo	Expo	Expo	Expo	Expo
Headline depth (m)	11	0	0	66.9	22	23.9	12	10	27.6	23	10	5.8	9
Seabed depth (m)	44.6	42.9	34.3	79.2	45.7	32	27.6	41	47.1	45.6	38.4	19.5	23
Day/Night	Day	Night	Night	Day	Day	Day	Day	Night	Day	Day	Night	Day	Day
Total Catch	105.281	659.991	117.585	483.930	2007.022	420.336	1525.001	1510.011	199.560	441.420	128.001	231.574	564.623
Total weight sprat (kg)	0.009	335.821	0.087	4.829	1044.955	270.129	1117.019	132.198	1.869	158.150	3.650	0.111	7.121
Subsample weight sprat (kg)	0.009	2.560	0.087	1.907	1.628	2.117	1.944	2.284	1.869	2.960	1.814	0.111	4.802
7.5									1				
8							1149						
8.5				3	642		5171		6				
9		131		43	642		32177	174	20		4		
9.5		2492	1	114	7061	4211	70101	1042	30	53	40		
10		6559	1	129	29526	15440	33327	3357	20	427	105		
10.5	1	8789	1	129	37228	7656		5151	16	855	93		
11		7215	2	66	21823	1786		2373	8	748	64		
11.5		4067	3	28	4493			347	13	481	24		6
12		1705		18	1284	128		116	15	1015	8		28
12.5		656			1926				12	1015	6	1	33
13		525		3					9	1175	12	1	73
13.5		131		3					9	1282	6	2	114
14		131		3					6	1336	2	2	67
14.5				3					3	748			37
15									1	427			10
Number measured	1	247	8	213	163	229	247	217	169	179	181	6	248
Raised Number	1	32401	8	539	104624	29220	141926	12560	169	9564	364	6	368
Mean Length	10.5	10.7	10.8	10.3	10.5	10.1	9.5	10.4	10.9	12.6	10.6	13.4	13.4

Table 6. Raised length distribution of mackerel by haul for the Danish acoustic survey with R/V Dana in June-July 2024.

Station	2	7	8	14	17	20	23	26	29	35	38	41	45	49	55	60	64	70	74	77	88	89	93	97	101	106	107	110	124	125	128	135	139
20			3									10			2																		
21	3	7	3						6				54			37													1			2	19
22		14	14			1	7		6			50	54	3	3	37					20							211	1		4	5	130
23	3	7	14			2		4	12	30	9			16	5	73			2609		120	8		4	48		1	791	12	2	9	14	382
24	3	7	17			1			25	30		30	109	70	12	37			9567	28	339	86	3	8	48		4	843	5	1	5	7	207
25	10	34	31	3	19			4	31	105	17	60	109	70	10	110		7	13046	57	229	133	3	50	72			1265				3	26
26	39	27	24	8		4	20	4	93	45		30	54	19	7	293		22	8697	104	70	55	8	80	48	2	3	738	2		2		
27	157	205	89	112	85	5	26	53	299	90	26	50	1633	27	30	1027		116	8262	255	90	71	45	91	241	1	5	1160	2		3		
28	123	178	102	224	114	28	66	121	374	105	102	230	1469	30	41	770		109	3479	265	100	173	57	50	458		1	527					
29	18	41	27	87	132	8	66	68	205	120	153	110	435	16	15	257		65	435	85	130	78	26	19	217	1	2	105			2		
30		7	7	11	123	6	53	23	31	60	60	40	327	11	5	257		36		28	40	24	3	11	24			105					
31	3	27	7	6	66	4	39	4	68	180	136	80	327	5	5	330		58		38	40	39	4	11	121	2	1	211	1		2		
32	5	21	17	3	123	3	66	6	19	256	273	140	327	16	1	403		152		28		31	4	34	362	6		53			2	1	
33	3	27	37		199	3	151	2	19	436	341	120	272		1	220		152		28	10	31	4	53	579	9	2	158		1	4		
34	3	14	14	6	95		92	8	19	226	332	80	163		2	257	1	116		9		24	3	19	434	3	2	53		1	2		
35	5	55	31	3	28	1	85		19	105	153	70	109					14		19		16		4	145	4	1	53	1	1	3		
36		14	14		47	1	7	2	6	30	60	40						7						4	24	2	1	53			1	1	
37	3	55	17		9	1	20	2		45	43							14							24		1				1	1	
38		48			19		39				26	40		3							10			8		1						
39		7	7				13	4			26								435			8	1	4		2						
40		7	7				7	2			9													4							1	1	
41		14									9												1									
42											17	10											1		24								
43																								4									
Total weight mackerel (kg)	71.061	211.240	110.530	90.280	301.326	15.122	224.036	65.253	257.298	523.398	537.627	309.509	1250.503	46.846	26.106	949.939	0.320	242.500	7325.935	202.589	197.804	153.864	34.220	112.927	816.707	11.756	5.604	1093.256	3.396	1.384	9.096	5.097	83.061
Subsample weight mackerel (kg)	27.661	30.874	32.442	32.174	31.856	15.122	34.105	33.480	41.333	34.805	63.124	30.920	22.980	17.376	22.428	25.898	0.320	33.476	16.847	21.438	19.832	19.618	25.236	29.624	33.870	11.756	5.604	20.739	3.396	1.384	9.096	5.097	12.820
Number measured	146	119	141	165	112	68	115	157	198	124	210	119	100	106	120	112	1	120	107	100	120	99	120	120	119	33	24	120	25	6	41	35	118
Raised Number	375	814	480	463	1059	68	755	306	1233	1865	1789	1191	5442	286	140	4108	1	869	46529	945	1197	776	163	457	2869	33	24	6326	25	6	41	35	765
Mean Length	27.5	30.1	29.1	28.1	31.2	28.7	32.2	28.7	28.1	31.2	32.6	30.2	28.6	26.2	27.1	28.8	34	30.9	25.6	28	25.9	27.9	28.4	28.9	30.9	33	28.8	26.1	24.4	28.7	28	24.6	23.1