

## Cruise Report

"25.08.2016, 15.11.-20.12.2016, 16/10860".

Sand eel Dredge Survey, Sand eel Area 1r, 2r and 3r, 2016

Vessel: Salling  
 Cruise number: 2016

Cruise dates: 21.11.2016 – 13.12.2016  
 Cruise name: Sand eel Dredge Survey, Sandeel Area 1r, 2r and 3r

<b>Port of departure:</b>	Esbjerg	<b>Date:</b>	21.11.2016
<b>Port of return:</b>	Esbjerg	<b>Date:</b>	13.12.2016
<b>Other ports:</b>	Hanstholm	<b>Date and justification:</b>	7.12.2016 to deliver samples of sandeel for analyses

## Participants

Leg #: 1		
Name	Institute	Function and main tasks
Dirk Tijssen	DTU Aqua	Cruise leader
Thorvald Boersmose	FOGA Aps	Consultant

Leg #:		
Name	Institute	Function and main tasks

## Objectives

The purpose of the sand eel dredge survey was to collect sand eels buried in the seabed and compare catches (number and age composition) with the previous year's collections to assess the 2016 year class strength of sand eel in area 1r, 2r and 3r of the different areas adopted by ICES in 2016 (figure 1). Data from the dredge survey is the basis for calculating an index, which is used in the stock assessment for sandeel in the North Sea.

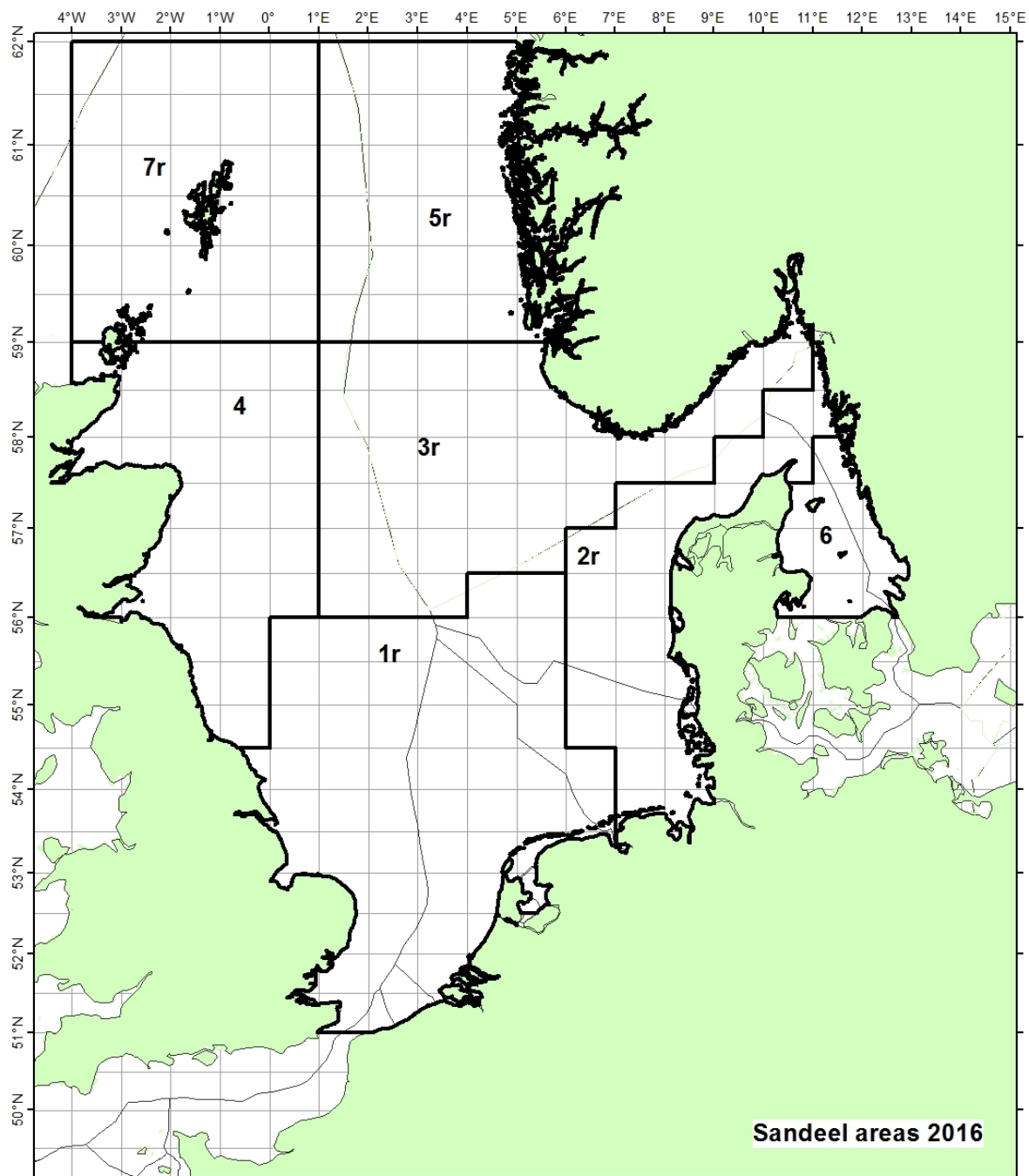


Figure 1. Sandeel management areas (ICES, 2016)

## Itinerary

The vessel departed Esbjerg Harbor 21.11.2016 at 20.00 hrs. and returned to Esbjerg Harbor at 11.00 hrs 13.12.2016. Sampling with the modified dredge typically started just after sunset (UTC 17.00 hrs) and the last station of the night was completed before sunrise (UTC 04.00 – 06.00 hrs) i.e. fishing was only conducted during darkness.

## Achievements

Types of data collected

- GPS Positions
- Depth
- Dredge (sand eels; species, weight, length)
- Van Veen grab (sediment samples; grain size composition)

Achievements in 2016:

- 23 days at sea (planned: 24)

- 297 stations; 27 sediment grab samples and 270 dredge hauls distributed over 90 sample positions.

## Methods

On each sampling location three hauls were carried out with the modified mussel dredge according to descriptions for fishing with modified mussel dredge used since 2004. The DK II dredge was used as the primary gear and the DK IV dredge served as 'back-up'. On new sample locations sediment samples were taken with the Van Veen grab (0.2m<sup>2</sup>), for the grain size composition analysis i.e. whether the bottom could be classified as a suitable habitat for sand eel (a very fine-grained sediment with a high content of silt is generally found to be unfit as an overwintering habitat for the sandeel).

### Time of sampling

Sand eels survive the winter by burying in the seabed, but can under some circumstances be forced to seek food in the water column. In these cases, the food search is almost exclusively carried out in darkness. In order to ensure that as large and constantly a fraction of sand eels as possible is available for the fishing gear the fishing was therefore exclusively done during darkness (i.e. optimizing the constancy of the catch ability). Sailing between sampling locations were hence, if possible, done during the light hours of the day.

### Prioritization of the sampling

It was sought after, that samples should be collected from all of the planned positions. In the event of problems causing exclusion of locations, e.g. by bad weather, the highest priority was given to the locations where samples had been collected during previous sand eel surveys or where the samples were considered to provide important information for a specific area. Lowest priority was given to the positions where only a few previous sand eel cruises had taken samples or where the samples were not considered to have important information for a specific area. The organization of the sampling (sail route) was done, so time spent sailing between locations was minimized.

### Processing of samples at sea

- Greater sand eel (*Hyperoplus lanceolatus*) and Smooth sand eel (*Gymnammodytessemisquamatus*) were identified at sea and discarded to separate samplebags. Small sand eel (*Ammodytes tobianus*) were not separated, and thus measured together with the lesser sand eel and first identified on land.
- Numbers of sand eels (total or sample) was recorded in a station scheme for each haul.
- At least one of the 3 hauls for each sample location was processed at sea
- All sand eels (or a sample) was length measured to the nearest half cm (scm) and the results were introduced in a graduated scheme.
- The fish were gathered in bags for each scm group, for each haul, which again were gathered for each location.

### Bottom contact

In order to be able to carry out an assessment of the individual hauls validity (in addition to the skipper's assessment of the haul quality) mechanical bottom contacts were fitted on the dredges. These were logging contact/no contact with the seabottom for the dredge each second while fishing as a measure for the performance of the dredge. This enabled the calculation of the part of the haul where the dredge had bottom contact. This was used to exclude hauls with a low bottom contact frequency from the later data analysis.

## Results

The sand eel dredge survey in sand eel areas 1r, 2r and 3r was carried out in accordance with the survey protocol in the period from November 22 - December 13. 90 positions

were sampled with a total of 297 stations; 113 in area 1r, 114 in area 2r and 70 in area 3r.

**Table 1.** Station list. GRB refers to Van Veen grab (sediment samples) and DK2 and DK4 are dredges (hauls).

Date_start	new_ position	Station	Area	Gear	Time start	Time end	latPos_ StartDec	lonPos_ StartDec	latPos_ EndDec	lonPos_ EndDec	Depth Avg (m)
22-11-2016	4165.16	1	1	DK2	16:22	16:32	56.2996	5.5946	56.2969	5.5858	36
22-11-2016	4165.16	2	1	DK2	16:48	16:58	56.2986	5.5841	56.2986	5.5950	36
22-11-2016	4165.16	3	1	DK2	17:37	17:47	56.3011	5.5863	56.2957	5.5885	36
22-11-2016	4165.02	4	1	DK2	20:32	20:42	56.0654	5.2929	56.0613	5.2842	40
22-11-2016	4165.02	5	1	DK2	20:55	21:05	56.0611	5.2881	56.0692	5.2863	39
22-11-2016	4165.02	6	1	DK2	21:20	21:30	56.0636	5.2829	56.0608	5.2907	38
22-11-2016	4165.03	7	1	DK2	21:58	22:08	56.0315	5.2624	56.0268	5.2568	36
22-11-2016	4165.03	8	1	DK2	22:21	22:31	56.0286	5.2550	56.0274	5.2662	36
22-11-2016	4165.03	9	1	DK2	22:45	22:55	56.0265	5.2607	56.0265	5.2552	36
22-11-2016	4065.03	10	1	DK2	23:41	23:51	55.9693	5.2482	55.7975	5.2499	41
23-11-2016	4065.03	11	1	DK2	00:05	00:15	55.9650	5.2544	55.9672	5.2453	42
23-11-2016	4065.03	12	1	DK2	00:25	00:35	55.9655	5.2483	55.9712	5.2588	41
23-11-2016	4065.02	13	1	DK2	01:39	01:49	55.8952	5.1518	55.8903	5.1479	35
23-11-2016	4065.02	14	1	DK2	02:00	02:10	55.8904	5.1515	55.8946	5.1424	35
23-11-2016	4065.02	15	1	DK2	02:25	02:35	55.8905	5.1452	55.8919	5.1600	35
23-11-2016	4065.01	16	1	DK2	03:49	03:59	55.7854	5.0661	55.7798	5.0635	31
23-11-2016	4065.01	17	1	DK2	04:10	04:20	55.7809	5.0675	55.7827	5.0594	31
23-11-2016	4065.01	18	1	DK2	04:31	04:41	55.7831	5.0631	55.7781	5.0691	31
23-11-2016	3964.03	19	1	GRB	16:13	16:14	55.4822	4.4103	55.4816	4.4114	27
23-11-2016	3964.03	20	1	DK2	17:06	17:16	55.4868	4.4132	55.4807	4.4087	28
23-11-2016	3964.03	21	1	DK2	17:26	17:36	55.4803	4.4142	55.4854	4.4075	28
23-11-2016	3964.03	22	1	DK2	17:45	17:55	55.4828	4.4059	55.4831	4.4171	28
23-11-2016	3964.02	23	1	GRB	18:34	18:36	55.4164	4.3174	55.4160	4.3174	31
23-11-2016	3964.02	24	1	DK2	18:44	18:54	55.4152	4.3113	55.4164	4.3217	31
23-11-2016	3964.02	25	1	DK2	19:04	19:14	55.4182	4.3177	55.4107	4.3151	31
23-11-2016	3964.02	26	1	DK2	19:25	19:35	55.4133	4.3198	55.4201	4.3132	31
23-11-2016	3964.01	27	1	GRB	20:49	20:50	55.4181	4.0653	55.4177	4.0646	26
23-11-2016	3964.01	28	1	DK2	20:58	21:08	55.4181	4.0591	55.4179	4.0699	26
23-11-2016	3964.01	29	1	DK2	21:18	21:28	55.4202	4.0672	55.4144	4.0608	26
23-11-2016	3964.01	30	1	DK2	21:38	21:48	55.4147	4.0663	55.4210	4.0628	26
23-11-2016	3963.04	31	1	GRB	23:29	23:31	55.2638	3.7265	55.2633	3.7262	31
23-11-2016	3963.04	32	1	DK2	23:40	23:50	55.2630	3.7189	55.2637	3.7304	31
24-11-2016	3963.04	33	1	DK2	00:01	00:11	55.2653	3.7269	55.2588	3.7206	31
24-11-2016	3963.04	34	1	DK2	00:23	00:33	55.2604	3.7275	55.2665	3.7232	31
24-11-2016	3963.01	35	1	GRB	02:05	02:07	55.0867	3.4760	55.0863	3.4759	30
24-11-2016	3963.01	36	1	DK2	02:16	02:26	55.0843	3.4713	55.0883	3.4790	30
24-11-2016	3963.01	37	1	DK2	02:37	02:47	55.0893	3.4731	55.0821	3.4795	30
24-11-2016	3963.01	38	1	DK2	02:58	03:08	55.0858	3.4804	55.0876	3.4703	30
24-11-2016	3762.05	39	1	GRB	16:00	16:02	54.4916	2.3795	54.4915	2.3795	16
24-11-2016	3762.05	40	1	DK2	16:10	16:20	54.4895	2.3752	54.4939	2.3841	16
24-11-2016	3762.05	41	1	DK2	16:30	16:40	54.4941	2.3794	54.4875	2.3808	16
24-11-2016	3762.05	42	1	DK2	16:50	17:00	54.4906	2.3833	54.4940	2.3739	16
24-11-2016	3862.01	43	1	GRB	18:07	18:09	54.5814	2.1473	54.5804	2.1457	16
24-11-2016	3862.01	44	1	DK2	18:18	18:28	54.5805	2.1413	54.5811	2.1518	15

24-11-2016	3862.01	45	1	DK2	18:37	18:47	54.5836	2.1485	54.5836	2.1485	15
24-11-2016	3862.01	46	1	DK2	18:55	19:05	54.5785	2.1485	54.5844	2.1430	15
24-11-2016	3762.01	47	1	GRB	20:21	20:22	54.4574	2.1396	54.4573	2.1396	13
24-11-2016	3762.01	48	1	DK2	20:28	20:38	54.4538	2.1371	54.4598	2.1407	13
24-11-2016	3762.01	49	1	DK2	20:46	20:56	54.4599	2.1354	54.4556	2.1433	13
24-11-2016	3762.01	50	1	DK2	21:05	21:15	54.4581	2.1442	54.4570	2.1327	13
24-11-2016	3761.04	51	1	GRB	21:56	21:58	54.4675	1.9841	54.4676	1.9834	15
24-11-2016	3761.04	52	1	DK2	22:05	22:15	54.4677	1.9776	54.4676	1.9890	15
24-11-2016	3761.04	53	1	DK2	22:26	22:36	54.4699	1.9873	54.4651	1.9794	15
24-11-2016	3761.04	54	1	DK2	22:48	22:58	54.4648	1.9847	54.4720	1.9816	15
25-11-2016	3861.36	55	1	GRB	00:17	00:19	54.5781	1.8825	54.5782	1.8823	19
25-11-2016	3861.36	56	1	DK2	00:27	00:37	54.5786	1.8754	54.5779	1.8853	19
25-11-2016	3861.36	57	1	DK2	00:46	00:56	54.5757	1.8843	54.5814	1.8792	19
25-11-2016	3861.36	58	1	DK2	01:09	01:19	54.5814	1.8855	54.5753	1.8795	19
25-11-2016	3762.02	59	1	GRB	15:57	15:59	54.1496	2.0600	54.1494	2.0603	24
25-11-2016	3762.02	60	1	DK2	16:06	16:16	54.1476	2.0646	54.1511	2.0563	24
25-11-2016	3762.02	61	1	DK2	16:27	16:37	54.1478	2.0548	54.1508	2.0638	24
25-11-2016	3762.02	62	1	DK2	16:47	16:57	54.1525	2.0606	54.1465	2.0589	24
25-11-2016	3761.08	63	1	GRB	18:51	18:52	54.1896	1.5790	54.1898	1.5784	25
25-11-2016	3761.08	64	1	DK2	19:02	19:12	54.1923	1.5808	54.1866	1.5757	26
25-11-2016	3761.08	65	1	DK2	19:22	19:32	54.1870	1.5811	54.1924	1.5745	25
25-11-2016	3761.08	66	1	DK2	19:45	19:55	54.1896	1.5745	54.1895	1.5851	25
25-11-2016	3760.03	67	1	GRB	22:43	22:45	54.2057	0.8392	54.2057	0.8391	32
25-11-2016	3760.03	68	1	DK2	22:54	23:04	54.2062	0.8339	54.2048	0.8445	42
25-11-2016	3760.03	69	1	DK2	23:13	23:23	54.2068	0.8407	54.2029	0.8316	40
25-11-2016	3760.03	70	1	DK4	23:34	23:44	54.2026	0.8408	54.2085	0.8366	34
26-11-2016	3760.04	71	1	GRB	00:12	00:15	54.2623	0.7993	54.2625	0.7989	54
26-11-2016	3760.04	72	1	DK2	00:26	00:36	54.2631	0.7947	54.2614	0.8053	51
26-11-2016	3760.04	73	1	DK2	00:48	00:58	54.2629	0.8017	54.2596	0.7925	45
26-11-2016	3760.04	74	1	DK2	01:14	01:24	54.2566	0.8008	54.2629	0.7977	49
26-11-2016	3760.05	75	1	GRB	02:06	02:09	54.3156	0.9280	54.3155	0.9288	45
26-11-2016	3760.05	76	1	DK2	02:20	02:30	54.3141	0.9335	54.3171	0.9238	47
26-11-2016	3760.05	77	1	DK2	02:43	02:53	54.3142	0.9219	54.3155	0.9326	47
26-11-2016	3760.05	78	1	DK2	03:05	03:15	54.3169	0.9279	54.3112	0.9224	44
26-11-2016	3861.19	79	1	GRB	16:57	16:59	54.5669	1.2639	54.5669	1.2639	23
26-11-2016	3861.19	80	1	DK2	17:07	17:17	54.5701	1.2663	54.5640	1.2627	24
26-11-2016	3861.19	81	1	DK2	17:28	17:38	54.5635	1.2683	54.5692	1.2622	23
26-11-2016	3861.19	82	1	DK2	17:49	17:59	54.5671	1.2589	54.5664	1.2698	23
26-11-2016	3861.22	83	1	GRB	18:21	18:23	54.5384	1.5701	54.5384	1.5714	18
26-11-2016	3861.22	84	1	DK2	18:30	18:40	54.5390	1.5769	54.5374	1.5665	22
26-11-2016	3861.22	85	1	DK2	18:51	19:01	54.5347	1.5701	54.5410	1.5723	22
26-11-2016	3861.22	86	1	DK2	19:10	19:20	54.5406	1.5712	54.5365	1.5758	21
26-11-2016	3861.23	87	1	GRB	19:39	19:40	54.5451	1.6229	54.5451	1.6230	17
26-11-2016	3861.23	88	1	DK2	19:53	20:03	54.5434	1.6270	54.5469	1.6179	16
26-11-2016	3861.23	89	1	DK2	20:13	20:23	54.5438	1.6166	54.5461	1.6264	25
26-11-2016	3861.23	90	1	DK2	20:36	20:46	54.5508	1.6222	54.5508	1.6229	16
26-11-2016	3861.35	91	1	GRB	21:34	21:36	54.6388	1.6638	54.6386	1.6642	15
26-11-2016	3861.35	92	1	DK2	21:45	21:55	54.6389	1.6720	54.6383	1.6610	17
26-11-2016	3861.35	93	1	DK2	22:06	22:16	54.6416	1.6600	54.6363	1.6687	16
26-11-2016	3861.35	94	1	DK2	22:27	22:37	54.6354	1.6620	54.6418	1.6660	16
27-11-2016	3861.14	95	1	GRB	00:38	00:41	54.8492	1.4333	54.8492	1.4333	22
27-11-2016	3861.14	96	1	DK2	00:51	01:01	54.8515	1.4273	54.9515	1.4458	23

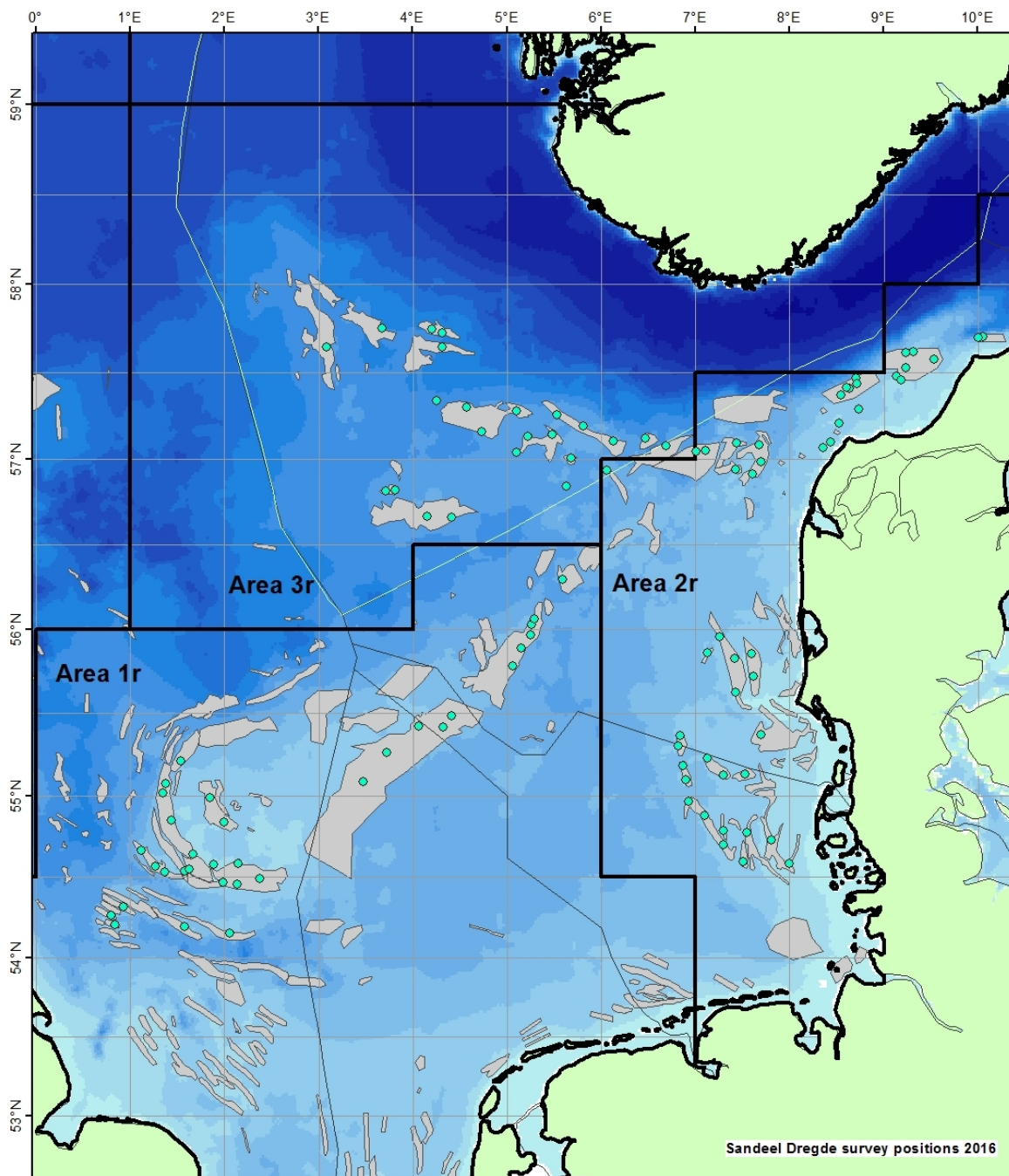
27-11-2016	3861.14	97	1	DK2	01:11	01:21	54.8462	1.4319	54.8525	1.4335	23
27-11-2016	3861.14	98	1	DK2	01:33	01:43	54.8499	1.4377	54.8499	1.4268	23
27-11-2016	3861.17	99	1	DK2	16:12	16:22	54.8344	1.9965	54.8406	1.9959	21
27-11-2016	3861.17	100	1	DK2	16:32	16:42	54.8399	1.9923	54.8364	2.0023	21
27-11-2016	3861.17	101	1	DK2	16:55	17:05	54.8407	2.0001	54.8372	1.9909	21
27-11-2016	3861.32	102	1	DK2	18:25	18:35	54.9854	1.8509	54.9902	1.8439	23
27-11-2016	3861.32	103	1	DK2	18:47	18:57	54.9869	1.8421	54.9891	1.8522	22
27-11-2016	3861.32	104	1	DK2	19:08	19:18	54.9922	1.8482	54.9857	1.8459	23
27-11-2016	3861.29	105	1	DK2	21:16	21:26	55.0168	1.3566	55.0180	1.3460	28
27-11-2016	3861.29	106	1	DK2	21:35	21:45	55.0145	1.3472	55.0188	1.3546	27
27-11-2016	3861.29	107	1	DK2	21:57	22:07	55.0208	1.3496	55.0143	1.3523	27
27-11-2016	3961.28	108	1	DK2	22:39	22:49	55.0716	1.3791	55.0776	1.3826	30
27-11-2016	3961.28	109	1	DK2	23:01	23:11	55.0773	1.3767	55.0729	1.3844	30
27-11-2016	3961.28	110	1	DK2	23:22	23:32	55.0759	1.3851	55.0740	1.3742	31
28-11-2016	3961.42	111	1	DK2	00:51	01:01	55.2081	1.5284	55.2308	1.5331	34
28-11-2016	3961.42	112	1	DK2	01:13	01:23	55.2143	1.5274	55.2095	1.5352	34
28-11-2016	3961.42	113	1	DK2	01:35	01:45	55.2128	1.5362	55.2105	1.5254	33
28-11-2016	4264.05	114	3	GRB	16:01	16:06	56.6634	4.4166	56.6635	4.4168	48
28-11-2016	4264.05	115	3	DK2	16:18	16:28	56.6662	4.4150	56.6598	4.4183	47
28-11-2016	4264.05	116	3	DK2	16:42	16:52	56.6628	4.4233	56.6475	4.4118	48
28-11-2016	4264.05	117	3	DK2	17:04	17:14	56.6616	4.4119	56.6646	4.4220	48
28-11-2016	4264.03	118	3	GRB	18:20	18:24	56.6668	4.1506	56.6670	4.1507	46
28-11-2016	4264.03	119	3	DK2	18:35	18:45	56.6674	4.1475	56.6639	4.1613	46
28-11-2016	4264.03	120	3	DK2	19:02	19:12	56.6678	4.1550	56.6654	4.1443	46
28-11-2016	4264.03	121	3	DK2	19:26	19:36	56.6634	4.1487	56.6700	4.1532	46
28-11-2016	4263.03	122	3	GRB	21:13	21:15	56.8181	3.8170	56.8186	3.8169	53
28-11-2016	4263.03	123	3	DK2	21:25	21:30	56.8216	3.8180	56.8185	3.8175	55
28-11-2016	4263.03	124	3	DK2	22:14	22:17	56.8176	3.8197	56.8180	3.8158	51
28-11-2016	4263.03	125	3	DK2	22:54	22:57	56.8178	3.8155	56.8192	3.8186	53
28-11-2016	4263.02	126	3	GRB	23:45	23:48	56.8131	3.7123	56.8133	3.7125	55
28-11-2016	4263.02	127	3	DK2	23:59	00:09	56.8134	3.7130	56.8137	3.7001	57
29-11-2016	4263.02	128	3	DK2	00:42	00:52	56.8140	3.7124	56.8116	3.7118	54
29-11-2016	4263.02	129	3	DK2	01:06	01:16	56.8117	3.7152	56.8131	3.7121	54
29-11-2016	4463.05	130	3	DK2	16:13	16:23	57.6451	3.0940	57.6455	3.0809	60
29-11-2016	4463.05	131	3	DK2	16:37	16:47	57.6439	3.0849	57.6482	3.0942	60
29-11-2016	4463.05	132	3	DK2	17:01	17:11	57.6484	3.0879	57.6413	3.0887	60
29-11-2016	4463.03	133	3	DK2	19:21	19:31	57.7491	3.6651	57.7506	3.6786	63
29-11-2016	4463.03	134	3	DK2	19:46	19:56	57.7539	3.6765	57.7479	3.6703	64
29-11-2016	4463.03	135	3	DK2	20:09	20:19	57.7465	3.6753	57.7523	3.6691	64
29-11-2016	4464.06	136	3	DK2	22:16	22:26	57.7465	4.2028	57.7454	4.2160	67
29-11-2016	4464.06	137	3	DK2	22:44	22:54	57.7491	4.2143	57.7442	4.2057	68
29-11-2016	4464.06	138	3	DK2	23:10	23:20	57.7427	4.2286	57.7492	4.2041	67
29-11-2016	4464.04	139	3	DK2	23:58	00:08	57.7252	4.3140	57.7227	4.3272	66
30-11-2016	4464.04	140	3	DK2	00:24	00:34	57.7266	4.3218	57.7224	4.3117	67
30-11-2016	4464.04	141	3	DK2	00:50	01:00	57.7223	4.3173	57.7292	4.3166	66
30-11-2016	4464.05	142	3	DK2	01:40	01:50	57.6489	4.3105	57.6418	4.2449	67
30-11-2016	4464.05	143	3	DK2	02:05	02:15	57.6427	4.3162	57.6473	4.3066	66
30-11-2016	4464.05	144	3	DK2	02:31	02:41	57.6434	4.3026	57.6462	4.3158	66
02-12-2016	4364.08	145	3	DK2	15:54	16:04	57.3328	4.2483	57.3368	4.2581	63
02-12-2016	4364.08	146	3	DK2	16:18	16:28	57.3382	4.2517	57.3314	4.2546	65
02-12-2016	4364.08	147	3	DK2	16:42	16:52	57.3329	4.2593	57.3365	4.2488	64
02-12-2016	4364.07	148	3	DK2	18:09	18:19	57.3028	4.5593	57.3010	4.5710	57

02-12-2016	4364.07	149	3	DK2	18:33	18:43	57.3037	4.5721	57.3000	4.5613	56
02-12-2016	4364.07	150	3	DK2	18:54	19:04	57.2984	4.5645	57.3052	4.5670	56
02-12-2016	4364.05	151	3	DK2	20:19	20:29	57.1603	4.7252	57.1542	4.7306	52
02-12-2016	4364.05	152	3	DK2	20:41	20:51	57.1562	4.7353	57.1573	4.7233	52
02-12-2016	4364.05	153	3	DK2	21:02	21:12	57.1544	4.7238	57.1584	4.7332	53
02-12-2016	4365.12	154	3	DK2	22:45	22:55	57.2724	5.0922	57.2765	5.1025	50
02-12-2016	4365.12	155	3	DK2	23:08	23:18	57.2778	5.0978	57.2712	5.0999	48
02-12-2016	4365.12	156	3	DK2	23:30	23:40	57.2733	5.1038	57.2765	5.0933	51
03-12-2016	4365.01	157	3	DK2	01:18	01:28	57.2549	5.5206	57.2540	5.5331	56
03-12-2016	4365.01	158	3	DK2	01:42	01:52	57.2570	5.5305	57.2529	5.5208	55
03-12-2016	4365.01	159	3	DK2	02:06	02:16	57.2515	5.5264	57.2581	5.5246	54
03-12-2016	4365.13	160	3	DK2	15:56	16:06	57.0394	5.1046	57.0343	5.0966	51
03-12-2016	4365.13	161	3	DK2	16:18	16:28	57.0330	5.1008	57.0400	5.0997	52
03-12-2016	4365.13	162	3	DK2	16:54	17:04	57.0365	5.0934	57.0367	5.1055	54
03-12-2016	4365.08	163	3	DK2	18:11	18:21	57.1278	5.2142	57.1341	5.2204	49
03-12-2016	4365.08	164	3	DK2	18:33	18:43	57.1331	5.2148	57.1294	5.2254	53
03-12-2016	4365.08	165	3	DK2	18:54	19:04	57.1334	5.2251	57.1306	5.2140	49
03-12-2016	4365.04	166	3	DK2	20:05	20:15	57.1416	5.4705	57.1415	5.4827	45
03-12-2016	4365.04	167	3	DK2	20:27	20:37	57.1443	5.4797	57.1384	5.4738	45
03-12-2016	4365.04	168	3	DK2	20:48	20:58	57.1385	5.4805	57.1441	5.4747	42
03-12-2016	4365.11	169	3	DK2	22:10	22:20	57.0091	5.6781	57.0043	5.6858	46
03-12-2016	4365.11	170	3	DK2	22:31	22:41	57.0071	5.6886	57.0063	5.6776	47
03-12-2016	4365.11	171	3	DK2	22:52	23:02	57.0033	5.6786	57.0084	5.6857	47
04-12-2016	4365.1	172	3	DK2	00:19	00:29	57.1888	5.8072	57.1952	5.8113	48
04-12-2016	4365.1	173	3	DK2	00:43	00:53	57.1955	5.8049	57.1917	5.8153	51
04-12-2016	4365.1	174	3	DK2	01:03	01:13	57.1942	5.8175	57.1931	5.8053	52
04-12-2016	4266.01	175	3	DK2	16:51	17:01	56.9373	6.0550	56.9500	6.0667	52
04-12-2016	4266.01	176	3	DK2	17:21	17:31	56.9353	6.0683	56.9351	6.0557	50
04-12-2016	4266.01	177	3	DK2	17:43	17:53	56.9322	6.0571	56.9376	6.0649	49
04-12-2016	4366.06	178	3	DK2	18:02	18:12	57.0974	6.1226	57.1039	6.1265	45
04-12-2016	4366.06	179	3	DK2	18:23	18:33	57.1043	6.1193	57.0996	6.1299	46
04-12-2016	4366.06	180	3	DK2	18:53	19:03	57.1026	6.1305	57.1008	6.1196	47
04-12-2016	4366.12	181	3	DK2	20:24	20:34	57.1195	6.4652	57.1204	6.4768	53
04-12-2016	4366.12	182	3	DK2	20:45	20:55	57.1217	6.4743	57.1161	6.4676	53
04-12-2016	4366.12	183	3	DK2	21:07	21:17	57.1181	6.4735	57.1242	6.4689	52
04-12-2016	4367.02	184	3	DK2	23:19	23:29	57.0433	6.9968	57.0418	7.0086	39
04-12-2016	4367.02	185	3	DK2	23:40	23:50	57.0440	7.0098	57.0407	6.9995	37
04-12-2016	4367.02	186	3	DK2	23:59	00:09	57.0377	7.0035	57.0445	7.0041	37
05-12-2016	4367.06	187	3	DK2	00:50	01:00	57.0501	7.0966	57.0520	7.1071	24
05-12-2016	4367.06	188	3	DK2	01:05	01:15	57.0548	7.1064	57.0481	7.1032	24
05-12-2016	4367.06	189	3	DK2	01:23	01:33	57.0491	7.1092	57.0534	7.1040	22
05-12-2016	4367.16	190	3	DK2	16:04	16:14	57.0904	7.4298	57.0911	7.4421	23
05-12-2016	4367.16	191	3	DK2	16:12	16:22	57.0927	7.4394	57.0870	7.4317	25
05-12-2016	4367.16	192	3	DK2	16:32	16:42	57.0881	7.4399	57.0937	7.4332	23
05-12-2016	4267.12	193	3	DK2	17:52	18:02	56.9467	7.4299	56.9398	7.4299	26
05-12-2016	4267.12	194	3	DK2	18:15	18:25	56.9402	7.4380	56.9427	7.4270	25
05-12-2016	4267.12	195	3	DK2	18:35	18:45	56.9400	7.4235	56.9437	7.4342	25
05-12-2016	4267.27	196	3	DK2	19:28	19:38	56.9141	7.5967	56.9116	7.6082	20
05-12-2016	4267.27	197	3	DK2	19:49	19:59	56.9130	7.6065	56.9108	7.5949	21
05-12-2016	4267.27	198	3	DK2	20:07	20:17	56.9092	7.6018	56.9160	7.6058	20
05-12-2016	4267.25	199	3	DK2	21:02	21:12	56.9796	7.6914	56.9845	7.6995	18
05-12-2016	4267.25	200	3	DK2	20:20	20:30	56.9848	7.6950	56.9785	7.7004	18



05-12-2016	4267.25	201	3	DK2	21:39	21:49	56.9821	7.7022	56.9838	7.6899	18
05-12-2016	4367.23	202	3	DK2	22:37	22:47	57.0762	7.6723	57.0830	7.6711	23
05-12-2016	4367.23	203	3	DK2	22:54	23:04	57.0817	7.6666	57.0799	7.6786	25
05-12-2016	4367.23	204	3	DK2	23:11	23:21	57.0824	7.6767	57.0798	7.6656	23
06-12-2016	4368.09	205	3	GRB	15:47	15:49	57.4326	8.7141	57.4327	8.7141	21
06-12-2016	4368.09	206	3	DK2	15:56	16:06	57.4355	8.7188	57.4302	8.7097	21
06-12-2016	4368.09	207	3	DK2	16:15	16:25	57.4307	8.7170	57.4362	8.7096	24
06-12-2016	4368.09	208	3	DK2	16:35	16:45	57.4330	8.7077	57.4328	8.7201	22
06-12-2016	4368.07	209	3	GRB	17:45	17:47	57.4142	8.6045	57.4141	8.6045	28
06-12-2016	4368.07	210	3	DK2	17:56	18:06	57.4143	8.6000	57.4143	8.6120	30
06-12-2016	4368.07	211	3	DK2	18:15	18:25	57.4176	8.6077	57.4120	8.6010	30
06-12-2016	4368.07	212	3	DK2	18:33	18:43	57.4113	8.6071	57.4172	8.6008	24
06-12-2016	4368.06	213	3	GRB	19:15	19:17	57.4051	8.6364	57.4052	8.6371	22
06-12-2016	4368.06	214	3	DK2	19:25	19:35	57.4077	8.6424	57.4024	8.6292	21
06-12-2016	4368.06	215	3	DK2	19:46	19:56	57.4023	8.6391	57.4085	8.6339	24
06-12-2016	4368.06	216	3	DK2	20:04	20:14	57.4059	8.6309	57.4046	8.6432	22
06-12-2016	4368.05	217	3	DK2	21:03	21:13	57.3713	8.5510	57.3676	8.5404	27
06-12-2016	4368.05	218	3	DK2	21:22	21:32	57.3645	8.5450	57.3712	8.5418	28
06-12-2016	4368.05	219	3	DK2	21:42	21:52	57.3698	8.5371	57.3675	8.5484	28
06-12-2016	4368.03	220	3	DK2	23:00	23:10	57.2111	8.5221	57.2046	8.5203	18
06-12-2016	4368.03	221	3	DK2	23:18	23:28	57.2036	8.5266	57.2075	8.5163	17
06-12-2016	4368.03	222	3	DK2	23:35	23:45	57.2051	8.5156	57.2069	8.5285	16
07-12-2016	4469.02	223	3	DK2	16:48	16:58	57.5703	9.5292	57.5762	9.5446	16
07-12-2016	4469.02	224	3	DK2	17:11	17:21	57.5747	9.5500	57.5681	9.5324	16
07-12-2016	4469.02	225	3	DK2	17:30	17:40	57.5701	9.5387	57.5740	9.5286	15
07-12-2016	4470.02	226	3	DK2	19:24	19:34	57.6938	9.9969	57.6974	10.0148	19
07-12-2016	4470.02	227	3	DK2	19:47	19:57	57.6997	10.0042	57.6937	9.9989	20
07-12-2016	4470.02	228	3	DK2	20:04	20:14	57.6918	10.0039	57.6987	10.0024	19
07-12-2016	4470.01	229	3	DK2	20:58	21:08	57.7036	10.0541	57.6971	10.0585	21
07-12-2016	4470.01	230	3	DK2	21:17	21:27	57.7008	10.0621	57.7014	10.0497	18
07-12-2016	4470.01	231	3	DK2	21:35	21:45	57.6994	10.0503	57.7046	10.0630	21
08-12-2016	4469.03	232	3	DK2	15:52	16:02	57.6178	9.3017	57.6172	9.3151	16
08-12-2016	4469.03	233	3	DK2	16:11	16:21	57.6199	9.3140	57.6150	9.3054	16
08-12-2016	4469.03	234	3	DK2	16:28	16:38	57.6139	9.3122	57.6204	9.3084	20
08-12-2016	4469.04	235	3	DK2	17:09	17:19	57.6134	9.2393	57.6110	9.2276	18
08-12-2016	4469.04	236	3	DK2	17:27	17:37	57.6083	9.2317	57.6152	9.2327	19
08-12-2016	4469.04	237	3	DK2	17:44	17:54	57.6142	9.2288	57.6093	9.2380	20
08-12-2016	4469.01	238	3	DK2	18:52	19:02	57.5296	9.2309	57.5227	9.2297	17
08-12-2016	4469.01	239	3	DK2	19:10	19:20	57.5224	9.2360	57.5263	9.2259	16
08-12-2016	4469.01	240	3	DK2	19:29	19:39	57.5236	9.2249	57.5265	9.2366	16
08-12-2016	4369.02	241	3	DK2	20:16	20:26	57.4599	9.1890	57.4537	9.1844	15
08-12-2016	4369.02	242	3	DK2	20:33	20:43	57.4528	9.1918	57.4574	9.1818	14
08-12-2016	4369.02	243	3	DK2	20:51	21:01	57.4552	9.1803	57.4567	9.1933	15
08-12-2016	4369.01	244	3	DK2	21:31	21:41	57.4729	9.1461	57.4758	9.1350	16
08-12-2016	4369.01	245	3	DK2	21:48	21:58	57.4729	9.1345	57.4784	9.1457	16
08-12-2016	4369.01	246	3	DK2	22:06	22:16	57.4779	9.1389	57.4708	9.1376	16
09-12-2016	4067.05	247	2	DK2	15:51	16:01	55.9589	7.2656	55.9541	7.2568	23
09-12-2016	4067.05	248	2	DK2	16:09	16:19	55.9523	7.2623	55.9583	7.2560	21
09-12-2016	4067.05	249	2	DK2	16:28	16:38	55.9555	7.2035	55.9553	7.2656	21
09-12-2016	4067.04	250	2	DK2	17:39	17:49	55.8329	7.4092	55.8267	7.4147	21
09-12-2016	4067.04	251	2	DK2	17:56	18:06	55.8285	7.4186	55.8302	7.4067	21
09-12-2016	4067.04	252	2	DK2	18:13	18:23	55.8271	7.4069	55.8313	7.4162	21

09-12-2016	4067.01	253	2	DK2	19:10	19:20	55.8522	7.5847	55.8538	7.5965	16
09-12-2016	4067.01	254	2	DK2	19:26	19:36	55.8558	7.5935	55.8494	7.5895	15
09-12-2016	4067.01	255	2	DK2	19:43	19:53	55.8508	7.5961	55.8558	7.5870	16
09-12-2016	4067.02	256	2	DK2	20:53	21:03	55.7248	7.6184	55.7176	7.6192	12
09-12-2016	4067.02	257	2	DK2	21:10	21:20	55.7190	7.6257	55.7213	7.6142	12
09-12-2016	4067.02	258	2	DK2	21:27	21:37	55.7185	7.6114	55.7217	7.6224	11
09-12-2016	4067.07	259	2	DK2	22:44	22:54	55.6295	7.4295	55.6244	7.4205	14
09-12-2016	4067.07	260	2	DK2	23:01	23:11	55.6239	7.4262	55.6306	7.4231	13
09-12-2016	4067.07	261	2	DK2	23:19	23:29	55.6275	7.4194	55.6246	7.4310	13
10-12-2016	3867.11	262	2	DK2	15:52	16:02	54.5845	7.9904	54.5869	8.0001	7
10-12-2016	3867.11	263	2	DK2	16:11	16:21	54.5888	7.9977	54.5814	7.9936	7
10-12-2016	3867.11	264	2	DK2	16:27	16:37	54.5834	7.9991	54.5882	7.9905	7
10-12-2016	3867.1	265	2	DK2	18:52	19:02	54.7208	7.8091	54.7268	7.8026	16
10-12-2016	3867.1	266	2	DK2	19:09	19:19	54.7241	7.7976	54.7255	7.8099	16
10-12-2016	3867.1	267	2	DK2	19:26	19:36	54.7271	7.8064	54.7048	7.7998	16
10-12-2016	3867.07	268	2	DK2	20:40	20:50	54.7702	7.5574	54.7722	7.5463	19
10-12-2016	3867.07	269	2	DK2	20:58	21:08	54.7693	7.5456	54.7746	7.5543	20
10-12-2016	3867.07	270	2	DK2	21:15	21:25	54.7746	7.5484	54.7677	7.5497	20
10-12-2016	3867.06	271	2	DK2	22:38	22:48	54.6011	7.5046	54.5940	7.5058	20
10-12-2016	3867.06	272	2	DK2	22:56	23:06	54.5957	7.5089	54.5984	7.4972	21
10-12-2016	3867.06	273	2	DK2	23:14	23:24	54.5950	7.5016	54.5991	7.5110	20
10-12-2016	3867.02	274	2	DK2	23:25	23:35	54.6935	7.3031	54.6983	7.2944	21
10-12-2016	3867.02	275	2	DK2	23:43	23:55	54.6955	7.2908	54.6968	7.3026	21
11-12-2016	3867.02	276	2	DK2	00:00	00:10	54.6993	7.2991	54.6923	7.2964	21
11-12-2016	3867.05	277	2	DK2	15:58	16:08	54.7852	7.2930	54.7872	7.3047	21
11-12-2016	3867.05	278	2	DK2	16:16	16:26	54.7896	7.3018	54.7824	7.3003	21
11-12-2016	3867.05	279	2	DK2	16:34	16:44	54.7838	7.3067	54.7881	7.2985	21
11-12-2016	3867.01	280	2	DK2	18:07	18:17	54.8742	7.1033	54.8780	7.1267	22
11-12-2016	3867.01	281	2	DK2	18:24	18:34	54.8750	7.0914	54.8787	7.1020	23
11-12-2016	3867.01	282	2	DK2	18:42	18:52	54.8777	7.0956	54.8701	7.0948	23
11-12-2016	3866.01	283	2	DK2	20:05	20:15	54.9627	6.9305	54.9674	6.9220	28
11-12-2016	3866.01	284	2	DK2	20:23	20:33	54.9648	6.9218	54.9677	6.9168	28
11-12-2016	3866.01	285	2	DK2	20:41	20:51	54.9675	6.9260	54.9609	6.9226	28
11-12-2016	3966.05	286	2	DK2	22:00	22:10	55.0985	6.8985	55.0990	6.9022	25
11-12-2016	3966.05	287	2	DK2	22:19	22:29	55.0977	6.8952	55.0974	6.9076	25
11-12-2016	3966.05	288	2	DK2	22:38	22:48	55.0942	6.9075	55.0990	6.8992	25
12-12-2016	3966.01	289	2	DK2	15:58	16:08	55.3610	6.8401	55.3676	6.8356	23
12-12-2016	3966.01	290	2	DK2	16:16	16:26	55.3662	6.8303	55.3648	6.8427	23
12-12-2016	3966.01	291	2	DK2	16:32	16:42	55.3677	6.8418	55.3638	6.8320	23
12-12-2016	3967.02	292	2	DK2	19:10	19:20	55.1291	7.2943	55.1224	7.2962	19
12-12-2016	3967.02	293	2	DK2	19:27	19:37	55.1224	7.3014	55.1253	7.2904	20
12-12-2016	3967.02	294	2	DK2	19:44	19:54	55.1220	7.2899	55.1253	7.3005	19
12-12-2016	3967.06	295	2	DK2	20:44	20:54	55.1306	7.5163	55.1304	7.5284	20
12-12-2016	3967.06	296	2	DK2	21:01	21:11	55.1330	7.5278	55.1278	7.5196	19
12-12-2016	3967.06	297	2	DK2	21:18	21:28	55.1280	7.5261	55.1343	7.5220	20



Map showing the 3 sandeel areas covered by the sandeel dredge surveys and the sampled positions.

## Others

A cruise summary report will be delivered online to

[http://seadata.bsh.de/csr/online/V1\\_index.html](http://seadata.bsh.de/csr/online/V1_index.html).