



Cruise Report
FRV „Solea“ Cruise 745
02. – 16.02.2018

Mupeds (Multi-purpose Education Survey)

Cruise leaders: Andrea Rau, Paco Rodriguez-Tress

Responsible scientist: Dr. Uwe Krumme

1. Background

The objective of the first part of the cruise (part 1) was a depth-stratified bottom trawl sampling of cod and flatfish along a transect from the area south of Adlergrund/Rönnebank into the Bornholm basin in winter. In detail we focused on the distribution of cod and flatfishes along the transect and sampling of cod stomachs.

The second part of the cruise (part 2) aimed at hydroacoustic and pelagic trawl sampling of herring and sprat in the Bornholm Basin to determine patterns in spatial distribution of fish in the pelagic zone in winter.

In addition, the hydrographic conditions during a winter without major Baltic inflows were assessed.

The cruise also fulfilled an educational purpose. Six students from the University of Rostock (master course “Integrative Zoology”) participated in this cruise. This was the practical education part of the MSc module “Methods in fisheries biology”.

Distribution list:

BLE, Hamburg
Schiffsführung FFS „SOLEA“
Deutsche Fischfang-Union
Sassnitzer Seefischerei e. G.
Landesverband der Kutter- u. Küstenfischer
DFFU Cuxhaven
BMEL, Ref. 614
Thünen-Institut - Pressestelle, Dr. Welling
Thünen-Institut - Präsidialbüro
Thünen-Institut - Institut für Fischereiökologie
Thünen-Institut - Institut für Seefischerei
Thünen-Institut - Institut für Ostseefischerei
Thünen-Institut - FIZ-Fischerei

BFEL HH, FB Fischqualität
Reiseplanung Forschungsschiffe, Herr Dr. Rohlf
Fahrtteilnehmer
Bundesamt für Seeschifffahrt und Hydrographie, Hamburg
Mecklenburger Hochseefischerei Sassnitz
Doggerbank Seefischerei GmbH, Bremerhaven
Deutscher Fischerei-Verband e. V., Hamburg
Leibniz-Institut für Meereswissenschaften IFM-GEOMAR
BSH, Hamburg
Leibniz-Institut für Ostseeforschung Warnemünde
Institut für Fischerei der Landesforschungsanstalt
LA für Landwirtschaft, Lebensmittels. und Fischerei
Euro-Baltic Mukran

1. Cruise track

The cruise started on Monday the 2nd of February 2018 and ended at the 16th of February in Marienehe / Rostock. The scientific crew and students changed in Sassnitz harbour at the 6th of February. During the whole cruise weather conditions were relatively good and fishing was performed as planned. A total of 36 double-belly hauls and 12 CTD casts were performed during the cruise. A depth range of 18,5 to 94 meters was covered by the cruise.

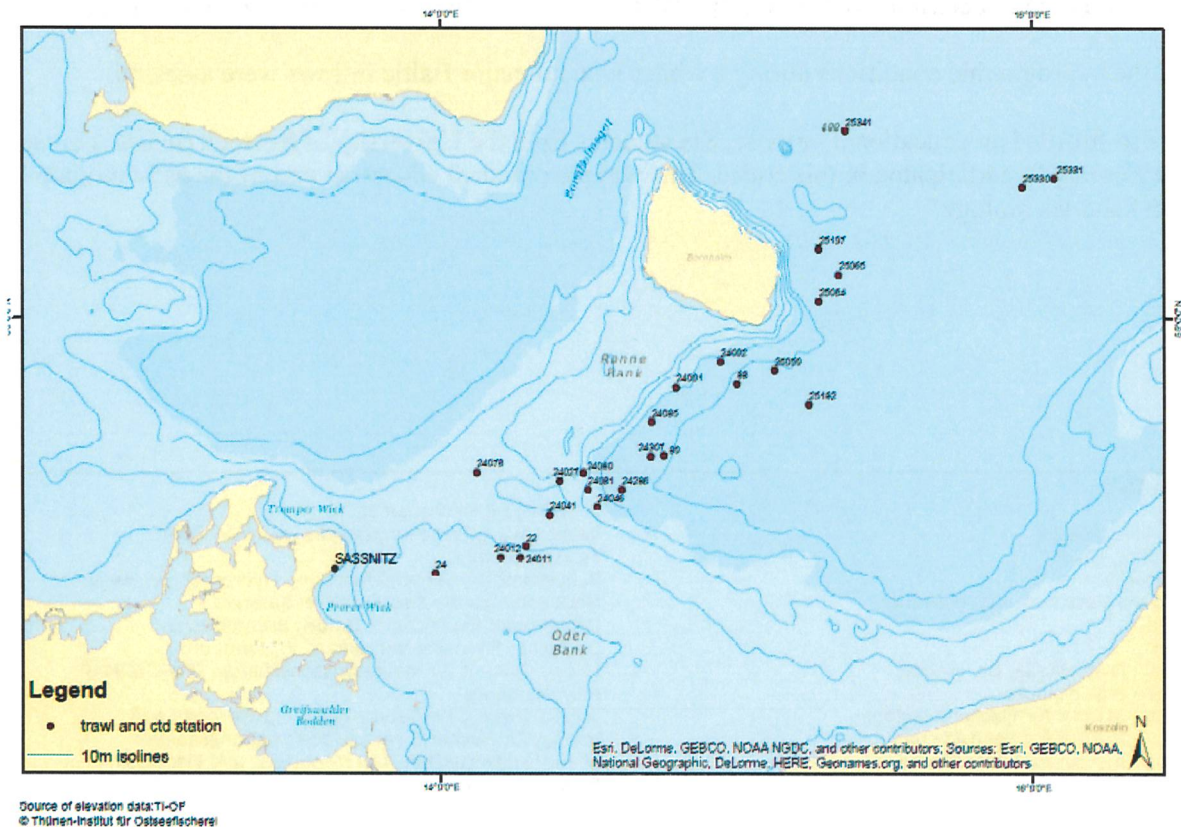
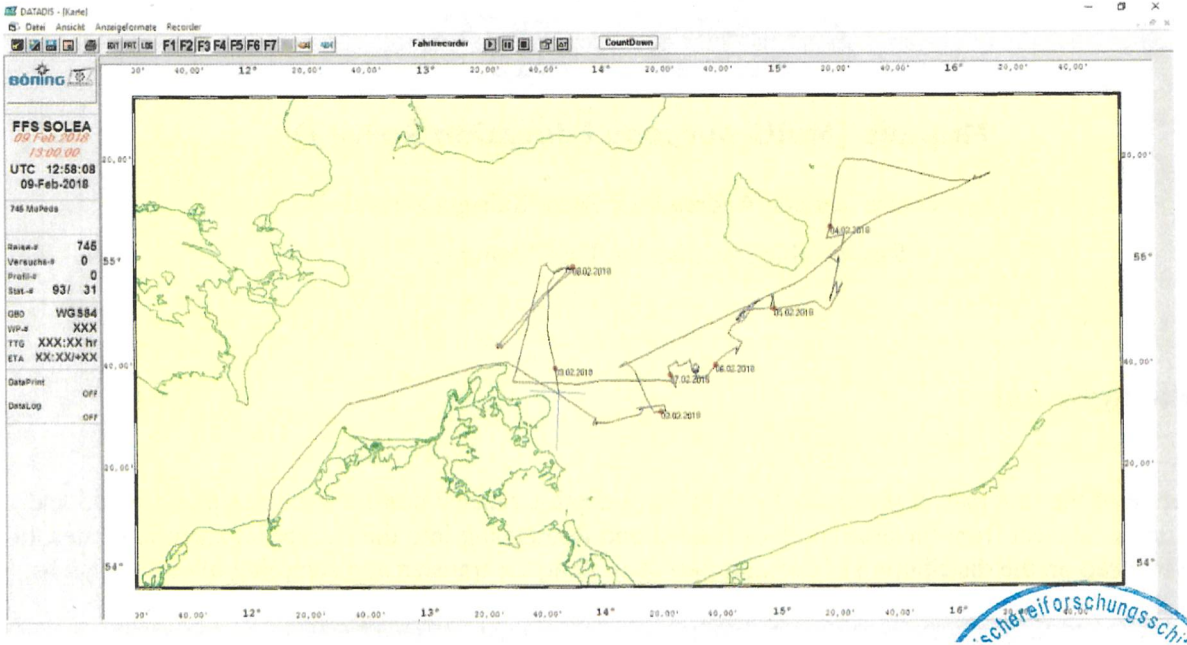


Figure 1. Stations fished during the first part of FRV Solea cruise 745.

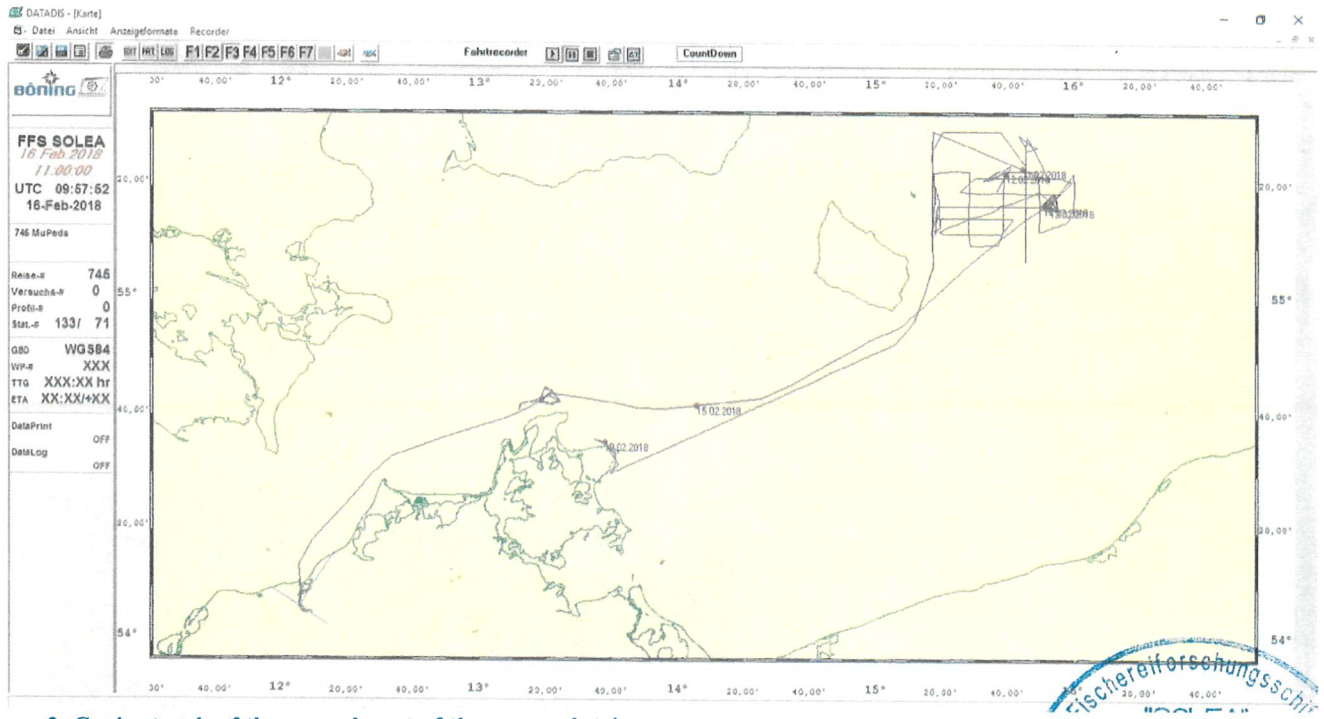


Figure 2. Cruise track of the second part of the research trip.

2. Oceanography

Hydrographic conditions showed a typical winter stratification. Oxygen concentrations during the study were up to 8 mL/L-1 in the upper layer. The oxygen concentrations in general decreased with depth and attained values close to zero in the deep water layer. Salinity increased from around 8 at the surface to about 17,5 in the deeper waters with a clearly distinguishable halocline in midwater at around 40 m depth. Water temperatures increased from 4°C at the surface layer to a maximum of 10°C at 50-60 m; further below water temperature slightly decreased with depth (Fig. 2).

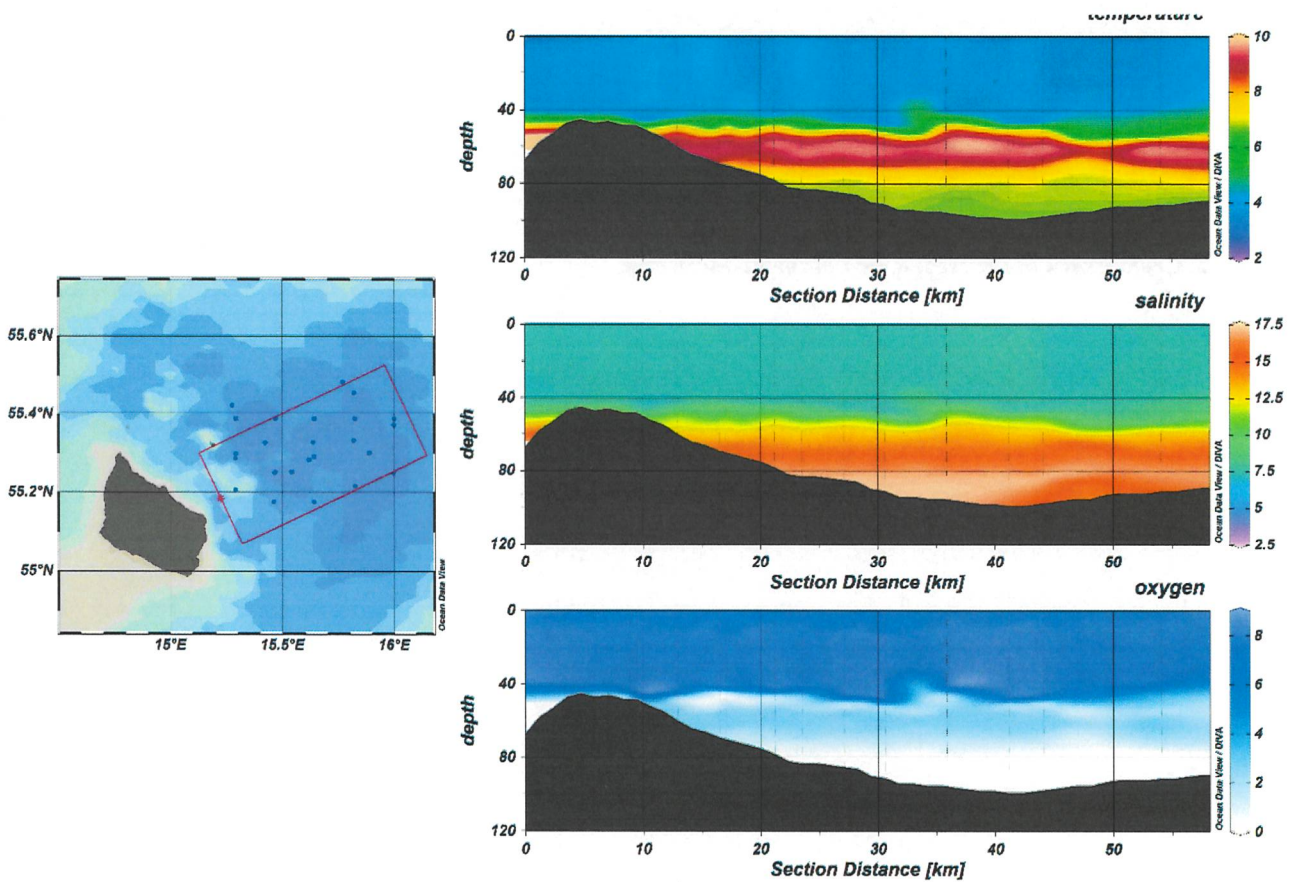


Figure 2. Water temperature, salinity and oxygen measurements in the Bornholm basin February 2018 during FRV SOLEA cruise 745.

3. Preliminary results of the first part of SOLEA cruise 745

Catch composition

The fish composition was dominated by flounder, followed by plaice and cod. Sprat and herring were bycaught, five other species were also captured (Table 1). The greatest amounts of flounder were caught between 60 and 80 m. Below this depth, the number of individuals declined slightly. Plaice was most abundant between 60 and 70 m depth. Cod was most abundant between 20 and 60 m water depth, i.e. above and below the halocline/thermocline/oxycline located at 40-50 m depth (see below).

Table 1. Total number of caught species

species	total number of individuals
<i>Platichthys flesus</i>	7920
<i>Pleuronectes platessa</i>	1049
<i>Gadus morhua</i>	863
<i>Sprattus sprattus</i>	276
<i>Myoxocephalus scorpius</i>	127
<i>Psetta maxima</i>	105
<i>Clupea harengus</i>	55
<i>Limanda limanda</i>	10
<i>Cyclopterus lumpus</i>	9
<i>Merlangius merlangus</i>	2

Cod

A total of 728 individual cod were examined on board and, for the analysis, grouped into 10m depth strata ranging from 0-10 m to 90-100 m. The main characters of length, sex and gonado-somatic index are shown in Table 2 and in Figures 3-6.

Table 2. Overview of 728 cod examined during the cruise. Data were stratified by 10m depth strata.

Depth stratum	Depth range	Total number of individuals	Number of male cod	Number of female cod	Mean cod length (mm)	GSI	Filling level of the stomach
0	0-10 m	0	0	0	0	0	0
1	10-20 m	4	2	2	375	2,41	1,00
2	20-30 m	111	60	51	359	2,08	2,66
3	30-40 m	188	98	90	342	2,86	3,02
4	40-50 m	84	46	38	364	2,69	2,86
5	50-60 m	193	85	108	35	3,54	3,47
6	60-70 m	130	66	64	353	4,23	3,41
7	70-80 m	13	10	3	345	4,88	3,31
8	80-90 m	5	2	3	394	3,94	4,40
9	90-100m	0					

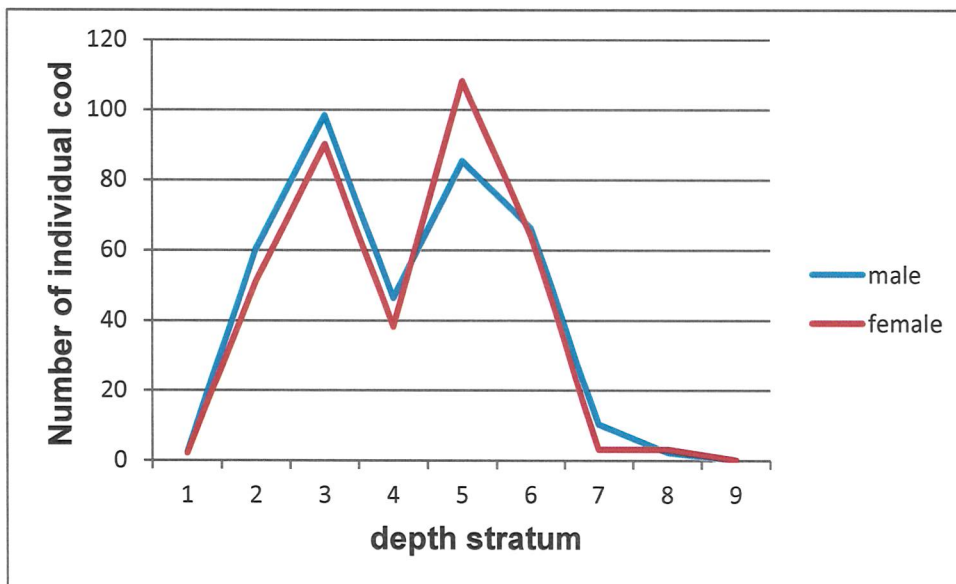


Figure 3. Distribution of male and female cod with depth stratum in February 2018.

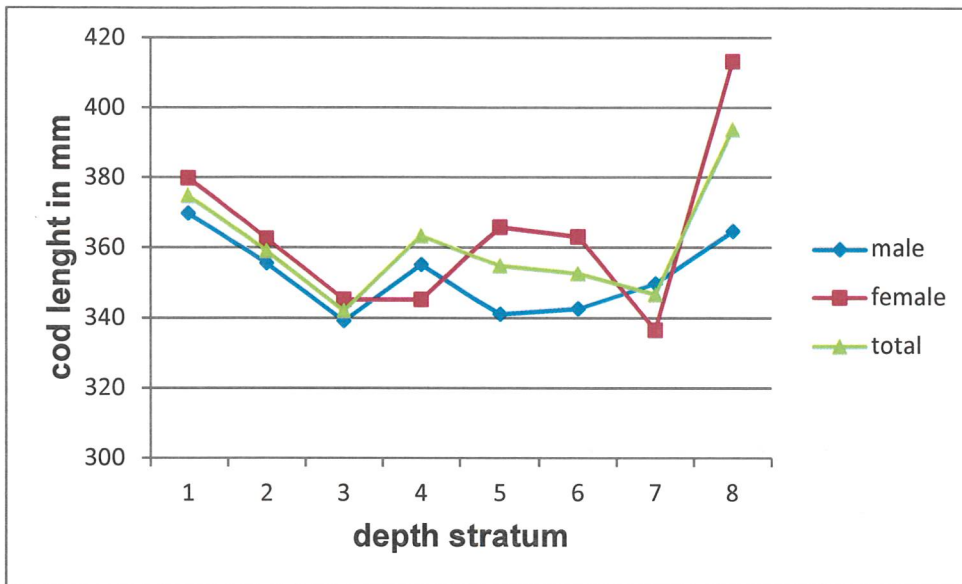


Figure 4. Distribution of mean length of male, female and all cod with depth stratum in February 2018.

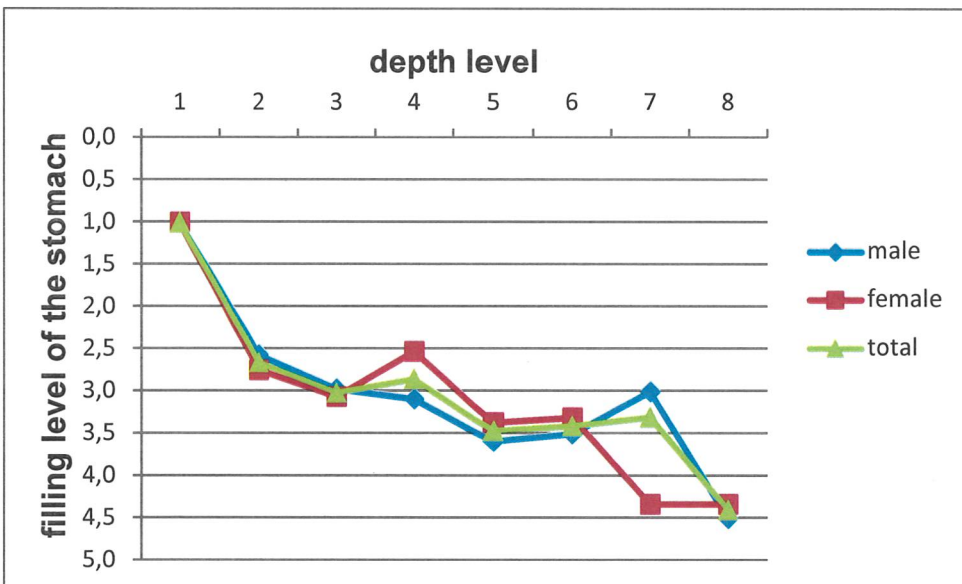


Figure 5. Distribution of mean filling level of cod stomachs of male, female and all cod with depth stratum in February 2018.

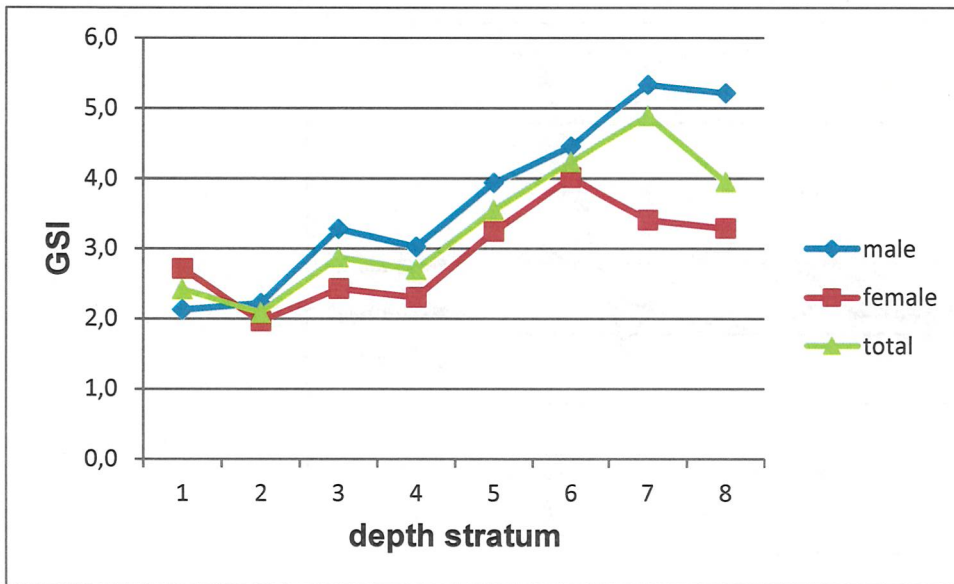


Figure 6. Distribution of the mean gonado-somatic index of male, female and all cod with depth stratum in February 2018.

4. Preliminary results of the second part of SOLEA cruise 745

Distribution of small pelagics

The NASC (the ratio of echo area (m^2) divided by the overall area recorded (nmi^2)) was highest near Bornholm in 40 – 75 m water depth (Fig. 8). There were up to $150 m^2/nm^2$.

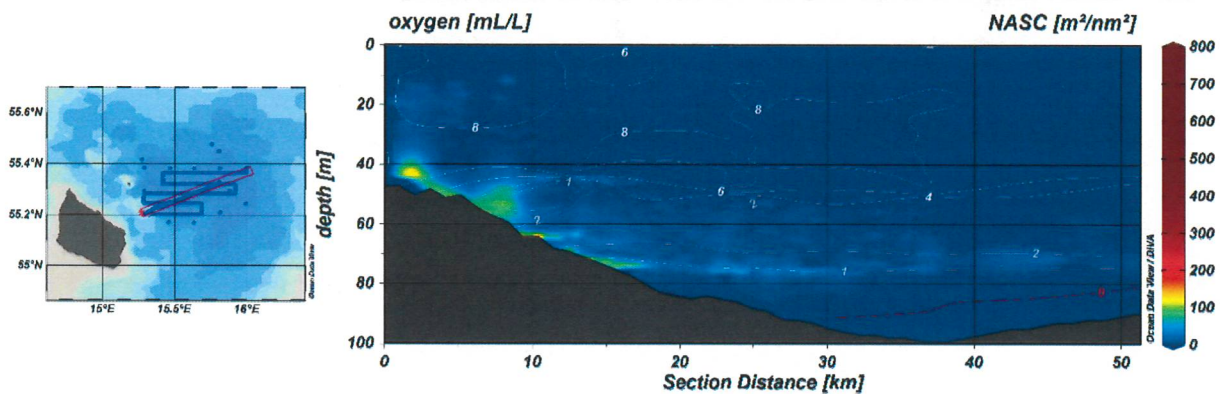


Fig. 8. NASC versus oxygen (right) in the survey area of FRV "Solea" cruise 745.

Species composition and length distributions

During the trawling sprat, herring, cot (*Gadus morhua*), flounder (*Platichthys flesus*), plaice (*Pleuronectes Platessa*), three-spined stickleback (*Gasterosteus aculeatus*) and fourbeard rockling (*Rhinonemus cimbricus*) were caught. Sprat was the dominant species (Fig. 9).

The highest frequency of sprat and herring was observed in station 99/37. In every haul more sprat than herring was caught (Fig 9). The length of sprat ranged from 6 to 15 cm (Fig. 10). The length of herring ranged from 7.5 to 26.5 cm with a peak at 13,5 and at around 19 cm total length (Fig. 11).

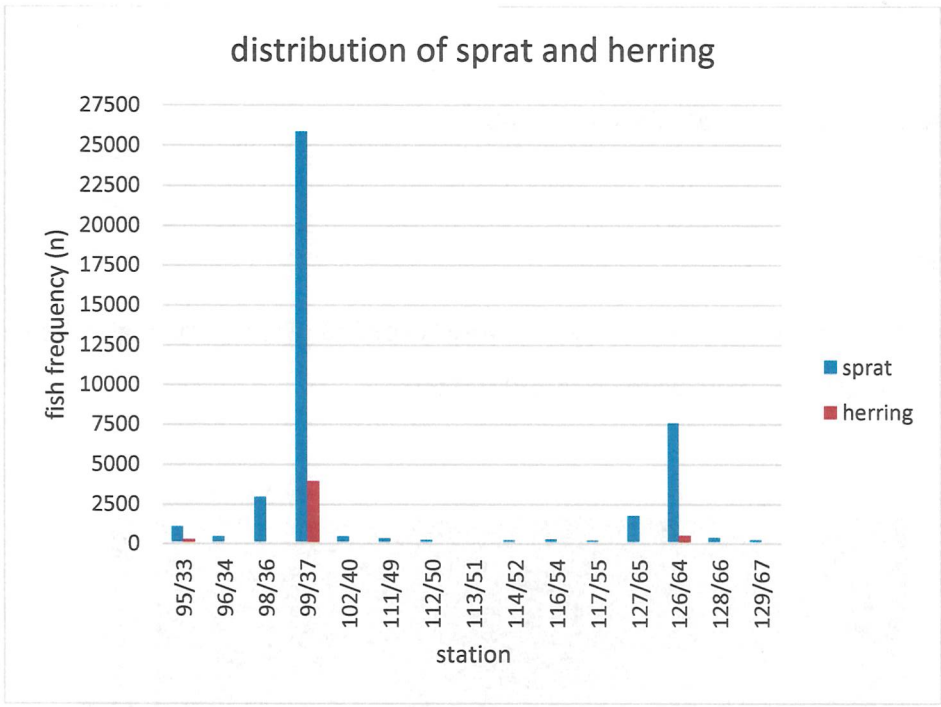


Fig. 9. Distribution of sprat (*Sprattus sprattus*) (blue) and herring (*Clupea harengus*) (orange) along the haul stations during the second part of FRV "Solea" cruise 745.

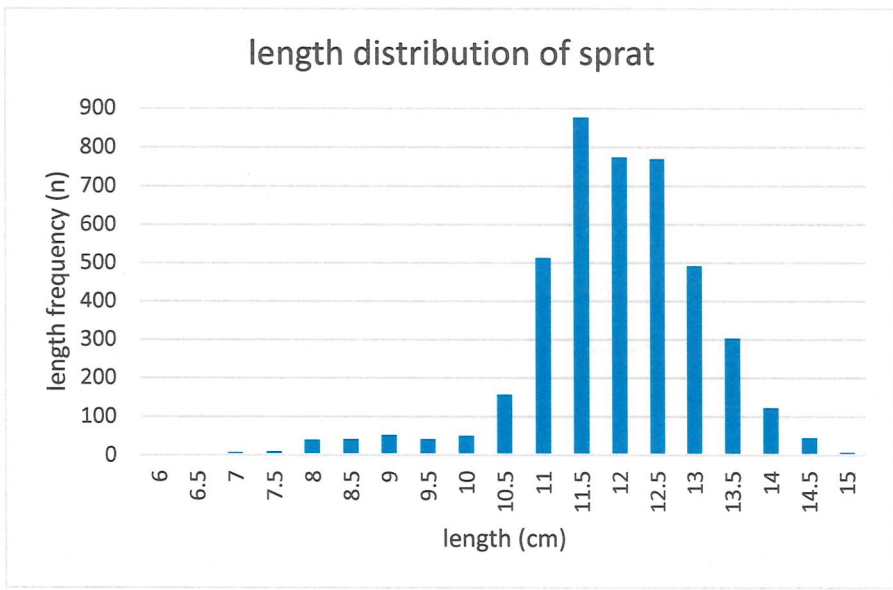


Fig.10. Length distribution of sprat (*Sprattus sprattus*) during the FRV "Solea" cruise 745.

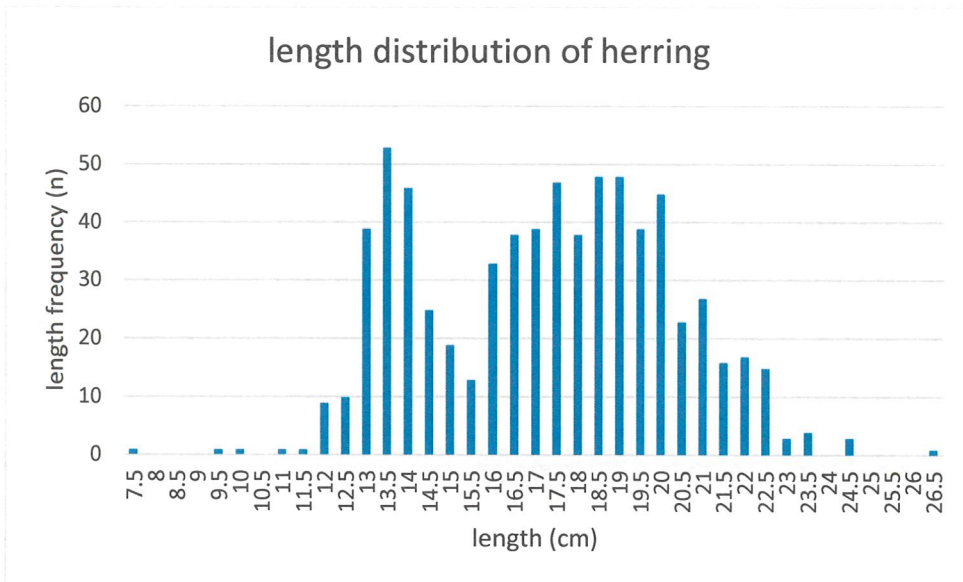


Fig. 11. Length distribution of herring (*Clupea harengus*) during the FRV "Solea" cruise 745.

5. Cruise participants

Part 1

Andrea Rau	scientist	Thünen-OF
Richard Klinger	PhD student	University of Hamburg
Anika Brunsch	student	University of Rostock
Tabea Gottschalk	student	University of Rostock
Jaqueline Fischer	student	University of Rostock

Part 2

Paco Rodriguez-Tress	scientist	Thünen-OF
Bernd Mieske	scientist	Thünen-OF (only 1 day)
Matthias Schaber	scientist	Thünen-OF (only 1 day)
Lisa Klemens	student	University of Rostock
Anne-Sophie Brunner	student	University of Rostock
Svea Winning	student	University of Rostock

Dr. Uwe Krumme (TI-OF)
(Scientist in charge)

Station list, cruise part 1

Haul no.	Station	Date	Depth (m)	Number of cod caught	Total catch weight of cod (kg)
63/1	24	03.02.2018	17,5-18,5	5	2,1
64/2	24012	03.02.2018	20,3-20,4	1	0,37
65/3	22	03.02.2018	21,3-22,1	0	0
66/4	24011	03.02.2018	19,5-19,8	0	0
67/5	24078	03.02.2018	27,1-27,8	3	6,05
68/6	25331	04.02.2018	86,9-91,1	0	0
69/7	25530	04.02.2018	91,5-92-8	0	0
70/8	25341	04.02.2018	92-8-94	0	0
71/9	25197	04.02.2018	65,9-68,6	94	31,89
72/10	25065	04.02.2018	74,5-83,2	5	2,4
73/11	25064	04.02.2018	77,7-77,8	1	0,27
74/12	25182	05.02.2018	71,3-75,5	12	5,94
75/13	25059	05.02.2018	62,9-63,8	68	32,26
76/14	88	05.02.2018	55,1-58,1	25	9,23
77/15	24092	05.02.2018	50,9-55,3	65	29,26
78/16	24091	05.02.2018	41,3-43,4	24	8,2
79/17	24085	06.02.2018	45,6-47	27	11,86
80/18	89	06.02.2018	54,9-55,5	90	39,04
81/19	24307	06.02.2018	52,4-54,1	132	57,96
82/20	24286	06.02.2018	46,9-48,8	31	16,56
83/21	24046	06.02.2018	38,7-39,9	69	20,72
84/22	24081	07.02.2018	37,2-38,6	50	21,67
85/23	24080	07.02.2018	30,1-34,4	55	21,06
86/24	24027	07.02.2018	26,8-28,4	94	38,84
87/25	24041	07.02.2018	29,2-32,3	12	5,44

Station list, cruise part 2

haul	station	date
1	95/33	11.02.2018
2	96/34	11.02.2018
3	98/36	11.02.2018
4	99/37	12.02.2018
5	102/40	12.02.2018
6	111/49	13.02.2018
7	112/50	13.02.2018
8	113/51	13.02.2018
9	114/52	13.02.2018
10	116/54	14.02.2018
11	117/55	14.02.2018
12	127/65	14.02.2018
13	126/64	14.02.2018
14	128/66	14.02.2018
15	129/67	15.02.2018

