

Cruise Report Demersal Young Fish Survey (DYFS) 2020 and FRV „Clupea“ 346, 21/08 to 07/10/2020

Cruise leader: Dr. Holger Haslob

1. Summary

Since 1974, the Demersal Young Fish Survey (DYFS) is carried out in the German Bight and in the German Wadden Sea area. The main goal of this survey is the determination of abundance indices the 0-groups of important commercially exploited fish species, e.g. plaice, sole, and cod. These recruitment indices are used for fish stock assessments coordinated by the International Council for the Exploration of the Seas (ICES). Further, this survey targets the abundance and distribution of brown shrimp (*Crangon crangon*) in this area. Before 2012, the DYFS was only operated with chartered commercial vessels. Since 2012, a research vessel is available which is able to complementarily cover the areas within the 12nm zone along the whole North Sea coast.

During the DYFS in 2020, 240 hauls (4 hauls invalid) were operated by 4 chartered commercial vessels and RV Clupea in different areas of the German Wadden Sea and along the German Bight coastal zone. The gear in use was a 3m beam shrimp trawl. 67 species were recorded, thereof 33 finfish species, 1 lamprey and 33 invertebrates. Whiting, plaice, flounder and sand goby dominated the catch compositions while the dominating invertebrates in the catches were brown shrimp, green shore crab, common swimming crab and common starfish. In 2020, the index for 0-group plaice was clearly above the ten-year average again, but lower compared to the previous year. The index for 0-group cod remained very low with a value near zero.

Verteiler:

Schiffsführung FFS „Clupea“
BA für Landwirtschaft und Ernährung (BLE) Fischereiforschung
BM für Ernährung und Landwirtschaft (BMEL), Ref. 614
BA für Seeschifffahrt und Hydrographie (BSH), Hamburg
Deutscher Angelfischerverband e.V.
Deutsche Fischfang-Union, Cuxhaven
Deutscher Fischereiverband Hamburg
Doggerbank Seefischerei GmbH, Bremerhaven
Erzeugergemeinschaft der Deutschen Krabbenfischer GmbH
Euro-Baltic Mukran
GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel
Kutter- und Küstenfisch Sassnitz
LA für Landwirtschaft, Lebensmittels. und Fischerei (LALLF)
LFA für Landwirtschaft und Fischerei MV (LFA)
Landesverband der Kutter- u. Küstenfischer MV e.V.

Leibniz-Institut für Ostseeforschung Warnemünde
Thünen-Institut - Institut für Fischereiökologie
Thünen-Institut - Institut für Seefischerei
Thünen-Institut - Institut für Ostseefischerei
Thünen-Institut - Pressestelle, Dr. Welling
Thünen-Institut - Präsidialbüro
Thünen-Institut - Reiseplanung Forschungsschiffe, Dr. Rohlf
Fahrteilnehmer*innen

2. Goal of the survey

Since 1974, the Demersal Young Fish Survey (DYFS) is carried out in the German Bight and in the German Wadden Sea area. The main goal of this survey is to determinate 0-group abundance indices of important commercially exploited fish species, e.g. plaice, sole, and cod. These recruitment indices are used for fish stock assessments coordinated by the International Council for the Exploration of the Seas (ICES). Further, this survey targets the abundance and distribution of other fish species and brown shrimp (*Crangon crangon*) in the covered area. Before 2012, the DYFS was exclusively run with chartered commercial vessels. Since 2012, a fishery research vessel is available which is able to complementary cover the areas within the 12nm zone along the whole North Sea coast.

3. Cruise schedule

Charter vessels

The cruises of chartered commercial fishing vessels were carried out as day cruises. The first cruise started at the 21st August with the shrimp vessel Jule Marie (ST10) and covered the coastal area of Dithmarschen (Meldorf Bight, Süderpiep, Norderpiep, Eider Estuary). Within three days (21/08 to 23/08) 28 stations were fished, partly in bad weather conditions. During the next two days 30 hauls were carried out in the Hever, Süderau, and Norderaue. The operations had to be stopped due to bad weather conditions at the 26th August and were continued at the 27th August in the Hever area and the Eider estuary. 14 hauls were operated during this final day during the North Frisian campaign. Sampling in the Weser area were conducted with the Nixe II (DOR 5) during the 8th September to the 10th September and 40 hauls were realized. In parallel, during the 8th to the 10th September 29 stations were operated with the vessel Gerda Bianka (ACC1) in the East Frisia area. During the last DYFS campaign operating in the Elbe area near Cuxhaven (24th to 25th September) 18 stations were covered by the vessel Ramona (CUX9). All in all 149 hauls (4 invalid) were carried out by chartered vessels for the DYFS in 2020.

346. Cruise FRV „Clupea“

Due to actions taken by the BLE with regard to the Corona pandemic situation, the 346th cruise of RV Clupea was carried out as day cruises. As scheduled, the cruise started at the 15th September from Emden and station work was started the same day north of Borkum. During the first two days of the cruise RV Clupea returned to Borkum. At the 17th September only two stations were carried out, before due to technical problems RV Clupea had to sail to Büsum. The required repairs were carried out the next day and the cruise was continued on the 21st September. During the 21st September and 2nd October RV Clupea operated from Helgoland and Büsum. Due to bad weather conditions no station work was carried out during the 24th and 1st October. At 5th October all scientific equipment was unloaded from RV Clupea in Büsum, before the ship sailed back to Rostock, via Cuxhaven and the Kiel-Canal, where the cruise ended at 7th October. During the cruise 91 hauls were carried out with the 3m shrimp beam trawl.

4. Preliminary results

Haul composition

Chartered vessels

During the DYFS in 2020, 145 valid hauls were operated by 4 chartered commercial vessels in five different areas in the German Wadden Sea and in the German Bight. The gear in use was a 3m shrimp beam trawl. 67 species were recorded, thereof 33 fish species, one lamprey and 33 invertebrates. Whiting, plaice, flounder, and sand goby dominated the catch composition while the dominating invertebrates in the catches were brown shrimp, green shore crab, common swimming crab and common starfish (Tab. 2).

346th cruise RV Clupea

During the 346th cruise of RV Clupea 91 hauls were carried out in the coastal zone of the German bight. 81 species were recorded, 35 fin fish species, one lamprey species, and 45 invertebrates. Whiting, plaice, flounder and sand goby dominated the catch compositions while the dominating invertebrates in the catches were brown shrimp, green shore crab, common swimming crab and common starfish.

Distribution patterns of selected species

Highest abundance values of 0-group plaice were recorded as usually in the area of the Elbe and Weser estuaries (area 412, 413). High abundances were also observed in the East Frisian area (414, Fig. 2a). In general, there were more 0-group plaice observed in the wadden areas compared to the coastal stations. Plaice was the dominating fish species and occurred on 97% of the stations. 0-group sole were caught in similar low numbers compared to the last year. Few individuals were distributed over the area of the Weser estuary up to the Hever area (Fig. 2b). However, different to previous years a higher number of sole >15cm were observed especially in the North Frisian area. Cod was only sporadically present in the index area (409-411, 406s and 406n; Fig. 2c). In the Elbe estuary and especially in the East Frisian area higher numbers of 0-group cod was observed. The spatial abundance values of whiting were again evenly distributed over the whole survey area and the abundances were similar to that of the last year. Higher abundances were recorded in the estuaries but also in the gully systems (Fig. 2d). The index value was similar to those of the last two years and is still clearly above the average of the last ten years. Brown shrimp was observed in lower abundances on the coastal stations and higher abundances in the wadden areas (Fig. 3). Exceptional high abundances of brown shrimp were observed in the East-Frisian area 414.

Abundance indices

The DYFS provides data to the "Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)", which estimates a 0-group plaice index used for North Sea plaice stock assessment. The German index is traditionally estimated for the coast of Schleswig-Holstein because for this area the time series is the most consistent one (ICES areas 406N, 406S, 411, 410, 409 Fig. 1). The 2020 index for plaice was 7.55 n/1000m² which is lower compared to the 2019 value (10.59 n/1000m²), but still clearly above the last ten years average (Fig. 4a). The abundance index for sole was 0.05 n/1000m² (the same as for 2019) and was again below the last ten years average (Fig. 4b). The abundance index for cod is on the same low level as for the last five years and still far below the long-term average (Fig. 4c). The whiting abundance index was on a similar level as for the previous two years and is the third highest value observed for the last ten years (Fig. 4d). The abundance index of brown shrimp for the coastal area in Schleswig-Holstein is decreasing since 2018 (Fig. 6). However, the brown shrimp indices were highly variable between the different areas (Fig. 5): while in the East Frisian area the index is the highest observed for the time series, the indices for the other areas are on average levels. The index calculated for the RV Clupea stations along the coast is the second lowest value observed (lowest value observed in 2016). In years with high abundances of whiting a top down control on the brown shrimp stock might be possible (Fig. 6).

The length distributions display (Fig. 7) that most of the caught fish belong to the 0-group. Only for sole (Fig. 7b) and dab (Fig. 7c) cohorts are visible in the length distributions (two year classes). It is remarkable that this year a considerable number of sole >15cm was recorded, which especially occurred in the area of the Süderaue (area 409).

Biological sampling

During the DYFS cruises the total number and total weight of all individuals per haul is recorded routinely. Of all fish species length measurements are recorded. For some selected species the relative length frequency distributions are displayed in figure 7.

In order to estimate the number of caught shrimp (*Crangon spec.*), for shrimp length measurements and the determination of sex and maturity stages, a subsample of ca. 250g *Crangon* is sampled per station. In addition, an exact species identification is conducted for this subsample and, if present, the proportion of *Crangon allmanni* is determined.

For age readings up to 5 individuals of plaice ($\geq 8.0\text{cm}$) per length class per ICES area were collected. Age was determined later in the laboratory by otolith readings.

5. Miscellaneous

In the East-Frisian area in front of the Isles (405) the invasive hermit crab *Diogenes pugilator* was recorded for the first time in the DYFS 2019. This year, attention was paid to the occurrence of this species and it was found all along the coast, but with highest abundances in front of the East Frisian coast. Further, for the first time the invasive *Palaemon macrodactylus* was recorded on several stations within the investigation area.

For the first time during the DYFS the thornback ray (*Raja clavata*) was caught. Two specimens were caught in the area in front of the Süder Piep. Further, two sea horses (*Hippocampus spec.*) were caught north off the East Frisian coast, which was also the first record of this species during this survey.

6. Participants and details of the cruises

Tab. 1: Cruise overview of chartered vessels DYFS 2020.

Reisenr.	20WE2	20OF2	20BU2
Ausgangshafen	Dorumersiel	Accumersiel	Büsum
Gebiet	Jade - Weser	Accumer Ee	Meld.Bucht - Eider
Chartertage	(3) 08.09. – 10.09.2020	(3) 08.09. - 10.09.2020	(3) 21.08. - 23.08.2020
Kutter	Nixe II (DOR 5)	Gerda Bianka (ACC 1)	Jule Marie (ST 10)
Eigner	Stefan Hellberg	Tom Caspers	Ted Sönnichsen
Fahrtleitung, Fahrtteilnehmer aus TI-SF	Philipp Schweizer, Christian Schulte, Felix Zundel	Dr. Holger Haslob, Annika Elsheimer, Valeria Adrian-Schütte	Dr. Holger Haslob, Dr. Hermann Neumann, Valeria Adrian-Schütte

Reisenr.	20HU2	20CU2	
Ausgangshafen	Eidersperrwerk/Büsum	Cuxhaven	
Gebiet	Hever – Norder Aue	Unterelbe	
Chartertage	(4) 24.08.- 27.08.2020	(2) 25.09. - 26.09.2020	
Kutter	Jule Marie (ST 10)	Ramona (CUX 9)	
Eigner	Ted Sönnichsen	Kay Poit	
Fahrtleitung, Fahrtteilnehmer aus TI-SF	Dr. Holger Haslob, Dr. Hermann Neumann, Valeria Adrian-Schütte	Philipp Schweizer, Valeria Adrian-Schütte, Jana Bäger	

7. Acknowledgements

Thanks to all captains who participated with their vessels in the "Demersal Young Fish Survey 2020", and thus enabled the sampling at sea. We hope to continue this good cooperation in future campaigns!

Thanks to Captain Köhn and the crew of FFS Clupea for all the support during the 346th cruise of RV Clupea!

Thanks to all cruise participants for their support and willingness to successfully realize the Demersal Young Fish Survey 2020.

Dr. Holger Haslob
Cruise leader

8. Figures and tables

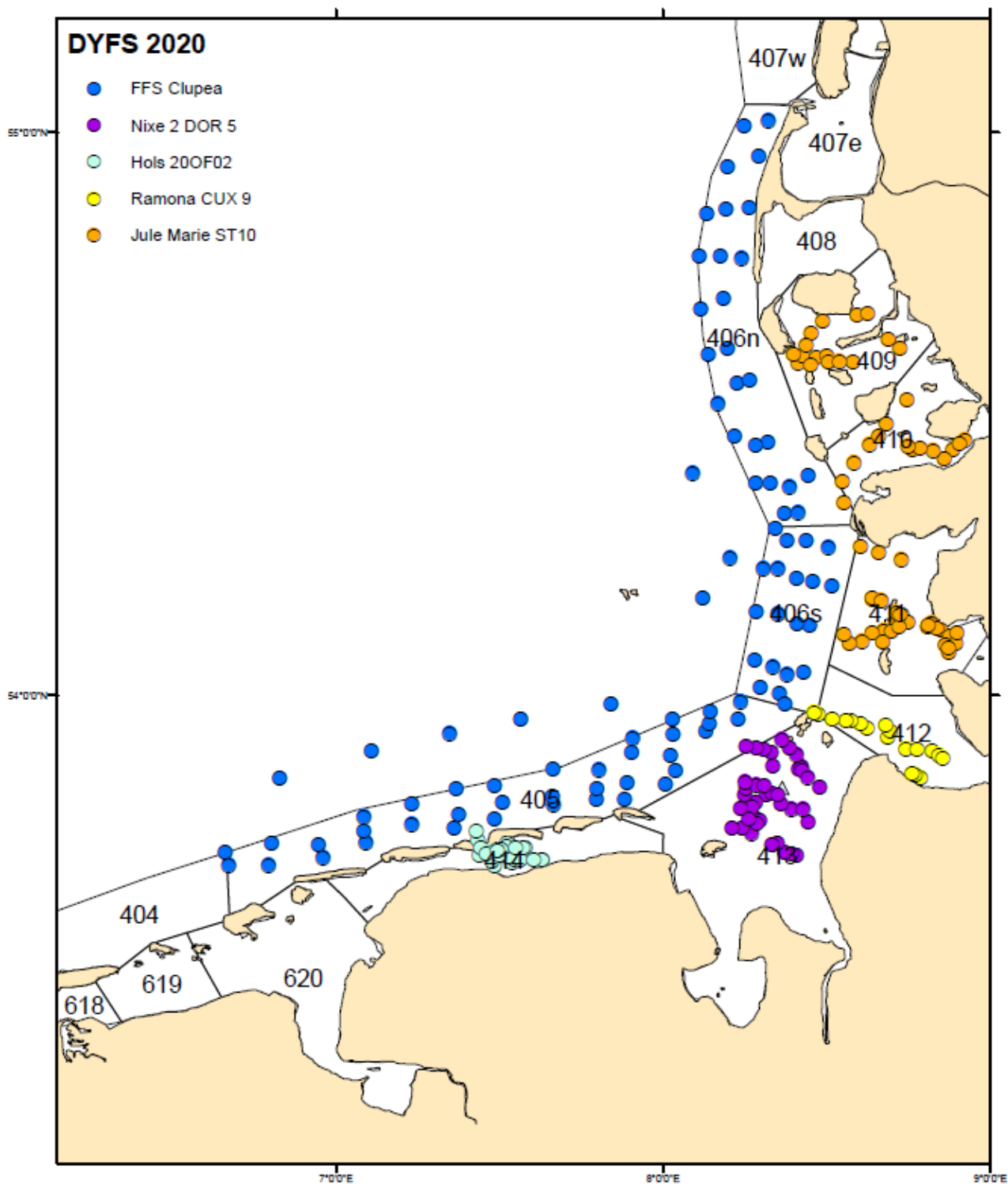


Fig. 1: Station overview Demersal Young Fish Surveys (DYFS) 2020. Numbers denote statistical ICES areas.

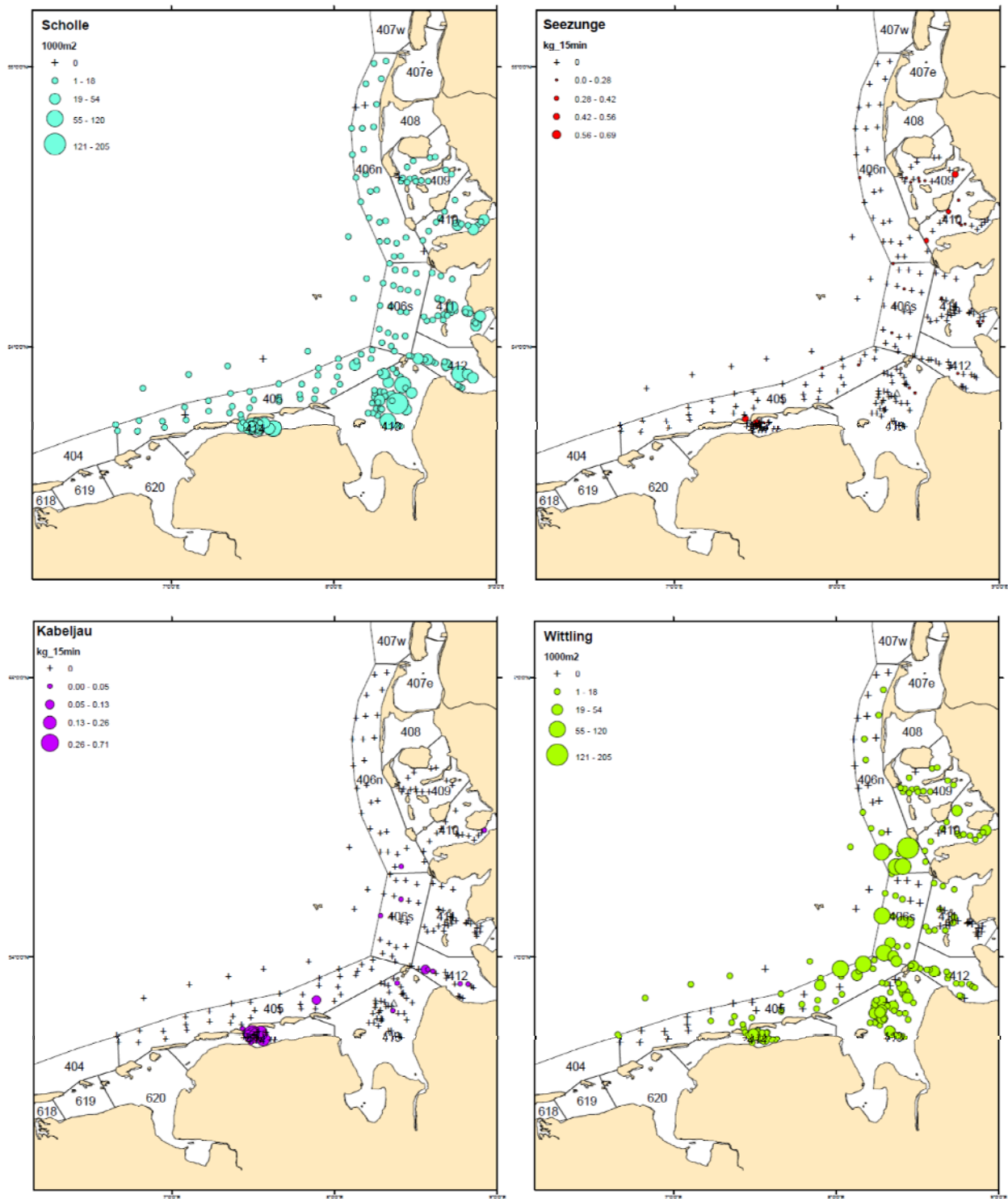


Fig. 2: Abundance (n/1000m²) and distribution of selected fish species during the DYFS 2020.

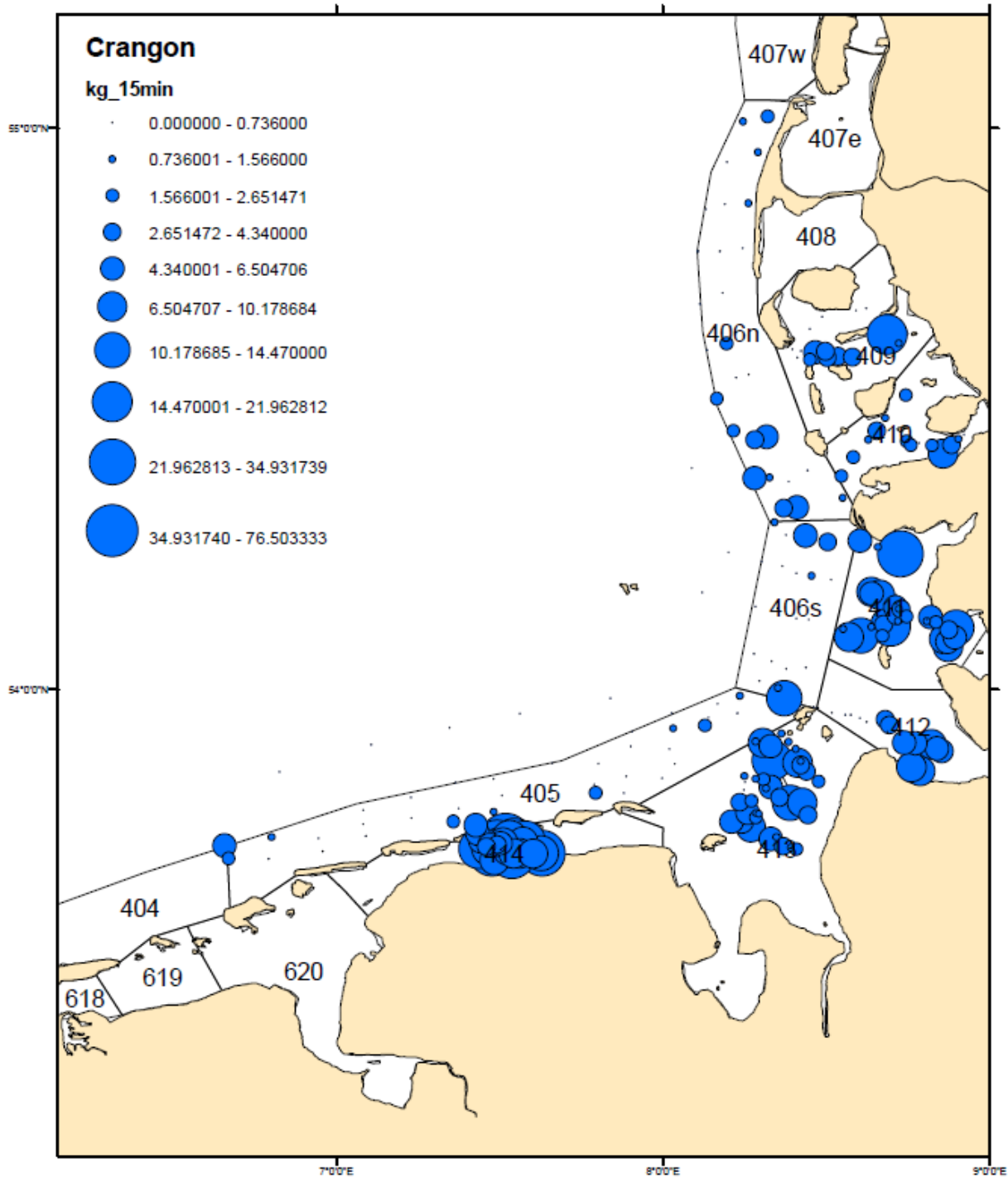


Fig. 3: Abundance (kg/15min) and distribution of brown shrimp (*Crangon crangon*) during the DYFS 2020.

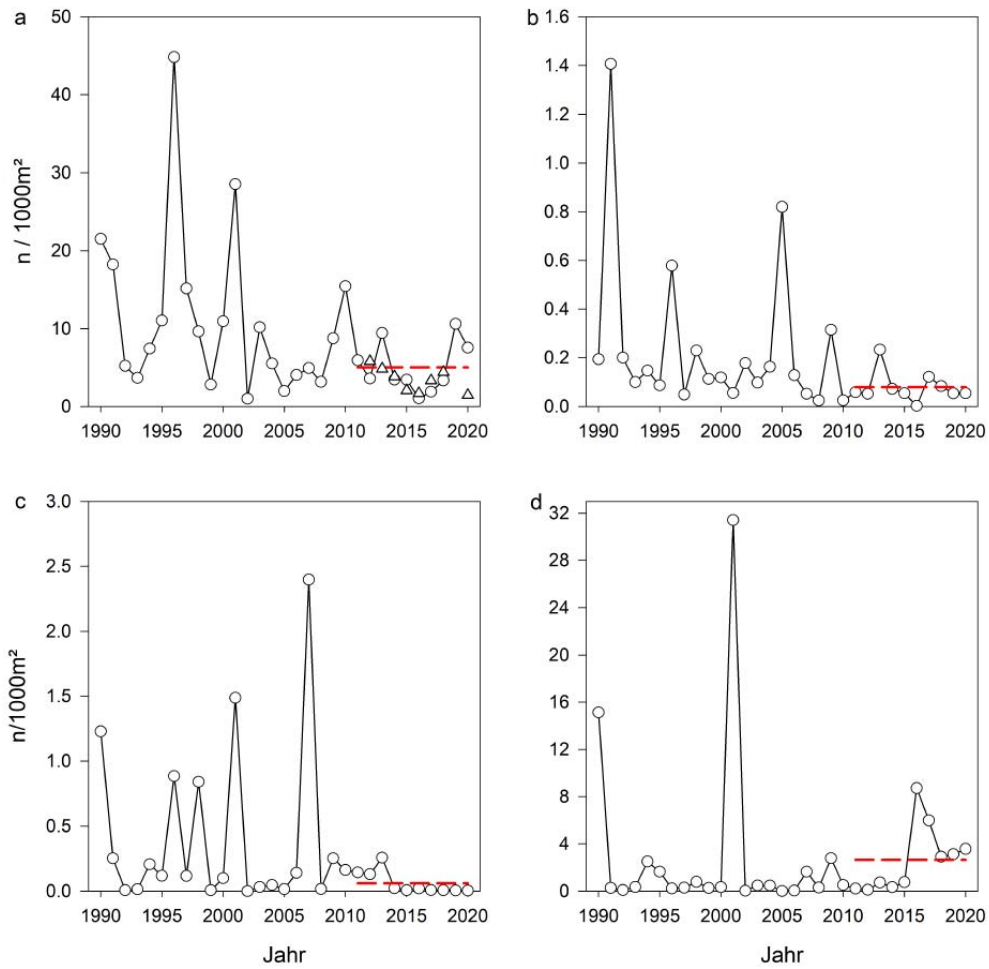


Fig. 4: Abundance indices for 0-group of plaice ≤ 12.5 cm (a), sole ≤ 13.5 cm (b), cod ≤ 18.5 cm (c) and whiting ≤ 17.5 cm (d) for the coastal areas of Schleswig-Holstein. The red dashed line denotes the last 10 years average.

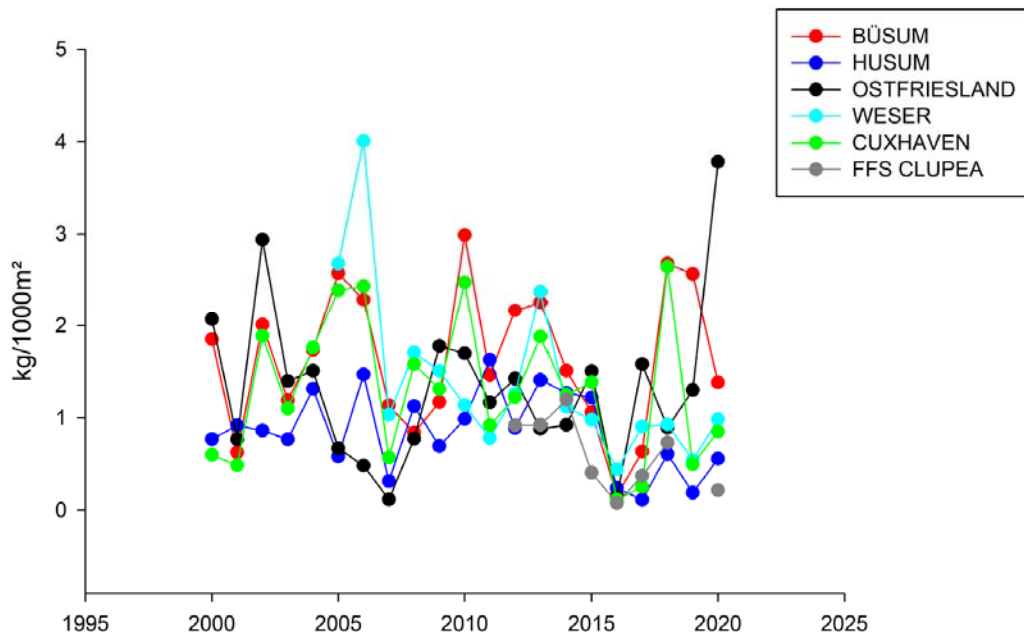


Fig. 5: DYFS biomass index for brown shrimp (*Crangon crangon*) by area.

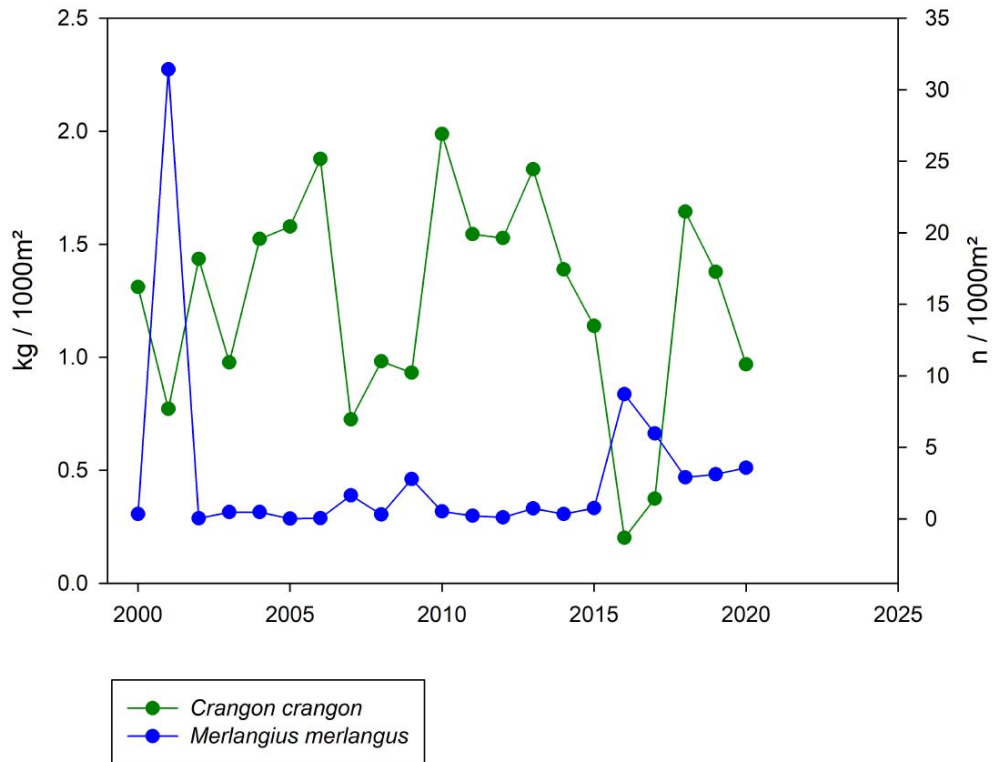


Fig. 6: Relative abundance index for whiting and brown shrimp in the coastal waters of Schleswig-Holstein (each index weighted by its mean).

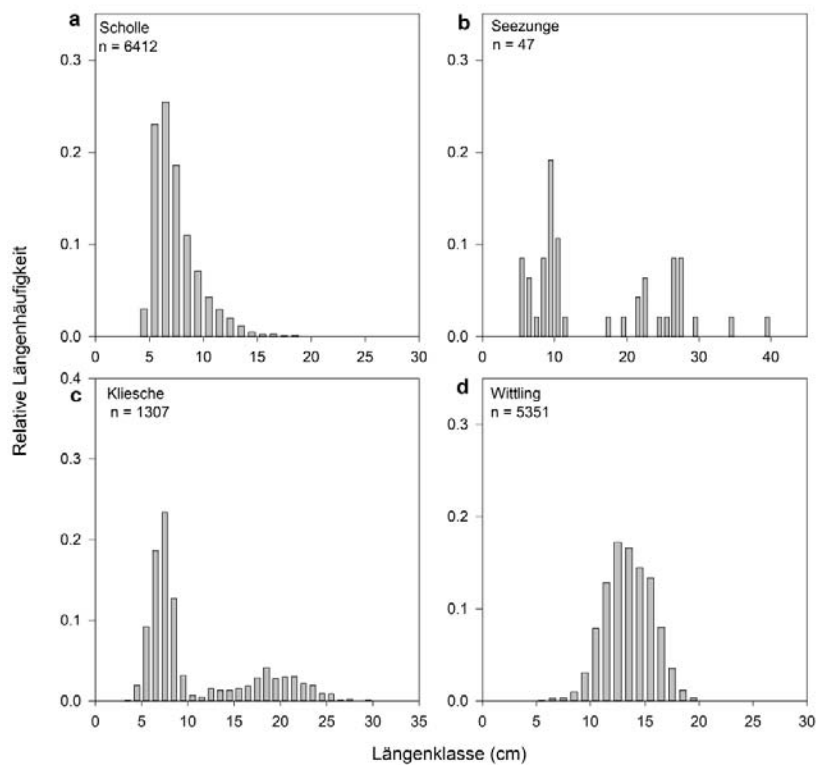


Fig. 7: Relative length frequency distributions for plaice (a), sole (b), cod (c) and whiting (d) caught in the DYFS 2020 campaign.

Tab. 2: The top ten most abundant finfish and invertebrate species in numbers (n) and total weight (kg) displayed for all chartered vessels (left column) and FRV Clupea (right column).

FFS Clupea 2020				Charterkutter (145 Hols)			
Fish	Total N	Invertebrates	Total N	Fish	Total N	Invertebrates	Total N
MERLANGIUS MERLANGUS	6303	CRANGON CRANGON	n.a.*	PLEURONECTES PLATESSA	8904	CRANGON CRANGON	n.a.*
LIMANDA LIMANDA	1240	OPHIURA OPHIURA	82272	MERLANGIUS MERLANGUS	4176	CARCINUS MAENAS	9555
PLEURONECTES PLATESSA	698	OPHIURA ALBIDA	44638	POMATOSCHISTUS MINUTUS	3069	OPHIURIDA	7265
POMATOSCHISTUS MINUTUS	453	ENSIS	9713	CLUPEA HARENGUS	2006	MACROPIPIUS HOLSATUS	4842
AGONUS CATAPHRACTUS	229	MACROPIPIUS HOLSATUS	6980	SYNGNATHUS ROSTELLATUS	1062	ASTERIAS RUBENS	1228
CLUPEA HARENGUS	198	ASTERIAS RUBENS	1491	OSMERUS EPERLANUS	737	MOLGULA	706
CALLIONYMUS LYRA	95	PAGURUS BERNHARDUS	991	PLATICHTHYS FLESUS	380	PAGURIDAE	419
MICROSTOMUS KITT	94	SPISULA SOLIDA	791	CILIATA MUSTELA	361	PAGURUS BERNHARDUS	266
SYNGNATHUS ROSTELLATUS	68	ABRA ALBA	298	AGONUS CATAPHRACTUS	296	MOLGULA OCCULTA	186
BUGLOSSIDIUM LUTEUM	37	MACROPIPIUS DEPURATOR	269	TRACHURUS TRACHURUS	162	CERASTODERMA EDULE	125
Fish	Total kg	Invertebrates	Total kg	Fish	Total kg	Invertebrates	Total kg
MERLANGIUS MERLANGUS	169.389	CRANGON	92.1	MERLANGIUS MERLANGUS	87.9	CRANGON	988.0
LIMANDA LIMANDA	30.737	OPHIURA OPHIURA	73.9	PLEURONECTES PLATESSA	42.9	CARCINUS MAENAS	76.3
PLEURONECTES PLATESSA	8.125	ASTERIAS RUBENS	48.7	PLATICHTHYS FLESUS	12.4	MACROPIPIUS HOLSATUS	30.8
RAJA CLAVATA	3.564 (n=2)	MACROPIPIUS HOLSATUS	29.2	POMATOSCHISTUS MINUTUS	11.9	ASTERIAS RUBENS	17.1
CALLIONYMUS LYRA	2.371	OPHIURA ALBIDA	9.2	OSMERUS EPERLANUS	9.2	OPHIURIDA	10.2
PLATICHTHYS FLESUS	1.766	SPISULA SOLIDA	7.7	CLUPEA HARENGUS	5.7	CRASSOSTREA GIGAS	9.8
POMATOSCHISTUS MINUTUS	1.102	ENSIS	4.7	CILIATA MUSTELA	5.1	MOLGULA OCCULTA	4.3
AGONUS CATAPHRACTUS	1.101	PAGURUS BERNHARDUS	2.8	SOLEA VULGARIS	3.7	PAGURUS BERNHARDUS	2.2
CLUPEA HARENGUS	0.604	CARCINUS MAENAS	1.3	AGONUS CATAPHRACTUS	2.4	MYTILUS EDULIS	0.6
SOLEA VULGARIS	0.569	HOMARUS VULGARIS (n=1)	1.1	GADUS MORHUA	2.2	PALAEEMON MACRODACTYLUS	0.5