

Cruise Report

Demersal Young Fish Survey (DYFS) 2023 01/09 to 06/10/2023 and FRV „Clupea“ 381/382, 11/09 to 06/10/2023

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 complementary cover the areas within the 12nm zone along the whole North Sea coast.

During the DYFS in 2023, 209 hauls (24 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. species were recorded, thereof 42 finfish species, 1 lamprey and 53 invertebrates. Whiting, plaice, dab and flounder dominated the overall catch composition while the dominating invertebrates in the catches were brown shrimp, brittle stars, common swimming crab and green shore crab. In 2023, the index for 0-group plaice was the lowest in the time series since 1990. However, in one of the main index areas there were problems caused by massive algae occurrence, leading to a clogging of the net and probably reduced catchability of the gear. Thus, the coverage of this area was not sufficient for the index calculation. The index for 0-group cod was the second year in a row zero.

Verteiler:

Schiffsführung FFS „Solea“
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
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 determine 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 complementarily cover the areas within the 12nm zone along the whole North Sea coast.

3. Cruise schedule

Charter vessels

The cruises of chartered commercial shrimp vessels were carried out as day cruises. The first cruise started at the 1st September with the shrimp vessel Jule Marie (ST10) and covered the coastal area of Dithmarschen (Meldorf Bight, Süderpiep, Norderpiep, Eider Estuary). Within three days (01/09 to 03/09) 30 stations were fished. During the next four days 52 hauls were carried out in the Hever, Süderaue, and Norderaue. It has to be noted here, that in this area the mass occurrence of algae hampered severely the catchability of the gear and 24 hauls had to be flagged invalid. Therefore, the area coverage was not sufficient for the index calculation. Sampling in the Weser area was conducted with the Nixe II (DOR 5) during the 5th September to the 7th September and 40 hauls were realized. During the 19th to the 21st September 30 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 (5th to 6th October) 12 stations were covered by the vessel Saphir (CUX14); six stations were skipped due to bad weather conditions. All in all, 164 hauls (24 invalid) were carried out by chartered vessels for the DYFS in 2023.

381. and 382. Cruise FRV „Clupea“

The 381st cruise FRV Clupea started as planned on the 11th September in Cuxhaven. Originally, the program of this cruise was dedicated to the DAM Pilot Mission MGF North Sea. However, due to core project staff absence, the ship time of this cruise was already used for the DYFS. On the same day first hauls were performed. On the 12th September crab pots from the previous cruise were retrieved. Due to bad weather conditions the DYFS station work was not possible on the 13th September and was continued on the 14th and 15th September. Overall, 23 hauls were performed for the DYFS during the 381st cruise of FRV Clupea. The 382nd cruise started on the 18th September from Helgoland. Ten hauls were performed on the first day of the cruise. Technical problems with the ship and bad weather conditions hampered the continuation of the station work. It was only possible to perform some hauls on the 25th and 27th September. Afterwards, it was not possible anymore to do any station work. Overall, 22 hauls were performed during the 382nd cruise. Given the fact that only 45 stations from 65 planned stations (69%) were fished, with additional ship time from the 381st cruise, the DYFS campaign with FRV Clupea was not fully successful in 2023.

4. Preliminary results

Haul composition

Chartered vessels

During the DYFS in 2023, 140 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. 72 species were recorded, thereof 34 fish species, one lamprey and 37 invertebrates. Whiting, plaice, smelt, and flounder 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). There were also high records of the bryozoan *Electra pilosa*, which was already the case for 2022.

381st and 382nd cruise RV Clupea

During the DYFS campaign with RV Clupea 45 hauls were carried out in the coastal zone of the German bight. 83 species were recorded, 33 fin fish species, one lamprey species, and 48 invertebrates. Whiting, dab, plaice, and flounder dominated the catch compositions while the dominating invertebrates in the catches were brittle stars, brown shrimp, common swimming crab and common starfish. During these two surveys high records of *Electra pilosa* were also recorded.

Distribution patterns of selected species

Highest abundance values of 0-group plaice were recorded in the area of East Frisia and the Weser estuary (area 414, 413). 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 88% of all valid stations. 0-group sole were caught in similarly low numbers compared to the last years. Higher concentrations of sole were found in the East Frisian area and the Weser estuary (Fig. 2b). Cod was not caught at all during the DYFS 2023, which was already the case in 2022. The spatial abundance values of whiting also showed higher concentrations in the Weser estuary and also in the East Frisia area higher abundances were observed. In lower abundances whiting was distributed over the whole survey area and the abundances were similar to that of the last year. Brown shrimp was observed in lower abundances on the coastal stations and higher abundances in the wadden areas (Fig. 3).

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 was 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 2023 index for plaice was 0.90 n/1000m² which is the lowest observed value for the whole time series. 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 was zero (Fig. 4c) for the second year in a row. No cod at all were caught during the whole 2023 DYFS campaign. The whiting abundance index was on a similarly low level as for the previous year (Fig. 4d).

The brown shrimp indices were highly variable between the different areas and years (Fig. 5). The indices for the East Frisian area, the Elbe (Cuxhaven), Weser and Büsum are on medium levels. The index calculated for the RV Clupea stations along the coast is the second lowest value observed (lowest value observed in 2016), but the station coverage in 2023 was incomplete. The same is true for the Husum area, where the coverage by valid hauls was not sufficient to calculate a comparable index.

The length distributions display (Fig. 6) that most of the caught fish belong to the 0-group. Only for dab (Fig. 6c) cohorts are visible in the length distributions (two year classes).

Biological sampling

During the DYFS cruises in 2023 the total number and total weight of all individuals per haul was recorded. Of all fish species length measurements and catch weights were 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 was sampled per station. In addition, an exact species identification was carried out for these subsamples and, if present, the proportion of *Crangon allmanni* was determined.

For age readings up to 1 individual 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 2023, high abundances of the bryozoan *Electra Pilosa* were recorded in some areas, especially on coastal stations which was already the case in 2021 and 2022. Three individuals of the sea horse *Hippocampus hippocampus* were recorded on coastal stations, which is only the second record of this species for the German part of the DYFS. The same is true for one thornback ray *Raja clavata*, which was recorded on one coastal station.

6. Participants and details of the cruises

Tab. 1: Cruise overview of the DYFS 2023.

Reisenr.	23WE2	23OF2	23BU2
Ausgangshafen	Dorumersiel	Accumersiel	Büsum
Area	Jade - Weser	Accumer Ee	Meld.Bucht - Eider
Date	(3) 06.09. – 08.09.2023	(3) 19.09. - 21.09.2023	(3) 01.09. - 03.09.2023
Vessel	Nixe II (DOR 5)	Gerda Bianka (ACC 1)	Jule Marie (ST 10)
Cruise lead, Participants	Philipp Schweizer, Sakis Kroupis	Dr. Julia Friese, Simon Wieser, Sylvan Rentel	Dr. Hermann Neumann, Simon Wieser, Dr. Julia Friese

Reisenr.	23HU2	23CU2	CL381/CL382
Ausgangshafen	Eidersperrwerk/Büsum	Cuxhaven	Cuxhaven
Area	Hever – Norder Aue	Elbe	German Bight coastal area
Date	(4) 04.09.- 07.09.2023	(2) 05.10. - 06.10.2023	11.09. – 06.10.2023
Vessel	Jule Marie (ST 10)	Saphir (CUX 14)	FRV Clupea
Cruise lead, Participants	Dr. Hermann Neumann, Dr. Julia Friese, Simon Wieser	Dr. Julia Friese, Valeska Borges, Tim Schorr	Dr. Hermann Neumann, Dr. Heino Fock (CL381), Sylvan Rentel (CL382)

7. Acknowledgements

Thanks to all captains who participated with their vessels in the "Demersal Young Fish Survey 2023", 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 the support during the cruises with RV Clupea.

Thanks to all cruise participants for their support and willingness to realize the Demersal Young Fish Survey in 2023.

Dr. Holger Haslob



8. Figures and tables

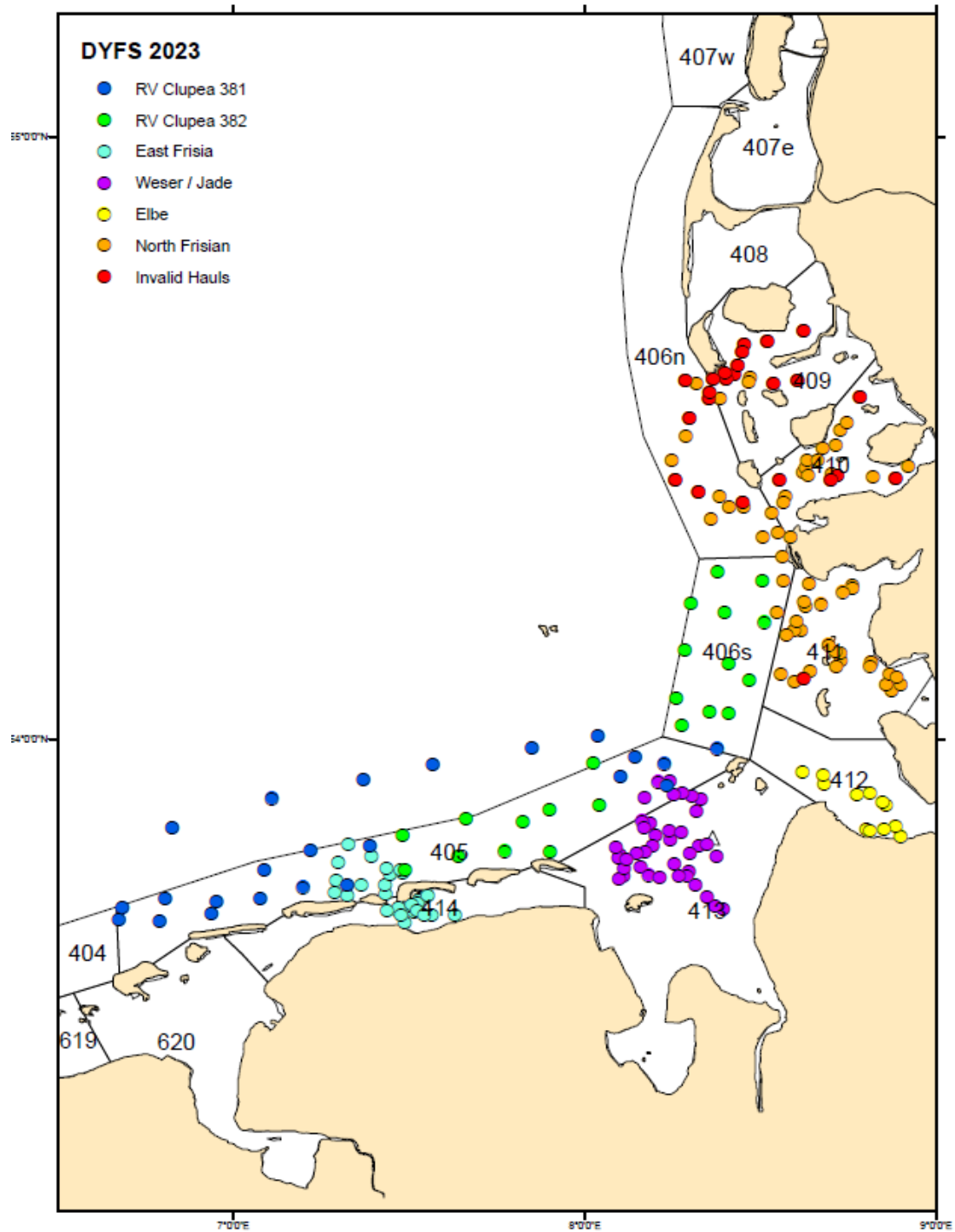


Fig. 1: Station overview Demersal Young Fish Surveys (DYFS) 2023. Numbers denote statistical ICES areas.

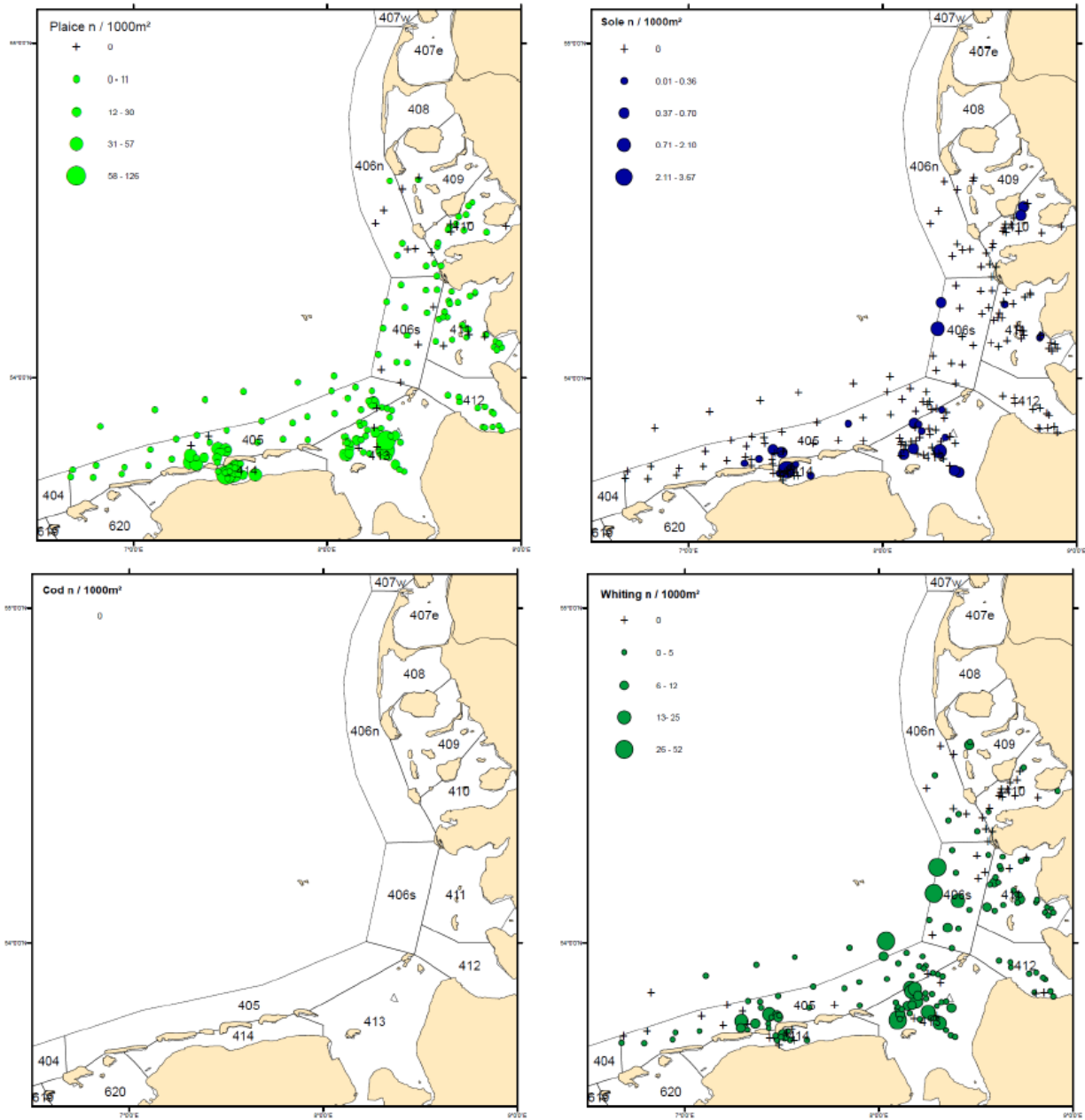


Fig. 2: Abundance (n/1000m²) and distribution of selected fish species during the DYFS 2023.

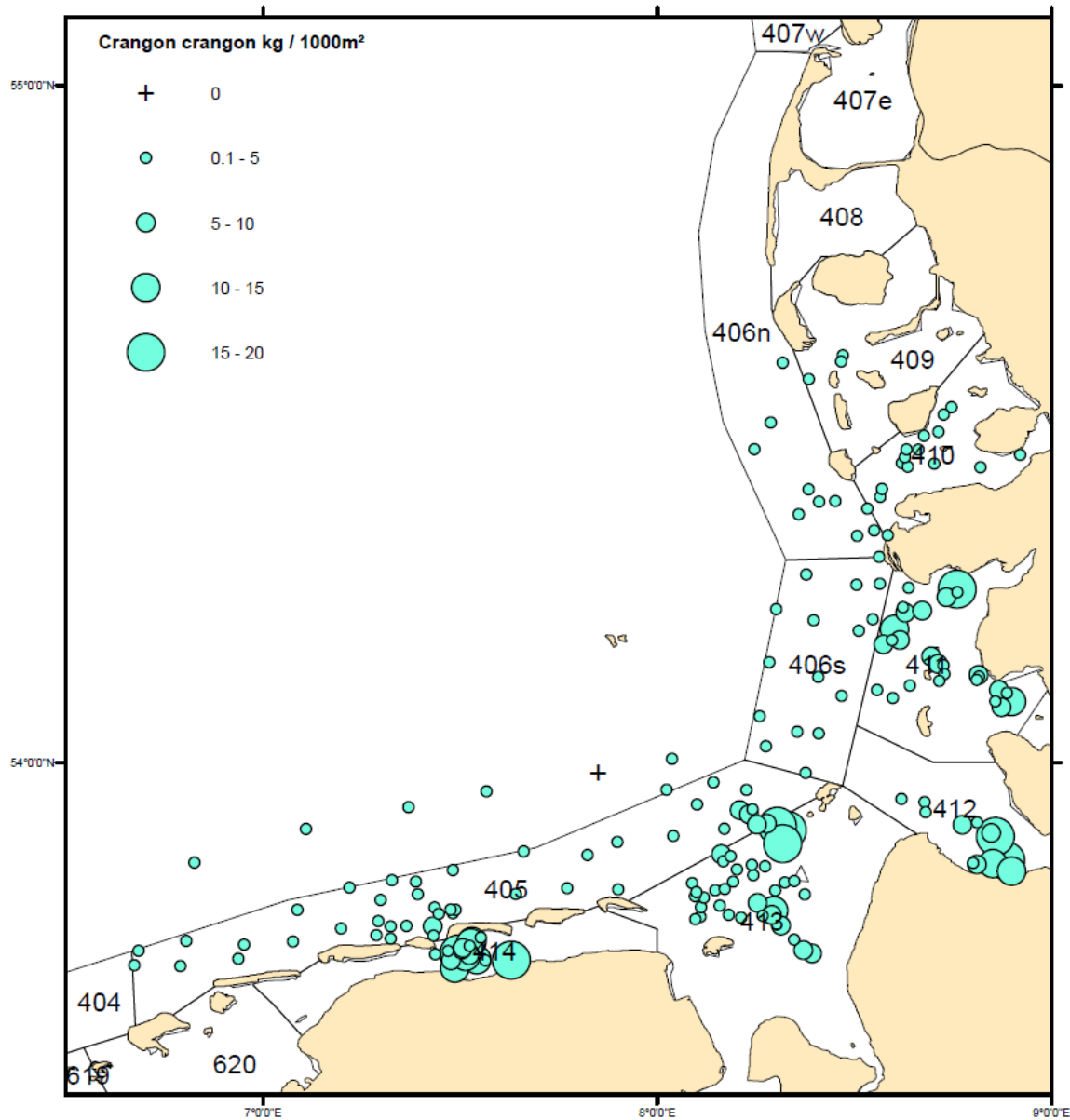


Fig. 3: Abundance (kg/1000m²) and distribution of brown shrimp (*Crangon crangon*) during the DYFS 2023.

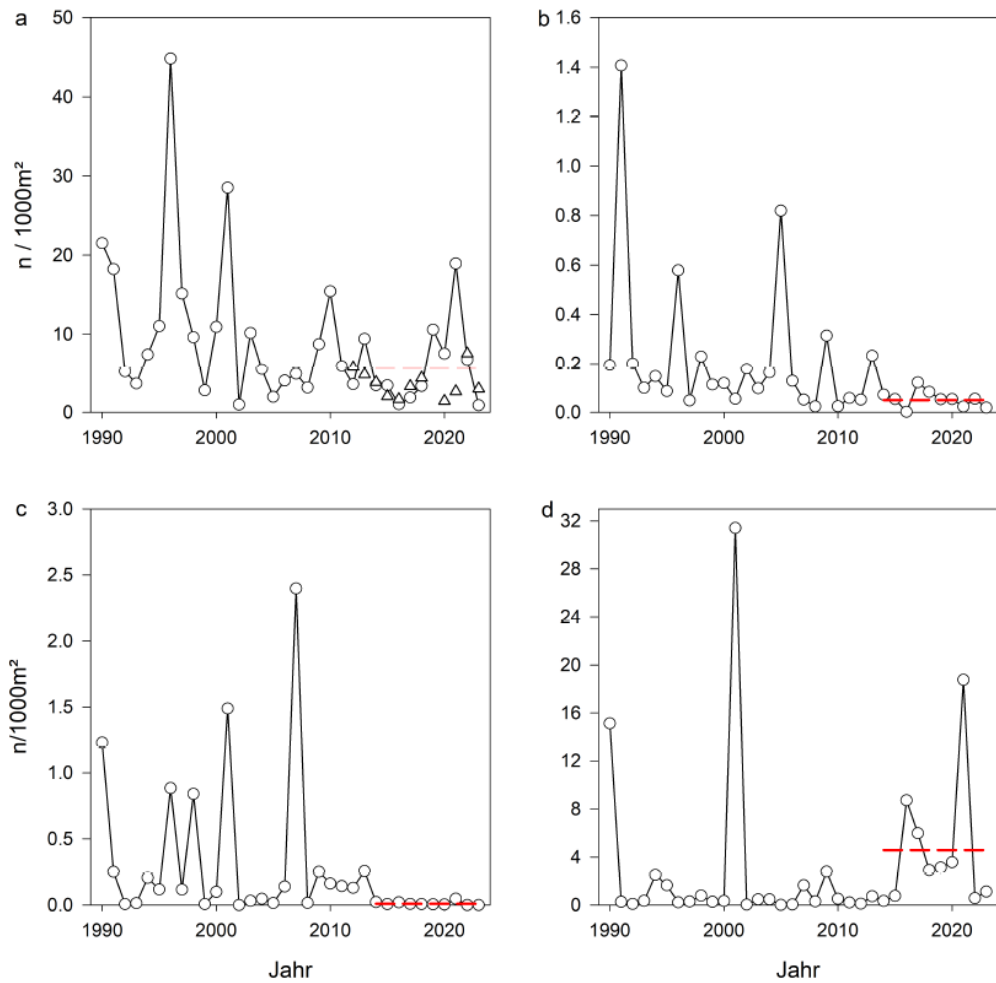


Fig. 4: Abundance indices for 0-group of plaice ≤ 12.5 cm (a), sole ≤ 13.5 cm (b), cod ≤ 18.5 cm (c) and whiting ≤ 17.5 cm (d) for the coastal areas of Schleswig-Holstein. The red dashed line denotes the last 10 years average.

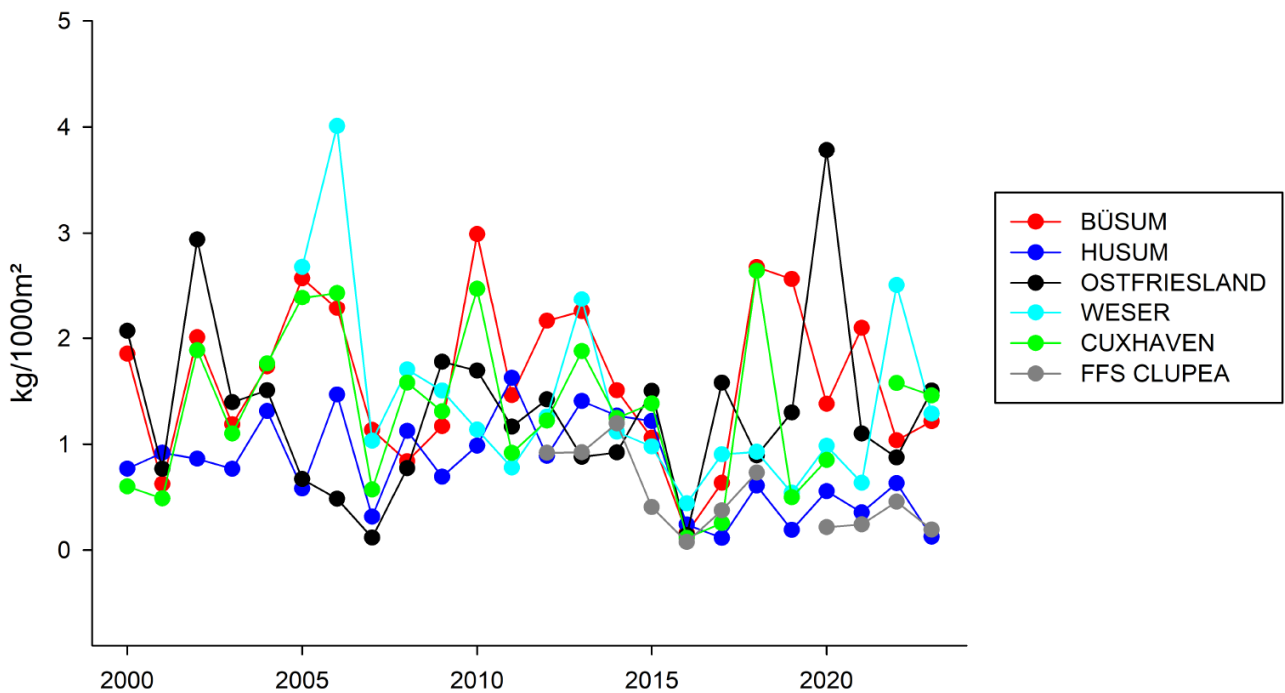


Fig. 5: DYFS biomass index for brown shrimp (*Crangon crangon*) by area.

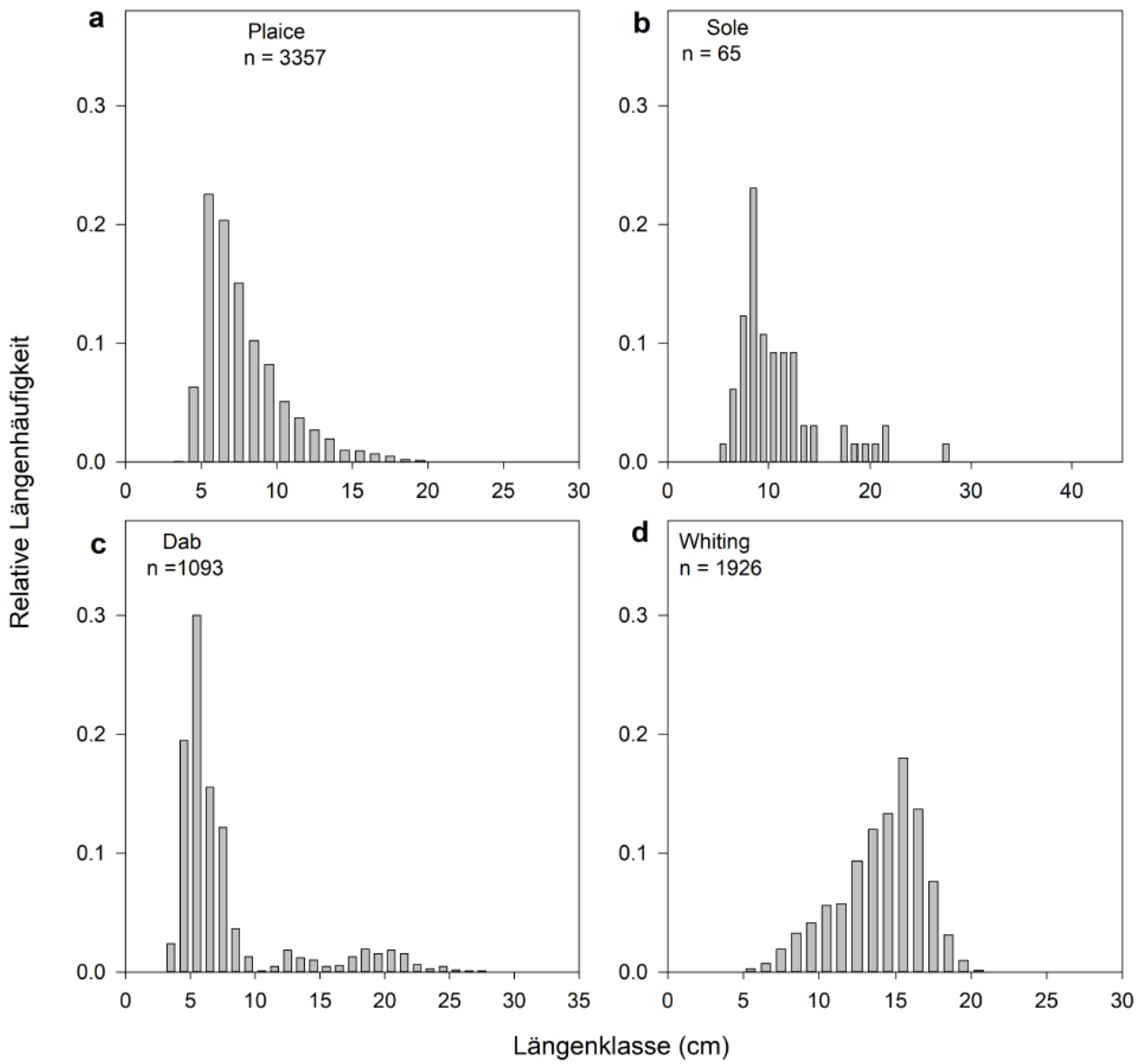


Fig. 6: Relative length frequency distributions for plaice (a), sole (b), cod (c) and whiting (d) caught in the DYFS 2020 campaign.

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 2023 (45 hauls)				Chartered vessels 2023 (140 Hauls)			
Fische	Gesamt n	Wirbellose	Gesamt n	Fische	Gesamt n	Wirbellose	Gesamt n
MERLANGIUS MERLANGUS	787	OPHIURA ALBIDA	94159	PLEURONECTES PLATESSA	5323	CRANGON CRANGON	n.a.*
PLEURONECTES PLATESSA	716	OPHIURA OPHIURA	73998	SYNGNATHUS ROSTELLATUS	3821	MACROPIPIUS HOLSATUS	8831
LIMANDA LIMANDA	648	CRANGON CRANGON	45211	MERLANGIUS MERLANGUS	1607	OPHIURA OPHIURA	4328
SYNGNATHUS ROSTELLATUS	366	MACROPIPIUS HOLSATUS	7601	OSMERUS EPERLANUS	1601	CARCINUS MAENAS	3759
CLUPEA HARENGUS	161	ABRA NITIDA	2070	POMATOSCHISTUS MINUTUS	1446	ASTERIAS RUBENS	1324
POMATOSCHISTUS MINUTUS	84	SPISULA SUBTRUNCATA	1858	CLUPEA HARENGUS	1326	OPHIURA ALBIDA	789
AGONUS CATAPHRACTUS	72	ASTERIAS RUBENS	699	LIMANDA LIMANDA	673	PAGURUS LONGICARPUS	367
ARNOGLOSSUS LATERNA	62	MACROPIPIUS DEPURATOR	642	AGONUS CATAPHRACTUS	456	PAGURUS BERNHARDUS	195
CALLIONYMUS LYRA	40	CARCINUS MAENAS	495	PLATICHTHYS FLESUS	262	RHIZOSTOMA OCTOPUS	157
OSMERUS EPERLANUS	28	PAGURUS BERNHARDUS	387	MYOXOCEPHALUS SCORPIUS	96	CERASTODERMA EDULE	95
Fische	Gesamt kg	Wirbellose	Gesamt kg	Fische	Gesamt kg	Wirbellose	Gesamt kg
MERLANGIUS MERLANGUS	24.00	ELECTRA PILOSA	80.3	MERLANGIUS MERLANGUS	39.9	CRANGON CRANGON	669.7
LIMANDA LIMANDA	10.13	OPHIURA OPHIURA	57.6	PLEURONECTES PLATESSA	30.0	ELECTRA PILOSA	112.4
PLEURONECTES PLATESSA	7.56	CRANGON CRANGON	39.1	OSMERUS EPERLANUS	8.1	RHIZOSTOMA OCTOPUS	85.0
PLATICHTHYS FLESUS	3.75	MACROPIPIUS HOLSATUS	29.8	PLATICHTHYS FLESUS	7.6	MACROPIPIUS HOLSATUS	67.9
RAJA CLAVATA	2.4 (n=1)	ASTERIAS RUBENS	23.0	LIMANDA LIMANDA	4.0	MERLANGIUS MERLANGUS	39.9
SCYLIORHINUS CANICULA	1.043 (n=2)	OPHIURA ALBIDA	22.2	POMATOSCHISTUS MINUTUS	3.5	CARCINUS MAENAS	32.1
ARNOGLOSSUS LATERNA	0.72	RHIZOSTOMA OCTOPUS	11.3	CLUPEA HARENGUS	3.4	PLEURONECTES PLATESSA	30.0
CALLIONYMUS LYRA	0.66	MACROPIPIUS DEPURATOR	3.0	AGONUS CATAPHRACTUS	3.1	OSMERUS EPERLANUS	8.1
AGONUS CATAPHRACTUS	0.64	HOMARUS VULGARIS	2.1	CILIATA MUSTELA	1.5	PLATICHTHYS FLESUS	7.6
CLUPEA HARENGUS	0.42	CARCINUS MAENAS	1.8	MYOXOCEPHALUS SCORPIUS	1.2	ASTERIAS RUBENS	6.2

* not yet available