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13.02.2023

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Report

Cruise SO 809 of FRV „SOLEA“

10.08. – 15.08.2022

Chief scientist: Dr. Vanessa Stelzenmüller

Objectives

1. Participation in the German Small-Scale Bottom Trawl Survey (GSBTS) to monitor the fish fauna in 5 out of 12 small areas (boxes),
2. Investigation of the hydrographical conditions within the boxes (vertical distribution of temperature, salinity and turbidity).
3. Experimental fisheries in the vicinity of offshore windparks located in the German EEZ

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1. Narrative

FRV “Solea” left Cuxhaven on the 10th of August 2022 and started its scientific program the following day (see Figure 1). Due to the limited survey time the scientific program comprised only 18 hauls in box K, 4 hauls in the German Nephrops fishery priority area and 3 hauls in the vicinity of the offshore windfarm Sandbank. Overall 10 accompanying CTD casts were conducted (see Table 1). In addition, 15 stations were sampled with pots targeting brown crab (*Cancer pagurus*) in the vicinity of the offshore windfarm Sandbank. A summary of the total sampling effort within the GSBTS survey program by box and year for the cod hopper is presented in Table 2.

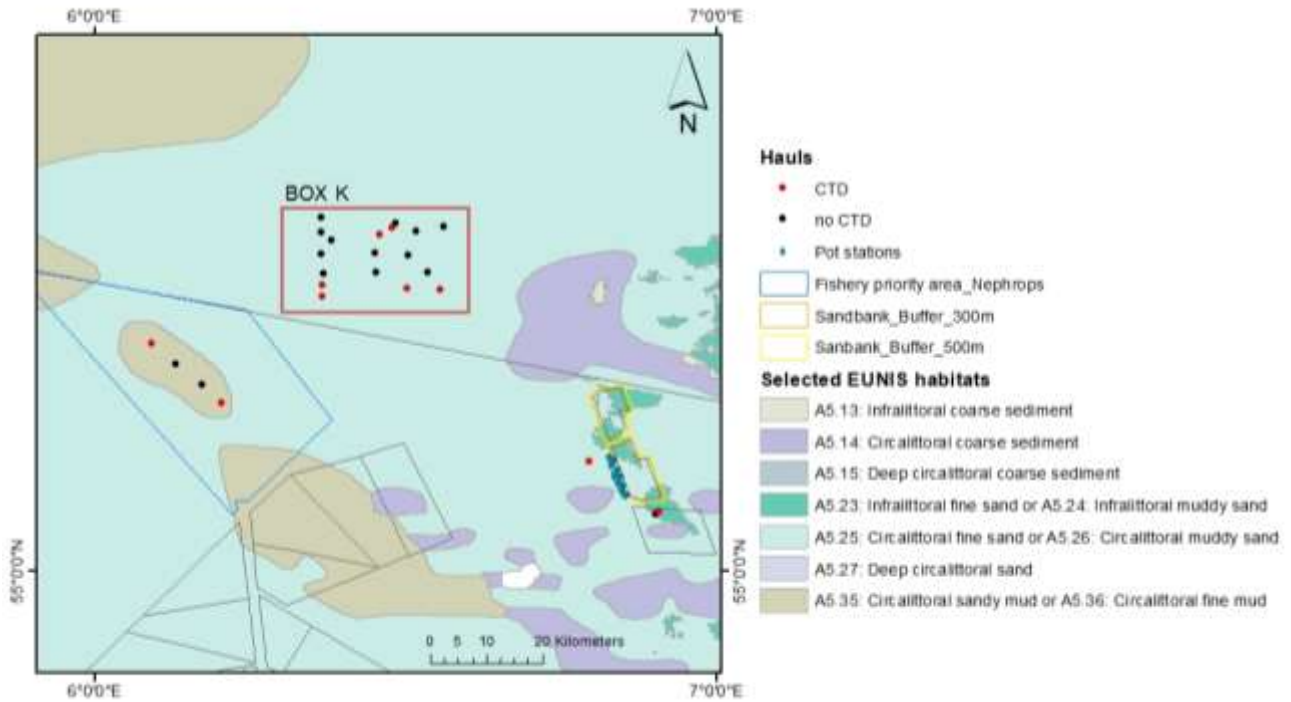


Figure 1: Sampling stations as mid points of the German small-scale bottom trawl survey cruise no. 809 within box K (10 x 10 nm) (black dot) or fishing in combination with a CTD cast (red dot), pot sampling stations (blue diamonds) in the vicinity of the offshore windfarm Sandbank.

Table 1. Total number of valid cod hopper (KJN) hauls and CTD casts within the GSBTS boxes during SO 809.

Box	KJH hauls	CTDs
BOX K	18	6
Total	18	6

Table 2. Total sampling effort (cod hopper hauls) in the standard GSBTS boxes per survey year.

Year	BOX E	BOX F	BOX H	BOX K	BOX N	BOX P	Total
1989	25	24	0	0	0	0	49
1990	8	28	0	0	0	0	36
1991	28	28	27	24	0	0	107
1992	28	21	23	19	0	0	91
1993	27	23	25	27	0	0	102
1994	19	25	27	26	0	0	97
1995	21	25	26	24	0	0	96
1996	28	26	17	28	0	0	99
1997	6	18	25	26	0	0	75
1998	17	20	25	23	0	0	85
1999	10	27	17	30	0	0	84
2000	0	0	0	0	8	0	8
2001	18	24	27	22	17	0	108
2002	15	17	17	9	9	0	67
2003	15	24	23	24	9	24	119
2004	19	17	23	17	29	16	121
2005	14	16	20	14	22	14	100
2006	0	0	16	24	44	0	84
2007	23	22	24	12	40	16	137
2008	21	22	21	18	29	18	129
2009	24	22	21	15	22	16	120
2010	21	21	21	16	21	14	114
2011	10	0	21	7	21	21	80
2012	21	0	21	7	21	18	88
2013	21	21	21	21	23	18	125
2014	21	21	23	18	17	24	124
2015	22	23	21	21	17	18	122
2016	12	12	21	14	16	18	93
2017	15	14	15	17	16	18	95
2018	21	0	14	21	21	15	92
2019	0	0	16	21	20	16	73
2020	20	0	21	16	17	17	91
2021	18	0	20	16	18	24	96
2022				18			18
Total	568	541	639	595	457	325	3125

2. Results

2.1. Long-term trends in catch compositions

Trawl duration was 30 min and the trawl speed over ground was around 3.6 kn across all valid hauls.

In Figure 2 annual catches within Box K ($\text{kg } 30\text{min}^{-1}$) of the species contributing at least 0.5% to the cumulative total catch across all sampling years are shown. Long-term trends in mean cpue per haul ($\text{kg } 30\text{min}^{-1}$) are shown in Figure 3. In total, a number of ten species contributed the most to the overall biomass caught in the respective GSBTS box.

In Box K, the catches of dab (*Limanda limanda*) and whiting (*Merlangius merlangus*) were highest in weight and where well above the median value of the respective time series. Since 2015 the catches of herring (*Clupea harengus*) remain ed at very low compared to previous years. In contrast, catches of plaice were above the median value.

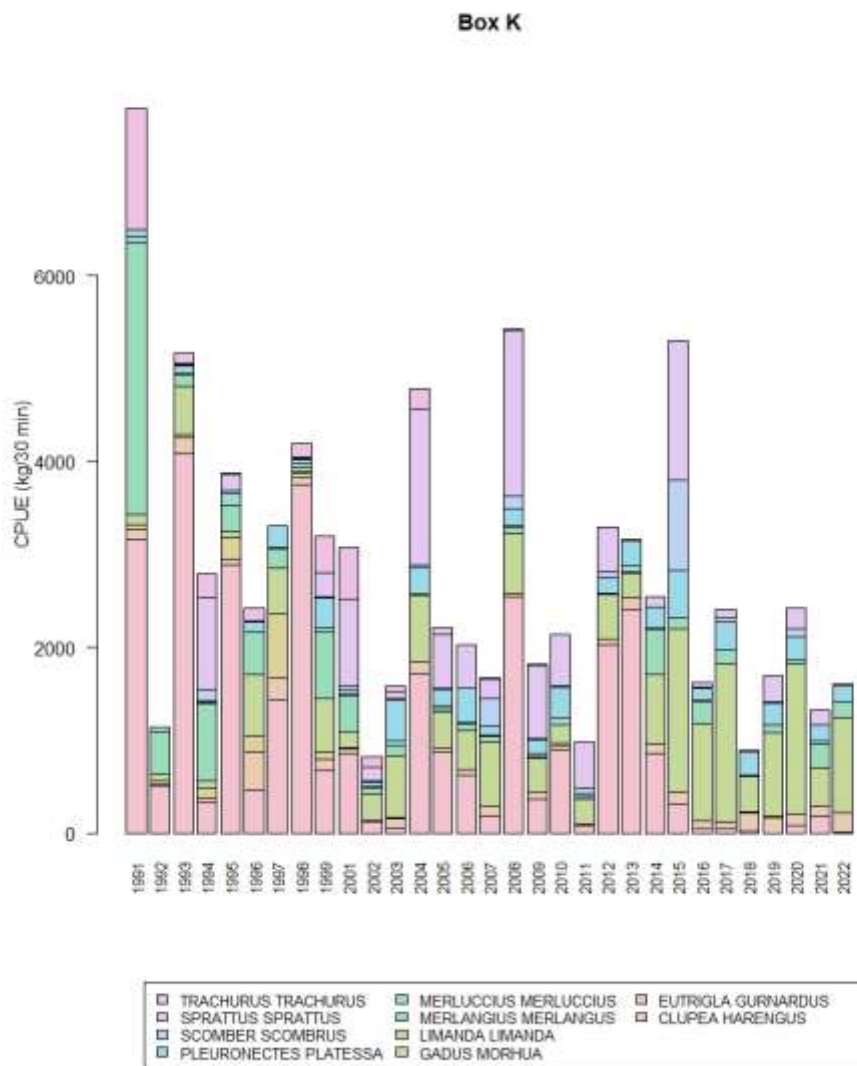


Figure 2: Summed CPUE ($\text{kg } 30\text{min}^{-1}$) of the species contributing to least 99.5% to the cumulative biomass in Box K.

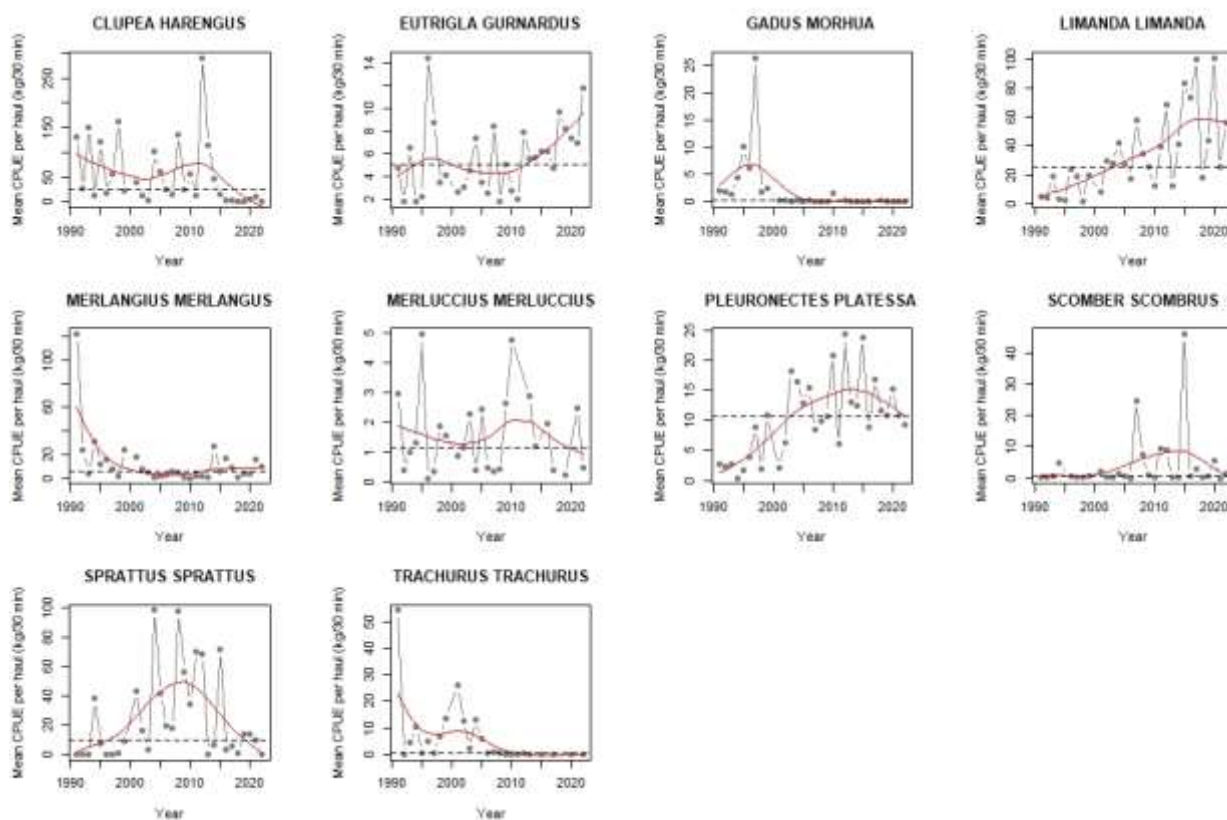


Figure 3: Long-term trends in mean CPUE per haul ($\text{kg } 30 \text{ min}^{-1}$) of the selected species in Box K, with indicated median CPUE per haul value over all sampling years (dashed line).

2.2. Long-term trends in elasmobranch catches

An overview of the total elasmobranch catches in 2022 as kg per 30 min and numbers per 30 min in box K are given in Table 3. In Figure 4, the increasing trend of lesser spotted dogfish (*Scyliorhinus canicula*) and thornback ray (*Raja clavata*) catches are shown.

Table 3. Overview of elasmobranch catches in the 2022 GSBTS box K.

Box	Species	Total catch (kg)	Total catch (n)
BOX K	RAJA CLAVATA	7.89	4
BOX K	SCYLIORHINUS CANICULA	0.96	3

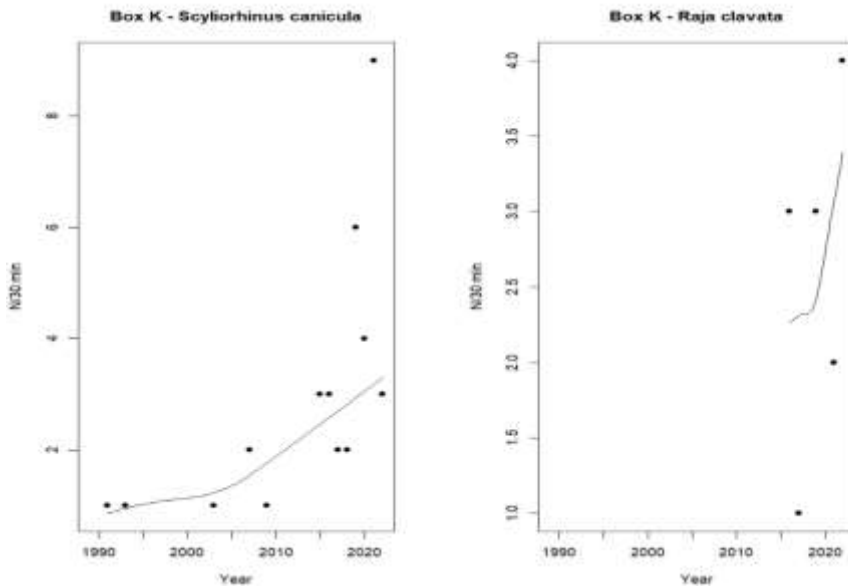


Figure 4: Long-term trends of the two more frequently caught elasmobranchs lesser spotted dogfish (left) thornback ray (right) as total numbers 30 min⁻¹.

2.3. Pot fisheries in the vicinity of offshore windparks

We deployed at 15 stations a string of five baited pots with a total soaking time of 24 h in the close proximity of the offshore windpark Sandbank (Figure 5). The total catches as number of female (N_F) and male (N_M) brown crab (*Cancer pagurus*) per station are also shown in Figure 5. Catches were standardised to a soaking time of 24 h (Table 4) and varied between 9 and 27 individuals per station. Overall more female crabs were caught (Figures 5, 6 and Table 4). Catches of female crabs decreased clearly with increasing distance to the nearest wind turbines. Since international fishing effort targeting brown crab takes usually place around the vicinity of the windfarm (> 500 m distance), the observed reduced catches may reflect a local depletion of biomass.

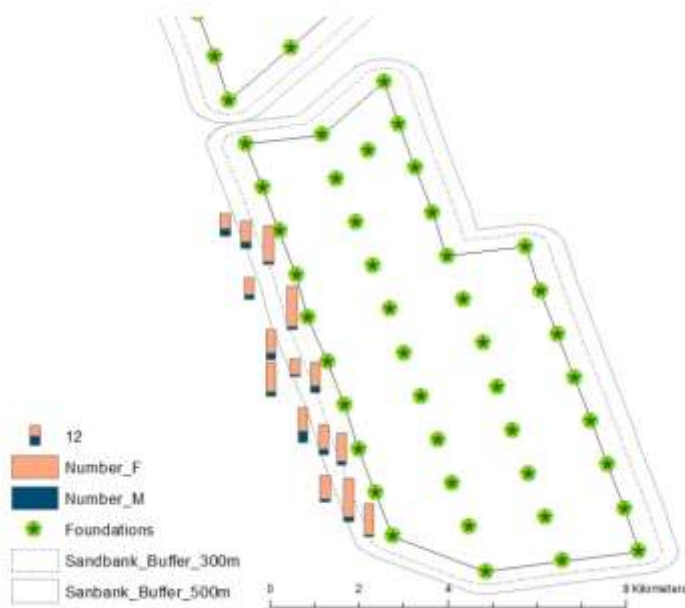


Figure 5: Experimental pot fisheries stations in the close proximity of the offshore windpark Sandbank with relative proportions of female (F) and male (M) brown crab catches.

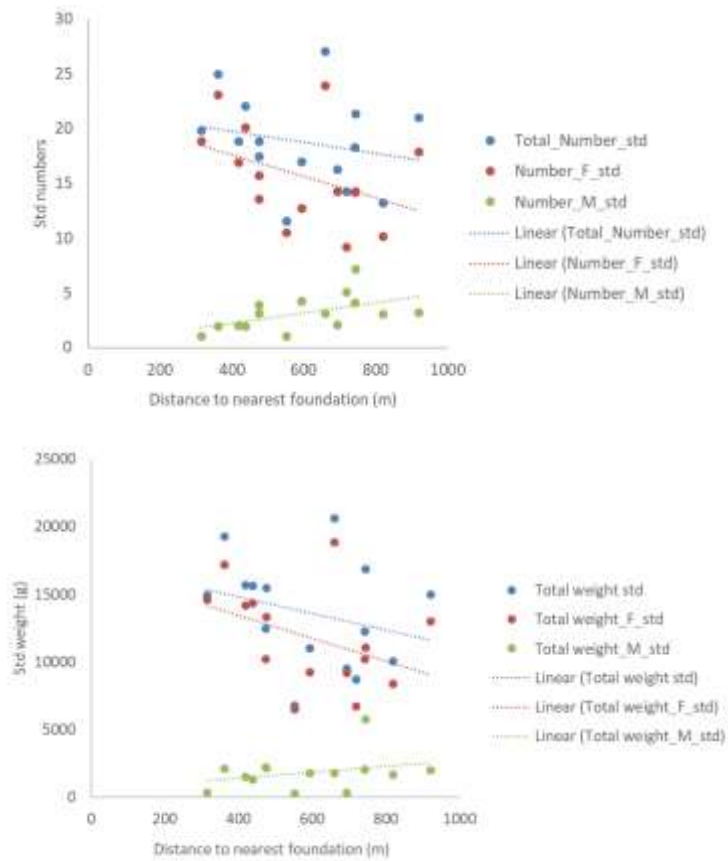


Figure 6: Trends of standardised (24) numbers and weights of total, female (F) and male (M) crabs with increasing distances (m) from the nearest foundation of the offshore windpark Sanbank.

Table 4: Standardised (24 h) brown crab catches in numbers (N) and weight (g) per pot string and mean carapace width (mm) for males (M) and females (F).

Station	Total weight [g]	Weight _F [g]	Weight _M [g]	Total number	Number _F	Number _M	Mean width _F [mm]	Mean width _M [mm]
1	14920	14612	308	20	19	1	183.4	135.5
2	15677	14170	1507	19	17	2	192.0	165.5
3	12451	10229	2222	17	14	4	182.3	130.5
4	19265	17176	2089	25	23	2	177.0	188.0
5	15644	14339	1305	22	20	2	179.3	155.5
15	20601	18829	1772	27	24	3	181.4	148.8
16	15456	13317	2140	19	16	3	187.8	162.2
17	6761	6509	252	12	10	1	166.5	110.5
18	14990	12983	2007	21	18	3	177.0	163.8
19	11015	9249	1766	17	13	4	176.3	141.8
29	9517	9197	319	16	14	2	168.8	102.5
30	16839	11077	5762	21	14	7	183.4	170.1
31	12256	10202	2055	18	14	4	177.0	147.3
32	10053	8366	1687	13	10	3	186.1	148.2
33	8719	6689	2030	14	9	5	180.9	136.3

Personnel

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Acknowledgements

We thank Captain Arne Schwegmann as well as the crew of FRV "Solea" and all members of the scientific team for their cooperation and outstanding commitment that allowed the successful accomplishment of the survey. Further, we thank Vattenfall, in particular Nicola Jantz, for the effective planning of the experimental fisheries around the windpark Sandbank.



Dr. Vanessa Stelzenmüller