Thünen-Institut für Seefischerei

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Report
Cruise SO 707 of FRV „SOLEA“
23.07. – 12.08.2015

Chief scientists: Friedemann Keyl & Jens Ulleweit

Objectives

1. Participation in the German Small-Scale Bottom Trawl Survey (GSBTS) to monitor the fish fauna in 6 out of 12 small areas (boxes),

2. Investigation of the hydrographical conditions within the boxes (vertical distribution of temperature, salinity and turbidity).

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Narrative

FRV “Solea” left Cuxhaven on the 23rd of July 2015 and started its scientific program the following day in Box P (comp. figure 1). In general, the scientific program consists of three days with 7 hauls a day per box together with a minimum of two CTD deployments. Due to unfavourable weather conditions FRV “Solea” had to enter the port of Esbjerg after sampling in boxes P and H and stayed there on the 29th and 30th of July before continuing the sampling in Box N. As a result, the planned number of 21 hauls was not reached in boxes P and N (table 1).

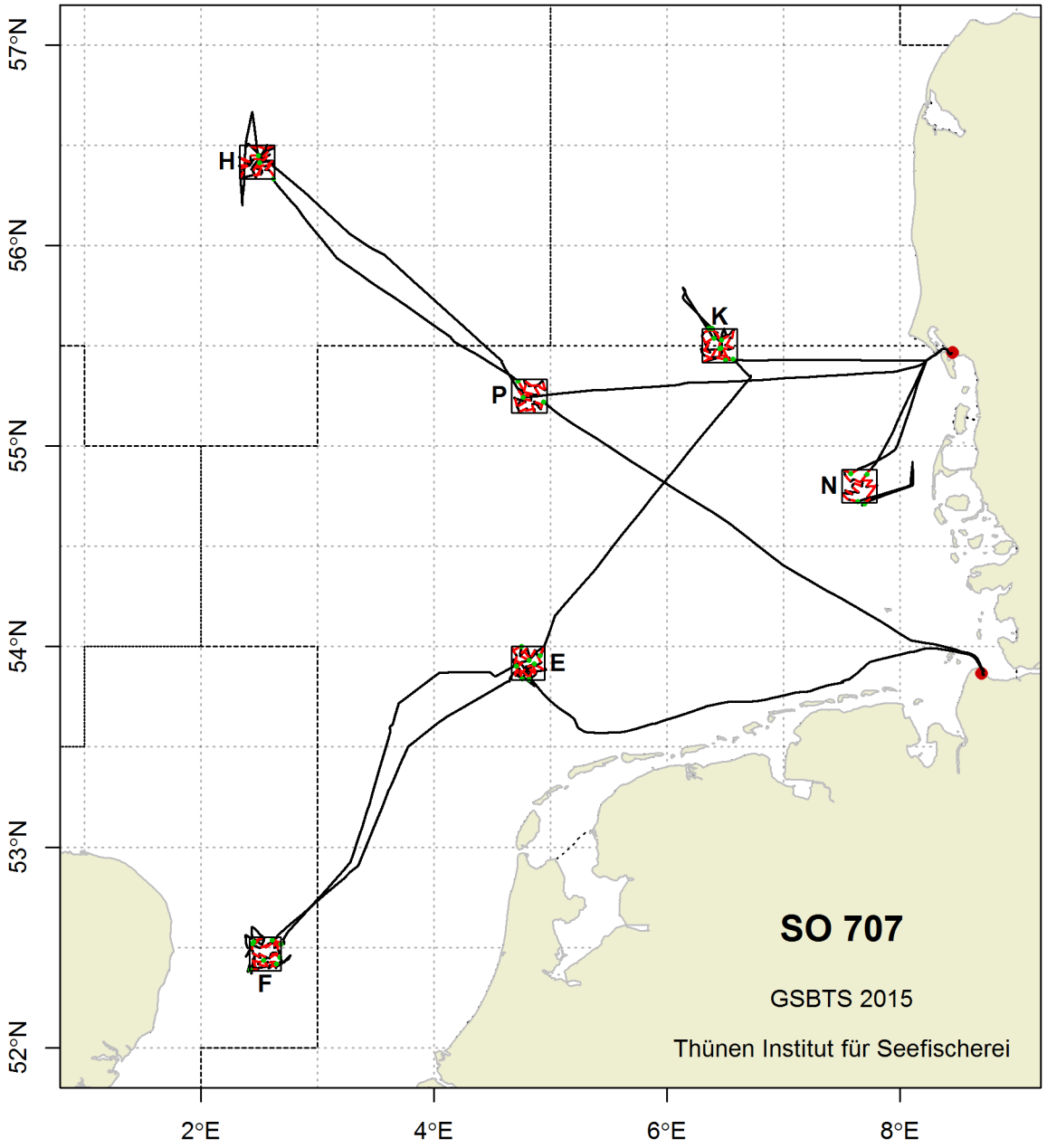

Fig. 1: ship positions and locations of the six GSBTS boxes monitored during the SO707 cruise; black lines: steaming, red lines: trawling, green lines: CTD cast positions, grey broken lines: limits of ICES statistical rectangles, black broken lines: limits of ICES roundfish areas.

The scheduled personnel exchange was carried out on the evening of the 1st of August again in Esbjerg. The scientific program continued from the 2nd of August until the 10th of August and ended on the 11th of August in Cuxhaven.

During this year's survey a total of 122 hauls with the cod hopper trawl net and an additional 39 accompanying CTD casts were conducted in the six boxes of the GSBTS assigned to FRV "Solea". The actual sequence of sampling in the boxes was: Box P (German EEZ; 2 days), Box H (British EEZ; 3 days), Box N (German Bight; 2 days), Box K (Danish EEZ; 3 days), Box E (Dutch EEZ; 3 days) and Box F (British EEZ; 3 days). A summary of the activities during SB707 within each box is given in table 1 and 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.

Table 1: sampling activities by box during SO 707; KJH: cod hopper trawl net.

Area	KJH hauls	CTD
Box P	18	4
Box H	21	6
Box N	17	4
Box K	21	7
Box E	22	9
Box F	23	9
total	122	39

Table 2: Total sampling effort (cod hopper hauls) in the GSBTS for each box and survey year.

Year	BOX P	BOX H	BOX N	BOX K	BOX E	BOX F	Total
1990	-	-	-	-	8	28	36
1991	-	27	-	24	28	28	107
1992	-	23	-	19	28	21	91
1993	-	25	-	27	27	23	102
1995	-	26	-	24	21	25	96
1996	-	17	-	28	28	26	99
1997	-	25	-	26	6	18	75
1998	-	25	-	23	17	20	85
1999	-	17	-	30	10	27	84
2000	-	-	8	-	-	-	8
2002	-	17	-	9	15	17	58
2003	24	23	-	24	15	24	110
2004	16	23	15	17	19	17	107
2005	14	20	20	14	14	16	98
2006	-	16	19	24	-	-	59
2007	16	24	21	12	23	22	118
2008	18	21	21	18	21	22	121
2009	16	21	22	15	24	22	120
2010	14	21	21	16	21	21	114
2011	21	21	21	7	10	-	80
2012	18	21	21	7	21	-	88
2013	18	21	23	21	21	21	125
2014	24	23	17	18	21	21	124
2015	18	21	17	21	22	23	122
Total	211	481	246	424	420	442	2224

First Results

In Figures 2 to 7 the species compositions based on the annual abundances of the most important species for each box are given. Species selected were either the 10 species with the highest summed weight caught per 30 min haul duration over all hauls in a specific box or those species that combined reach a cumulative sum of 98% of the overall biomass. The cumulative sums of the species shown in the figures in all boxes were 96% or more. The ranks of the species in the figure legends reproduce the decreasing mean long-term species abundances in each box.

Compared to the long-term trend in 2015 some differences are noticeable:

- catches in Box P (Fig. 2) had low herring (*Clupea harengus*) abundance and lower overall abundances than in all years before,
- in Box H (Fig. 3) exceptionally high abundance of herring was found that in the long-term mean has been only third most abundant in this box,
- Box N (Fig. 4) had low abundance of great sandeel (*Hyperoplus lanceolatus*) that has been relatively prominent in the overall mean and but instead the abundance of sprat was relatively higher than before,
- in Box K (Fig. 5) relatively higher weights of dab (*Limanda limanda*), sprat (*Sprattus sprattus*) and mackerel (*Scomber scombrus*) were caught per effort unit and lower ones of herring that was most abundant in the long-term mean in this box,
- Box E (Fig. 6) had a higher than usual abundance of sprat and
- in Box F (Fig. 7) we found higher abundances of sprat and mackerel than in all years before which led also to the highest overall abundance caught in this box.

The spiny spurdog (*Squalus acanthias*) that in the 2014 survey was found in exceptionally high numbers in box H, in this year again was back to low levels (N = 2 in boxes H and E) similar to the numbers that have been found usually during the GSBTS.

Annual biodiversity for each of the boxes measured as Shannon-Wiener Index H' is given in Figure 8. A reduction of H' diversity occurred in boxes N and K and especially pronounced in box F in the last years.

Personnel

Name	Role	Cruise leg	Affiliation
Dr. Friedemann Keyl	Scientist in charge/CTD	1	TI-SF
Jens Ulleweit	Scientist in charge/CTD	2	TI-SF
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Thomas Kehlert	Fisheries biology	1, 2	TI-SF
Henrike Rambo	Fisheries biology	1, 2	TI-SF
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Lars Christiansen	Fisheries biology	2	Research assistant TI-SF
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Acknowledgements

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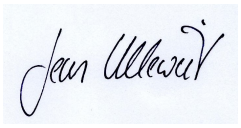

Friedemann Keyl

Jens Ulleweit

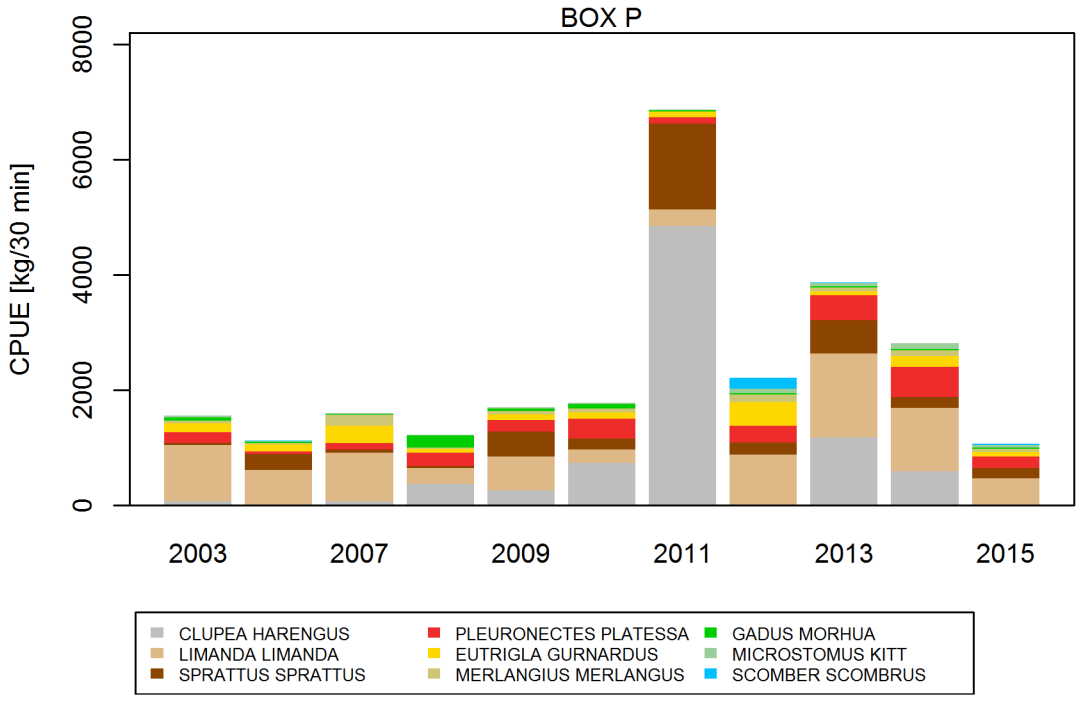

Fig. 2: CPUE [kg/30 min] of the most abundant species in Box P.

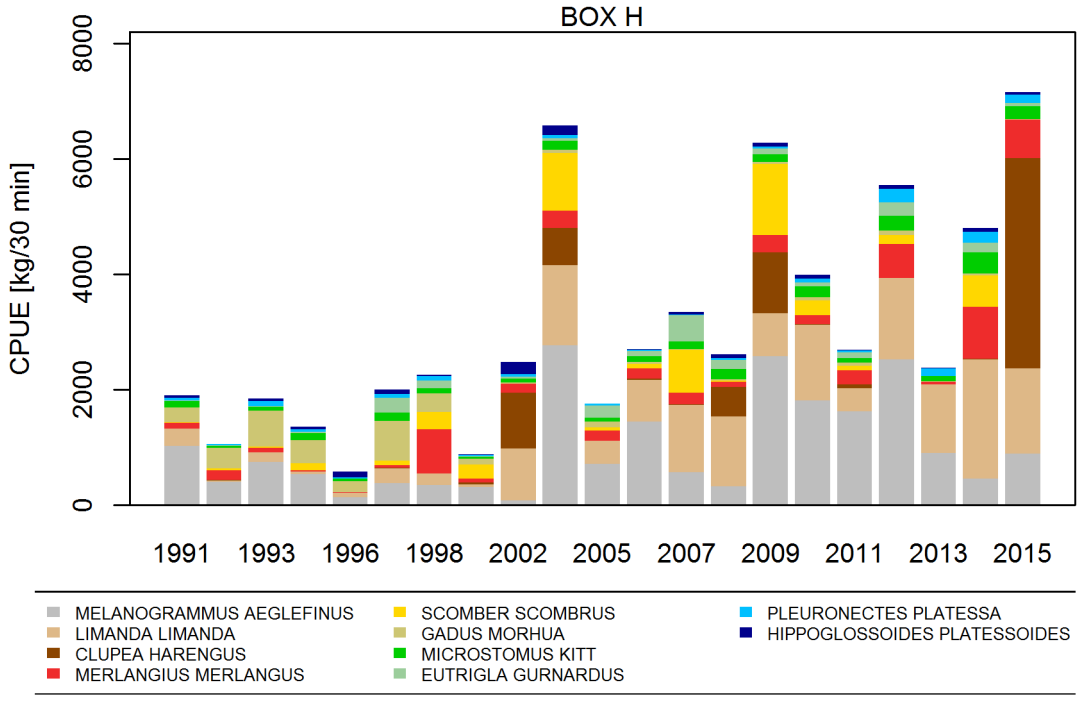

Fig. 3: CPUE [kg/30 min] of the most abundant species in Box H.

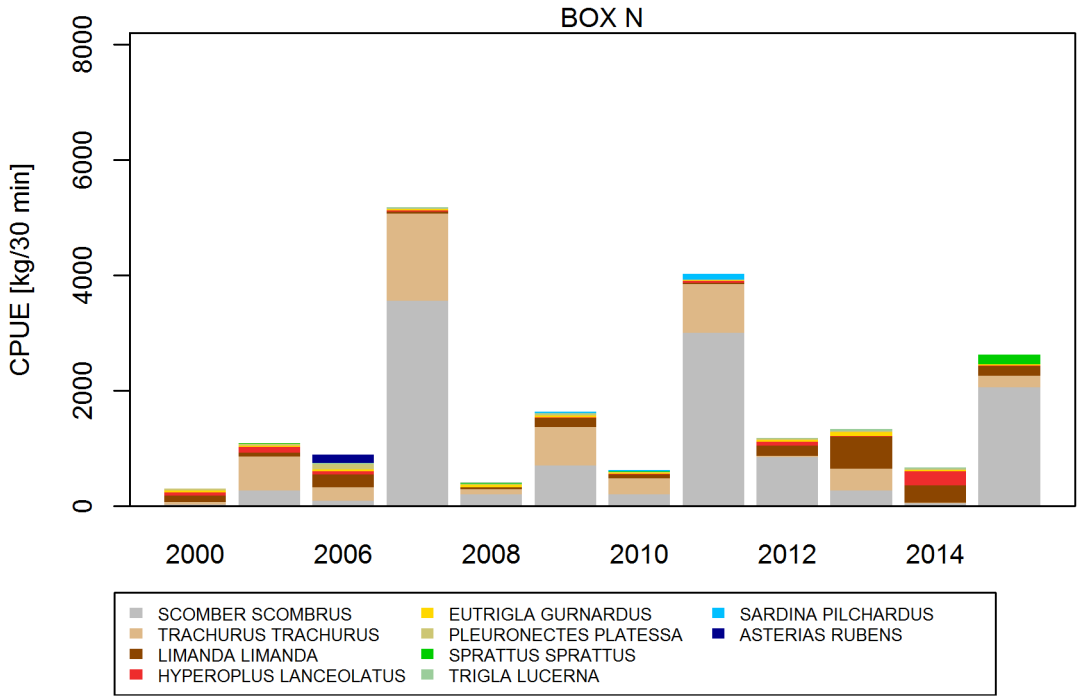

Fig. 4: CPUE [kg/30 min] of the most abundant species in Box N.

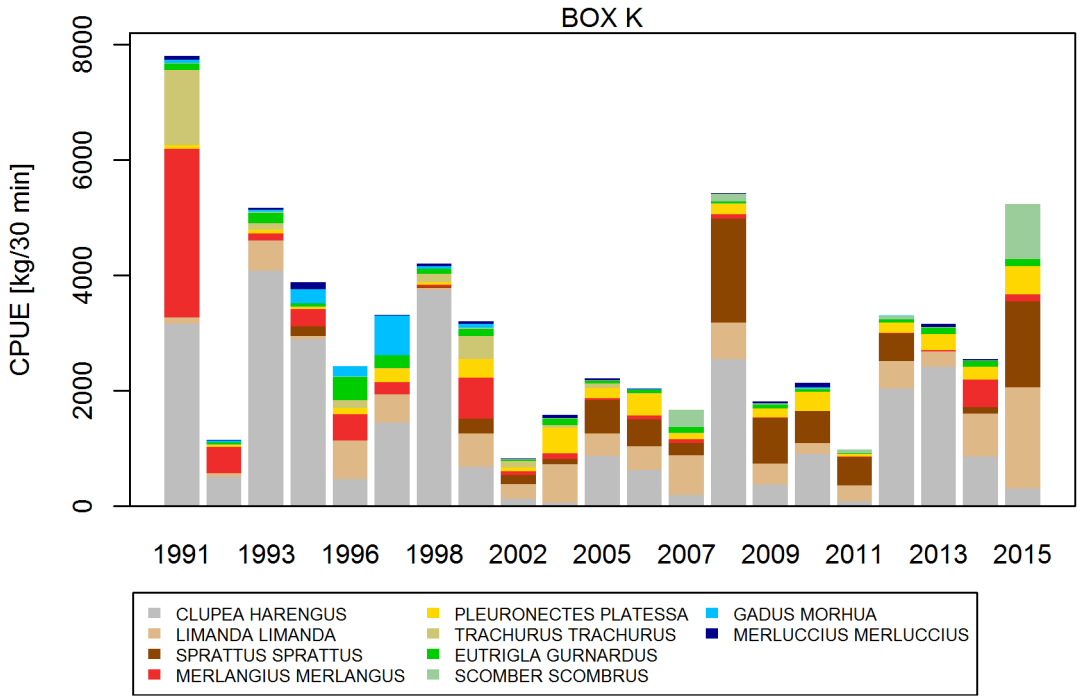

Fig. 5: CPUE [kg/30 min] of the most abundant species in Box K.

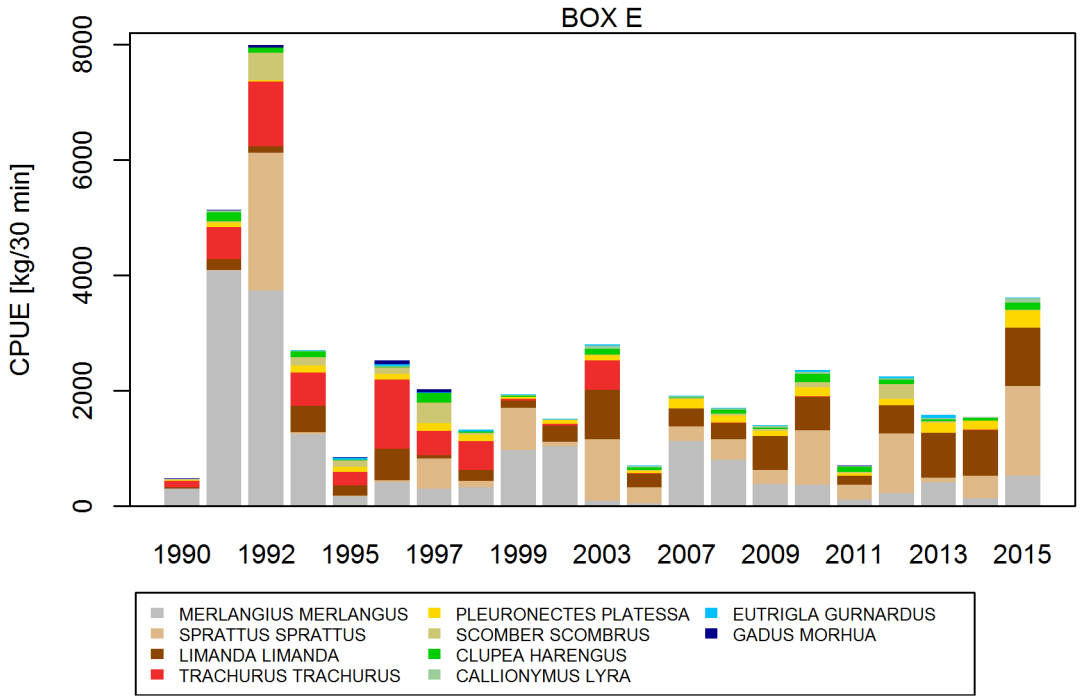

Fig. 6: CPUE [kg/30 min] of the most abundant species in Box E.

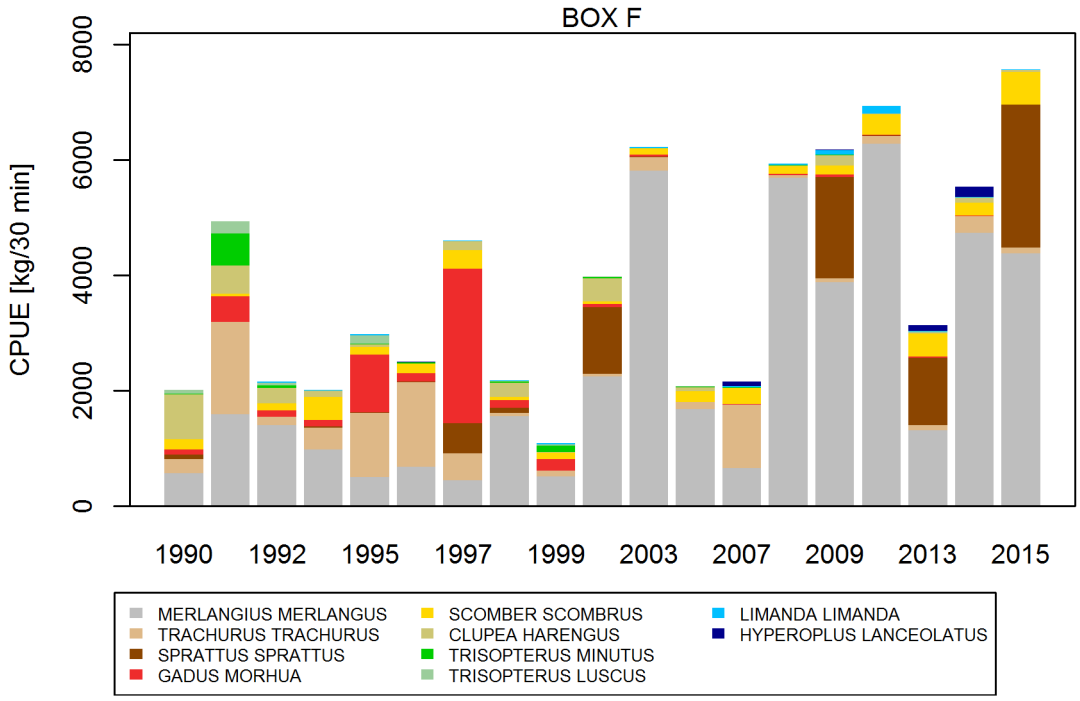

Fig. 7: CPUE [kg/30 min] of the most abundant species in Box F.

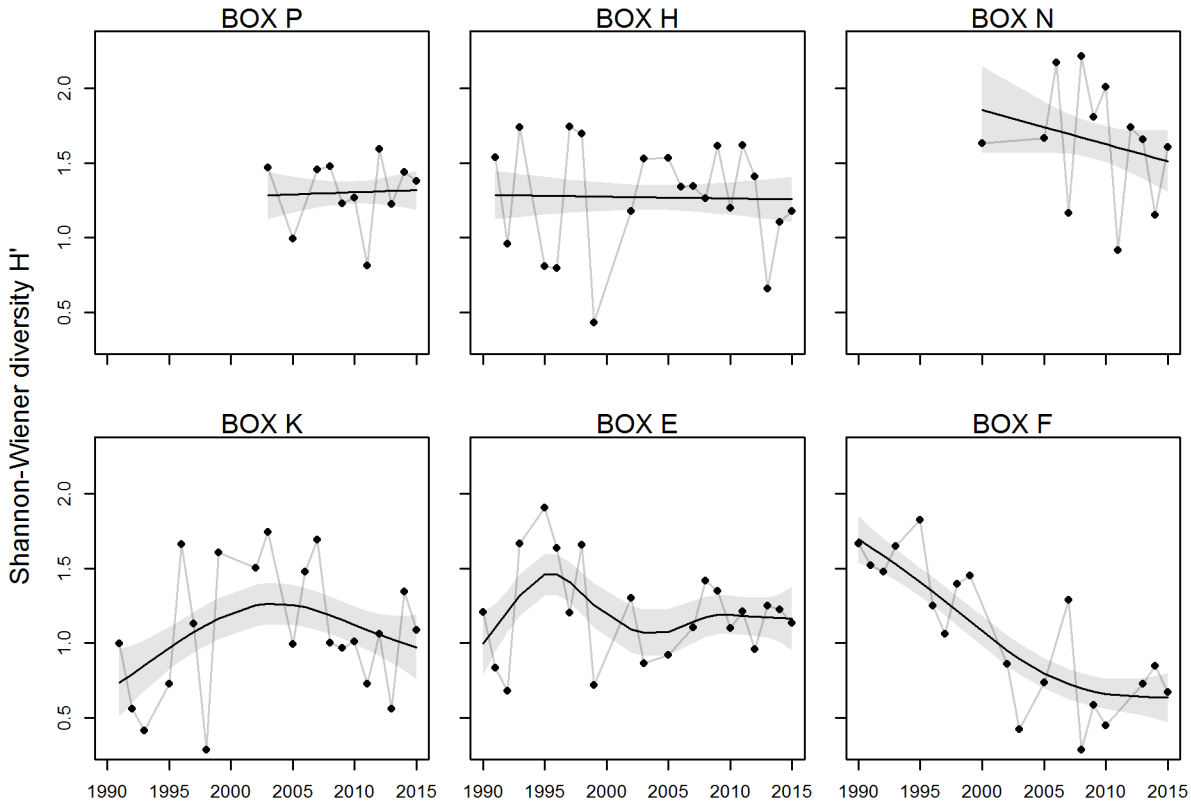

Fig. 8: Annual Shannon-Wiener diversity (black filled circles with grey lines) in each box; black lines and shaded polygons: GAM smoother with std. error band to highlight trend.