

Cruise report
FRV Clupea, Cruise 307
25.10. to 18.11.2016

Biodiversity in the Pomeranian Bay & RAWS

Cruise leaders: Dr. Daniel Oesterwind (part 1), Thomas Hogh (part 2), Dr. Uwe Krumme (part 3)

Part 1: Biodiversity in the Pomeranian Bay
Cruise schedule and preliminary results

The vessel was equipped for all three cruise parts on the 25th of October and shipped in the following days to Sassnitz harbour where the first cruise part started on Tuesday the 1st of November. Due to the weather forecasts and condition it was decided to work the first day in the western area of the Oderbank and on the Oderbank (Fig 1). In both areas a CTD, a trawl with TV3-520 (OTB) and fishing with a beam trawl was performed. In the late afternoon FRV Clupea steamed back to Sassnitz harbour. During shipping the scientific cruise leader had an accident and had to be picked up by the German Maritim Search and Rescue Association. Due to the bad weather condition, fishing was not possible on the following day. The survey was continued on the 3th of November and FRV Clupea shipped with a decimated scientific crew close to the shoreline of the Island of Usedom to perform another two fishing (TV3-520 & beamtrawl) and CTD stations, at the evening the vessel returned back to Sassnitz harbour. On the last day two additional stations in the western area of the small Island ‘Greifswalder Oie’ were conducted and FRV Clupea sailed into the Greifswald Lagoon to finish with the first part of the survey.

Cruise participants

	Name	Task	Institute
1	Dr. Daniel Oesterwind	Cruise leader	TI-OF
2	Tom Jankiewicz	Technican	TI-OF
3	Maria Posern	Master student	TI-OF / University of Rostock
4	Dr. Patrick Polte		TI-OF
5	Titus Rohde	Technican	TI-OF
6	Gustav Basedow	Technican	TI-OF
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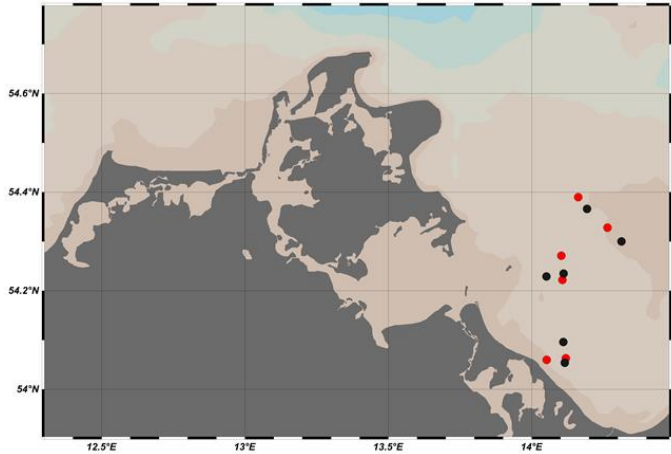


Figure 1. Station map of cruise part 1. Red dots: TV3-520 Positions; black dots: beamtrawl positions. CDT stations were performed close to each TV3-520 position.

The catch biomass per TV3-520 station was between 85 kg and 250 kg (Table 1). Resulting in a total catch of 970 kg during the cruise part A. Overall 22 species were identified, the most dominant species were flounder followed by ruffe and cod.

Table 1. Catch-composition in kg of TV3-520 stations.

Species	Haul 1	Haul 2	Haul 3	Haul 4	Haul 5	Haul 6	Total
<i>Ammodytes tobianus</i>	0.058	0.044		0.02	0.014		0.136
<i>Clupea harengus</i>	5.18	4.896	7.328	12.653	25.1	43.043	98.2
<i>Coregonus maraena</i>			1.152				1.152
<i>Engraulis encrasicolus</i>					0.014	0.02	0.034
<i>Gadus morhua</i>	20.1	15.18	6.344	7.152	32.1	32.732	113.608
<i>Gobiidae</i>			5.025	3.085		0.96	9.07
<i>Gymnocephalus cernua</i>			76.002	73.765	0.062	0.008	149.837
<i>Hyperoplus lanceolatus</i>	0.75	0.272				0.067	1.089
<i>Limanda limanda</i>	0.018						0.018
<i>Merlangius merlangus</i>			0.063		0.102	0.133	0.298
<i>Myoxocephalus scorpio</i>	0.296		0.167	0.514	0.292	0.639	1.908
<i>Neogobius melanostomus</i>					0.078	0.973	1.051
<i>Osmerus eperlanus</i>	0.002		3.559	2.275	0.462	3.592	9.89
<i>Perca fluviatilis</i>			61.555	13.182	0.49	2.57	77.797
<i>Platichthys flesus</i>	95.8	49.9	42.712	38.581	63.3	71.192	361.485
<i>Pleuronectes platessa</i>	6.72	12.3	0.544	0.156	7.9	4.722	32.342
<i>Pomatoschistus</i>	0.022						0.022
<i>Psetta maxima</i>	4.92	2.262			0.616	0.499	8.297
<i>Rutilus rutilus</i>			10.05	0.701	0.3	0.5003	11.5513
<i>Sander lucioperca</i>			30.359	11.219	3.34	14.709	59.627
<i>Scophthalmus rhombus</i>					0.028		0.028
<i>Sprattus sprattus</i>	3.9	0.742	1.277		20.7	6.565	33.184
<i>Syngnathus typhle</i>	0.002		0.042			0.002	0.046
Total	137.768	85.596	246.179	163.303	154.898	182.9263	970.6703

In summary a total of six beam trawls were performed and resulted in a total of 17 kg caught fish. Most of the catches were frozen and still need to be examined in the lab.

Table 2. Catch composition in kg of the beam trawl stations.

Species	beam trawl 1	beam trawl 2	beam trawl 3	beam trawl 4	beam trawl 5	beam trawl 6	Total
<i>Gadus morhua</i>			0.007				0.007
<i>Gymnocephalus cernua</i>			0.022				0.022
<i>Neogobius melanostomus</i>			0.03	1.969			1.999
<i>Perca fluviatilis</i>			0.058				0.058
<i>Platichthys flesus</i>		0.479	0.795				1.274
<i>Pleuronectes platessa</i>		0.332	0.013				0.345
Mix		1	3	3	2.8	3.3	13.1
Total	0	1.811	3.925	4.969	2.8	3.3	16.805

Part 2: RAWS**Cruise schedule and preliminary results**

The ichthyoplankton sampling for larval herring (335 μm & 780 μm Bongo net) was conducted from 7.11-9.11. 2016 in the waters of Greifswald Bay and Strelasund (36 stations, double-oblique hauls, haul duration depth dependent, 5 min. max.). To assess the occurrence of advanced larval stages Calcofi-net samples (1500 μm) were taken on 6 stations in Greifswald Bay and the adjacent Rügen coast of the Pommeranian Bay in the direction of Sassnitz Port on 10.11. 2016. Due to the expected low abundance of advanced larval stages, the haul duration of the Calcofi sampling was extended to 30 min. (double-oblique haul). Simultaneously to each ichthyoplankton haul a CTD profile was taken. Preliminary results are demonstrated based on the samples from the 335 μm Bongo-net (Fig. 2, 3). In general, the total quantity of herring larvae sampled during the survey was marginal compared to spring time abundance (141 indiv. in total). The spatial distribution in the waters of Greifswald Bay and the adjacent Strelasund is presented in Figure 2. The majority of larval herring during the 2-day cruise was distributed in the western part of the bay.

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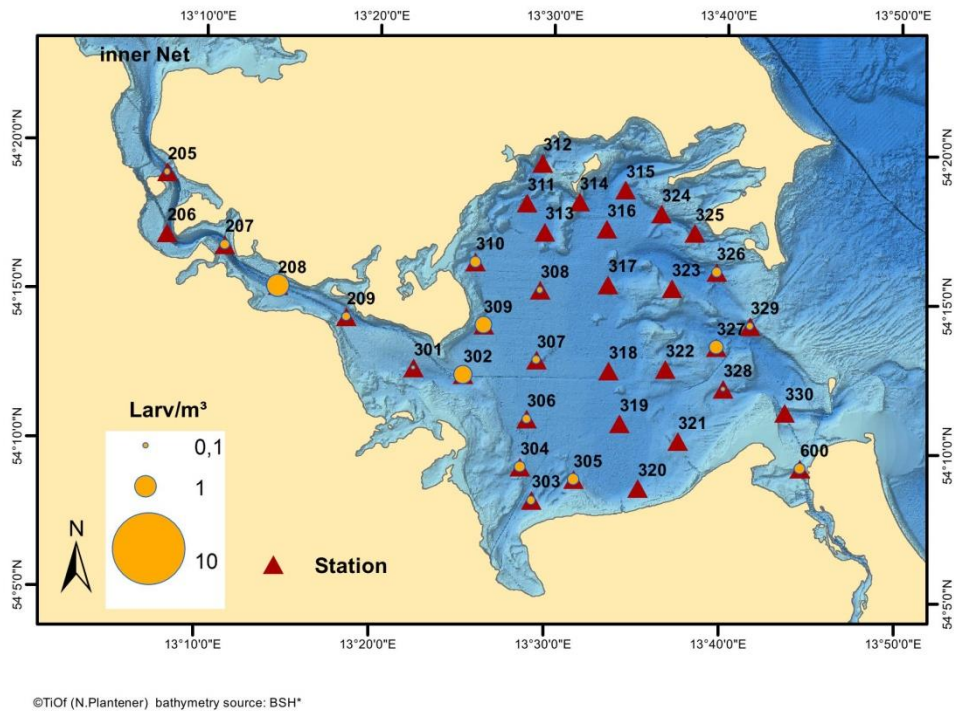


Fig. 2. Spatial distribution of herring larvae caught with the 335µm Bongo-Net during the sampling period.

The length frequency distribution of larval herring (Fig.3) reveals that the majority of larval herring during the sampling period is composed of rather early larval stages (< 20 mm). This indicates minor herring spawning activity (i.e. larval hatching) during autumn. Average physical parameters during the sampling period are presented in Table 1.

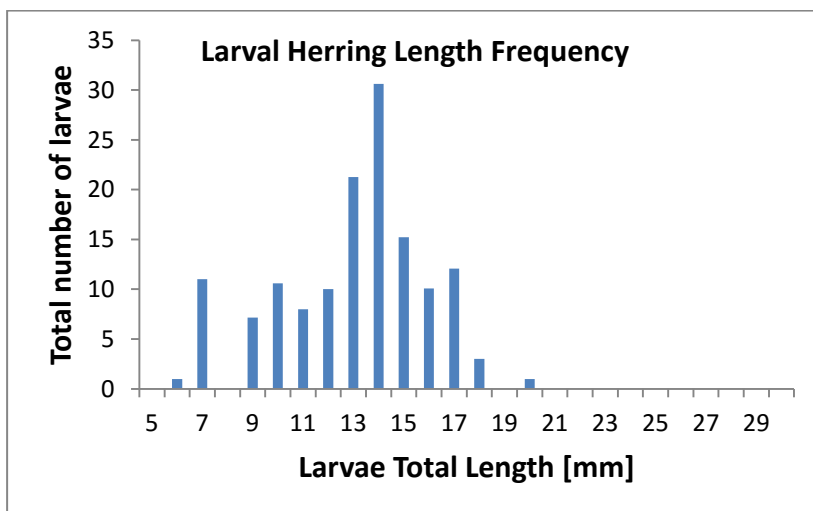


Fig. 3. Length distribution of herring larvae caught with the 335µm Bongo-Net during the sampling period.

Table 1: Average physical water parameters (\pm SD) at the surface and on the bottom during the sampling period.

<i>Surface</i>				<i>Bottom</i>			
Temp [°C]	Sal	Diss. Ox. [mg/l]	Turbidity [NTU]	Temp [°C]	Sal	Diss. Ox. [mg/l]	Turbidity [NTU]
6.7 (\pm 0.4)	7.4 (\pm 0.5)	8.8 (\pm 0.3)	2.5 (\pm 1.3)	6.9 (\pm 0.4)	7.4 (\pm 0.5)	9.7 (\pm 1.8)	4.2 (\pm 6.0)

Part 3: tagging activities East of Rügen Island Cruise schedule and preliminary results

This report summarizes the tagging activities for the TABACOD project carried out by TI-OF during a 3-day cruise period (14.11.2016 to 16.11.2016). Trawling was conducted from the German research vessel “CLUPEA” (28.80m, 478kW), whilst travelling at a speed of 3 knots. Trawl duration varied between 15 and 40 minutes (Table 1). The trawl gear used was the TV3-520 model. The codend was modified through inclusion of a BACOMA window, a 120mm square mesh window inserted into the top panel of the codend to improve selectivity and reduce bycatch (Figure 1). To focus the fishing power of the trawl on cod, the standard extension piece was replaced by FLEX, a flatfish bycatch reduction device developed by the Thünen Institute in 2014 (Figure 1). Reducing the bycatch of flounder through use of this gear reduced the extent of abrasions sustained by captured cod, resulting in cod which were in better condition for tagging.

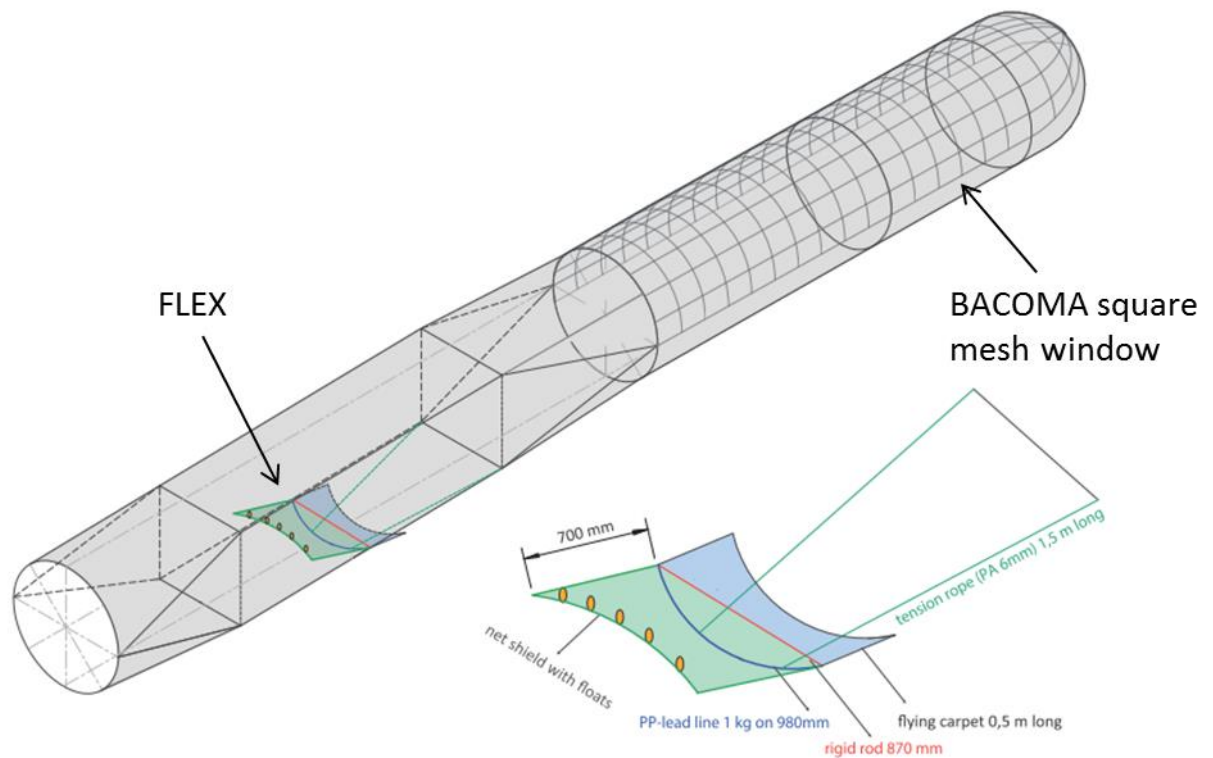


Figure 1: Diagram of trawl gear with FLEX flatfish bycatch reduction device and BACOMA selectivity modification.

All trawling took place east of the island of Rügen (Figure 2). Three trawls were conducted each day between 08:00 and 14:25 at depths ranging between 19 and 26m (Table 1). The differences in temperature, oxygen and salinity between surface and depth varied between trawl locations (Table 1). On average, the difference in temperature was 1.65°C, the difference in salinity was 1.79‰ and the difference in oxygen was 2.73 mg/l between the surface and the sea bed.

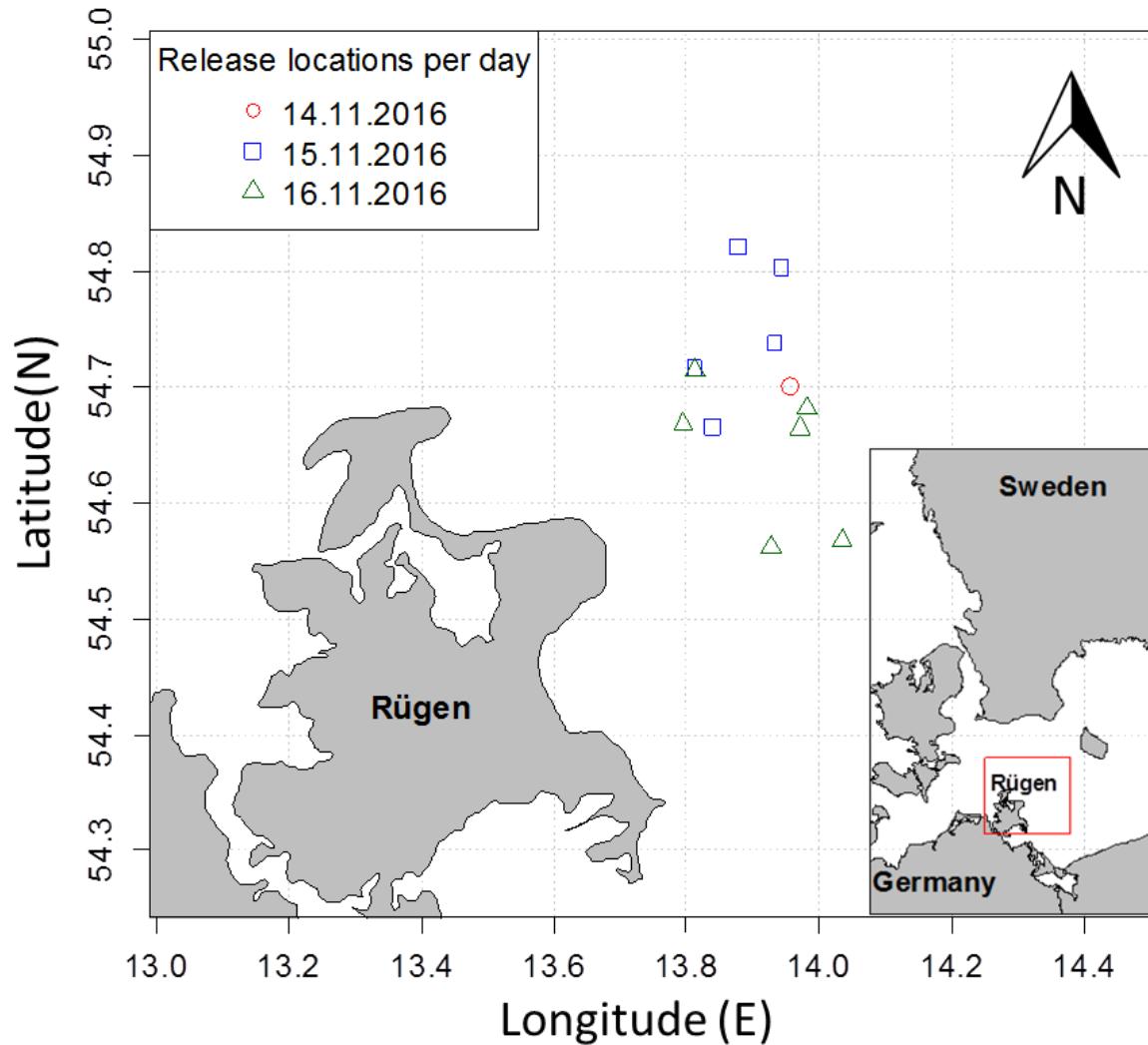


Figure 2: Release locations of tagged cod each day of the cruise. All cod were captured within the same area. On 14.11.2016 there was a problem with the GPS device, so only the central point of release locations is presented rather than each individual release location.

Table 1: The date and timing of each trawl, and the corresponding environmental conditions recorded at each trawl location.

Date	Time at shooting	Time at hauling	Depth (m)	Temp. at surface (°C)	Temp. at depth (°C)	Salinity at surface (‰)	Salinity at depth (‰)	O ² at surface (mg/l)	O ² at depth (mg/l)
14.11.2016	09:20	09:45	22.5	8.6	10.9	8.299	10.6	8.16	5.6
	12:00	12:20	22	8.65	10.96	8.184	10.59	8.3	6.3
	14:00	14:25	24.7	9.135	10.55	8.2	11.4	8.99	4.4
15.11.2016	08:00	08:20	25	8.4	10.43	8.03	9.8	8.1	5.5
	09:00	09:40	21	8.84	8.86	8.12	8.12	8	8
	13:00	13:40	21	8.63	10.89	8.215	10.33	8.15	5.45

16.11.2016	08:10	08:40	22	8.56	10.6	7.88	10.45	8.9	5.14
	10:00	10:30	19	8.68	9.74	8.075	9.09	10.5	6.6
	12:10	12:40	26	8.71	10.2	7.97	8.7	8.32	5.9

The optimal haul size for tagging operations was found to be 50kg. Hauls were opened on deck and sorted, with live cod transported to a holding tank with a constant supply of fresh sea water. Cod within the holding tank were assessed to ensure that they were in a good condition to be tagged.

Tagging was carried out by two employees from the TI-OF. One person was responsible for measuring fish, weighing fish, externally tagging with T-bar tags and internally marking with tetracycline. The other person was responsible for recording the data. A total of 571 cod were tagged during the trip, with total lengths ranging from 19.5cm to 63.0cm. The majority of cod tagged were between 38.0cm and 43.0cm (Figure 3). Condition of tagged cod, calculated as Fulton's K ($K=100(W/L^3)$) ranged between 0.62 and 1.57, though the majority of tagged cod had K between 0.92 and 1.03. Larger cod generally had lower K than smaller cod (Figure 4). Cod were released close to capture locations (Figure 2). Unlike the SOLEA cruise in March 2016, there were no immediate recaptures of released cod during this cruise. As it was not possible to keep the pumps supplying seawater to holding tanks running overnight, no fish were kept overnight as a control.

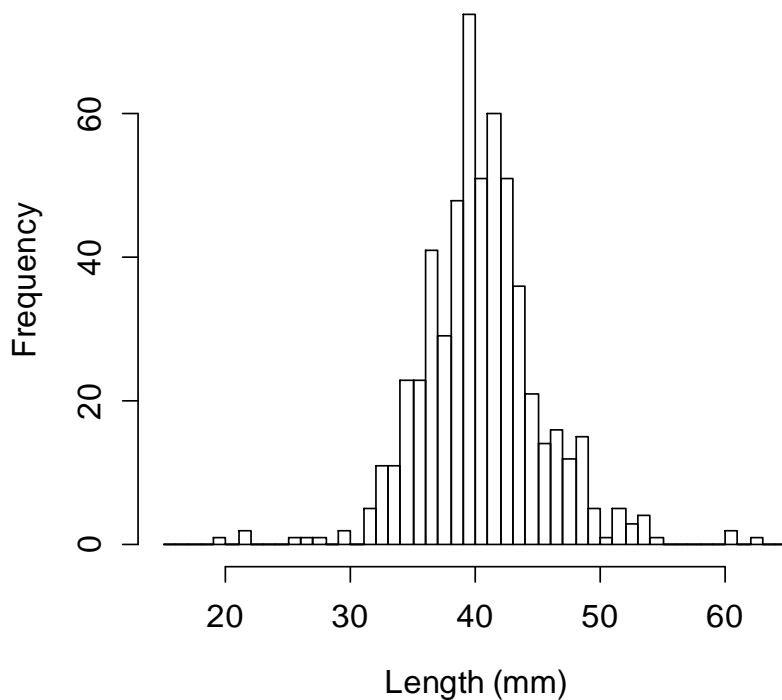


Figure 3: Length distribution of tagged cod.

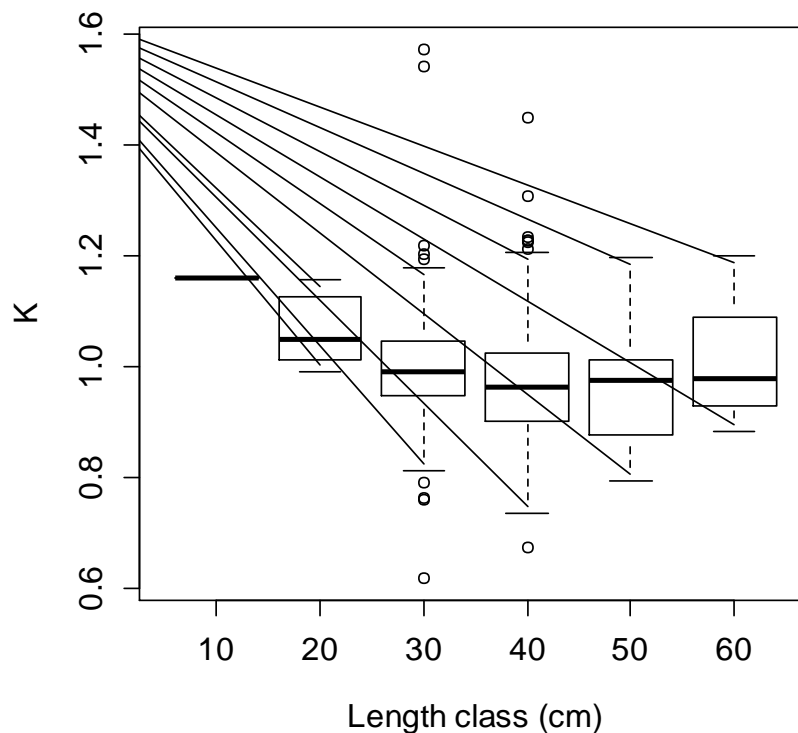


Figure 4: The average condition of tagged cod per length class, presented as Fulton's K. The average K per length class is represented by the thick black line, the interquartile range by the box, 1.75 x the interquartile range by the whiskers and outliers by single points.

On-board handling and release procedures were refined and optimized for the upcoming tagging cruises on CLUPEA in 2017. In particular, two different procedures were tested to counter the adverse effects of barotrauma on cod captured through trawling. In general, shorter trawls resulted in a lower proportion of cod suffering from barotrauma, and smaller cod were generally less adversely affected than larger cod. However, in every haul there was a proportion of cod which displayed signs of barotrauma, demonstrated through an inability to swim to the bottom of the holding tank. Release cages were not currently available for use in this tagging expedition, therefore alternative methods were required to ensure the successful return of tagged cod to the sea bed. One method involved placing tagged cod into drums extracted from washing machines which were then submerged below the vessel. After at least 30 minutes, the drums were brought slowly back to the surface and the cod were released. However, this method was not always successful in alleviating the effects of barotrauma. Cod which were released but which still had difficulties in submerging due to positive buoyancy were particularly susceptible to predation by sea birds.

A second method tested was the use of a cannula to release pressurised air from the swim bladders of the fish. In this procedure, cod with inflated swim bladders were punctured with the cannula, and gently squeezed to encourage the release of pressurised air. Although time-consuming, this method appeared to be successful, with cod released at the surface generally able to quickly descend

I hereby thank all participants, the captain and the crew of FRV Clupea for their cooperation and support.

Rostock, 26.06.2017

Dr. Daniel Oesterwind
(Scientist in charge)