

**Cruise Report**  
**FRV „Clupea“ Cruise 279**  
**10.02. – 21.02.2014**

**Hydroacoustic survey for the assessment of small pelagics in the Baltic Sea**

Scientists in charge: Dr. Daniel Oesterwind (TI-OF) & Dr. Patrick Polte (TI-OF)

**1. In a nutshell**

The first part of the cruise was conducted to assess concentrations of ripe and running herring in the area of the outer coastal waters of the Pommeranian Bay by hydroacoustic means.

According to the annual Rügen larval herring survey (RHLS), regularly starting at the beginning of the spring spawning period of western Baltic herring in March, the second part of this cruise was performed to control the system of Greifswald Bay for potential abundance of larvae resulting from winter spawning events. Due to extensive ice cover only 15 of the planned 36 stations could be sampled with the Bongo-net. However, the aim of the survey verifying that all potential herring spawning events are included into the annual assessment of herring reproduction success could be fulfilled. Additionally, this first ichthyoplankton cruise of the year allowed for testing new sampling gear and to adjust routines due to relevant approaches in ecological system analysis within the following RHLS.

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**Distribution list:**

BLE, Hamburg  
Schiffsführung FFS „Clupea“  
Deutsche Fischfang-Union  
Sassnitzer Seefischerei e. G.  
Landesverband der Kutter- u. Küstenfischer  
DFFU Cuxhaven  
BMEL, Ref. 614  
Thünen-Institut - Pressestelle, Dr. Welling  
Thünen-Institut - Präsidialbüro  
Thünen-Institut - Fischereiökologie  
Thünen-Institut - Seefischerei Hamburg  
Thünen-Institut - Ostseefischerei  
Thünen-Institut - FIZ-Fischerei

BFEL HH, FB Fischqualität  
Reiseplanung Forschungsschiffe, Herr Dr. Rohlff  
Fahrtteilnehmer  
Bundesamt für Seeschifffahrt und Hydrographie, Hamburg  
Mecklenburger Hochseefischerei Sassnitz  
Doggerbank Seefischerei GmbH, Bremerhaven  
Deutscher Fischerei-Verband e. V., Hamburg  
Leibniz-Institut für Meereswissenschaften IFM-GEOMAR  
BSH, Hamburg  
Leibniz-Institut für Ostseeforschung Warnemünde  
Institut für Fischerei der Landesforschungsanstalt  
LA für Landwirtschaft, Lebensmittels. und Fischerei  
Euro-Baltic Mukran

## **2. Cruise objectives**

The following objectives were planned for CLU279:

1. Control the presence of herring larvae in the main spawning area
2. Record of environmental parameters
3. Test and revision of the flowmeter measurement
4. Nutrient and reproduction studies on adult herring
5. Hydro-acoustic investigations of the abundance and distribution of adult herring around Rügen

## **3. Cruise narrative and preliminary results**

### **3.1 Cruise narrative (Daniel Oesterwind & Patrick Polte)**

FRV "Clupea" was equipped with all hydro-acoustic equipment and biological sampling gear for both cruise parts on February 10<sup>th</sup>. Due to the ice cover and wind conditions FRV "Clupea" left Marienehe port on February 12<sup>th</sup> with a delay of 2 days to Sassnitz port. Due to the weather and ice at the area of Rügen and Greifswalder Bodden, the first week of the cruise had to be cancelled. Scientists boarded FRV "Clupea" in the morning of February 17<sup>th</sup> and the acoustic cruise part started immediately. Due to a power blackout on FRV "Clupea" during the weekend the Doppler log had to be calibrated at first. The cruise continued with the first CTD-station to measure the hydrographic conditions to set the acoustic records. Afterwards, the hydro acoustic records started at the first transect (T3) at the Prorer Wiek. Generally, survey operations were conducted during daytime. At the end of the first day transect 3, transect 2 and a half of transect 1 were finished and FRV Clupea returned to Sassnitz port. Because of the rare acoustic signals, only one haul was performed at the first day. On the second day, FRV "Clupea" left Sassnitz port in the morning to continue the survey and finished the northern transect (T1). Afterwards FRV "Clupea" steamed to the southern transects (T4 & T5) and finished the last two transects in the afternoon. After transect 5 FRV "Clupea" shipped to the beam trawl position near Oderbank and performed a standard haul, before FRV "Clupea" shipped into the port of the Island of Rügen and the second day ended. On the second day a total of three hauls (2 OTM + 1 TBB) and eight CTD stations were performed. Due to the low herring abundance and therefore the low number of fishing hauls all transects were fulfilled within two days, and enough time remained for the ichthyoplankton survey. Therefore FRV "Clupea" left the port of Lauterbach Rügen and moved Stralsund to change the scientific crew and to start with the second part.

### **3.2 Hydroacoustic sampling (Matthias Schaber)**

Hydroacoustic data were recorded with a Simrad EK60 scientific echosounder with hull-mounted 38 kHz and 120 kHz transducers. Post-processing and analysis were accomplished with Myriax Echoview 5.4 software. Data from the 38 kHz transducer were used for integration. Corresponding transducer settings were: Pulse duration 1024  $\mu$ s, ping interval 4 s-1.

Data were recorded at a ship speed of 10 to 11 kn. Overall hydroacoustic transect length was 78 nm. Transects and NASC values (1 nm intervals) are depicted in Fig. 2.

Altogether, NASC values were zero in large parts of the surveyed area indicating absence of herring pre-spawning aggregations. However, in deeper parts of the section connecting transects T2 and T1 as well as on the northernmost transect T1 patches of several very large schools were detected leading to NASC values sometimes well exceeding 10 000 m<sup>2</sup>nm<sup>-2</sup> in the corresponding intervals. Trawl hauls targeting the schools yielded large herring in mostly pre-spawning condition indicating arrival of spawners. In the shallow southeastern part of the survey area (section connecting T4 and T5), also correspondingly large schools were detected. However, those were spatially restricted and occurred on a short transect section.

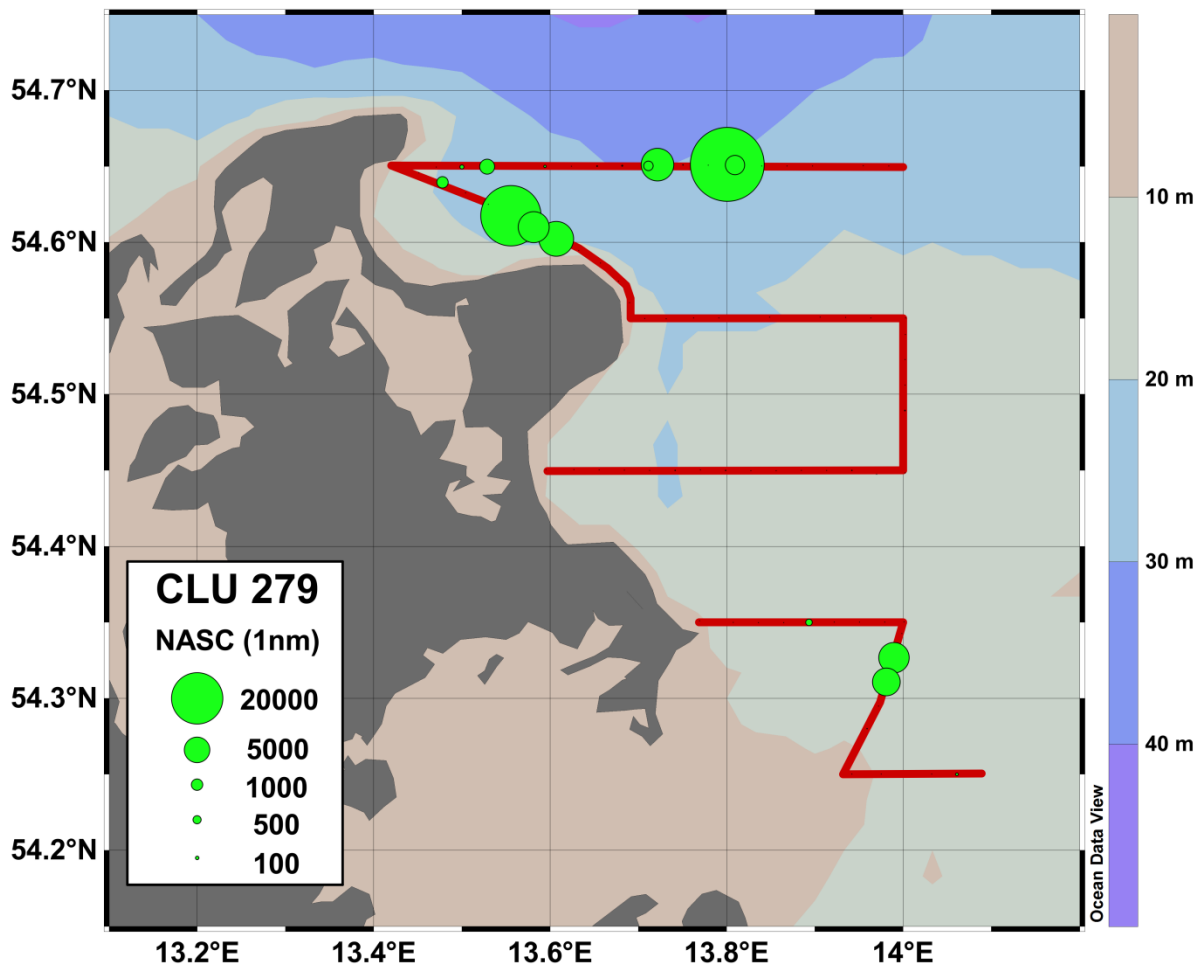


Figure 1: Clupea CLU279. Hydroacoustic transects (red line) and NASC values (Nautical Area Scattering Coefficient,  $m^2nm^{-2}$ ). Water depths (m) are indicated in scale. The large schools identified mostly in the northern part of the survey area consisted almost exclusively of big, pre-spawning herring.

### 3.3 Biological sampling

To validate and allocate echorecordings, altogether 3 fishery hauls were performed (Figure XX with an OTM PSN 388 and fish were handled after the standard acoustic protocol. One additional haul were performed with a beam trawl near Oderbank. The total catch is listed in Table 1.

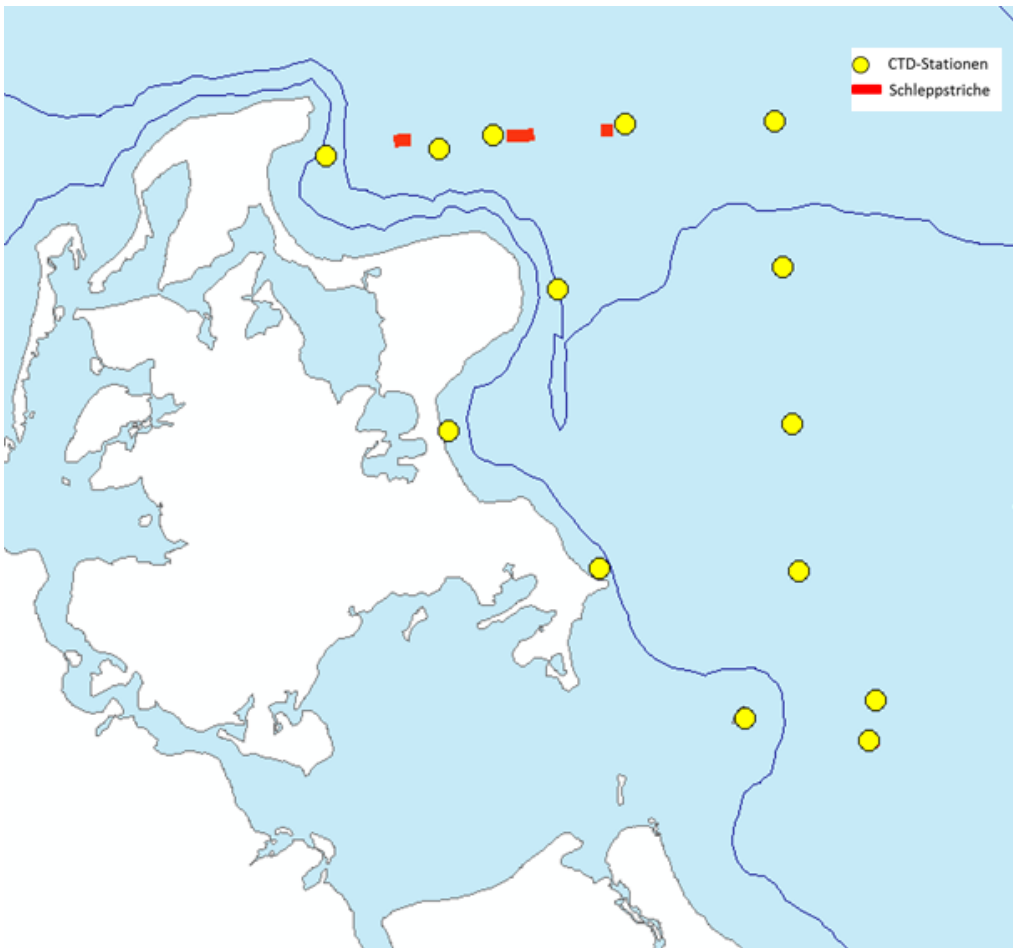


Figure 2. Overview about the performed CTD stations and fisheries hauls.

Table 1. Catch composition during FRV Clupea cruise 279.

Gear	transect	Haul	Species	Total wet weight
OTM PSN388	T1	1	<i>Cyclopterus lumpus</i>	0,267
OTM PSN388	T1	2	<i>Sprattus sprattus</i>	10,05
OTM PSN388	T1	2	<i>Clupea harengus</i>	52,37
OTM PSN388	T1	3	<i>Clupea harengus</i>	235,86
TBB 2m		4	<i>Platichthys flesus</i>	0,084

### 3.4 Larval herring survey

Limited ice cover allowed for ichthyoplankton sampling in the Greifswalder Bodden on February 19<sup>th</sup>/20<sup>th</sup>. However, only 16 out of 36 stations could be successfully sampled

due to (partly extensive) floating ice sheets that were abundant during the investigation period. In general, the winter control on larval herring abundance resulted in a total of 56 herring larvae (21 larvae caught by mesh size 335 $\mu$ m/ 35 larvae caught by mesh size 780 $\mu$ m). Compared to the huge weekly quantities generally found in the spring survey (RHLS) this result is considered a marginal abundance. The length frequencies of larvae found in this survey (Fig.3) imply that larvae found during this survey are most probably offspring from autumn spawning events of the previous year. The smallest larvae found measured about 21 mm (TL). Compared to the average results of the RHLS this size class reflects the latest larval stage that usually is not subjected to significant variation of early life stage mortality. Accordingly this control survey for spawning/hatching activity prior to the main larval survey (starting in March) did not indicate any winter spawning or larval occurrence in the area relevant for stock recruitment.

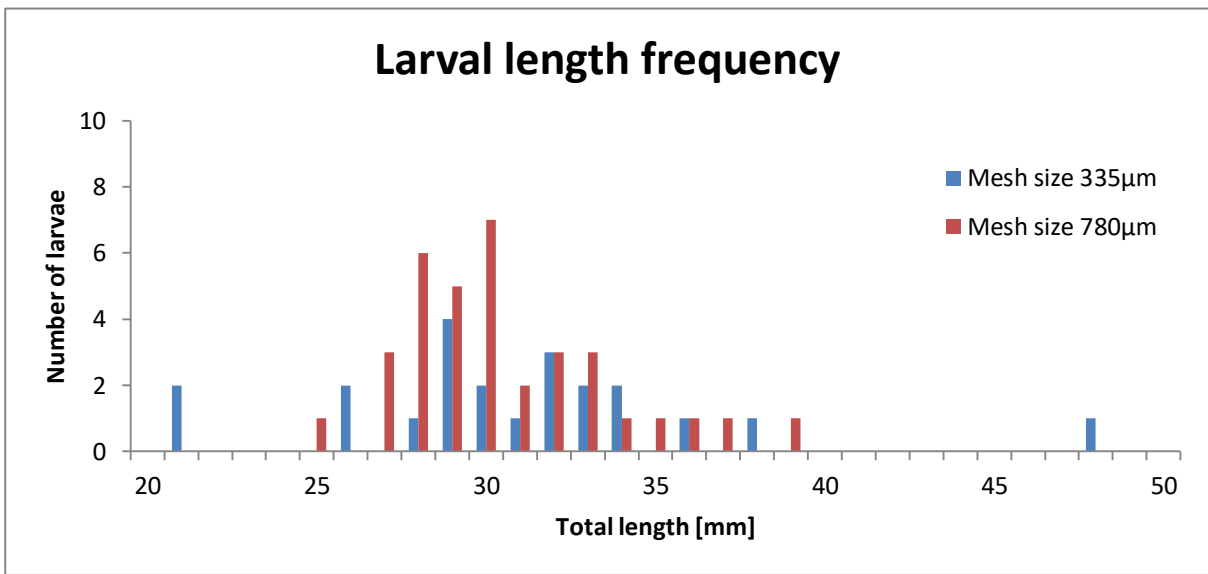
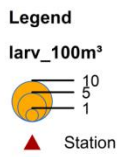
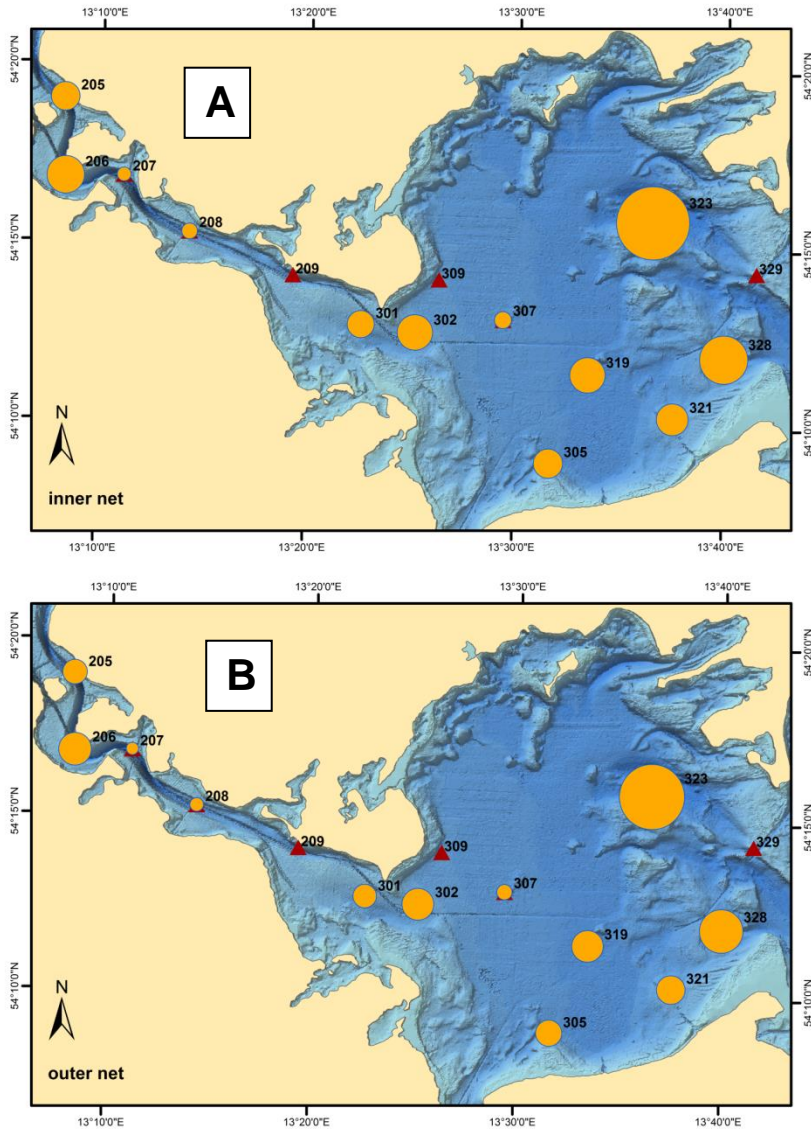


Figure 3. Length frequency of herring larvae found during the winter control in Greifswald Bay

Spatial distribution of herring larvae is shown in Fig. 4, A (335 $\mu$ m mesh); B (780 335 $\mu$ m mesh). Since catch efficiency of the two mesh sizes in the Bongo net does not differ among size classes, the spatial distribution of larvae caught with either mesh size is rather equivalent.



Tiefenmodell unter Verwendung von Datenmaterial des Bundesamts für Seeschifffahrt und Hydrographie nach Maßgabe der Bestimmungen des GeoZG sowie der GeoNutzV. Das BSH hat dieses Produkt nicht geprüft. Es fällt in die alleinige Verantwortlichkeit des Erstellers.

Figure 4. Spatial distribution of herring larve in Greifswald Bay caught by “A” the Bongo-Net 335µm, and “B” 780 µm

## 4. Cruise Participants

### 1. Part:

Dr. Daniel Oesterwind	scientist in charge	TI-OF
Dr. Matthias Scharber	scientist (acoustic)	TI-SF
Mario Koth	technician	TI-OF

### 2. Part

Dr. Patrick Polte	scientist in charge	TI-OF
Annemarie Jetter	technician	TI-OF

## 5. Acknowledgments

We hereby thank all participants, the crew of FRV "Clupea" and Captain R. Singer for their outstanding cooperation and commitment.