

**Survey Report**  
**FRV Walther Herwig III, WH 437**  
**22 July to 13 August 2020**

**IBTS and GSBTS**  
Chief scientist: Dr. Anne Sell

## Summary

Survey WH 437 covered fisheries research representing the German contribution to the International Bottom Trawl Survey (IBTS) in the annual quarter 3, as well as one component of the two-ship operation in the German Small-scale Bottom Trawl Survey (GSBTS). Both surveys use the same principle fishing methods but at different spatial scales, applying a GOV otter board trawl. A large subset of the fishing hauls is accompanied by hydrographic measurements and investigations of benthic epifauna, infauna and sediments. Bycatch of marine litter in the GOV is reported.

The GSBTS is a national program to monitor small-scale variability as well as long term changes in demersal fish assemblages in relation to physical and biological habitat characteristics. In order to fully cover the international IBTS programme, the GSBTS component of the survey in the western North Sea had to be reduced due to constraints in available ship time.

Upon special request to the ICES IBTS-Working Group, plankton hauls with the MIK were conducted at night-time in order to assess the distribution of clupeid fish larvae during the third quarter of the year. Additional vertical plankton hauls at selected stations supported a research project on food webs.

The start of the survey was postponed due to technical problems of the vessel, leading to a delay of the departure, which was originally planned for July 16<sup>th</sup>. The survey vessel departed on 22 July 2020 from Bremerhaven, starting investigations for the IBTS on 23 July. The 'Walther Herwig III' returned to Bremerhaven one day earlier than scheduled, on August 13, because work in the northernmost part of the survey area (Box M) had to be terminated prematurely due to a winch failure.

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### 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, Dr. Welling  
Thünen-Institut - Präsidialbüro  
Thünen-Institut - Reiseplanung Forschungsschiffe, Dr. Rohlf  
Fahrteilnehmer\*innen

## Number of stations sampled during WH 437

	Hauls GOV	CTD casts (total)	Hauls 2-m beam trawl	van Veen sediment grab**	MIK Plankton net	WP2 Plankton net
IBTS	31*	31	31	90	67	
Box A	21	15	9	18		
Box C	21	15	9	21		
Box L	20	15	9	18		
Box M	12	12	8	16		
<b>total</b>	<b>101</b>	<b>84</b>	<b>62</b>	<b>154</b>	<b>67</b>	<b>61</b>

\*) Includes hauls in the wider German Bight, and one each in "Boxes" C, L, and M; see map.

\*\*\*) Sediment analysed from all stations sampled infauna for selected stations

Box B and Box D/D' were not sampled in 2020, due to constraints in ship time.

## Methods

### 1. Demersal and pelagic fishes (Thünen Institute of Sea Fisheries, TI-SF)

The qualitative and quantitative composition of the bottom fish fauna was analysed from a total of 101 GOV hauls for the IBTS and the GSBTS, respectively (survey track, see Fig. 1). Larger invertebrates of commercial interest were quantified as specified in the IBTS manual. In addition, other benthic macro-invertebrates from the by-catch of the GOV otter board trawl were analysed for IBTS stations, and for selected additional GSBTS stations. During all hauls, the GOV was equipped with sensors to monitor net geometry as required for the IBTS and GSBTS surveys. Data from the IBTS hauls taken in the wider German Bight are to be combined with international data covering the entire North Sea for the assessment of groundfish stocks and for analyses on the non-commercial fish species. IBTS data have been uploaded to the ICES DATRAS system.

### 2. Hydrography (TI-SF)

A total of 84 hydrographic casts were performed with a Seabird CTD to record vertical profiles of temperature, salinity and oxygen concentration at the fishing stations. For a subset of stations, water samples for calibration of the oxygen probe were processed aboard through Winkler titration, and another subset of samples was taken to shore for calibration of the salinity probe.

### **3. Epibenthos (Senckenberg Research Institute)**

Epibenthos was sampled within ICES rectangles of the wider German Bight, as well as in the Boxes A, C, L and M, applying a 2m-beam trawl. Samples were sieved over 5-mm and 2-mm mesh. The 5-mm fraction was analysed aboard, the 2-mm fraction was preserved in 4-% formaldehyde for analysis in the laboratory ashore. Length-frequency measurements of the starfish *Asterias rubens* were taken in Box A.

### **4. Sediments, benthic infauna (Senckenberg Research Institute)**

Investigations of epibenthos were accompanied by sampling of sediments using a 0.1-m<sup>2</sup> van Veen-grab. Additional grabs were taken to sample benthic infauna in the Boxes as well as in the ICES rectangles.

### **5. Sampling of fish larvae (TI-SF)**

During the WH437 survey, plankton samples were collected at night with the MIK in order to assess the distribution and abundance of fish larvae during Q3. The sampling method followed the ICES MIK survey protocol.

### **6. Zooplankton sampling (Senckenberg, TI-SF)**

During daytime, zooplankton samples were taken at selected stations through vertical hauls, using a WP2 net equipped with a mechanical flow meter. For the BMBF-funded project BioWeb, two plankton samples were collected at each of 18 stations in the ICES rectangles and two stations in the Boxes C and M. For each station, one sample was preserved in formaldehyde, one in 96% undenatured ethanol. For a future DAM project (CREATE), additional samples were taken in the Natura 2000 sites 'Sylt Outer Reef' and 'Borkum Reef Ground' and preserved in 96% undenatured ethanol for metabarcoding to evaluate the local zooplankton diversity.

### **7. Marine litter (TI-SF)**

Marine litter bycatch from the GOV hauls was reported according to the ICES standards on all fishing stations. Data have been prepared for uploading to the ICES database.

## **Survey schedule**

The FRV 'Walther Herwig III' departed with six days delay on 22 July 2020 from Bremerhaven, Germany. On 23 July, the scientific program started with sampling for the IBTS. Three days of GSBTS sampling in Box A were performed from July 28-30, before continuing the IBTS sampling in the German Bight until August 2<sup>nd</sup>. In the following days, sampling for the IBTS and the GSBTS alternated in the northern part of the survey area in the GSBTS Boxes C, L and M. On August 11, the vessel suffered a final winch failure and started to steam towards Bremerhaven, where the cruise was terminated on August 13<sup>th</sup>, 2020.

## **Preliminary Results**

### **Demersal and pelagic fish (Thünen Institute of Sea Fisheries)**

#### **IBTS samples**

48 fish species were recorded in the IBTS hauls overall, of which the five most abundant ones were sprat (*Sprattus sprattus*), herring (*Clupea harengus*), whiting (*Merlangius merlangus*), haddock (*Melanogrammus aeglefinus*) and mackerel (*Scomber scombrus*). After the survey, the IBTS data set has been quality-checked, supplemented with age readings, and uploaded to the ICES database DATRAS, where they are publicly available.

## **GSBTS samples**

### **Box A (German Bight)**

Mean catch biomass in Box A (232 kg/ 30 min haul) was similar to the values reported since 2015, and lower than values typical for the period before 2015. The catches were dominated by sprat (139 kg/ 30 min), followed by herring (40 kg/ 30 min), mackerel (22 kg/ 30 min) and whiting (16 kg/ 30 min).

### **Box C (Central North Sea)**

Catches in Box C contained with a mean of 215 kg slightly more biomass than in the long-term mean (mean until 2019 175 kg/ 30 min haul). Herring dominated with an average of 111 kg per 30-min haul, followed by sprat (34 kg) and whiting (20 kg). As in the preceding year 2019, haddock occurred again at an unusually high biomass, also averaging 20 kg/haul, hence ranking even before dab (17 kg/haul).

### **Box L (Northern North Sea)**

Total biomass in Box L (614 kg/ 30-min haul) was among the higher values since 1999, while the biomass in Box L remained highly variable throughout the time series. Herring contributed the highest share to the fish biomass in 2020 (275 kg/ 30-min haul), followed by haddock (217 kg/30 min) and mackerel (70 kg/30 min).

### **Box M (Northern North Sea)**

Total biomass in Box M was 300 kg/ 30-min haul, very close to the long-term average between 1999-2019. Mackerel (200 kg/ haul) dominated the catch and reached almost the same value as the maximum biomass within the time series in 2018. The latest for years, 2017-2020, thus reached an average of 146 kg/ haul, 4.5-times as high as the average for the previous part of the time series in Box M, 32 kg/ haul (1999-2016). The next lower ranks in biomass were represented by horse mackerel (27 kg / haul), herring (21 kg/ haul) and haddock (18 kg/ haul).

### **Box B and D' (Western North Sea)**

Not sampled in 2020.

## Epibenthos (Senckenberg Research Institute)

### IBTS rectangles

Generally, abundance and biomass of species was high at the coast and decreased towards offshore areas. Three invertebrate species were found in almost all rectangles: The starfish *Asterias rubens*, the swimming crab *Liocarcinus holsatus* and the hermit crab *Pagurus bernhardus*. Common fishes were the solenette *Buglossidium luteum*, the goby *Pomatoschistus minutus* and the dab *Limanda limanda* and. No exceptional changes compared to recent years have been noted for these dominant species.

### GSBTS samples

#### **Box A**

Nine replicates were taken in Box A in 2020. Epifauna assemblages were dominated by the solenette *Buglossidium luteum*, the starfishes *Asterias rubens* and *Astropecten irregularis* and the goby *Pomatoschistus minutus*. The abundance of *Astropecten irregularis* has been steadily increasing since 2015.

#### **Box C**

Ten samples were taken in Box C in 2020. The epibenthic community in 2020 was characterized by the starfishes *Astropecten irregularis* and the hermit crab *Pagurus bernhardus*. Abundance of the starfishes *Astropecten irregularis* and *Asterias rubens* increased remarkably since 2016. As usual, a high diversity of gastropods was found in Box C.

#### **Box L**

Nine replicates were taken in Box L in 2020. Box L was characterized by exceptional high numbers of the sea urchin *Gracilechinus acutus* accompanied by high numbers of the shrimps *Pandalus montagui* and *Crangon allmanni*.

#### **Box M**

Nine replicates were taken in Box M in 2020. The sea urchin *Gracilechinus acutus* was the most frequently species in Box M, followed by the hermit crabs *Anapagurus laevis* and *Pagurus prideaux*. High abundances of the hermit crab *Pagurus pubescens*, the shrimp *Pandalus montagui* and the echinoid *Spatangus purpureus* were found.

## Survey participants

1	Dr. Anne Sell	TI-SF	Cruise leader + Fischeries biology, plankton/ CTD
2	Andriy Martynenko	TI-SF	Oceanography, plankton (MIK)
3	Samira Kadhim	TI-SF	Fisheries biology
4	Sakis Kroupis	TI-SF	Fisheries biology
5	Tim Schorr	TI-SF	Fisheries biology
6	Theresa Reismann	TI-SF	Fisheries biology
7	Pauline Wagner	TI-SF	Fisheries biology
8	Murielle Muesfeldt	TI-SF	Fisheries biology
9	Wiebke Stamerjohanns	TI-SF	Data entry, fisheries biology
10	Dr. Julia Meyer	Senckenberg am Meer	Benthos, plankton (WP2)
11	Vanessa Fromme	Senckenberg am Meer	Benthos, plankton (WP2)

(No port stop; no crew exchange)

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Dr. Anne Sell, Chief scientist

