

Institute of Sea Fisheries

Cruise Report FRV Walther Herwig, WH 335

07/19 - 08/17/2010

IBTS and GSBTS

Cruise Leader: Dr. Anne Sell

1. Summary

This cruise covered fisheries research representing the German contribution to the International Bottom Trawl Survey (IBTS) in quarter III, 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 bottom trawl, accompanied by hydrographic measurements, investigations of benthic epifauna and sediments.

The scientific program lost the first two days, as well as individual hauls during the cruise, due to multiple engine and winch problems. A total of 148 stations were sampled in the wider German Bight, and in the central and northern North Sea. Besides the regular survey tasks, sampling was performed for stomach analyses of demersal and pelagic fish species (collaboration with Hamburg University). Furthermore, specimens of a large variety of species were collected for a project on marine genetic diversity (bar-coding), lead by Senckenberg Research Institute (WG Molecular Taxonomy of marine Organisms). For a collaborative study with the IMR (Tromsø, Norway) on stock identification, tissue samples and data of saithe were obtained for genetic analyses.

2. Number of stations sampled during WH 335

	Hauls GOV	CTD casts (total)	CTD casts with nutrient sam- ples	Hauls 2-m beam- trawl	Van Veen sediment grab**
IBTS	28*	28*	28*	28*	84*
Box A	21	15	9	9	18
Box B	20	15	9	9	18
Box C	21	16	9	9	9
Box D	18	15	9	9	18
Box L	21	15	9	9	18
Box M	21	16	9	9	20
total	145	115	77	77	170

*) IBTS: Includes 23 hauls in rectangles in the wider German Bight (inkl. Box A), and one each in the remaining 5 Boxes.

**) Sediment samples from all stations, infauna for selected areas

2.1 Groundfish (vTI-SF)

(Institute of Sea Fisheries, Johann Heinrich von Thünen-Institute, vTI-SF)

The qualitative and quantitative composition of the bottom fish fauna was analyzed from a total of 145 GOV hauls for the IBTS and the GSBTS, respectively. 28 of the 30 ICES rectangles allocated for IBTS sampling during WH 335 could be covered (1 GOV haul and accompanying investigations, each). Within the GSBTS, six areas of investigation ('Boxes') were sampled. Less than the target of 21 fishing hauls per Box were obtained in Boxes B and particularly D, due to technical problems with winches and one haul with net damage. Otherwise, the 21 hauls were completed within three consecutive days (Fig. 1).

Data from the IBTS hauls taken in the wider German Bight will be combined with international data covering the entire North Sea for the assessment of groundfish stocks and for analyses on the non-commercial species. (Data uploaded to ICES DATRAS system).

In all GSBTS Boxes, specimens of cod, grey gurnard, mackerel and horse mackerel were dissected for the analysis of stomach contents (vTI-SF/ University of Hamburg).

From the GOV hauls, larger invertebrates were quantified as specified in the IBTS manual. Cephalopods were collected for identification and quantitative analysis by vTI-OSF (D. Oesterwind).

2.2 Hydrography (vTI-SF)

A total of 115 hydrographic casts were performed with a Seabird CTD to record vertical profiles of temperature, salinity and oxygen concentration within the Boxes. At 77 of these stations, water samples for nutrient analyses were taken.

2.3 Epibenthos (Senckenberg Res. Inst.)

Epibenthos was sampled within ICES rectangles of the wider German Bight (IBTS stations), as well as in the Boxes A, B, C, D, L and M, applying a 2 m-beamtrawl. 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.

2.4 Sediments, benthic infauna (Senckenberg Res. Inst.)

Investigations of epibenthos were accompanied by sampling of sediments using a 0.1 m² van Veen grab. The same grab was used to sample benthic infauna from stations in the Boxes A, B, D, L and M (9 samples per Box) and at IBTS stations (1 sample per ICES rectangle).

2.5 Genetic analyses of fish and invertebrates (Senckenberg Res. Inst.)

The research group "Molecular Taxonomy of Marine Organisms" of the Senckenberg Research Institute develops molecular methods for the identification of the marine metazoan fauna of the North Sea, aiding efforts to monitor biodiversity patterns. For this, selected species were taken from the GOV and beam-trawl hauls in all GSBTS-Boxes and preserved in alcohol for further genetic analysis (barcoding). A total of 74 fish and invertebrate species from all Boxes (182 samples of 20 specimens) were preserved. DNA samples and specimen vouchers will be long-term stored and managed by a self-governing data base as well as be published at NCBI Gene Bank and incorporated within the International Barcode of Life Initiative.

2.6 Seabirds (Research and Technology Centre, FTZ)

Investigations on seabirds were conducted during the fishing operations and also while the ship was steaming, using three different methods: During the fishing hauls, maxima in the numbers of ship-following birds were recorded. Secondly, discard feeding experiments were performed to document which fish species would be taken by which bird species, and

at which size of prey fish. For these feeding trials, individual fish from a representative subsample of one of the two preceding GOV catches were fed while another fishing haul was being conducted. Finally, during steaming transects and at ship speeds > 9 kn, counts of ship-independent seabirds were obtained for the international Seabirds at Sea (SAS) monitoring program, which records species occurrence, as well as behavioural observations. Transects with seabird counts for the SAS program are indicated in Fig. 3.

3. Cruise schedule

During cruise WH335, several days' work was affected by technical problems. *FRV Walther Herwig* was scheduled to depart in the afternoon of July 19 from Bremerhaven, Germany, which had to be postponed one day due to problems with main engine and winches. The ship departed on the 20th (07:30 MESZ) toward Helgoland to conduct equipment test runs on the way and – after successful repairs – transfer the (external) repair team to the island. Afterwards, the scientific program started with a first haul in ICES rectangle 38F7, but had to be stopped immediately again due to further defects in the winch electronics. The first haul was successfully conducted on July 21, and the day's four planned IBTS hauls were completed. The following nine days were used to sample the boxes C, L and M (Fig. 1). After a 1 1/2-day port stop (Lerwick, Shetland Islands), *Walther Herwig* continued the survey on August 2nd with stations on the Boxes D and B (3 days each), followed by four day of IBTS sampling, three days in Box A, and a last day of IBTS work in the German Bight. The ship returned to Bremerhaven on August 16 and was disembarked the following morning.

4. Preliminary Results

Groundfish (SF - vTI)

IBTS samples (ICES rectangles in the wider German Bight)

Data from the IBTS stations were transmitted to ICES, where data from all participating nations are collated and analysed with respect to groundfish stock conditions and abundance of non-commercial species.

Box A (German Bight)

Mean total catches in Box A were roughly on the level of 2008 catches (total biomass ~750 kg / 30 min haul) and were mainly composed of pelagic species, namely sprat and herring (Fig. 2a). Catch rates of all other species except dab, *Limanda limanda*, and whiting, *Merlangius merlangus*, were below 100 ind/ 30 min. Horse mackerel, which had been a regular and often abundant component of the Box A assemblage between 1987 and 2005, has only occurred in very low numbers since (mean of 2 ind/haul in 2010).

Box C (Central North Sea)

Mean total catches in Box C were 318 kg/30 min haul, with 242 kg/haul of herring and 39 kg/haul of dab. Within the remaining portion of the catch, cod (*Gadus morhua*, mean of 11 kg/haul) long rough dab (*Hippoglossoides platessoides*, 9 kg/haul) had the greatest share (Fig. 2b).

Box M (Northern North Sea)

Total biomass in Box M was relatively low (mean of 179 kg/ haul) in comparison to the long-term mean, but higher than in 2009. Saithe, which was very abundant in 2001 and particularly 2002, but almost absent from the catches in 2009 (mean of 0.8 ind/ haul), had increased in number (mean 8 ind/ haul and 28 kg/haul, respectively). Herring, mackerel and haddock together constituted > 60 % of the total biomass of the catch (Fig. 2c).

Box L (Northern North Sea)

In contrast to catches of the year 2009, mackerel was almost absent in Box L. Norway pout, haddock and herring were the most abundant species and also highest in biomass (Fig 2d).

Box D (Western North Sea)

Total average catch rates (~ 1600 kg/ haul) were higher than the long-term mean. Roughly one third each consisted of haddock and herring (Fig. 2e). Norway pout biomass with an average of 300 kg/haul was highest within the long-term time series of Box D.

Box B (Western North Sea)

Catches in Box B were with ~ 575 kg/haul higher than in the preceding year and in the order of 2007 catches. Dominant species in biomass were mackerel and whiting (> 200 kg/haul, each) (Fig. 2f).

Epibenthos (Senckenberg Res. Inst.)

IBTS stations , German Bight

The species composition varied between the ICES rectangles sampled within the IBTS (Fig. 1). Within the German Bight, the epibenthic assemblage was dominated by the starfishes *Asterias rubens*, *Astropecten irregularis*, the swimming crab *Liocarcinus holsatus* and small fish species like *Buglossidium luteum* and *Arnoglossus laterna*. In contrast, in the southern Oyster Ground high numbers of the snail *Turritella communis* and the bivalves *Nucula nitidosa* and *Corbula gibba* were found. In the northern rectangles the starfish *Astropecten irregularis*, the sea urchins *Echinocardium cordatum* and *E. flavescens* as well as the swimming crab *L. holsatus* and the masked crab *Corystes cassivelaunus* dominated.

In contrast to the previous years the non-indigenous Angular crab *Goneplax rhomboides* was less frequently found in the Oyster Ground area probably due to negative effects of the preceding strong winter on the population.

Box A

Epifauna in Box A was dominated by the starfish *Asterias rubens* and the shrimp *Crangon allmanni*. Furthermore fishes such as *Limanda limanda*, *Buglossidium luteum* and *Arnoglossus laterna* were dominating in Box A. Higher numbers of juvenile *A. rubens* were found in Box A compared to previous years.

Box B + D

Boxes B and D near the British coast had low numbers and diversity of benthic species, with regular occurrence of hermit crabs *Pagurus bernhardus* and *P. pubescens*, as well as *Anapagurus laevis*. Sessile species such as Hydrozoa, Bryozoa and Anthozoa were also relatively common. Abundance and biomass of species were lower than in previous years in both Boxes. In particular, the increasing trend in abundance of the Atlantic bobtail squid *Sepiolo atlantica* was intermitted this year in Box D.

Box C

The assemblage in Box C was dominated by the starfishes *Astropecten irregularis* and *Luidia sarsi*. The latter revealed an increase in abundance since several years. Common species were also the sea urchin *Brissopsis lyrifera*, the hermit crab *Pagurus bernhardus* and the gastropod *Turritella communis*. The latter revealed conspicuously higher numbers than during the preceding years, while for instance abundance of the pelican's foot *Aporrhais pespelicani* and the sea urchin *Echinocardium flavescens* remarkably decreased.

Box L

In Box L, very high abundance of the sea urchin *Echinus acutus* was found, accompanied by larger numbers of the starfish *Astropecten irregularis*, the shrimp *Pandalus montagui* and the hermit crab *Anapagurus laevis*. Additionally, many sessile species occur in Box L such as *Verruca stroemia*, *Hydroides norwegica* and *Heteranomia squamula*. High abundance of the polychaeta *Ditrupea arietina* were found this year in Box L.

Box M

As in the previous years the community in Box M was very species rich. Common species were the hermit crabs *Anapagurus laevis*, *Pagurus pubescens* and *P. prideaux*. The latter was found together with the symbiotic sea anemone *Adamsia carcinopados*. Furthermore, the sea urchin *Spartangus purpureus* and the polychaeta *Thelepus cincinnatus* were frequently found in Box M. As in Box L the sessile species *Verruca stroemia*, *Hydroides norwegica* and *Heteranomia squamula* were very common. The squat lobster *Galathea dispersa* and the sea squirt *Asciidiella scabra* conspicuously increased in abundance.

Seabirds (FTZ Büsum)

Estimated maximal numbers of ship-following seabirds observed at any one time during fishing activities:

Box C: Northern Fulmars, *Fulmarus glacialis* (500),
Lesser black-backed Gulls, *Larus fuscus* (300)

Box L: Northern Fulmars (900), Lesser Black-backed Gulls (100)

Box M: Northern Fulmars (1200), Great Black-backed Gull, *Larus marinus* (100)

Box D: Northern Fulmars (1050), Black-legged Kittiwake, *Rissa tridactyla* (350)

Box B: Northern Fulmars (650), Northern Gannet, *Morus bassanus* (320)

Box A: Lesser Black-backed Gulls (6100), Great Black-backed Gull (110)

5. Cruise participants

Name	Institution	Tasks
1. Dr. Anne Sell	SF - vTI	Cruise leader, hydrography
2. Dr. Ingrid Kröncke	Senckenberg Res.	Benthos
3. Dr. Hermann Neumann	Senckenberg Res.	Benthos
4. Ingo Wilhelms	SF - vTI	Fisheries biology, databases
5. Timo Meißner	SF - vTI	Fisheries biology
6. Tim Dudeck	SF - vTI	Fisheries biology
7. Sascha Bednarz	SF - vTI	Fisheries biology
8. Florian Schmich	SF - vTI	Fisheries biology
9. Felix Koch	Volontär	Fisheries biology
10. Ulrich König	Volontär	Fisheries biology
11. Tanja Weichler	FTZ Büsum	Seabirds
12. Siegfried Schemmel	FTZ Büsum	Seabirds

6. Acknowledgements

We thank the ship's crew for their extended and efficient effort to keep the ship operating to fulfil the tasks of this cruise!

(Dr. Anne Sell, Cruise leader)

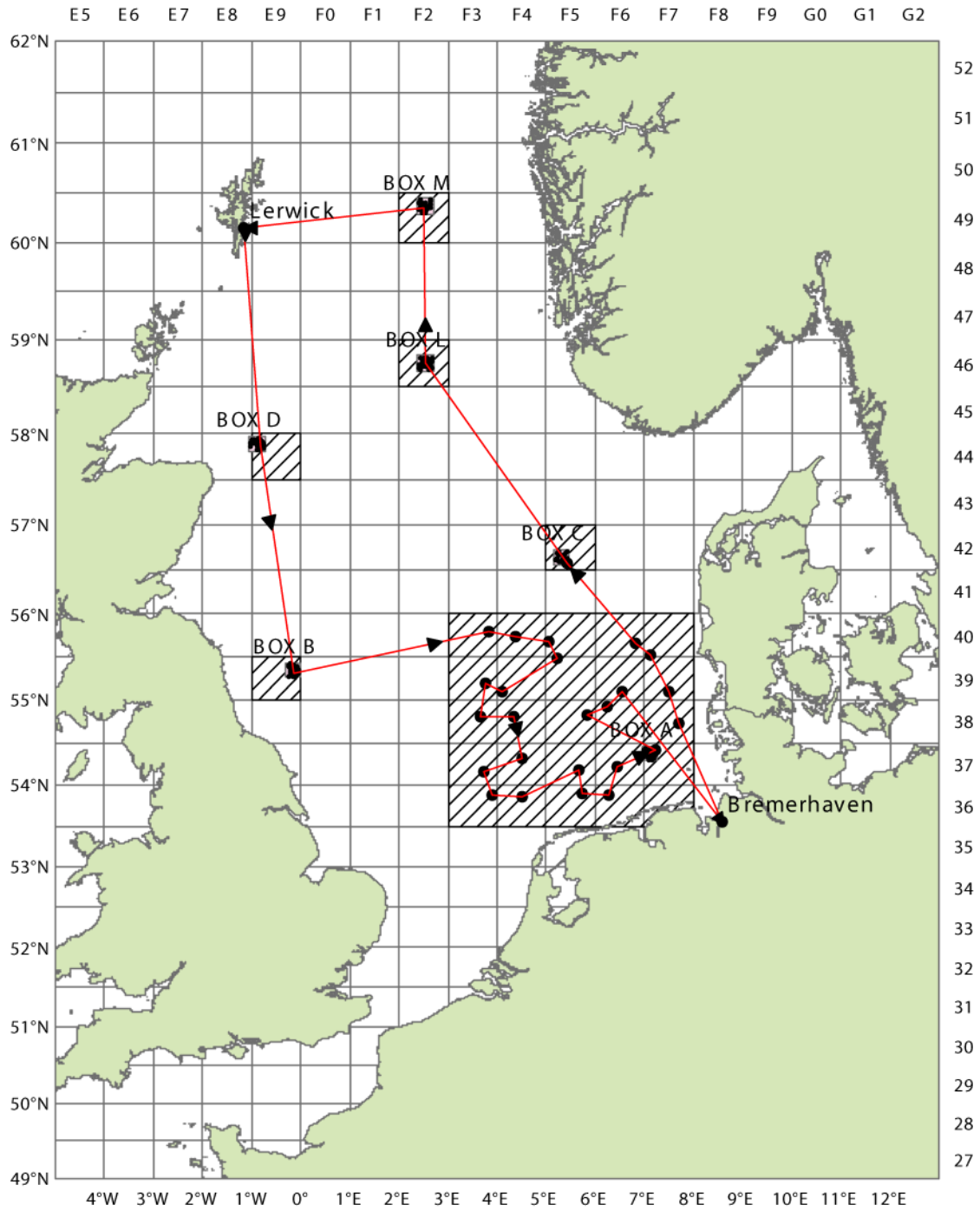


Fig. 1: Cruise track of WH 335, GSBTS and IBTS, 07/19-08/17/2010. Hatched area: ICES rectangles sampled within the IBTS, letters: areas of investigation (Boxes) within the GSBTS.

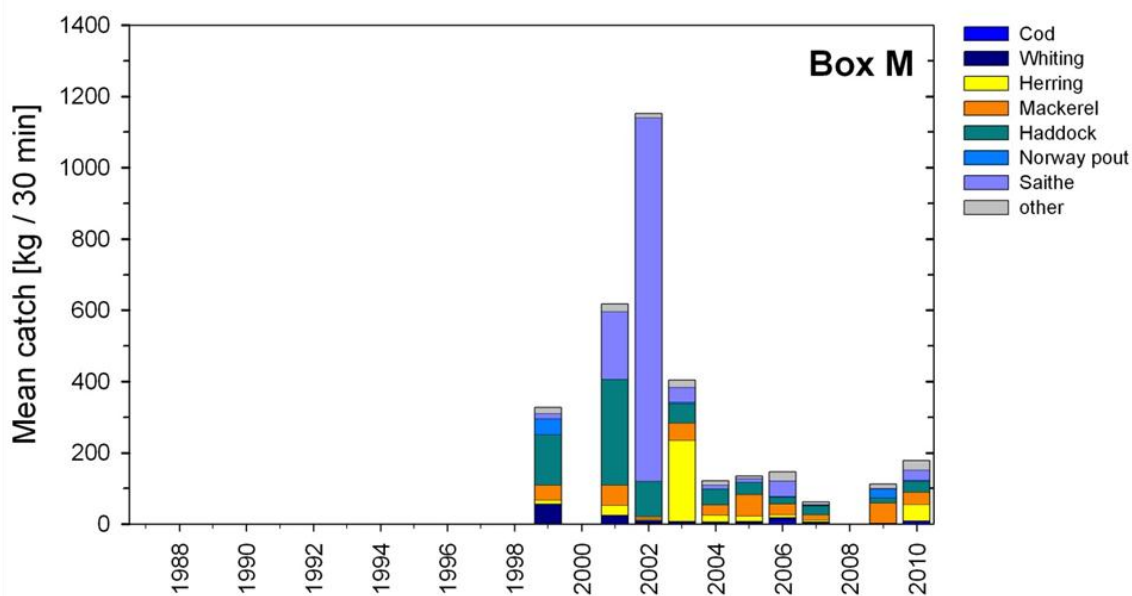
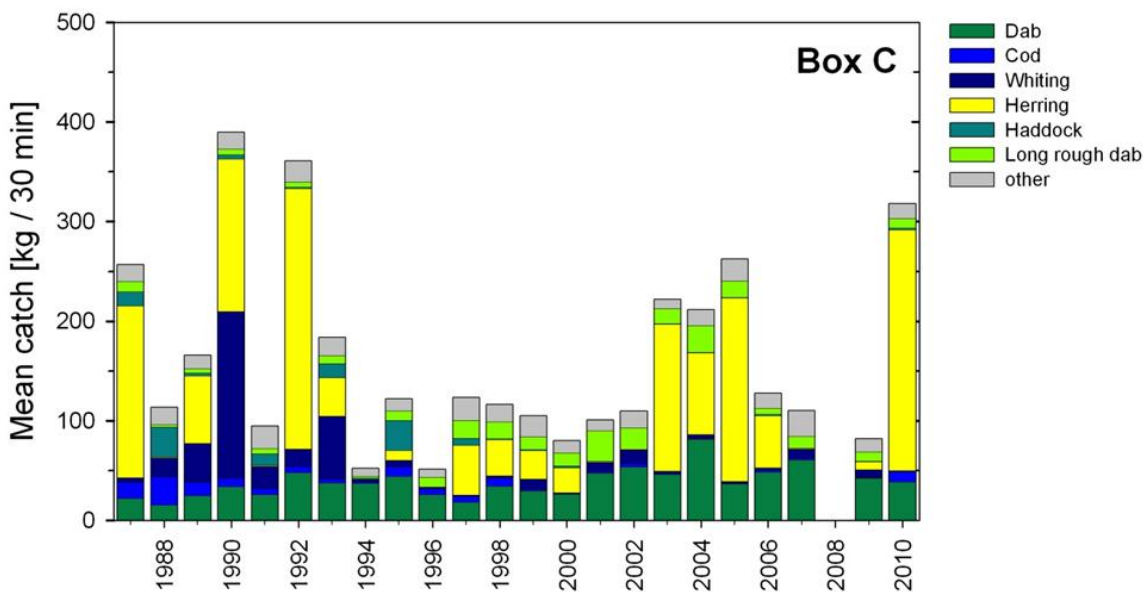
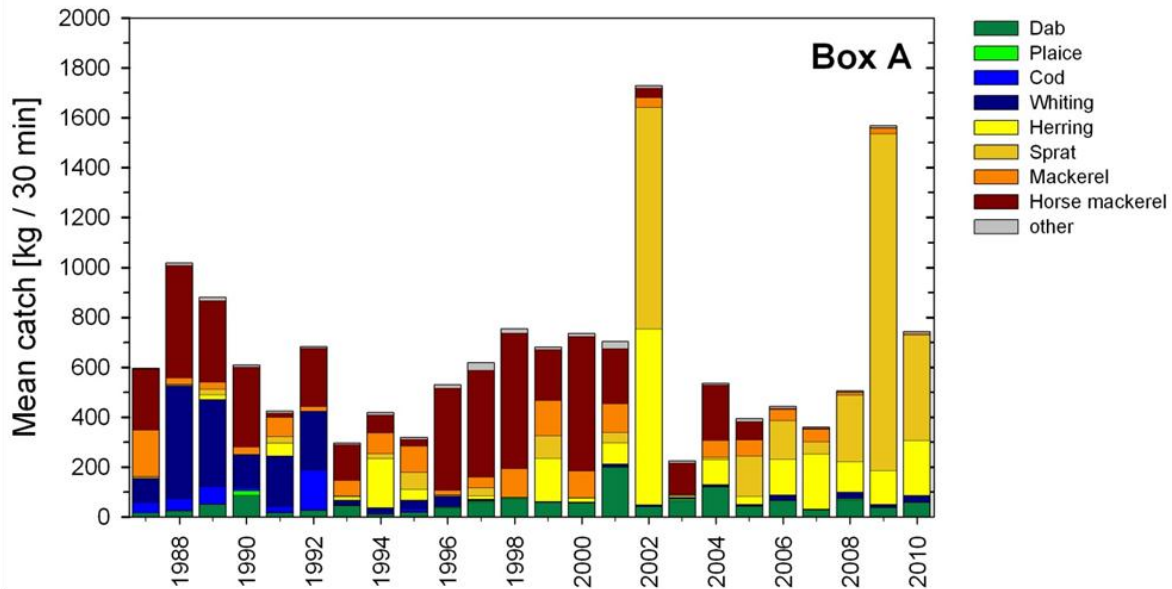


Fig. 2 (a-c), mean catch in 21 GOV hauls during cruise WH335 (2010) and preceding years since the beginning of the GSBTS.

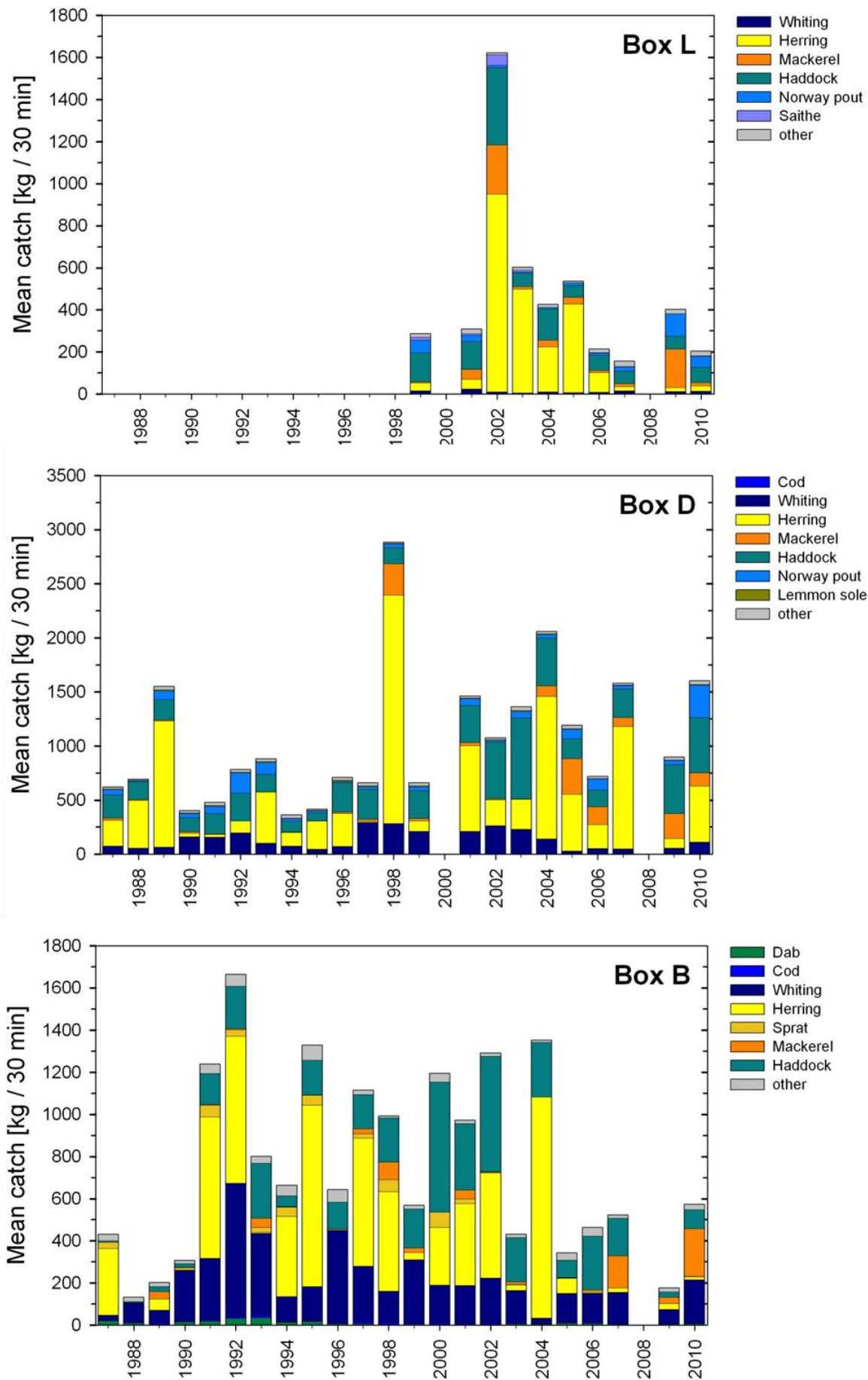


Fig. 2 (d-f), mean catch in 18-21 GOV hauls during cruise WH335 (2010) and

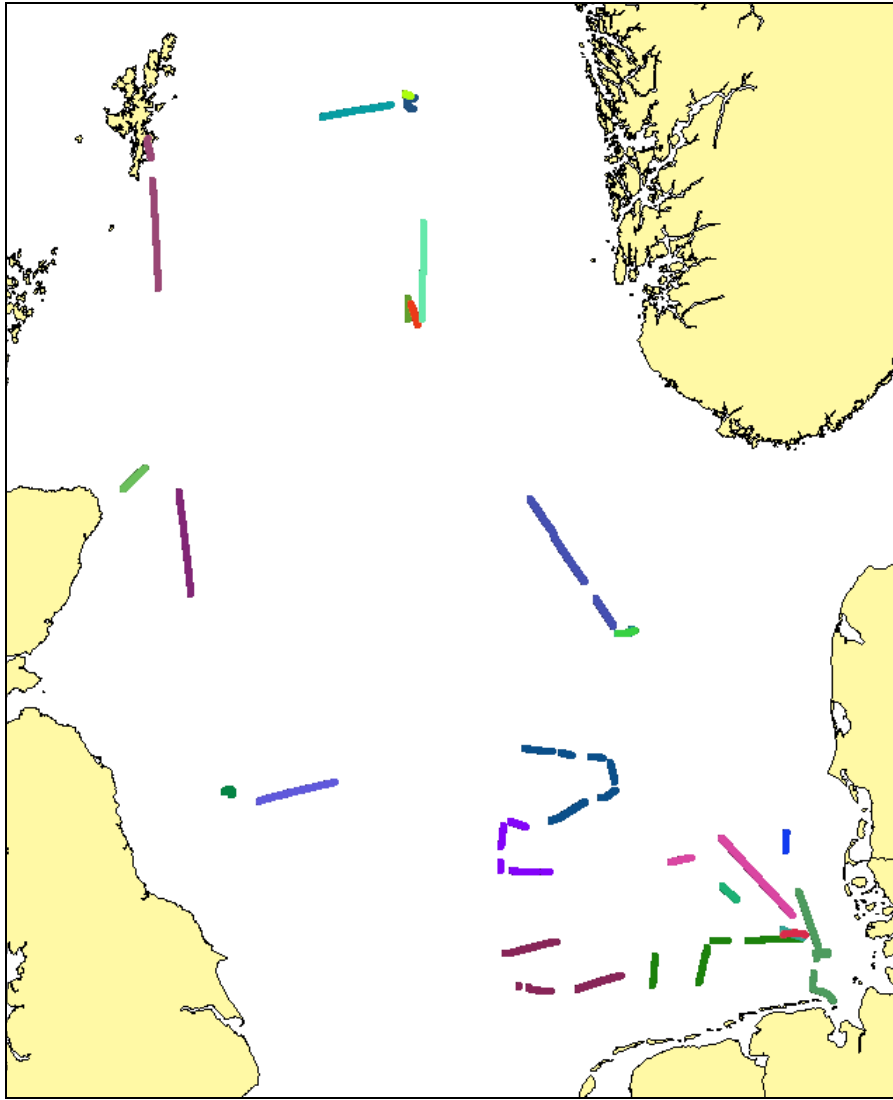


Fig 3: Transects with seabird counts for the SAS program during WH 335 (2010).