Federal Research Institute for Rural Areas, Forestry and Fisheries

Institute of Sea Fisheries

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Cruise Report
FRV Walther Herwig, WH 345
07/26-08/24/2011

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.

A total of 121 stations were sampled in the wider German Bight, and in the central and northern North Sea, including 120 GOV fishing stations. Besides the regular survey tasks, sampling was performed for stomach analyses of demersal and pelagic fish species (collaboration with Hamburg University). Furthermore, expanding the collection started in 2010 specimens of numerous fish and invertebrate species were collected for a project on marine genetic diversity (bar-coding), led by Senckenberg Research Institute (WG Molecular Taxonomy of Marine Organisms). For the Max Rubner Institute, tissue samples were obtained for analyses of parasite infestation, and for genetic as well as chemical analyses.

2. Number of stations sampled during WH 345

	Hauls GOV	CTD casts (total)	CTD casts with nutrient samples	Hauls 2-m beamtrawl	Van Veen sediment grab**
IBTS	29*	29*	29*	29*	87*
Box A	21	15	9	9	18
Box B	14	10	6	6	12
Box C	21	15	9	9	9
Box D	14	11	6	9	18
Box L	21	15	9	9	18
Box M	6	5	3	3	6
Total	**120**	**94**	**65**	**68**	**150**

*) IBTS: Includes 23 hauls in rectangles in the wider German Bight (incl. Box A), and one each in the remaining 5 Boxes.
**) Sediment samples from all stations, infauna for selected areas

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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 120 GOV hauls for the IBTS and the GSBTS, respectively. 29 of the 30 ICES rectangles allocated for IBTS sampling during WH 345 could be covered (1 GOV haul and accompanying investigations, each). Within the GSBTS, six areas of investigation ('Boxes') were sampled. Due to a substantial loss in ship time through a winch failure and return for repairs, the target of 21 fishing hauls per Box could only be obtained in three of the six Boxes (compare table above). Hauls for each Box were completed within two or 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 are uploaded to ICES DATRAS system. During all hauls, the GOV was equipped with sensors for net geometry as required for the IBTS and GSBTS surveys.

At all IBTS stations where they occurred, specimens of grey gurnard, whiting, mackerel and horse mackerel were collected for the analysis of stomach contents (collaboration with University of Hamburg).

2.2 Hydrography (vTI-SF)

A total of 94 hydrographic casts were performed with a Seabird CTD to record vertical profiles of temperature, salinity and oxygen concentration within the Boxes. At 65 of these stations, water samples for nutrient analyses were taken, as well.

2.3 Epibenthos (Senckenberg Research Institute)

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 2m-beamtrawl. Samples were sieved over 5mm and 2 mm mesh. The 5-mm fraction was analyzed aboard; the 2-mm fraction was preserved in 4-% formaldehyde for analysis in the laboratory ashore. Selected species were taken from the beam-trawl hauls for further genetic analysis (barcoding).

2.4 Sediments, benthic infauna (Senckenberg Research Institute)

Investigations of epibenthos were accompanied by sampling of sediments using a 0.1 m^2 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 Research Institute)

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. To expand the existing library of specimens and DNA samples, individuals of additional species were collected in all GSBTS-Boxes and in the ICES rectangles sampled, taken from the GOV or beam-trawl hauls or from plankton samples from the surface. A total of 476 samples (plankton, nekton, and benthos) were collected at 108 stations and preserved in alcohol for further genetic analysis (barcoding). 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)

Throughout the cruise WH 345, seabird data were obtained for three different tasks:

During steaming times between survey areas, seabird counts for the “Seabirds at sea” - program (SAS) were performed. SAS uses internationally agreed standard methods to obtain data on the distribution of species, abundance, age, and behavior. Transects with seabird counts for the SAS program are indicated in Fig. 3.

During fisheries hauls of the IBTS or GSBTS programs, species composition and numbers of ship-following seabirds were reported. Maximum numbers of birds following the ship at any one time were also documented.

Discard feeding experiments were performed during several fishing hauls throughout each day. Fishes from a subsample from the previous GOV haul were offered individually to ship-following birds to observe their feeding behavior, including prey preferences and interactions between competing birds.

3. Cruise schedule

On July 26, 2011, the FRV ‘Walther Herwig’ departed for cruise WH 345 from Bremerhaven, Germany. On the 27th, the scientific program started with the first hauls in ICES rectangle 39F7 and continued sampling for the IBTS until July 29 with 4 hauls per day. The following seven days were used to sample the boxes C, L and M (Fig. 1). On August 5, after six GOV hauls in Box M, a failure of the fisheries winch caused an extended interruption of the cruise. Immediate correspondence between the captain and the company of the winch led to the conclusion that a repair would not be possible in the nearby port of Bergen (Norway), but that the vessel should return to its homeport of Bremerhaven (Germany). The ship steamed back and reached Bremerhaven during the morning of Sunday, August 7. Inspection of the damage through the manufacturing company started in the afternoon of August 8, and repairs were completed between August 9 and 11, followed by an overnight pressure test of the hydraulics on August 11/12. The ‘Walther Herwig’ left Bremerhaven again at noon on August 12 and steamed overnight to the south-western part of the IBTS area remaining to be sampled, where the cruise continued in the morning of August 13 (Fig. 1). After four IBTS hauls, the ship steamed overnight to reach Box B (sampled for 2 days) and another night toward Box D (2 sampling days), before it returned to the IBTS rectangles in the wider German Bight. IBTS hauls and three days of sampling were completed in Box A. The last IBTS hauls were completed on August 23 and the ‘Walther Herwig’ returned to port the following morning.

All 29 IBTS stations could be completed as planned, but the winch failure did significantly impair the coverage of stations within the GSBTS in Boxes M, D and B. On August 22, the two ornithologists disembarked and the ‘Walther Herwig’ took a 2-person film team aboard. Their task was the production of a short documentary for public outreach of the BMELV and BLE, which is presented to students of different educational institutions and to the general public through the website at

http://www.bmelv.de/SharedDocs/Pressemitteilungen/2012/07-Fischereifilm.html.

The team documented activities in the laboratory and on deck and held interviews with several members of the ship’s crew and the scientific crew. The film sequences are published

4. Preliminary Results

Groundfish (SF - vTI)

IBTS samples (ICES rectangles in the wider German Bight)
Data from the IBTS stations were submitted 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 around 325 kg/ 30 min haul (average total biomass per haul) and were mainly composed of pelagic species, namely sprat and herring (Fig. 2a). Average catch rates of all other species except dab, *Limanda limanda,* and whiting, *Merlangius merlangus*, were below 100 ind/ haul. Horse mackerel, which had been a regular and often abundant component of the Box A assemblage between 1987 and 2005 but had been low in numbers since then, occurred with slightly higher numbers again in 2011 (ca. 90 ind/ haul).

Box C (Central North Sea)
Mean total catches in Box C were ~ 100 kg/30 min haul, with a rather typical amount of dab (43 kg/ haul). Herring occurred in rather low numbers, but abundance of grey gurnard was higher than usual (ca. 150 ind/ haul, represented under “other” in Fig. 2 b).

Box M (Northern North Sea)
Total biomass in Box M was similarly low as since 2004 (mean of 132 kg/ haul; Fig. 2c). Herring, present in 2010, was nearly absent.

Box L (Northern North Sea)
Total biomass in in Box L was similar as in 2010, with a dominance of haddock and herring, but compared to 2010 with a smaller share of Norway pout (by weight, not by numbers), and a higher share of hake and cod (Fig 2d).

Box D (Western North Sea)
Total average catch rates (~ 1600 kg/ haul) were higher than the long-term mean, but almost identical to 2010. Large individuals of herring occurred in high abundance (Fig. 2e). Norway pout biomass, which had reached the highest value of the time series in 2010, was very low again in 2011 with ca. 6.5 kg/ haul.
In Box D, a very large individual of a skate was caught on August 16, measuring 198 cm and 64 kg. The specimen was given to the ichthyological collection of the Zoological Museum in Hamburg for identification and documentation, where it was confirmed to belong to the one of the two components the currently still valid species *Dipturus batis* is presently being considered to be separated into: The individual was identified as *Dipturus cf. intermedia*.

Box B (Western North Sea)
Catches in Box B were similar as in the preceding year, but mackerel was almost absent, whereas herring were much more abundant than in 2010. Dominant species in biomass were herring and whiting (~ 1550 and 180 kg/haul, respectively; Fig. 2f).

Epibenthos (Senckenberg Res. Inst.)

IBTS stations
The species composition varied between the ICES rectangles sampled within the IBTS while species composition of single rectangles generally did not change compared to previous years. Within the German Bight, the epibenthic assemblages were dominated by the starfishes *Asterias rubens* as well as small fish species like *Pomatoschistus minutus*, *Buglossidium luteum* and *Arnoglossus laterna.* The swimming crab *Liocarcinus holsatus*

was less abundant in the German Bight compared to previous years. In the southern Oyster Ground, high numbers of the snail *Turritella communis* and the bivalves *Nucula nitidosa* and *Corbula gibba* were found. In the ICES rectangles sampled in the northern North Sea, the starfish *Astropecten irregularis, the sea urchins Echinocardium cordatum und E. flavescens* and the swimming crabs *L. holsatus* and the masked crab *Corystes cassivelaunus dominated*. As in previous years, the non-indigenous Angular crab *Goneplax rhomboides* was found in the Oyster Ground area, indicating an establishment of this species in German waters. In all rectangles unusual high numbers of juvenile *P. minutus*, *B. luteum* and *A. rubens* were found.

Box A

Epifauna in Box A was dominated by the starfish *Asterias rubens* and the shrimp *Crangon allmanni.* Furthermore fishes such as *Pomatoschistus minutus*, *Buglossidium luteum* and *Arnoglossus laterna* were dominating in Box A. Unusual high numbers of juveniles of these species were found in Box A compared to previous years.

Box B + D

Box B near the British coast has low numbers and diversity of benthic species, with regular occurrence of the hermit crabs such as *Pagurus bernhardus* and *Anapagurus laevis* as well as polychaetes such as *Thelepus cincinnatus* and *Hydroides norvegica*. Sessile species such as Hydrozoa, Bryozoa and Anthozoa were also relatively common. Abundance and biomass of species were lower than in previous years in this Box and previously more common species such as *P. pubescens* were not found in 2011.

Box D

Box D near the Scottish coast was characterized by the regular occurrence of the shrimp *Crangon allmanni*, the polychaete *Hyalinoecia tubicola* as well as the hermit crabs *Pagurus bernhardus, P. prideaux* and *Anapagurus laevis*. Sessile species such as Hydrozoa, Bryozoa and Anthozoa were also relatively common in Box D. Abundances of hermit crabs as well as the bobtail squid *Sepiola atlantica* were lower than in previous years.

Box C

The assemblages in Box C were dominated by the starfishes *Astropecten irregularis* and *Luidia sarsi*. Common species were also the sea urchin *Brissopsis lyrifera*, the hermit crab *Pagurus bernhardus* and the gastropod *Turritella communis. L. sarsi, B. lyrifera* and *T. communis* have occurred in conspicuously high numbers since 2004, *T. communis* revealed the highest abundance since 1999 during the 2011 survey.

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*. However, abundance of these characteristic species was generally lower compared to previous years. Additionally, many sessile species occured in Box L such as *Verruca stroemia*, *Hydroides norwegica* and *Heteranomia squamula*.

Box M

Only three replicate samples were taken in Box M this year due to technical problems with the ship. But as in previous years common species were the hermit crabs *Anapagurus laevis, Pagurus pubescens and P. prideaux,* although a decreasing trend in abundance is obvious during the last years. *P. prideaux* was found together with the symbiotic sea anemone *Adamsia carcinopados*. Furthermore, the sea urchin *Spartangus purpureus* and the polycheata *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. Abundance of the squat lobster *Galathea dispersa* and the sea squirt *Ascidiella scabra* were still found to be increasing in Box M.

Seabirds (FTZ Büsum)

Estimated maximum numbers of the two most abundance species of ship-following seabirds during sampling for each of the GSBTS boxes:

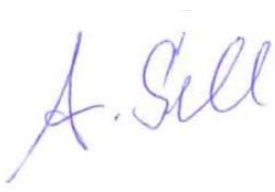
Box		Number		Number
C	Northern Fulmar (*Fulmarus glacialis*)	230	Lesser Black-backed Gull (*Larus fuscus*)	50
L	Northern Fulmar	950	Lesser Black-backed Gull	42
M	Northern Fulmar	850	Northern Gannet (*Morus bassanus*)	20
B	Northern Fulmar	380	Northern Gannet	290
D	Northern Fulmar	870	Northern Gannet	175
A	Lesser Black-backed Gull	1050	Common Tern (*Sterna hirundo*)	29

5. Cruise participants

	Name	Institution	Tasks
1	Dr. Anne Sell	vTI-SF, Inst. of Sea Fisheries	Cruise leader, hydrography
2	Dr. Ingrid Kröncke	Senckenberg	Benthos
3	Dr. Hermann Neumann	Senckenberg	Benthos
4	Julia Wolske	vTI-SF, Inst. of Sea Fisheries	Fisheries biology, databases
5	Sakis Kroupis	vTI-SF, Inst. of Sea Fisheries	Fisheries biology
6	Marthe Otto	vTI-SF, Inst. of Sea Fisheries	Fisheries biology
7	Inken Rottgardt	vTI-SF, Inst. of Sea Fisheries	Fisheries biology
8	Sven Hammann	vTI-SF, Inst. of Sea Fisheries	Fisheries biology
9	Sven Stötera	vTI-SF, Inst. of Sea Fisheries	Fisheries biology
10	Dr. Thomas Knebelsberger	Senckenberg	Fisheries biology
11	Jonas Geburzi	FTZ Büsum	Seabird ecology
12	Sinikka Lennartz	FTZ Büsum	Seabird ecology

6. Acknowledgements

We thank the ship's crew for their support during this cruise.



(Dr. Anne Sell, Cruise leader)

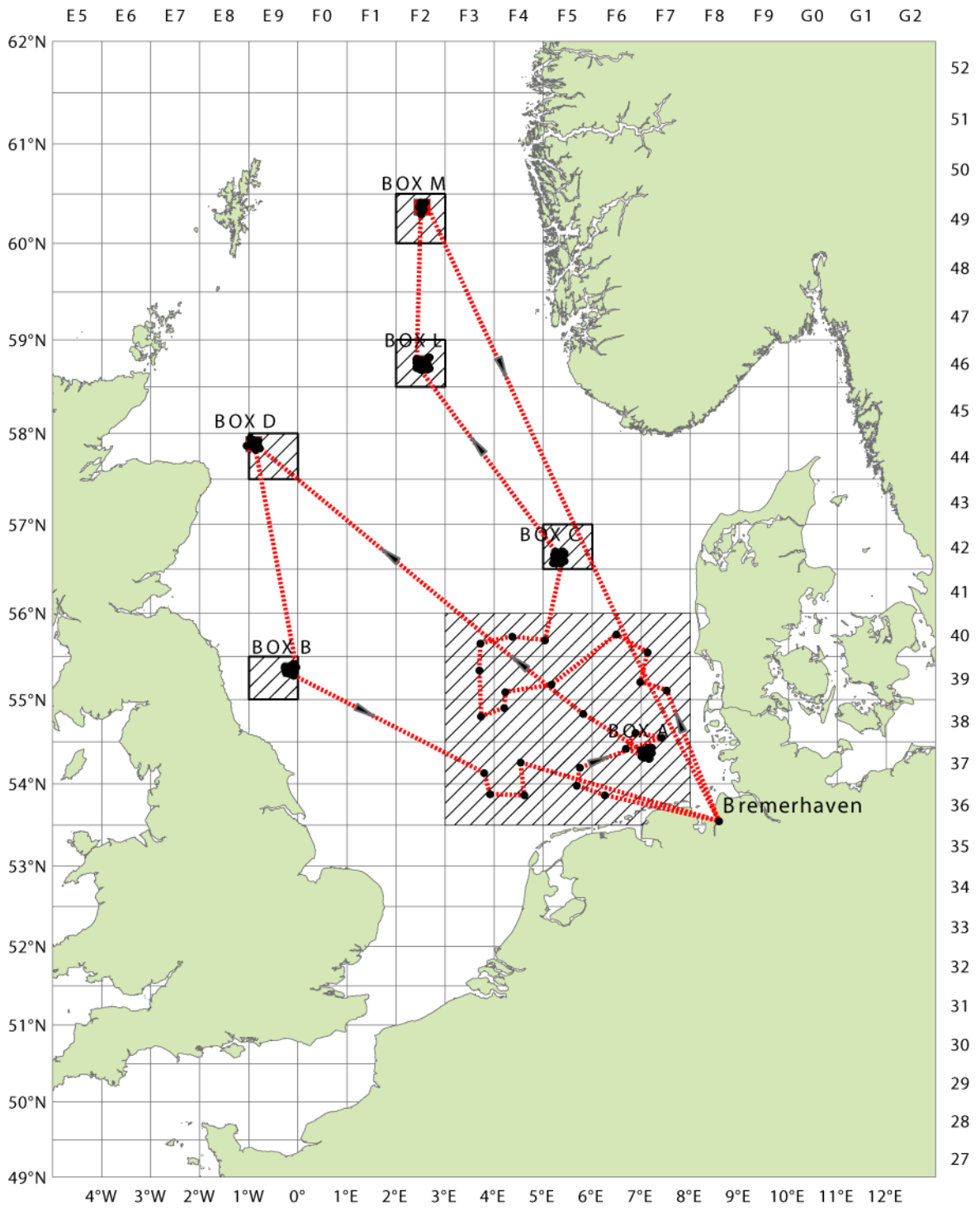


Fig. 1: Cruise track of WH 345, GSBTS and IBTS, 07/26-08/24/2011. Hatched area: ICES rectangles sampled within the IBTS, letters: areas of investigation (Boxes) within the GSBTS.

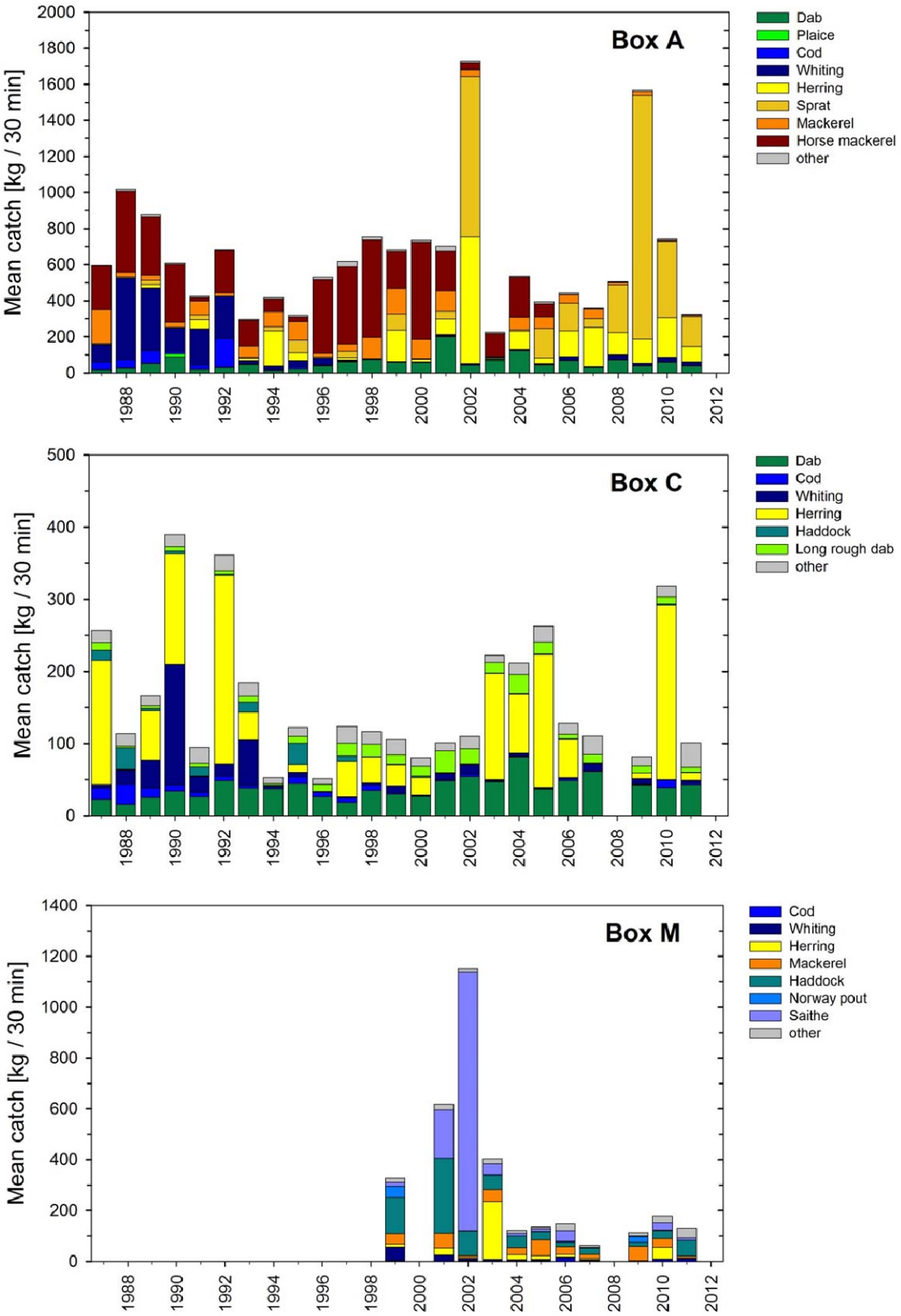


Fig. 2 (a-c), Boxes A, C and M: mean catch in GOV hauls during cruise WH345 (2011) and preceding years since the beginning of the GSBTS.

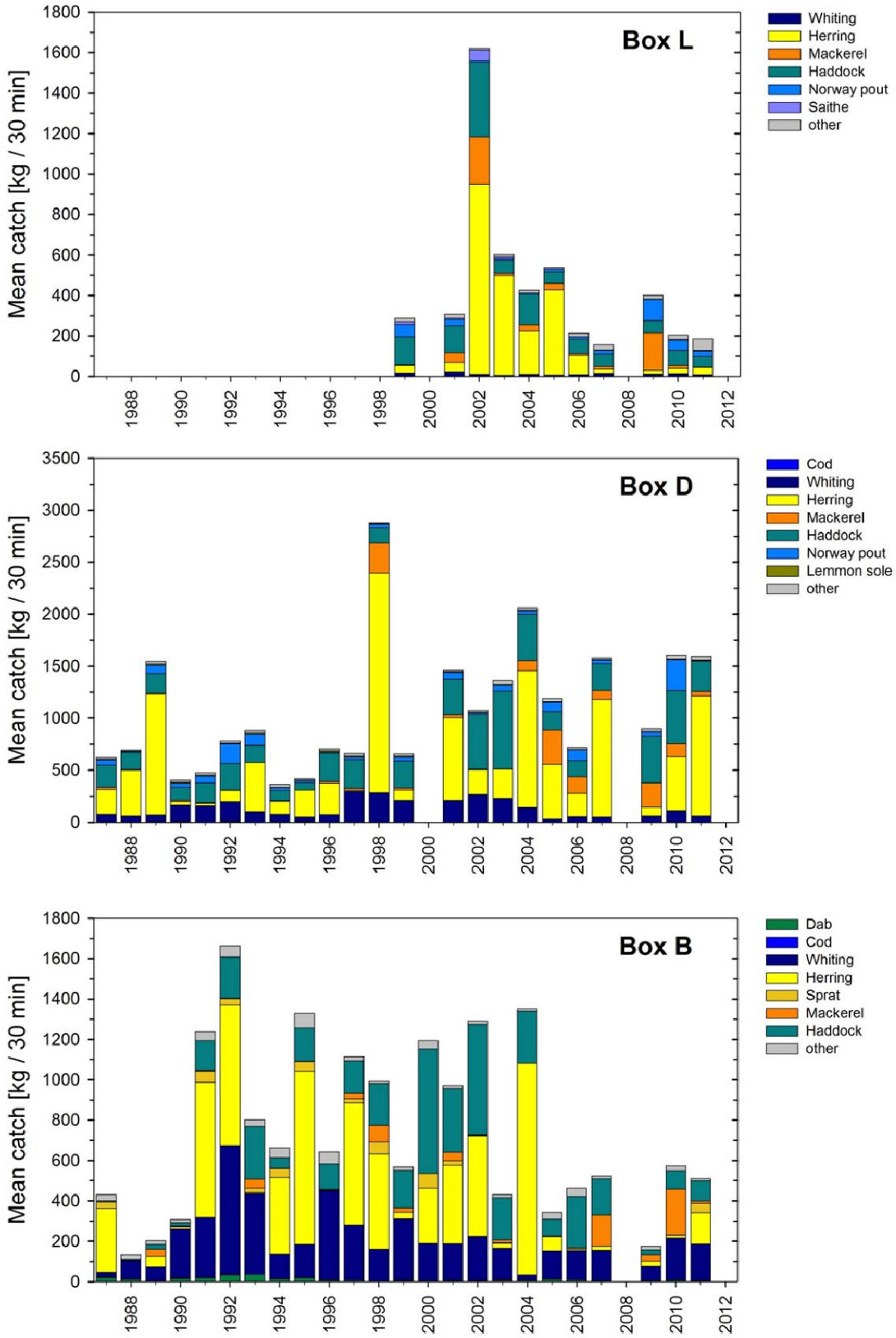


Fig. 2 (d-f), Boxes L, D and B: mean catch in GOV hauls during cruise WH345 (2011) and preceding years since the beginning of the GSBTS.

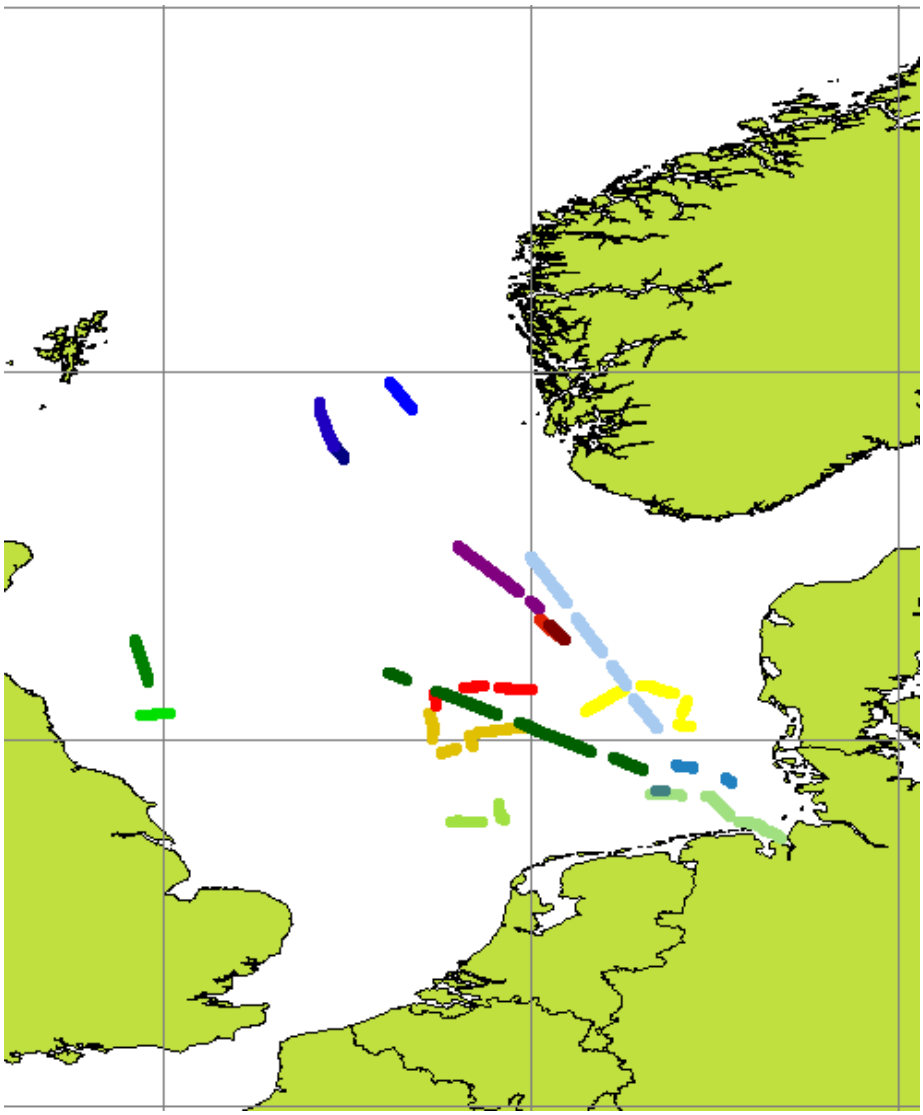


Fig 3: Transects with seabird counts for the SAS program during WH 345 (2011).