Federal Research Institute for Rural Areas, Forestry and Fisherie

Thünen-Institute of Sea Fisheries

THÜNEN

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Cruise Report
FRV Walther Herwig III, WH 418
07/24 to 08/15/2018

IBTS and GSBTS

Cruise Leader: Dr. Anne Sell

Summary

Cruise WH 418 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 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 cruise had to be reduced due to weather conditions and technical constraints.

Originally, the cruise was scheduled to last from 07/19 to 08/15, but due to various technical failures, the vessel 'Walther Herwig' could not depart before 07/24, and had to return to port for repairs from 07/29-08/01.

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*Cruise acronym:
31.01.2018, 19.07.-15.08.2018, Jnr. 18/1927

Number of stations sampled during WH 418

	Hauls GOV	CTD casts (total)	Hauls 2-m beam trawl	Van Veen sediment grab**
IBTS	30*	27	27	81
Box A	21	15	9	18
Box C	14	10	6	12
Box L	14	10	6	12
Box M	14	10	6	12
total	**90**	**72**	**54**	**135**

*) Includes 27 hauls in the wider German Bight, and 1 each in "Boxes" C, L, and M; see map.
**) Sediment samples from all stations in this column, infauna for selected areas.

Box B and Box D/D' were not sampled in 2018, due to technical failures of the ship.

Methods

1. Groundfish (Thünen Institute of Sea Fisheries, TI-SF)

The qualitative and quantitative composition of the bottom fish fauna was analysed from a total of 90 GOV hauls for the IBTS and the GSBTS, respectively (cruise 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 Scanmar 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.

As agreed in the ICES IBTS Working Group, the German contribution to the 2017 Q3-IBTS was expanded by three rectangles in the southern North Sea (35F2 to 35F4; same extension since 2016). This addition supports an initiative of all survey partners to optimize the overall distribution of hauls over the area of the North Sea, but required 1 additional day of shiptime, which was allocated at the expense of the GSBTS.

Following a special requests, tissue samples of cod (*Gadus morhua*) were taken for the Max Rubner-Institute for investigations of provenance through stable isotope analyses. These investigations aim at developing a method to derive proofs of origin for fish products.

Due to a lack in ship time resulting from extensive technical failures aboard, the ICES rectangles 39E9 and 44E9 could not be fished by the Walther Herwig III, but were fished by the IBTS partner nations.

2. Hydrography (TI-SF)

A total of 72 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.

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3. Epibenthos (Senckenberg Research Institute)

Epibenthos was sampled within ICES rectangles of the wider German Bight (24 rectangles of the regular German IBTS + 35F2-F4), 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 solenette *Buglossidium luteum*, the goby *Pomatoschistus minutus* and the starfish *Asterias rubens* were taken in Box A and all sampled IBTS rectangles.

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 in all Boxes as in the ICES Rectangles.

5. 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.

Cruise schedule

After five days delay due to repairs of acute technical failures, the FRV 'Walther Herwig' departed on July 24 from Bremerhaven, Germany. On the 25st, the scientific program started with sampling for the IBTS, which continued as planned until July 28. The ship had to return to port on the 29th after further technical problems. It departed again on August 1 after repairs and the partial crew exchange, which was originally planned to be conducted via tender from Helgoland. The IBTS programme in the German Bight was continued from August 2, followed by three days of GSBTS sampling in Box A from August 5-7. Fishing continued in the GSBTS boxes C, L and M for two days each. The sampling in Box L was separated to take place on one day each before and after the sampling in Box M, in order to allow for short enough steaming times between boxes to be conducted over night. After completion of the second day of fishing in Box L on August 13th, the vessel returned towards Bremerhaven, where it arrived in the morning of August 15th.

Preliminary Results

Groundfish (Thünen Institute of Sea Fisheries)

IBTS samples

39 fish species were recorded in the IBTS hauls in the southern North Sea, of which the five most abundant ones were sprat, herring, dab, grey gurnard and greater sandeel. After the cruise, the IBTS data set has been quality-checked, supplemented with age readings, and uploaded to the ICES database DATRAS.

GSBTS samples

Overall, the number of hauls in GSBTS boxes had to be reduced due to repeated technical failures of the vessel, leading to reduced sampling effort in Boxes C, L and M, while sampling in the Boxes B and D' was omitted altogether.

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Box A (German Bight)

Mean catch biomass in Box A (166 kg/ 30 min haul) was lowest in the time series since 1987 (for 1987-2017: mean = 640 kg/ 30 min; range: 225-1728 kg/ 30 min). The groundfish assemblage was dominated by dab (72 kg/ 30 min) and sprat (55 kg/ 30 min), followed by herring (21 kg/ 30 min; Fig. 2a). Several species occurred with single individuals for the first time in the 30-year time series: *Argentina* sphyraena, *Cristallogobius linearis* and *Syngnathus typhle*.

Box C (Central North Sea)

Catches in Box C contained with a mean of 55 kg close to the minimum of the long-term time series (mean until 2017 172 kg/ 30 min haul; Fig. 2b). Herring was almost absent, and the largest portion of biomass was contributed by dab (35 kg) and grey gurnard (8.2 kg), followed by lemon sole (*Microstomus kitt*, 3.4 kg).

Box L (Northern North Sea)

Total biomass in Box L (120 kg/ 30-min haul) was lowest since the start of the Box L time series in 1999, with the most abundant species being haddock (25 kg/ 30 min), cod (22 kg/ 30 min) and herring (16 kg/ 30 min) (Fig. 2c). Cod remained at comparably high biomass to 2017 (then 18 kg/ 30 min). Individuals of two gurnard species (*Chelidonichthys cuculus, C. lucerna*) and *Cristallogobius linearis* occurred for the first time in this box.

Box M (Northern North Sea)

Total biomass in Box M scored with 473 kg/ haul ranked among the highest values since 1999 (Fig. 2d). Mackerel (209 kg/ 30 min) reached again the highest biomass within the time series, more than twice the biomass observed with the previous maximum in 2017. It again co-occurred with horse mackerel (*Trachurus trachurus*, 43 kg / 30 min). Herring biomass reached 100 kg per average haul.

Box B and D' (Western North Sea)

Not sampled in 2018, due to lack in ship time.

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 goby *Pomatoschistus minutus*, the dab *Limanda limanda* and the solenette *Buglossidium luteum*. No exceptional changes compared to recent years have been noted for these dominant species. Unusually high numbers of the sea urchin *Echinocardium cordatum* were found in rectangle 35F3 (4705 ind. / 500 m^2). Additionally, the snail *Turritella communis* was very abundant in rectangle 38F6 (1924 ind. / 500 m^2) and the shrimp *Crangon crangon* in rectangle 36F6 (1652 ind. / 500 m^2).

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GSBTS samples

Box A

Nine replicates were taken in Box A in 2018. Epifauna assemblages were dominated by the solenette *Buglossidium luteum* and the starfishes *Asterias rubens and Astropecten irregularis.* The abundance of the latter has been steadily increasing since 2015. In contrast, numbers of the goby *Pomatoschistus minutus* decreased remarkably in 2018 after very high abundances in 2017.

Box C

Six samples were taken in Box C in 2018. The epibenthic community in 2018 was characterized by the starfishes *Astropecten irregularis* and the hermit crab *Pagurus bernhardus*. Numbers of the starfishes *Astropecten irregularis* and *Asterias rubens* increased remarkably after low abundances in 2016 and 2017. Additionally, abundance of the sea urchin *Brissopsis lyrifera* was high in 2018.

Box L

Six replicates were taken in Box L in 2018. 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*. Abundance of *P. montagui* in 2018 was the highest of the last 10 years in Box L. Similar to the year 2017, mass occurrences of the polychaet *Ampharete falcata* were found in Box L in 2018 accompanied by high abundances of juvenile individuals of e.g. the snail *Aporrhais pespelicani* or the sea stars *Asterias rubens*, *Astropecten irregularis* and *Luidia sarsi*.

Box M

Six replicates were taken in Box M in 2018. The shrimps *Crangon allmanni* and *Pandalus montagui* as well as the hermit crab *Anapagurus laevis* and the sea urchin *Gracilechinus acutus* were frequently found in Box M. Similar to Box L, exceptional high abundances of *P. montagui* were found in Box M in 2018. To a lesser extent this also applies for *A. laevis* and *C. allmanni.* In contrast, abundance of the hermit crabs *Pagurus prideaux* and *Pagurus pubescens* decreased.

Box D' and Box B

Not sampled in 2018.

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Cruise participants

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Dr. Boris Cisewski [2]	TI-SF	Hydrography
Marcellus Rödiger [1]	TI-SF	Fisheries biology /data management
Romain Frelat [2]	Hamburg University	Fisheries biology
Gertrud Delfs	TI-SF	Fisheries biology
Timo Meißner	TI-SF	Fisheries biology
Bünyamin Kekec	TI-SF	Fisheries biology
Marcel Bächtiger	TI-SF, student	Fisheries biology
Simon Wieser	TI-SF, student	Fisheries biology
Jonathan Schleyken	TI-SF, student	Fisheries biology
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Leah Schroedter [2]	TI-SF, student	Fisheries biology
Dr. Hermann Neumann	Senckenberg	Benthos
Lara Beckmann	Senckenberg	Benthos

[1] Leg 1, until July 29
[2] Leg 2, from August 1

Acknowledgements

We are grateful to Captain Arne Schwegmann and to the vessel's crew for their unremitting efforts to keep the ship in working conditions, and to lose as little cruise time as possible under the given circumstances.

A. Sell

Dr. Anne Sell, Cruise Leader

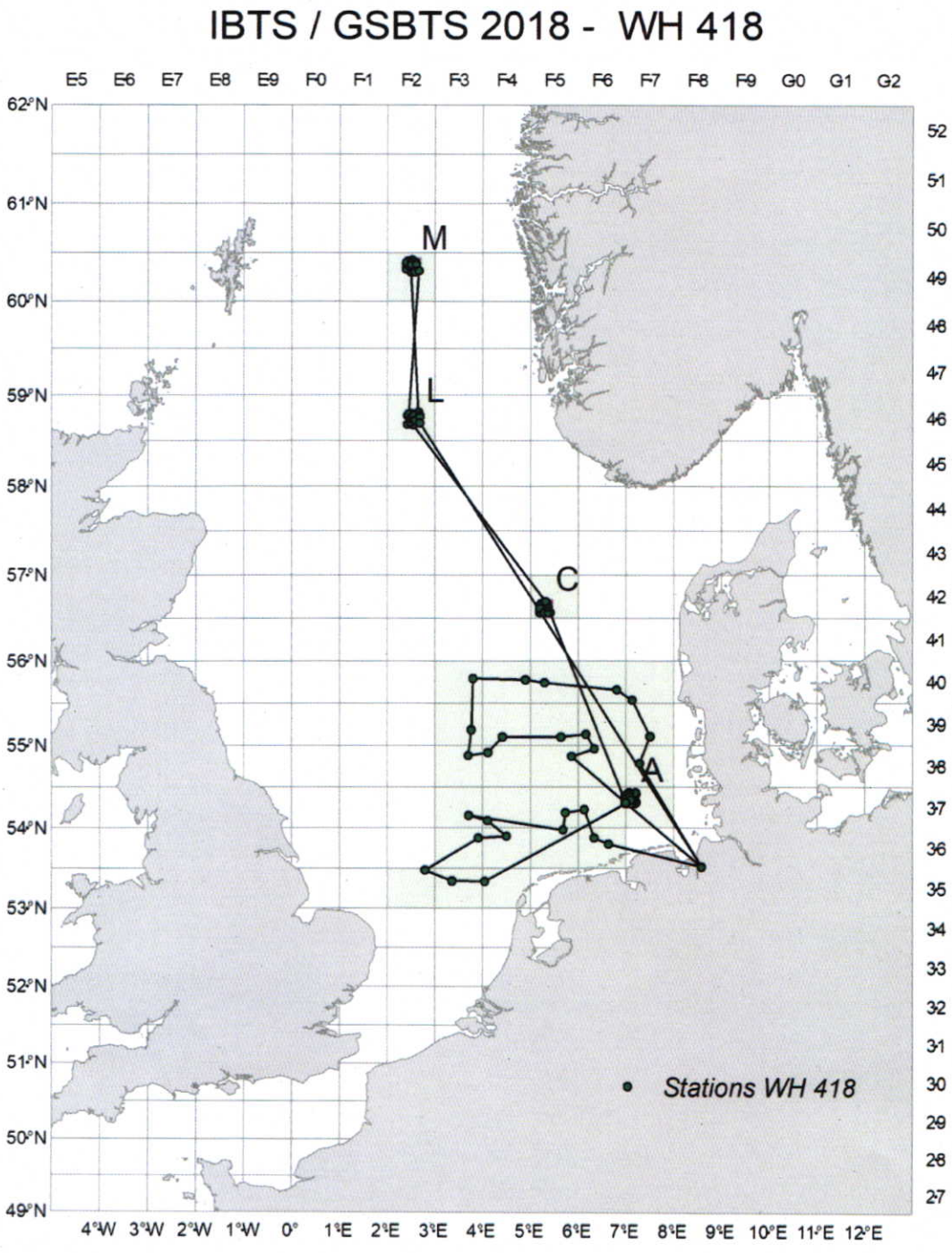

Fig. 1: Cruise track of WH 418, GSBTS and IBTS, 07/24-08/15/2018 (line). Light green areas: ICES rectangles sampled for the IBTS, letters: areas of investigation (Boxes) sampled within the GSBTS.

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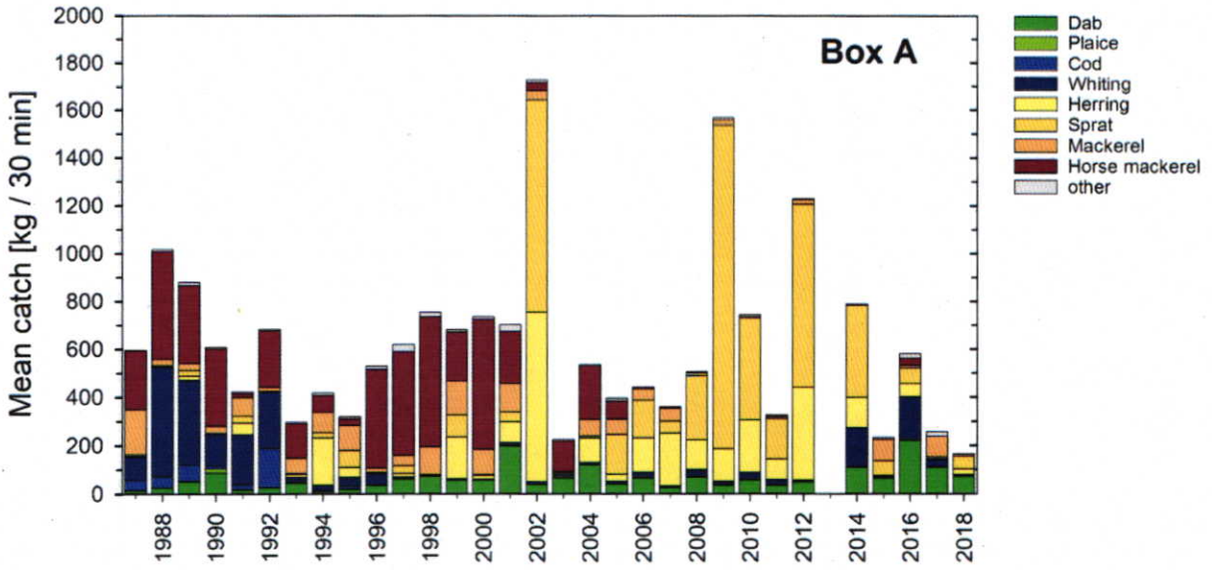
(a)



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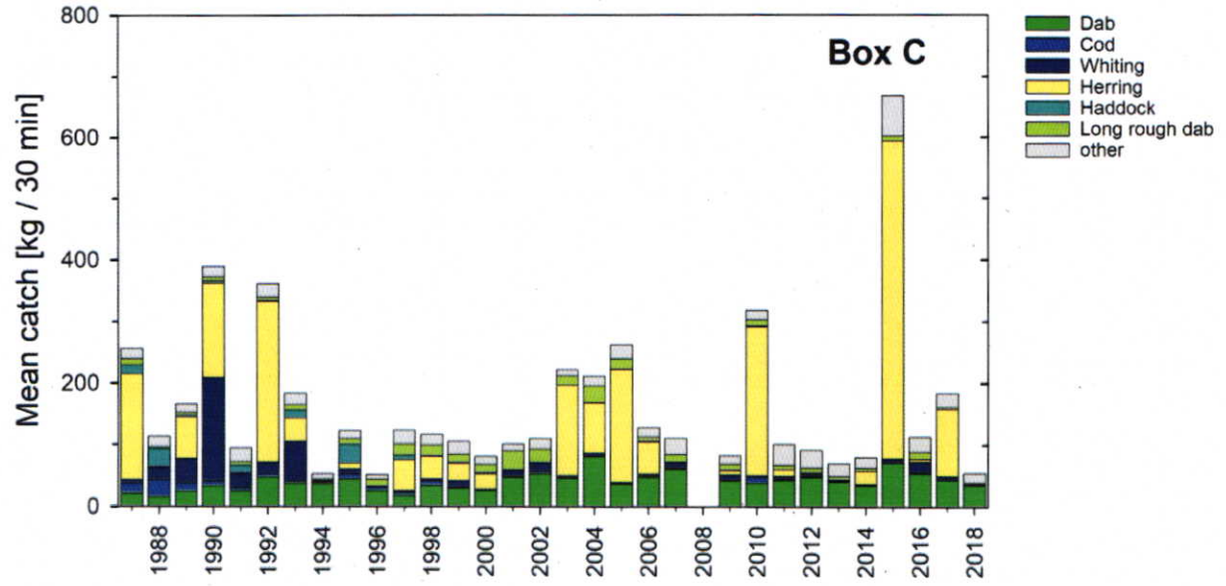

Fig. 2 (a, b), Boxes A and C: mean biomass caught in standardized GOV hauls during cruise WH 418 (2018), and during preceding years since the beginning of the GSBTS.

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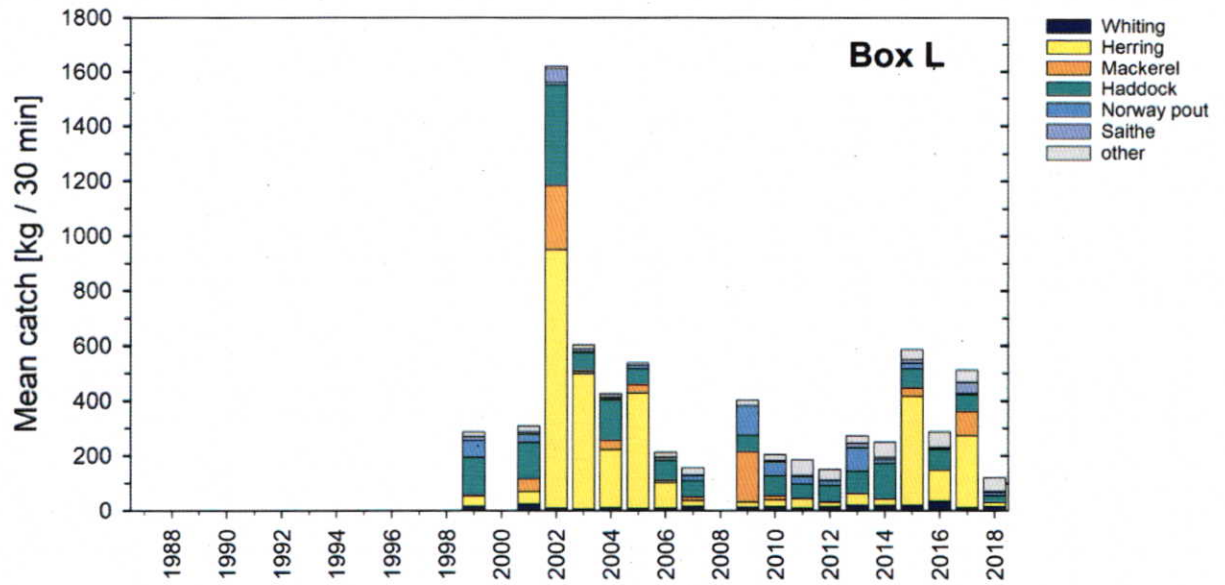
(c)



(d)

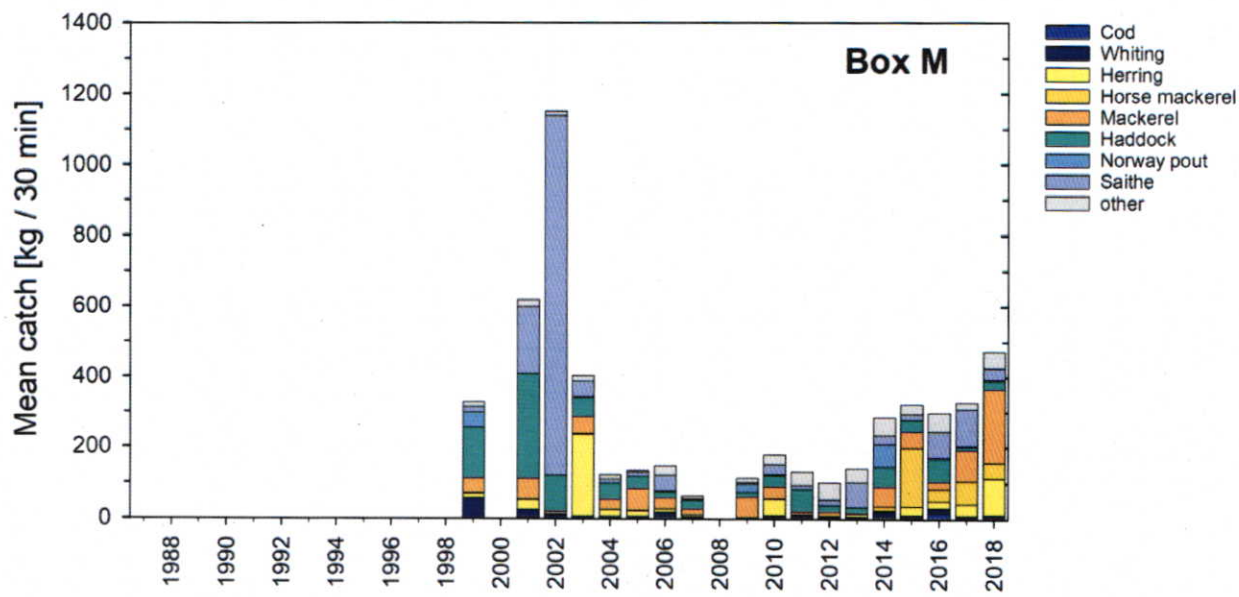


Fig. 2 (c, d), Boxes L and M: mean biomass caught in standardized GOV hauls during cruise WH 418 (2018), and during preceding years since the beginning of the time series within the GSBTS.

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