Federal Research Institute for Rural Areas,
Forestry and Fisheries

Thünen-Institute of Sea Fisheries

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Report of the cruise 389 of the FRV Walther Herwig III
German Greenland groundfish survey
Oct 08 – Nov 17, 2015

Scientist in charge: Dr. Heino O. Fock

Background

The German survey off Greenland is conducted since 1981, aiming at monitoring groundfish stocks in particular of cod and redfish, collecting environmental data and conducting ecosystem studies in the area.
During the second leg of the survey, a glider from Woods Hole Oceanographic Institute was retrieved.

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Sampling

WH389 was carried out in October and November 2015. First leg from Bremerhaven to Nuuk, second leg from Nuuk to Bremerhaven.

The report contains updated figures until 2015.

Survey goals were fully accomplished. 110 stations were sampled in 2014 as compared to 120 in 2014 and 106 in 2013. The sampling area was subdivided into 9 regional strata. The new stratification was approved during the ICES North-Western Working Group in 2012 (Fig 1).

55 CTD station were sampled (Fig. 4). Cross section across Kleine Bank displayed in Fig. 3.

West Greenland :	Stratum 1 (NAFO 1C), north of 61°N
	Stratum 2 (NAFO 1D), north of 61°N
	Stratum 3 (NAFO 1E), party north of 61°N
	Stratum 4 (NAFO 1F), SW Greenland
East Greenland :	Stratum 5&6 (SE Greenland), south of 63°N
	Stratum 7 (E Greenland), north of 63°N
	Stratum 8 (E Greenland), northeast of 63°N
	Stratum 9 (E Greenland), east of 33°W

Meetings

In 2015, a meeting was held in Nuuk on Nov 6, with fisheries scientists from the Greenland Institute of Natural Resources and TI-SF taking part, where first results were discussed from both the Greenlandic and the German surveys.

Cod

Trends

Trends are given in terms of survey standard unit catches (CPUE). To compare with the historical situation, CPUEs are scaled to the long-term maximum value, which was observed in 1988 in stratum 2. This value was set to 100.

Results are given Table 1 and Figure 2.

West Greenland:
Overall, an increase for stratum 3 occurred together with a decrease in strata 2 and 4. As stated in 2012, this shift in cod is likely linked to a southward movement of young cod that was observed in 2012 and 2013.

East Greenland:
Opposite to the previous year, cod abundance decreased in SE Greenland (5&6) and Dohrnbank area (9).

Overall:
Cod abundance is comparable to the highs in 2006 (West GL)-2007 (East GL) and 2012-2013.

Age Distribution of Cod

In East Greenland, ages > 6 were dominating in stratum 5&6 and strata 7 and 9. Still, with sizes mainly between 80 and 100 cm. These cod are likely to constitute an important component of the spawning stock of the so-called bank cod, whose offspring is then drifted to SE and W Greenland.

In West Greenland in the areas analysed so far, mainly younger cod were encountered. The size distribution indicates that this in the year class 2009 with an average size of about 70 cm.

0-groups were encountered, mostly in Kleine Bank-area and SW Greenland. However, it must be noted, that the catchability of cod younger than 3 years old is low with the nets deployed during the survey.

Evaluation of survey results and assessment for cod

(1) East GL cod has slighty recovered despite ongoing fisheries except for the closure at Kleine Bank.

(2) In West GL, the inter-annual variability in cod is likely linked to mostly southward movements of young cod that was also observed in 2012 and 2013.

(3) As pointed out in the last reports, the distribution of the year class 2009 off West Greenland shows (a) the relevance of a significant spawning stock off East Greenland, and (b) a potentially new strong year class incoming.

Redfish (*S. mentella* and *S. marinus*)

Survey trends

High abundance for *S. mentella* formerly encountered in stratum 8 of the German survey has disappeared. Catch rates for *Sebastes mentella* declined sharply in stratum 8, after opening the fisheries in 2010. The CPUE declined in this area for 98 % from 2009 to 2015 (Table 2). This strong negative trend has been stated in this report since 2011.

Golden redfish *Sebastes marinus* is by-caught in the *S. mentella* fisheries and CPUE is also declining until 2012 (Table 3). Since then, golden redfish has increased, in particular for East Greenland. In 2013 and 2014, CPUE for golden redfish now clearly exceeds CPUE for *S. mentella* in relative and absolute terms, and CPUE remains high in 2015.

Evaluation of survey results

(a) Present catch rates are not likely to maintain the redfish population on the stock. The demersal *S. mentella* fisheries on the shelf is likely not sustainable.

(b) The survey results indicate trends of redfish above 400 m depth only. The deeper part of the stock is not covered by the survey, but is considered in the ICES advice.

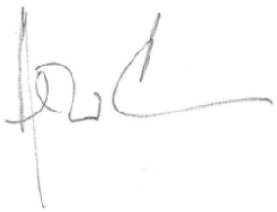
Cruise participants

Name and function

Dr. Heino Fock	Cruise leader	TI_SF, Hamburg
Annika Elsheimer	Oceanography & IT	TI_SF, Hamburg
Heike Schwermer	Fisheries biology	TI_SF, Hamburg
Wolfgang Brenoe	Fisheries biology	TI_SF, Hamburg
Lars Christiansen	Fisheries biology	TI_SF, Hamburg
Constanze Hammerl	Fisheries biology	TI_SF, Hamburg
Ramona Ohde	Fisheries biology	TI_SF, Hamburg
Nicole Stollberg	Fisheries biology	TI_SF, Hamburg
Thilo Weddehage	Fisheries biology	TI_SF, Hamburg (only leg 1)
Rene Kallen	Fisheries biology	TI_SF, Hamburg
Will Ostrom	Glider rescue	Woods Hole Oceanographic Institute (only leg 2)

TI_SF Johann Heinrich von Thünen-Institut, Thünen-Institut für Seefischerei

Dr. Heino O. Fock



Tables and Figures

Table 1: Trends for standard unit catches (CPUE) for cod in the German offshore survey in Greenland waters by stratum, 1981 to 2014. Values scaled to maximum value in 1988, stratum 2 (=100%); - = no data.

	West Greenland				East Greenland			
Jahr	Stratum1	Stratum2	Stratum3	Stratum4	Strat5&6	Stratum7	Stratum8	Stratum9
1982	0	16	9	10	1	2	1	2
1983	0	7	10	7	1	1	1	4
1984	0	2	2	3	1	1	0	0
1985	0	4	4	2	1	3	1	2
1986	1	6	9	6	1	4	1	1
1987	27	70	49	9	3	4	2	1
1988	9	100	14	18	3	2	1	2
1989	0	6	98	24	23	16	3	0
1990	0	1	2	6	2	6	2	1
1991	0	0	1	1	1	1	1	2
1992	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	1	0	0
1996	0	0	0	0	0	1	0	0
1997	0	0	0	0	0	0	0	3
1998	0	0	0	0	0	0	0	1
1999	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	1	0	0
2001	0	0	1	0	0	2	0	3
2002	0	0	0	1	0	7	0	2
2003	0	0	0	0	0	19	1	3
2004	0	0	0	1	0	5	1	3
2005	0	0	1	5	4	16	1	5
2006	0	19	1	14	0	17	2	10
2007	0	1	4	32	3	0	2	6
2008	0	0	6	8	4	0	1	9
2009	0	0	0	0	1	48	2	11
2010	0	1	2	2	0	25	2	8
2011	0	0	1	5	3	8	2	13
2012	8	2	5	13	5	12	2	19
2013	1	3	4	29	3	9	2	3
2014	2	15	2	51	15	2	2	21
2015	3	1	23	5	2	2	4	14

Table 2: Trends for standard unit catches (CPUE) for deep-sea redfish *Sebastes mentella* in the German offshore survey in Greenland waters by stratum, 1996 to 2015. Values scaled to maximum value in 2009, stratum 8 (=100%); - = no data.

Year	Str1	Str2	Str3	Str4	Str5&6	Str7	Str8	Str9
1996	0	0	0	0	2	0	32	1
1997	0	0	0	0	1	0	63	1
1998	0	0	0	0	2	0	36	0
1999	0	0	0	0	0	1	13	0
2000	0	0	0	0	3	1	7	0
2001	0	0	0	0	2	2	11	1
2002	0	0	0	0	2	0	17	4
2003	0	0	0	0	1	0	54	4
2004	0	0	0	0	0	0	65	8
2005	0	0	0	0	1	0	83	1
2006	0	0	0	0	0	1	47	2
2007	0	0	0	0	3	1	68	1
2008	0	0	0	0	0	0	36	0
2009	0	0	0	0	0	0	100	0
2010	0	0	0	0	0	0	37	0
2011	0	0	0	0	0	0	10	0
2012	0	0	0	0	0	0	15	0
2013	0	0	0	0	0	0	3	0
2014	0	0	0	0	1	0	2	0
2015	0	0	0	0	0	0	2	0

Table 3: Trends for standard unit catches (CPUE) for golden redfish *Sebastes norvegicus* in the German offshore survey in Greenland waters by stratum, 1996 to 2015. Values scaled to maximum value in 2009, stratum 8 (=100%); - = no data.

	Str1	Str2	Str3	Str4	Str5&6	Str7	Str8	Str9
1996	0	0	0	0	1	0	2	0
1997	0	0	0	0	1	0	2	0
1998	0	0	0	0	0	0	3	1
1999	0	0	0	0	0	2	4	0
2000	0	0	0	0	1	12	5	1
2001	0	0	0	0	4	5	2	2
2002	0	0	0	0	1	0	18	15
2003	0	0	0	0	1	0	13	2
2004	0	0	0	1	0	6	17	8
2005	0	0	0	1	1	5	36	7
2006	0	0	0	3	0	3	15	24
2007	0	0	0	3	73	6	77	24
2008	0	0	0	1	3	2	67	9
2009	0	0	0	1	32	5	100	4
2010	0	0	1	3	0	1	67	19
2011	0	0	0	2	13	0	41	19
2012	0	0	1	2	22	0	54	9
2013	0	0	2	6	45	0	62	32
2014	0	0	4	3	125	17	38	51
2015	0	0	1	10	70	34	45	52

Fig. 1a: New stratification scheme for the German Greenland survey, introduced in 2012 and applied since.

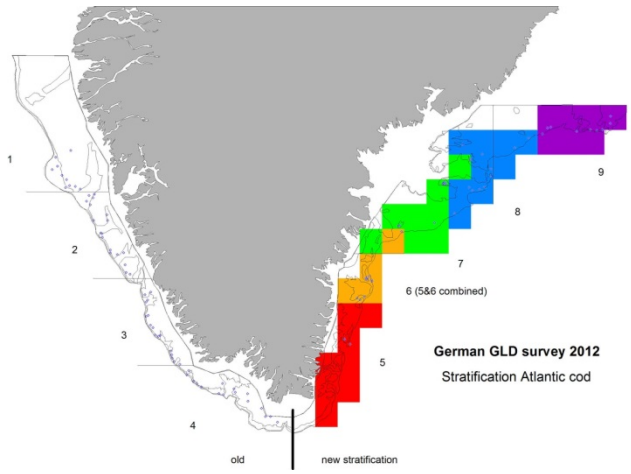


Fig. 1b: Stations sampled in 2015 for demersal fish

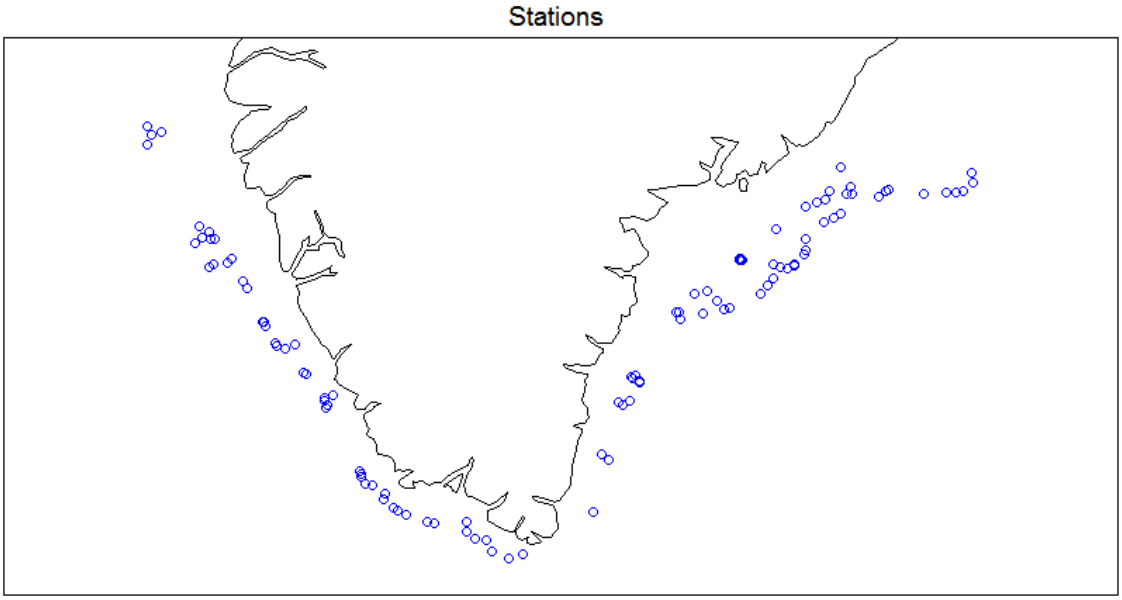
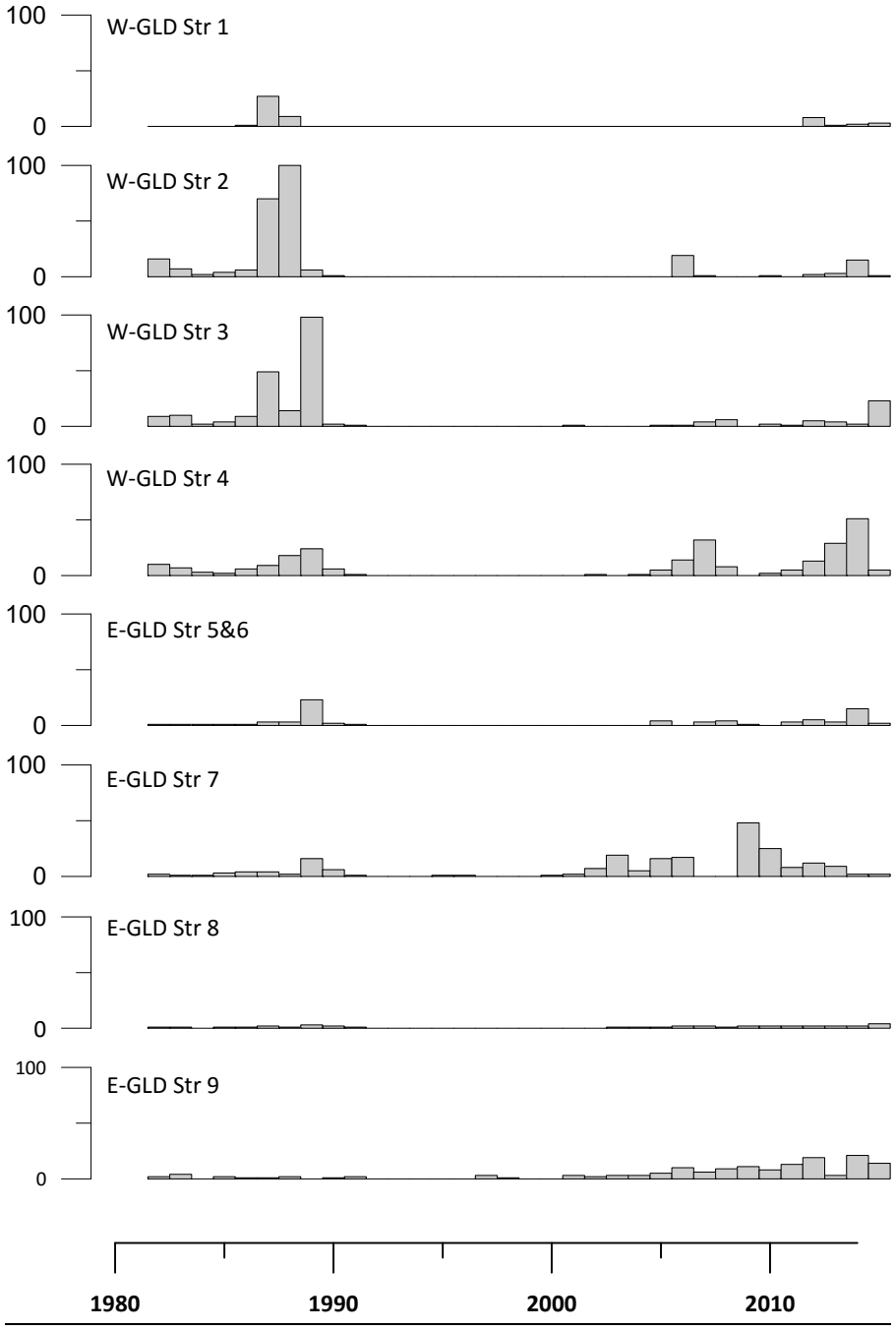


Figure 2: Trends for CPUE for cod from the German offshore survey off Greenland. Stratum affiliation see Table 1. Stratum 1 not sampled in 2011.



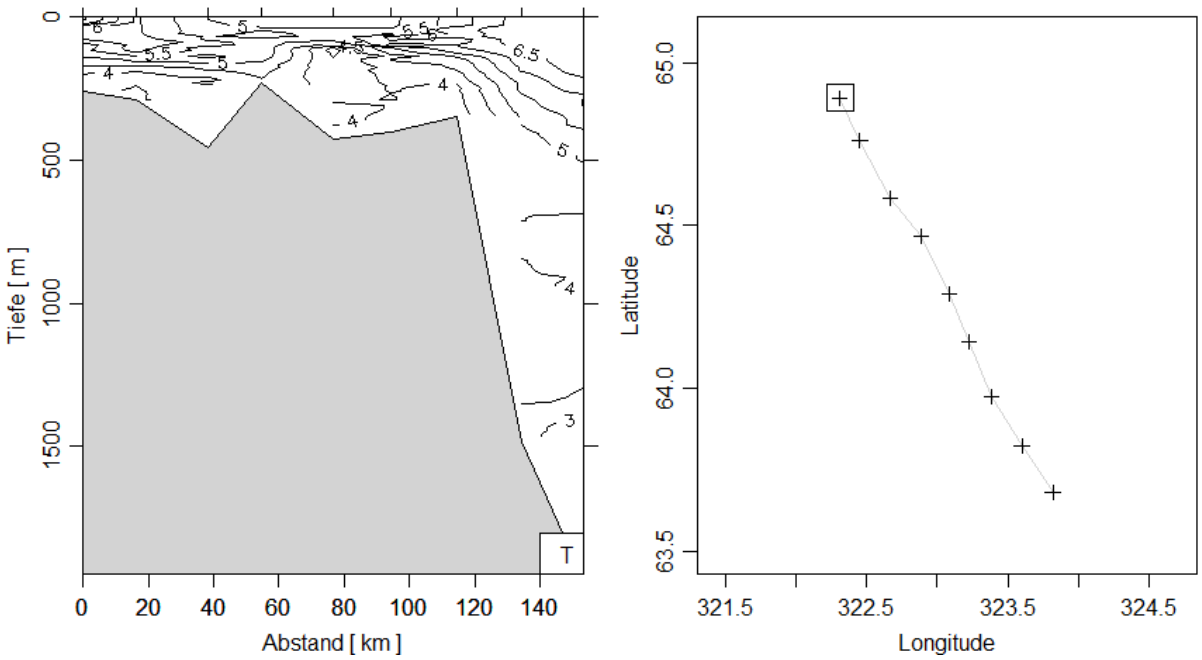


Fig 3: Oceanographic section across Kleine Bank, 2015

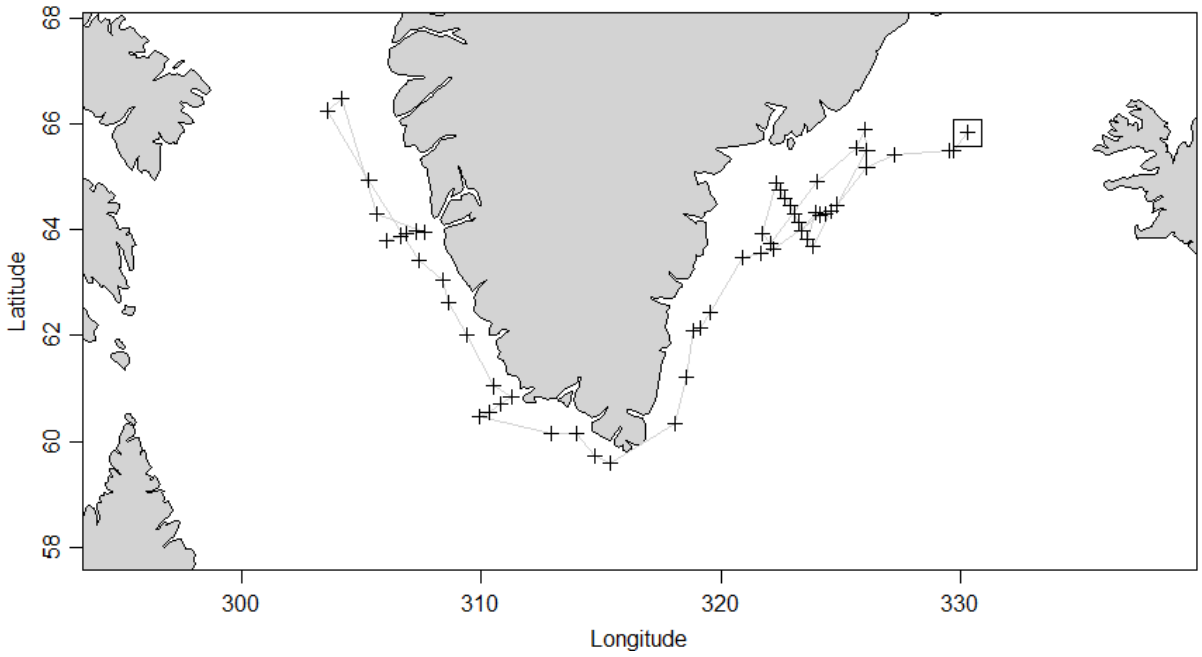


Fig. 4: CTD stations 2015, box indicates starting position