

Northwest Atlantic



Fisheries Organization

Serial No. N1473

NAFO SCR Doc. 88/34

SCIENTIFIC COUNCIL MEETING - JUNE 1988

Distribution, Abundance and Size Composition of Greenland Halibut

Estimated from a Stratified-Random Trawl Survey

off West Greenland in 1987

by

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Introduction

Annual TAC's for Greenland Halibut in Subarea 0+1 have been kept as 25,000 tons since 1979 lacking of adequate data to conduct more detailed assessment of this stock.

In July/August 1987, Japan and Greenland carried out jointly a stratified random trawl survey in NAFO Subarea 1 by R/V Shinkai Maru. The survey covered Div. 1A south of 70°N to 1F at depths from 0 to 1000 m, outside the 3-mile limit. Greenland halibut, which is one of the commercially most interesting species for both Japan and Greenland, took the second position after cod in the estimated biomasses (Yamada et al., MS 1988). Based on the results of the survey, the distribution, abundance and size composition of Greenland halibut occurring in Subarea 1 are described in this report.

Materials and Methods

The outline of the survey is described by Yamada et al. (MS 1988). From each trawl haul, a random sample of Greenland halibut was taken up to around 100 specimens. Fork length was measured to cm-below and grouped at 2-cm groups by sex. These data were standardized to the size composition in number per km² area swept. The area swept at each station is calculated as the product of the width between the tips of wing

nets and towed distance. Catchability coefficient is assumed to be 1.0. Size composition in each stratum is expressed as a mean of the standardized size compositions within the stratum. Size composition by depth zone in northern (Div. 1ABC) and southern (Div. 1DEF) areas were calculated as weighted mean of the size composition by stratum, using the stratum area as weighting factor.

In this report, sexes are combined since no clear difference occurs between sexes in their size composition in each stratum. Five strata, in which no hauls were made, are excluded from this analysis.

Results and Discussion

Fig. 1 shows the distribution (kg/km^2) of Greenland halibut in the survey. While the species was caught throughout the survey area, the larger catches occurred in deeper waters north of 63°N . However, one should take into account that there are no successful stations in 600-1000 m zone of Div. 1A, 1E and 1F.

The biomass estimates for Greenland halibut are shown by division and depth zone in Table 1. The total trawlable biomass estimates was 58,000 t with coefficient of variation at 14 %.

Length of Greenland halibut ranged from 5 cm (unsexed) to 75 cm for male and to 101 cm for female. Fig. 2 shows the size compositions by depth zone in northern (Div. 1ABC) and southern (Div. 1DEF) areas. The high values occurred in all depth zones except for 0-200 m of the northern area and in depth zone of 600-1000 m of the southern area (Div. 1D (no hauls in Div. 1EF)). In the northern area, the size composition in the 200-400 m depth zone was characterized by many small fish having two length modes at 12 cm and 18 cm, respectively. While the number of these small fish decreased in 400-600 m depth zone, the number of middle-sized fish around 40 cm increased. In the 600-1000 m depth zone, there are two length modes at 34 cm and 48 cm, respectively. In the southern area, the size composition in the 600-1000 m depth zone showed a mode at 46 cm. The size composition in the total survey area (Fig. 3) is characterized by many small fish around 12 cm and 18 cm and by a lack of fish larger than 50 cm. Such large fish might be distributed in more deeper waters than those covered by the survey, because good catch rates of large fish were obtained at depths of 1000-1180 m in Div. 1CD during the later feasibility study by Shinkai Maru.

According to Smidt (1969) and Atkinson et al. (1982), it is considered that Greenland halibut off West Greenland belong to the same stock as those distributed in Canadian waters from Baffin Island to Newfoundland. The spawning area is located around the Greenland-Canadian midline between 62° and 64°N in depths of 1000-1500 m. In spring, the larvae are spread from the spawning area northward off West Greenland by

the West Greenland Current. In autumn, the larvae seek to the bottom on nursery grounds, afterwards the fish migrate to the spawning area. The result of the survey supports this theory because small fish of around 12 cm occurred in the 200-400 m depth zone and in Div. IABC north of spawning area, while larger fish occurred in deeper waters of Div. ICD, considered to be the spawning area.

References

- Atkinson, D. B., W. R. Bowering, D. G. Parsons, Sv. Aa. Horsted and J. P. Minet. 1982. A review of the biology and fisheries for roundnose grenadier, Greenland halibut and Northern shrimp in Davis Strait. NAFO Sci. Coun. Studies, 3, 7-27.
- Smidt, E. 1969. The Greenland halibut, Reinhardtius hippoglossoides (Walb.), biology and exploitation in Greenland waters. Medd. Danm. Fisk.-og. Havunders. N. S., 6, 79-148.
- Yamada, H., K. Okada and O. Jørgensen. 1988. West Greenland groundfish biomasses estimated from a stratified random trawl survey in 1987. NAFO SCR Doc., 88/31, 6 pp.

Table 1. Biomass estimates (tonnes) for Greenland halibut by division and depth zone.

Division	Depth zone (m)						Total
	0-100	100-200	200-300	300-400	400-600	600-1000	
IA	0	8	178	209	445	-	839
IB	3	16	302	2973	5439	2453	11188
IC	3	13	125	48	773	34866	35827
ID		0		12		10489	10501
IE		5		43		-	48
IF		0		0	11	-	11
TOTAL							58413 (C.V. = 14 %)

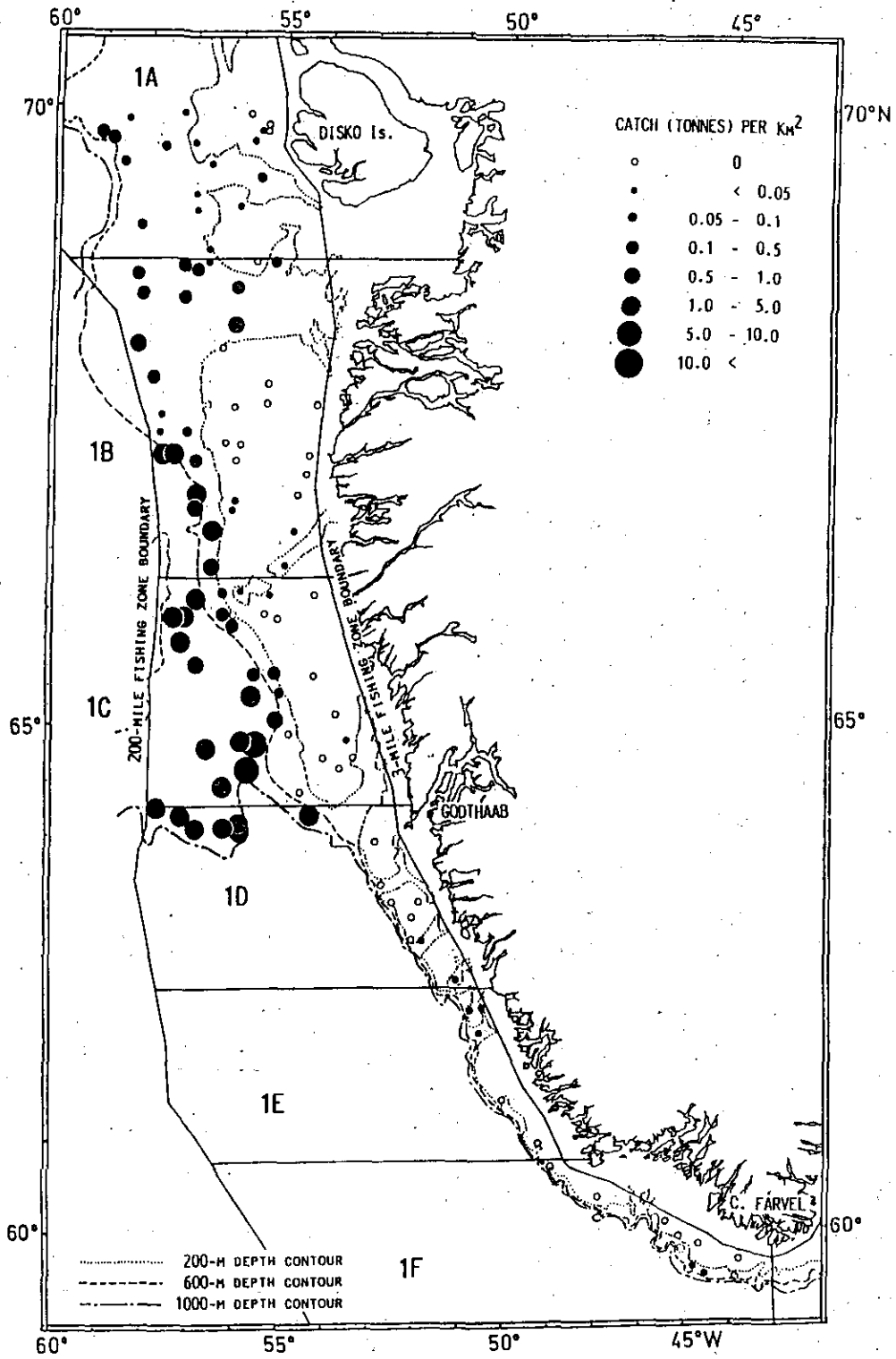


Fig. 1. Distribution of Greenland halibut in summer 1987. Div. 1ABC and 1DEF are taken as northern and southern area, respectively.

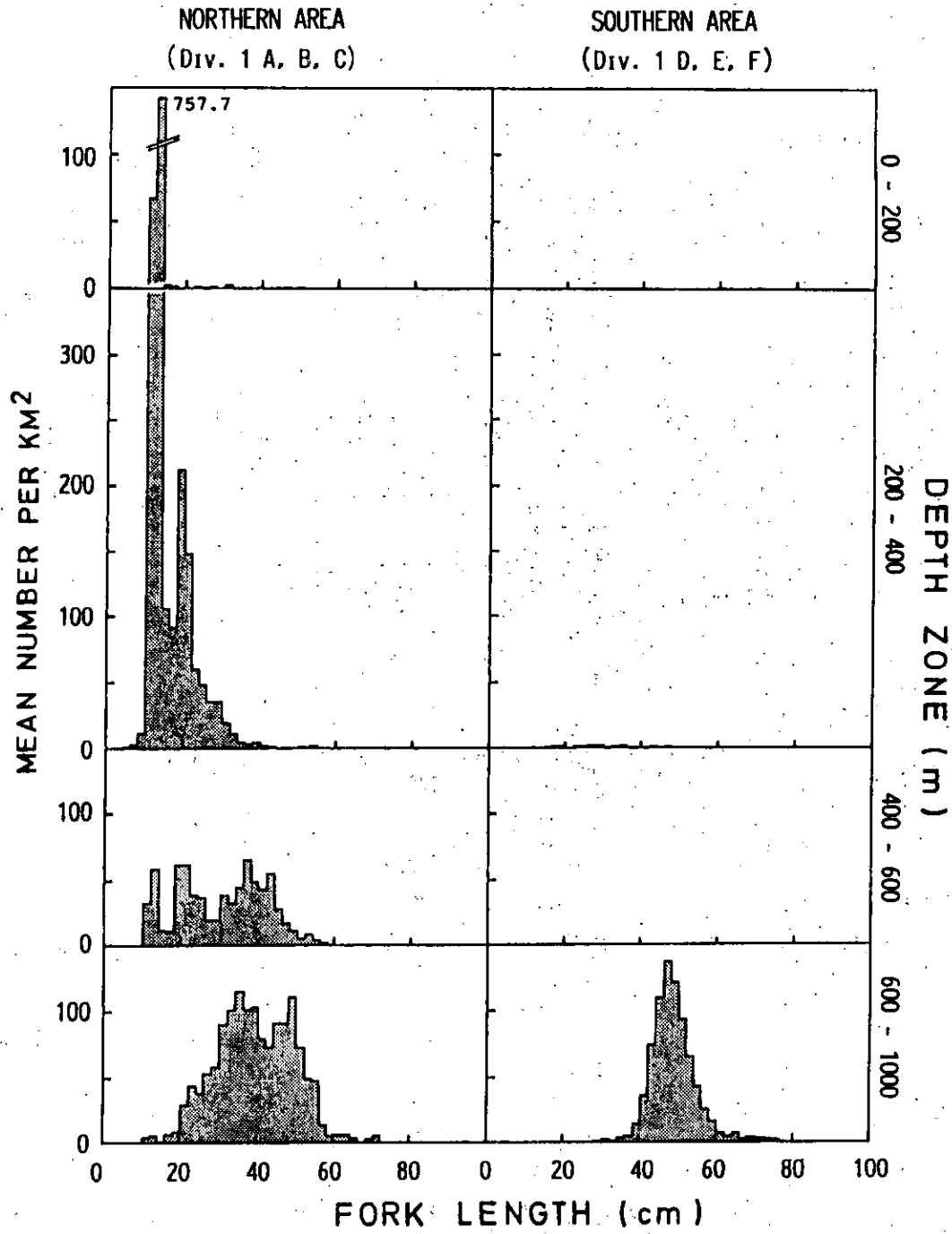


Fig. 2. Size compositions of Greenland halibut by depth zone in the northern and the southern area.

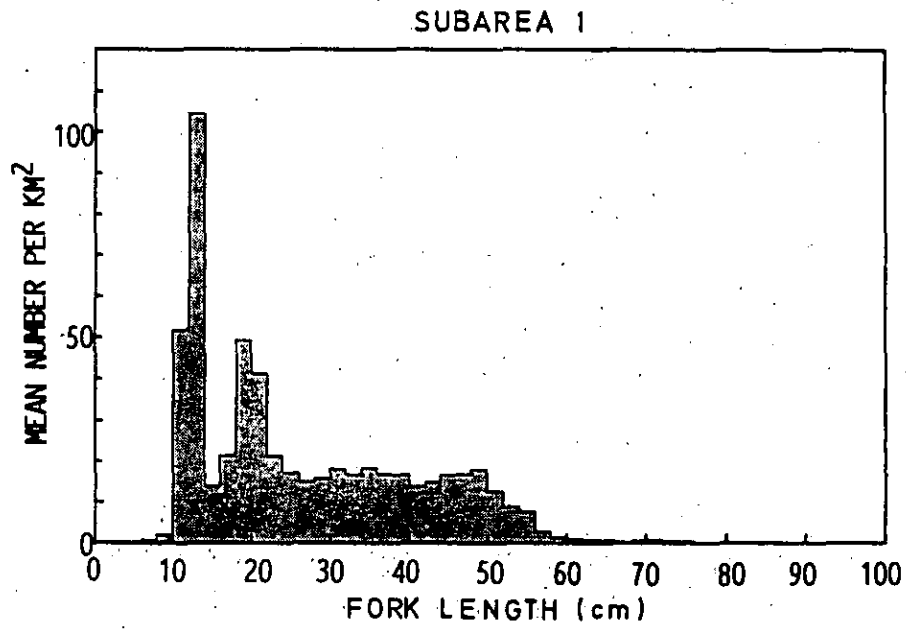


Fig. 3. Size composition of Greenland halibut off West Greenland during the Shinkai Maru survey in 1987.