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Distribution of Silver Hake, Other Fish Species and Squid in 1988 on the Scotian Shelf Slopes from Data Obtained by USSR Observers

by

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INTRODUCTION

In April-June and earliy in July 1988, the Soviet observers collected size-age samples of silver hake and determined the species composition of commercial catches in the area open for foreign fisheries. The present paper continues the series of papers dealing with the distribution of silver hake and other massive species and is based on the data obtained by the Soviet observers in the previous years.

MATERIALS AND METHODS

Due to earlier beginning of the fishing season in 1988, for the first time the sampling was made almost throughout April. However as the observers were present just on a single ship, the gained data do not give the idea of the distribution of the fish and squids in the entire fishing ground. The observers finished their work in the area open for foreign fisheries on 4 July. A total of 43721 specimens was measured and 850 pairs of silver hake otoliths collected for ageing. Methods of data processing and analysis were those used in the previous years. Numbers in figures (denominator) and tables (in brackets) are indicative of the number of trawlings with the catches of corresponding species. The distribution of red hake of genus Urophycis and flounders (yellowtail, witch flounder and American plaice) is shown without the classification by species due to their negligible

proportion in the catches. The amount of samples collected in 1988 by fishing ground and period is presented in table 1. As is evident from the data, the intensity of sampling in 1988 somewhat increased compared with the previous year (Rikhter and Turok, 1988). However the area in the western part of the fishing ground covered with observations reduced. Fishery statistics given in tables 2 and 3 is based exclusively on the information obtained on the ships with the observers on board.

RESULTS AND DISCUSSION

Early in April, dense silver hake aggregations were already formed on the continental slope between 59°00 and 62°00W (fig. 1). In May, the hake was also recorded in a more westward part of the area open for fisheries (fig. 2). In June, like in the previous year, the catches per trawling hour decreased (fig. 3), which can be attributed to migration of the hake northward of the SMGL in the third ten-day period.

Smaller catch size per unit effort in May and June 1988 compared with 1987 (table 2) with an approximately similar stock size (Rikhter, 1989) may be explained by several reasons (specific hydrometeorological conditions, increased fishing effort and initiation of intensive fishing at dates earlier than usual).

An obvious and sudden worsening of the fishing situation took place in the end of June - beginning of July, which is most likely related to massive migration of the hake northward of the SMGL. Compared with 1987, the fishing for the silver hake completed almost a month earlier (Rikhter and Turok, 1988).

The situation observed in the end of June 1988 was quite identical to that in 1983, when the fishery closed in the end of June (Rikhter and Turok, 1984). Fluctuations of dates of migration of the hake from the continental slope can be largerly attributed to hydrological conditions. No obvious relationship between the rate of sexual maturation of the hake from the data obtained by the observers in 1977-1988 and the dates of migration of the latter onto the shelf can be seen, though under definite hydrometeorological conditions such a relationship could have taken place (Rikhter and Konovalov, 1985).

Haddock (Melanogrammus aeglefinus)

The distribution of this species on the continental slope in April-June is shown in figs. 4, 5 and 6. The given data suggest that the haddock abundance gradually increased in the fishing ground from April to June.

Being nearly absent from the catches in April, the haddock by-catch constituted 1.2% in June (table 3). In general, as in the previous years, the haddock by-catch taken during the fishing season was below 1%.

Saithe (Pollachius virens)

In April, the saithe catches were negligible (fig. 7), however, the abundance of the species on the continental slope considerably increased in May-June (figs. 8 and 9). Compared with 1987, the saithe by-catch in those months appeared to be notably larger (table 3) amounting to 3.9% for the entire fishing season, which, nevertheless, is below the allowable quota.

Red hake (Urophycis sp.)

The representatives of this genus occurred on the continental slope in approximately equal numbers (figs. 10, 11, 12). However, their abundance seems to be somewhat reduced compared with 1987 (table 2). The by-catch constituted 0.9% in April-June (table 3).

Cod (Gadus morhua)

In 1985-1987, the cod was actually missing in the area to the south of the SMGL occurring individually in the catches (Rikhter and Turok, 1986, 1987, 1988). In 1988, however, the species was found in the catches quite frequently though in small numbers (figs. 13, 14, 15). The by-catch size increased from April to June having averaged to 0.2% during the season (table 3).

Redfish (Sebastes mentella)

As in the previous years, this species was found in the catches in small numbers (figs. 16, 17 and 18). The minimum recorded by-catch was in April-May. A certain increase was observed in June (table 3).

Flounders (Hippoglossoides plotessoides, Glyptocephalus cynoglossus, Limanda ferruginea)

The flounder distribution on the shelf slopes in 1988 is shown in figs. 19, 20 and 21. Their abundance in the fishing area seems

to be somewhat higher than in 1987. The maximum by-catch (1.3%) was taken in June (table 3).

Atlantic herring (Clupea harengus)

As in 1986, the herring was rather common in the catches (figs. 22, 23 and 24). The maximum by-catch was taken in April and amounted to 2.2% on the whole during the season, i.e. below the 1986 level (Rikhter and Turok, 1987).

Mackerel (Scomber scombrus)

In April, the mackerel was actually absent from the catches. In May-June, its abundance on the continental slope somewhat increased (figs. 25 and 26) and reached the 1987 level. The maximum by-catch (1.6%) was taken in June (table 3).

Squid (Illex illecebrosus)

In April-May, this species was nearly absent from the catches. In June, the squid abundance somewhat increased in the fishing ground (fig. 27) having maintained, nevertheless, at an extremely low level. The by-catch was as small as 0.2% (table 3). Thus, the expected massive migration of the squid to the Scotian Shelf did not take place.

CONCLUSION

Presence of dense silver hake aggregations on the continental slope early in April makes it possible to suggest that these aggregations were formed in the previous month. Hence it can be admitted that the efficient fishing for the hake can be carried out in as early as March, at least in some years. No significant difference was observed between the distribution of the hake in May-June 1988 and 1987. However, the presence of dense hake aggregations in the area accessible for fishing has become still less durable than over the 1984-1986 period.

Compared with 1987, the abundance of the Atlantic herring, flounders, cod, herring, saithe and haddock on the continental slope somewhat increased. However, over the fishing season on the whole, the by-catch of the said species appeared to be much below the allowable quota. Also it is worth noting, that the minimum recorded by-catch of all species caught during the directed fishing for the silver hake was in April.

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Table 1

Distribution of silver hake samples collected by USSR observers in 1988 by area and fishing period

Positions	Months and ten-day periods										Total
	April			May			June			July	
	I	II	III	I	II	III	I	II	III	I	
50°00			3								3
10		2					2	1	1		6
20		1	8			2	1	1	3	1	17
30		2	3			1	4	3		1	14
40		4	3			3	3	3	1	2	19
50		4	6	1		4	3	2	2		22
60°00			2	14	14	13	3	3	1	1	51
10		1			2	1	1				5
20		2	6	3			1		1	1	14
30		1	3	3	1		2		7		17
40			2		1		2	1	8		14
50		1			3		2	3	3		12
61°00						1	6	3	3	1	14
10		1				6	6	5	4	2	24
20	1	3		4	2	3		4	5	2	24
30	1	1			2	4	1	3	1	1	14
40				2	1	2		1			6
50				1				4		2	7
62°00				3	1						4
10				1	1						2
20				2	1					1	4
	2	23	36	34	29	40	37	37	40	15	293

Table 2

Catches per trawling hour (kg) by species, month and year

Species	Months	Year							
		1981	1982	1983	1984	1985	1986	1987	1988
Silver hake	April								4260 (61)
	May	2368 (33)	8654 (34)	2771 (160)	5738 (90)	3094 (131)	-	5988 (47)	3671 (103)
	June	1121 (69)	5471 (103)	2778 (105)	2783 (57)	3635 (195)	4469 (174)	2957 (74)	2085 (114)
	July	1909 (68)	1724 (99)	-	3298 (125)	3994 (208)	4372 (170)	3610 (77)	
	August	-	-	-	-	-	-	476 (11)	-
Haddock	April								1 (10)
	May	3 (10)	22 (23)	17 (81)	6 (37)	28 (123)	-	21 (39)	28 (72)
	June	20 (46)	-	40 (90)	17 (53)	54 (190)	43 (119)	18 (60)	29 (114)
	July	8 (37)	10 (74)	-	-	37 (204)	42 (129)	16 (60)	
Saithe	April								8 (42)
	May	-	-	-	-	38 (105)	-	22 (46)	213 (72)
	June	-	-	-	-	22 (123)	417 (63)	25 (57)	216 (84)
Urophycis sp.	April								36 (59)
	May	-	-	-	-	39 (125)	-	53 (42)	39 (99)
	June	-	-	-	-	25 (188)	191 (153)	42 (73)	21 (111)
	July	-	-	-	-	-	-	39 (73)	
Redfish	April								8 (38)
	May	106 (3)	-	34 (118)	7 (51)	-	-	50 (17)	6 (99)
	June	1 (2)	96 (41)	49 (53)	-	-	-	13 (41)	10 (102)

Table 3

Species composition of catches (%) studies by USSR observers in 1988

Species	Months			
	April	May	June	April-June
Silver hake	97.7	89.0	86.7	90.3
Haddock	+	0.7	1.2	0.7
Saithe	0.2	5.2	5.2	4.0
Red hake	0.8	0.9	0.9	0.9
Redfish	0.2	0.2	0.4	0.2
Flounders	0.5	0.4	1.3	0.7
Mackerel	0.1	0.2	1.6	0.7
Herring	0.4	3.2	2.2	2.2
Cod	0.1	0.2	0.3	0.2
Squid	+	-	0.2	0.1

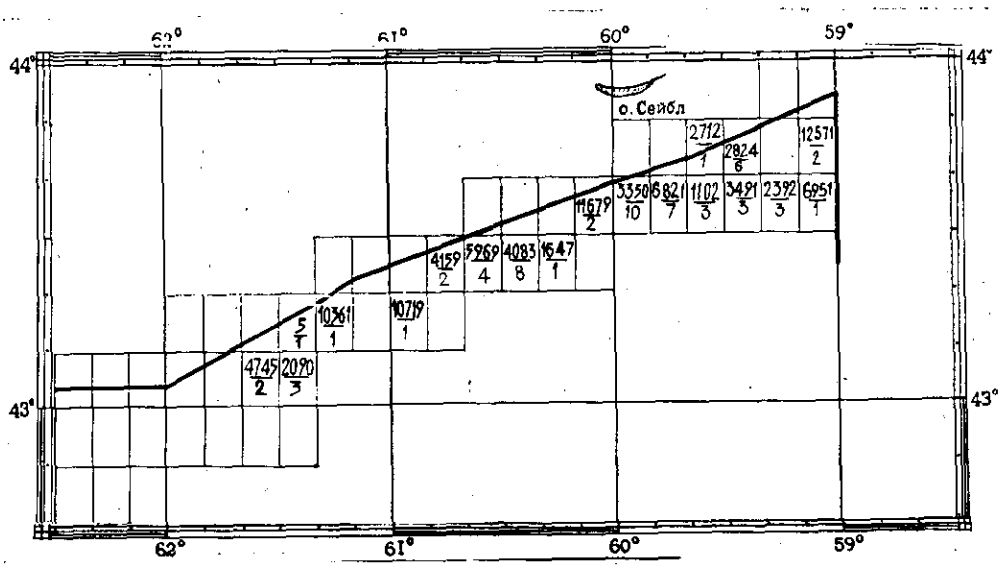

Fig. 1. Silver hake catches per trawling hour (kg) in April 1988.

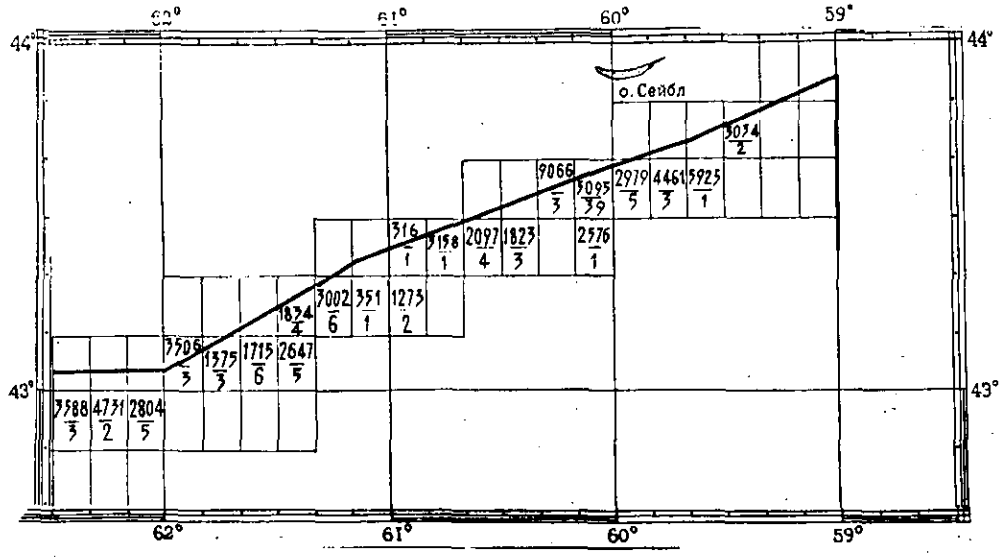

Fig. 2. Silver hake catches per trawling hour (kg) in May 1988.

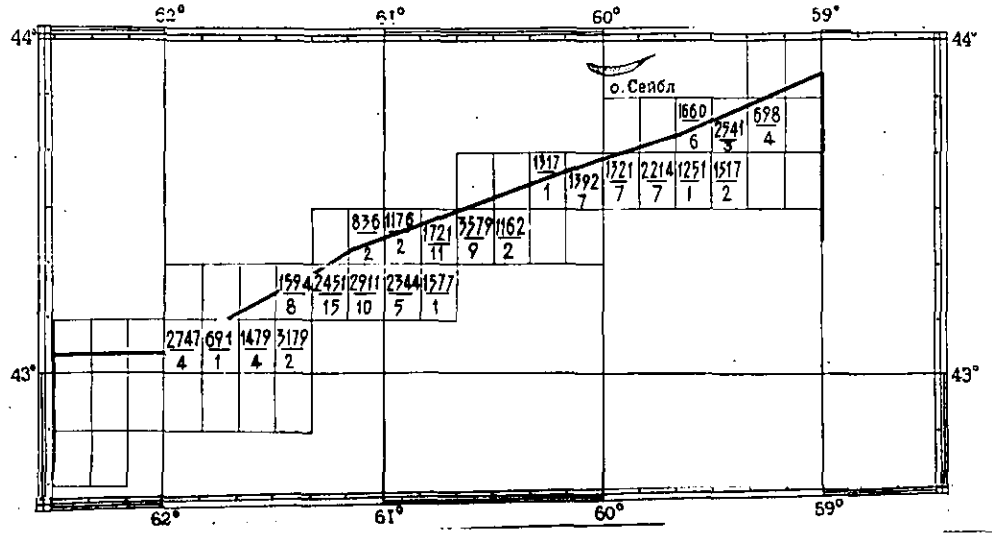

Fig. 3. Silver hake catches per trawling hour (kg) in June 1988.

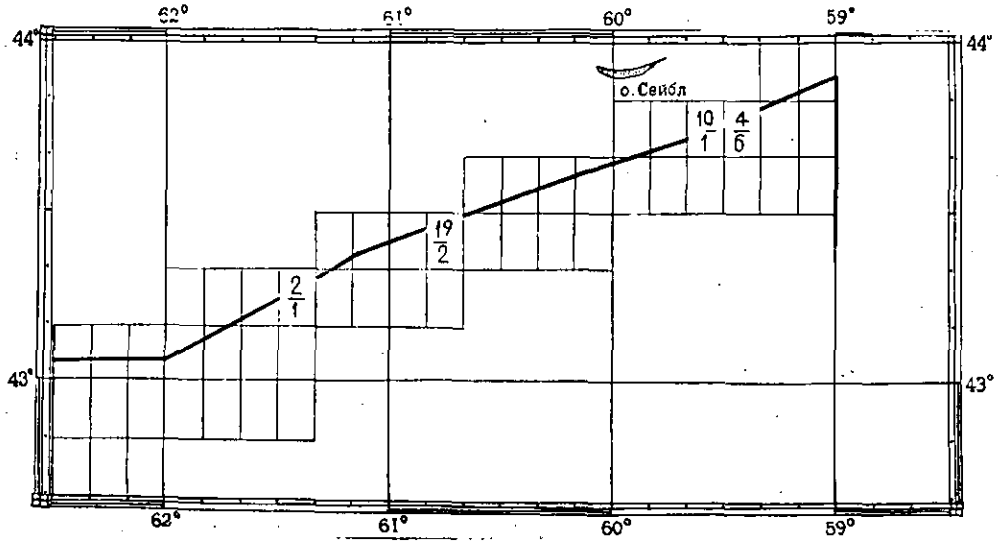

Fig. 4. Haddock catches per trawling hour (kg) in April 1988.

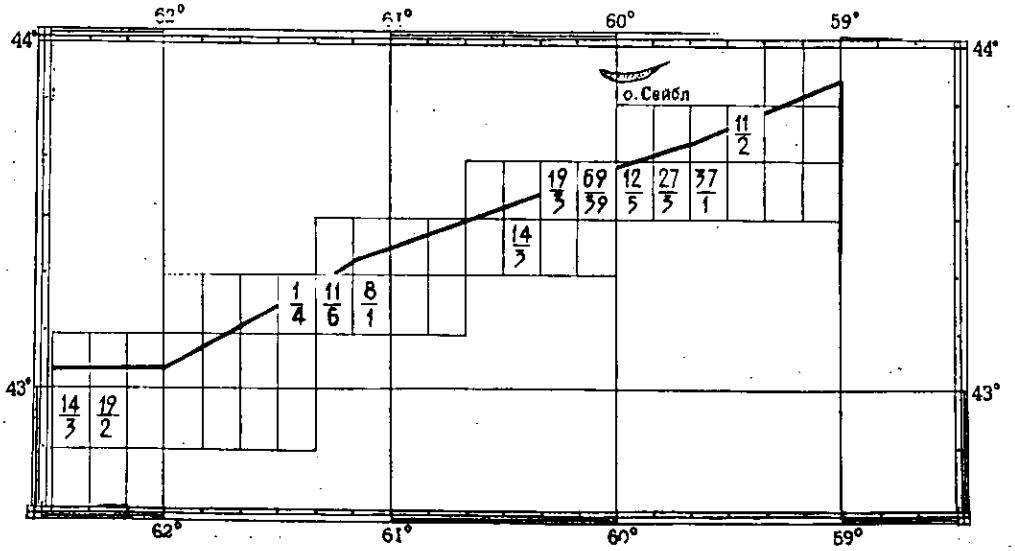

Fig. 5. Haddock catches per trawling hour (kg) in May 1988.

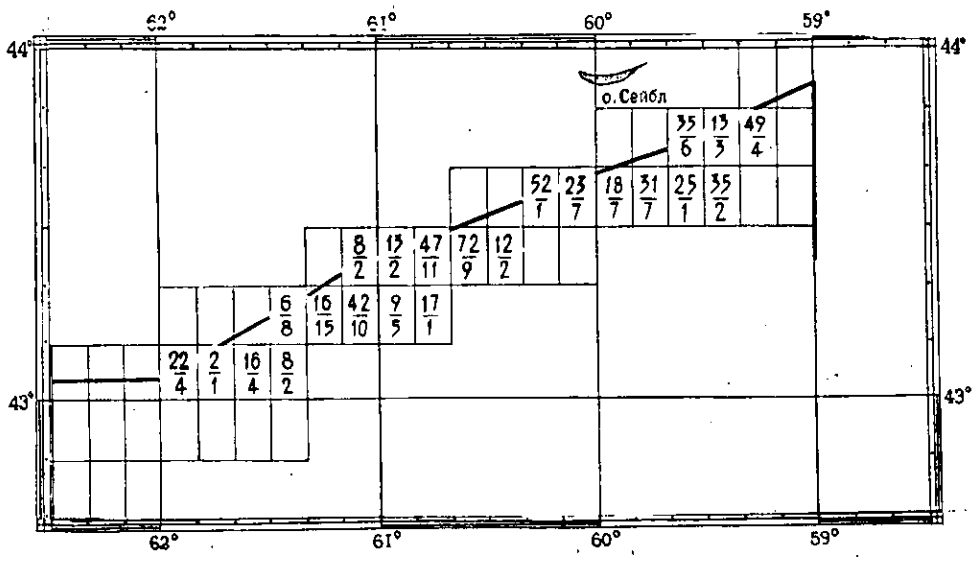

Fig. 6. Haddock catches per trawling hour (kg) in June 1988.

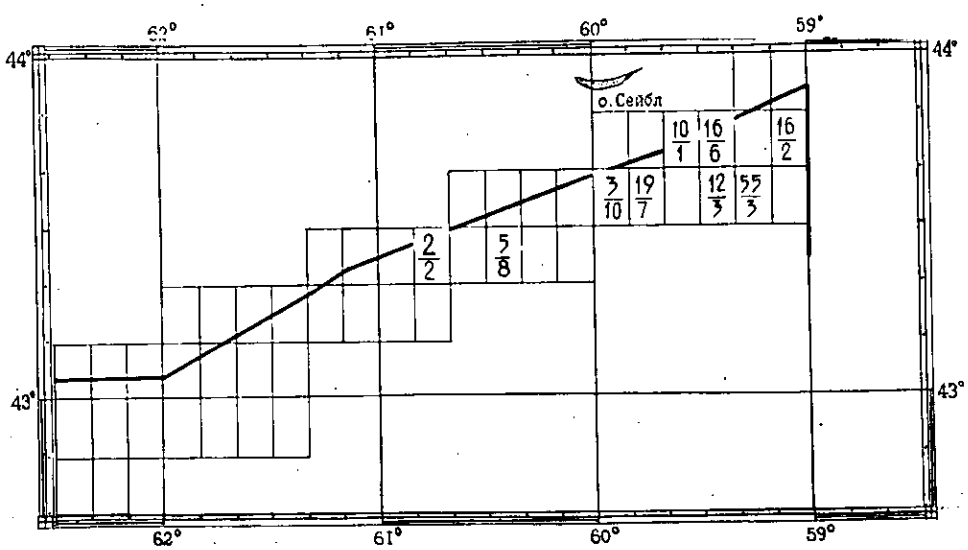

Fig. 7. Saithe catches per trawling hour (kg) in April 1988.

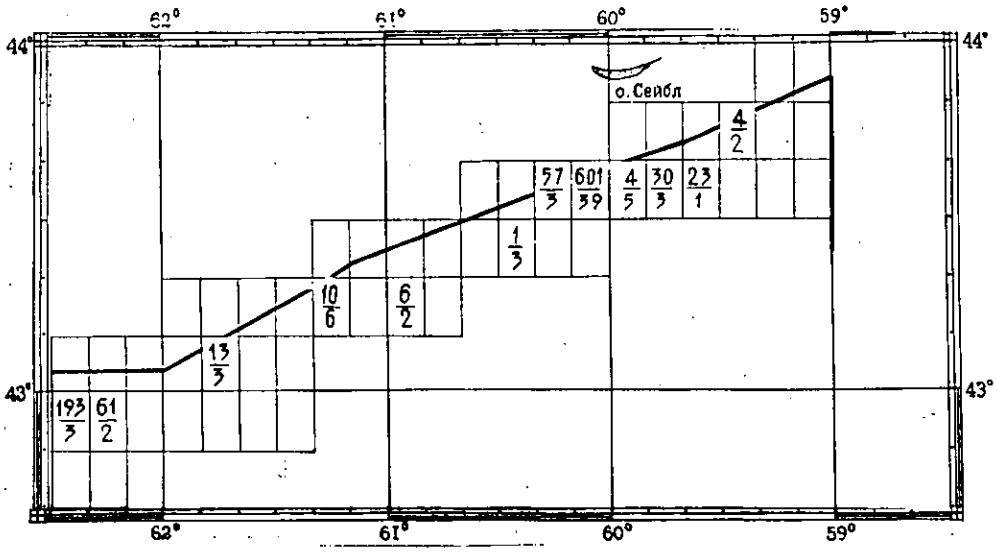

Fig. 8. Saithe catches per trawling hour (kg) in May 1988.

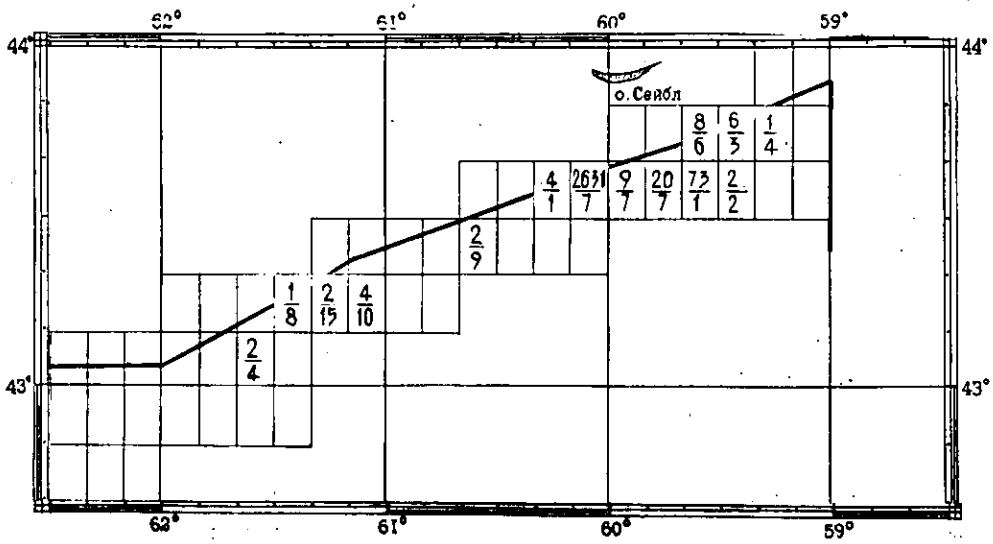

Fig. 9. Saithe catches per trawling hour (kg) in June 1988.

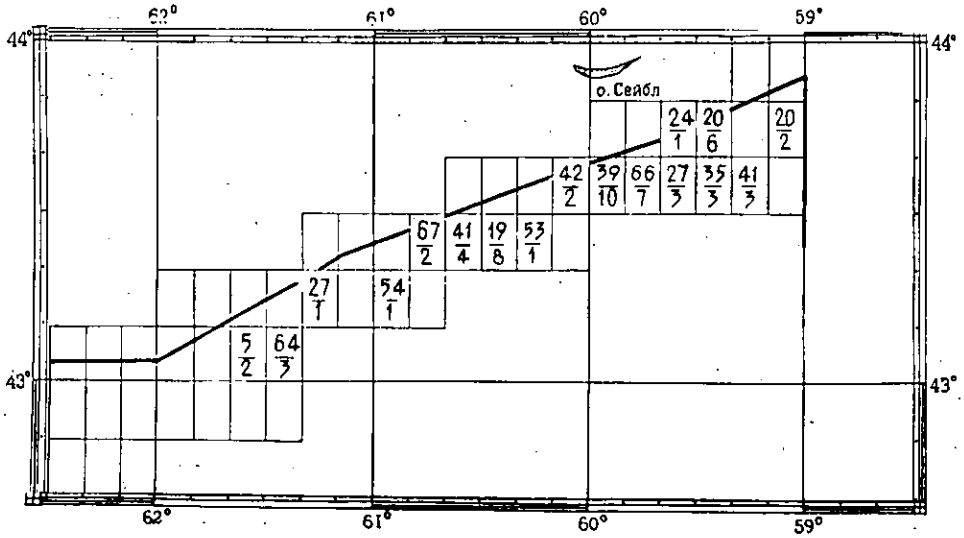

Fig. 10. Red hake, Urophycis spp., catches per trawling hour (kg) in April 1988.

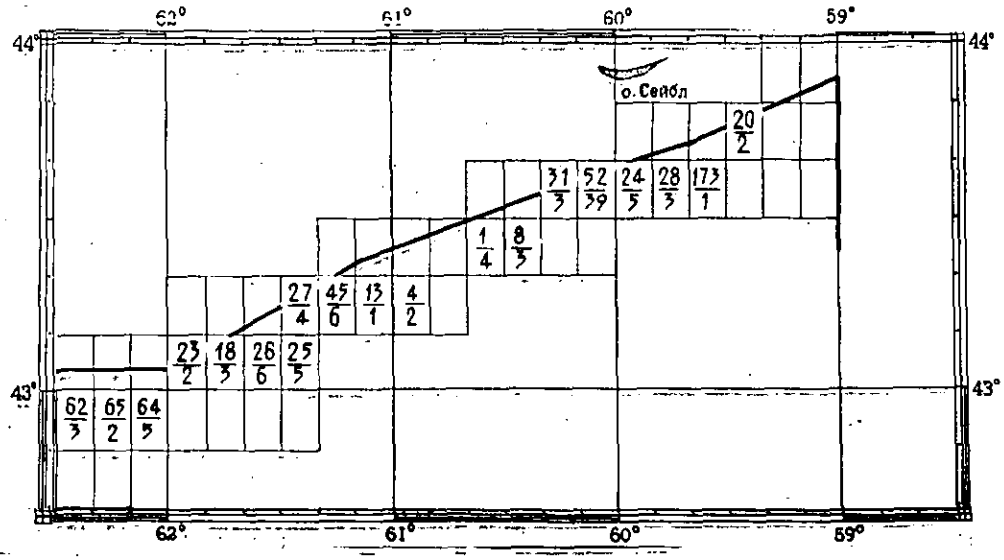

Fig. 11. Red hake, Urophycis spp., catches per trawling hour (kg) in May 1988.

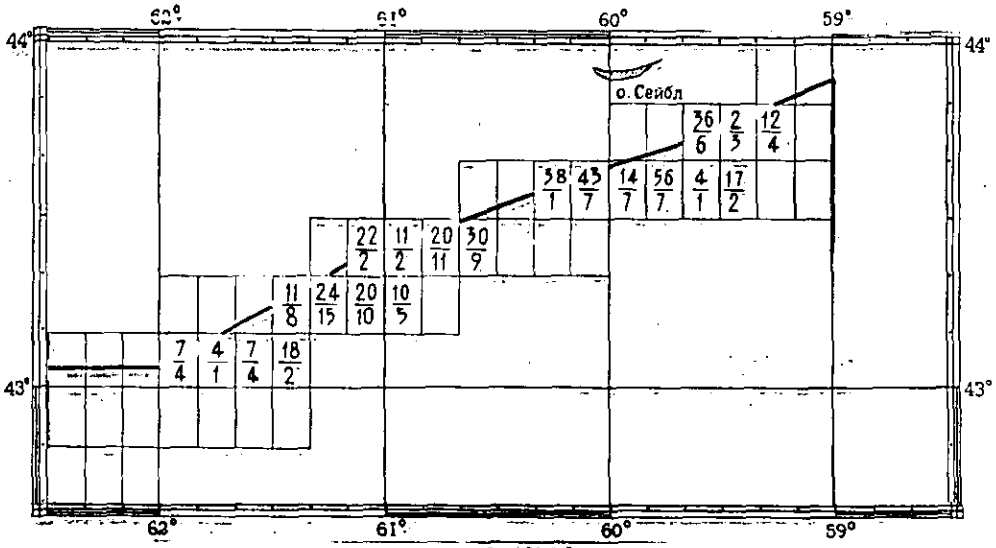

Fig. 12. Red hake, Urophycis spp., catches per trawling hour (kg) in June 1988.

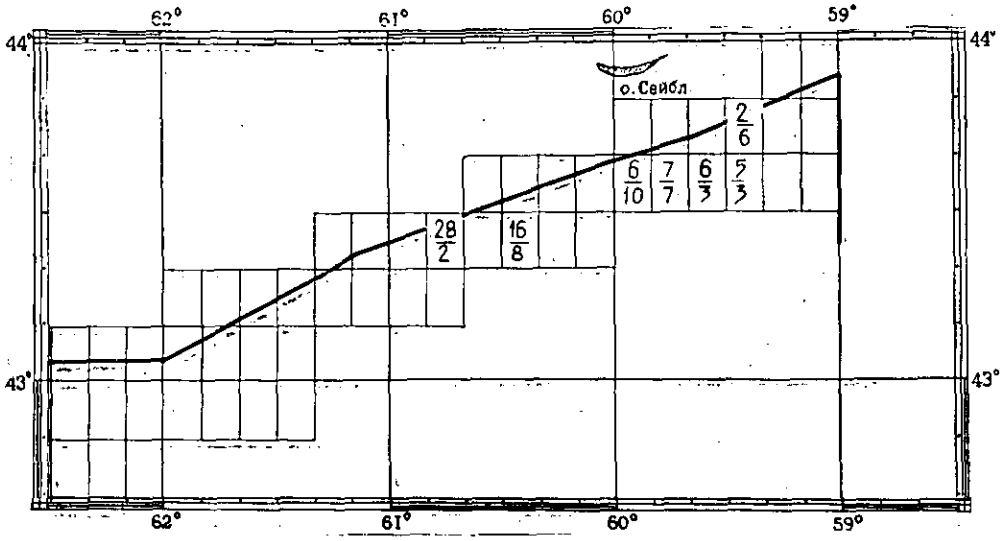

Fig. 13. Cod catches per trawling hour (kg) in April 1988.

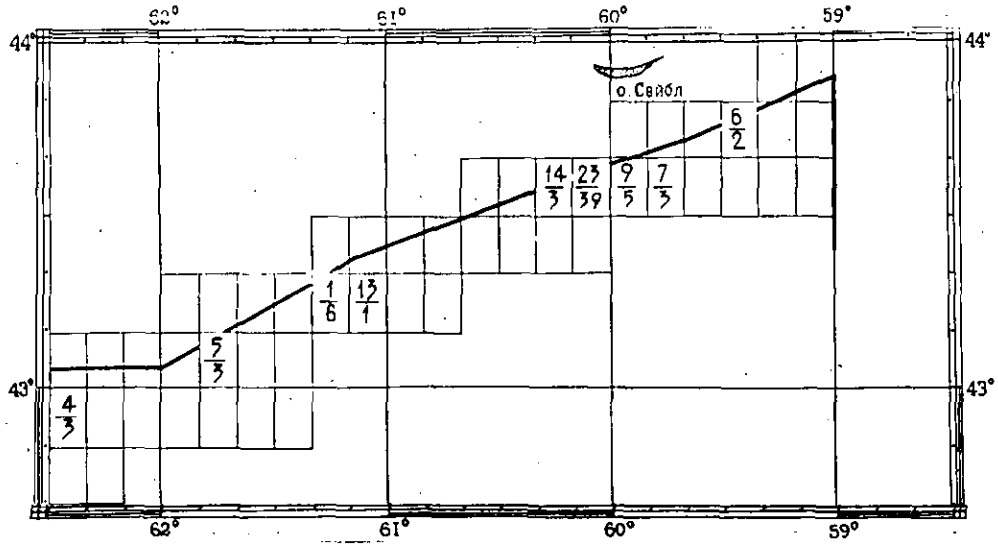

Fig. 14. Cod catches per trawling hour (kg) in May 1988.

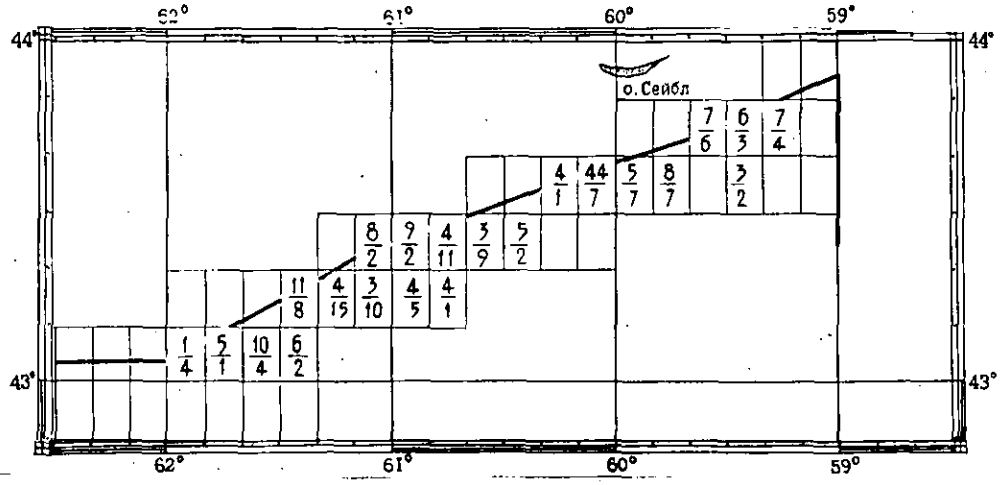

Fig. 15. Cod catches per trawling hour (kg) in June 1988.

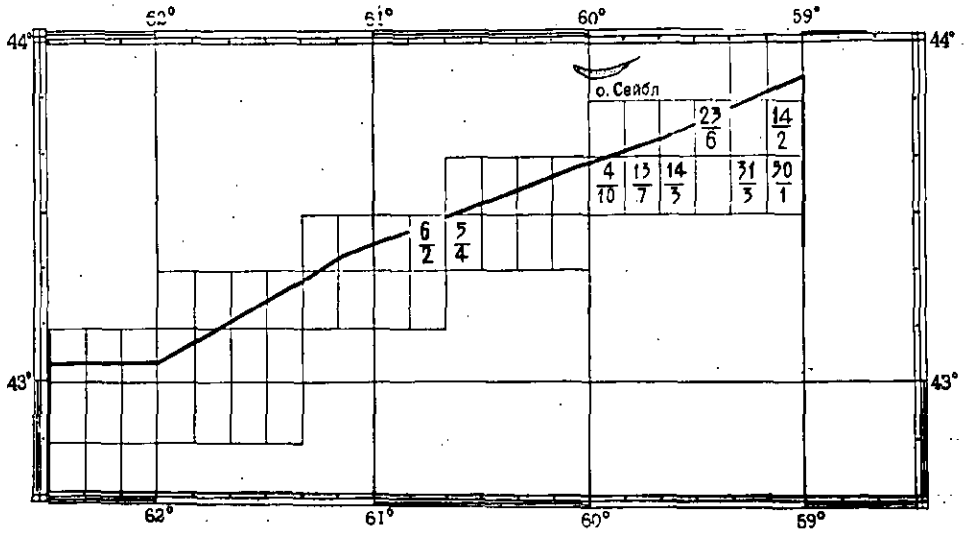

Fig. 16. Redfish catches per trawling hour (kg) in April 1988.

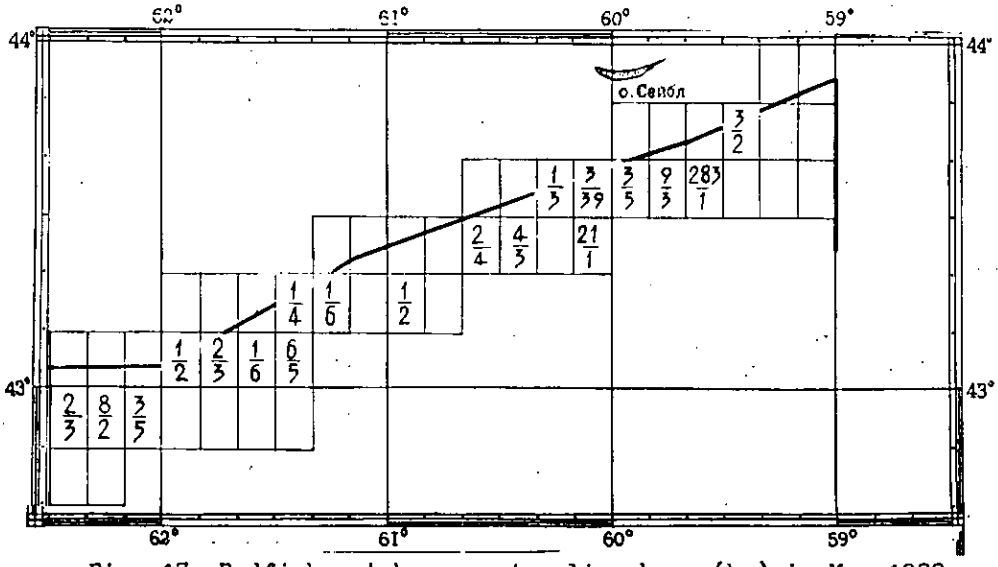

Fig. 17. Redfish catches per trawling hour (kg) in May 1988.

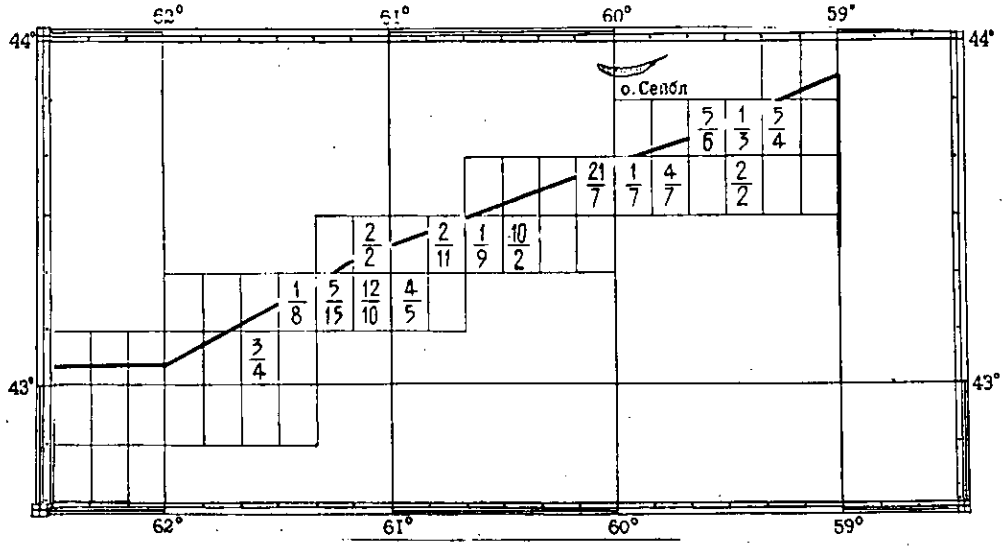

Fig. 18. Redfish catches per trawling hour (kg) in June 1988.

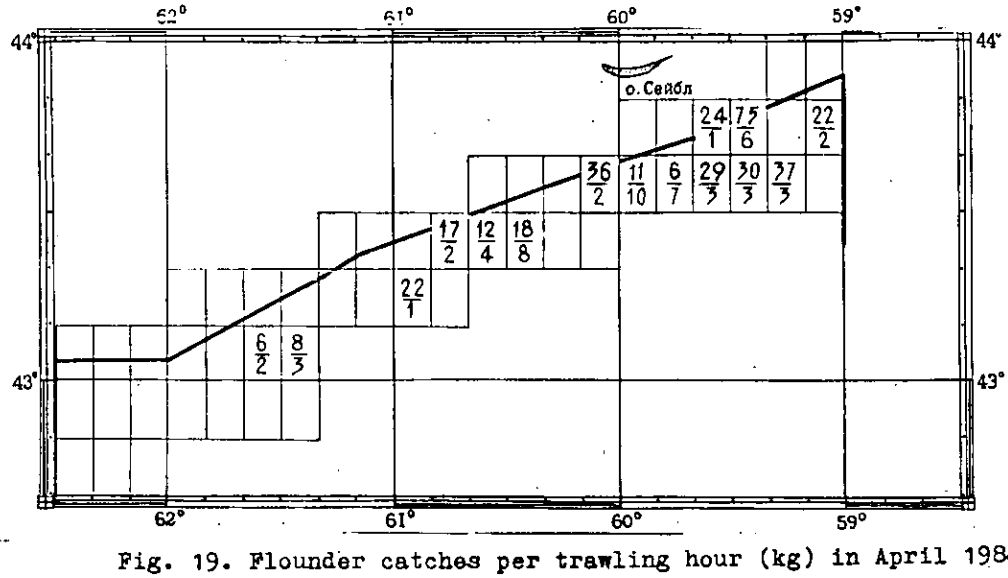

Fig. 19. Flounder catches per trawling hour (kg) in April 1988.

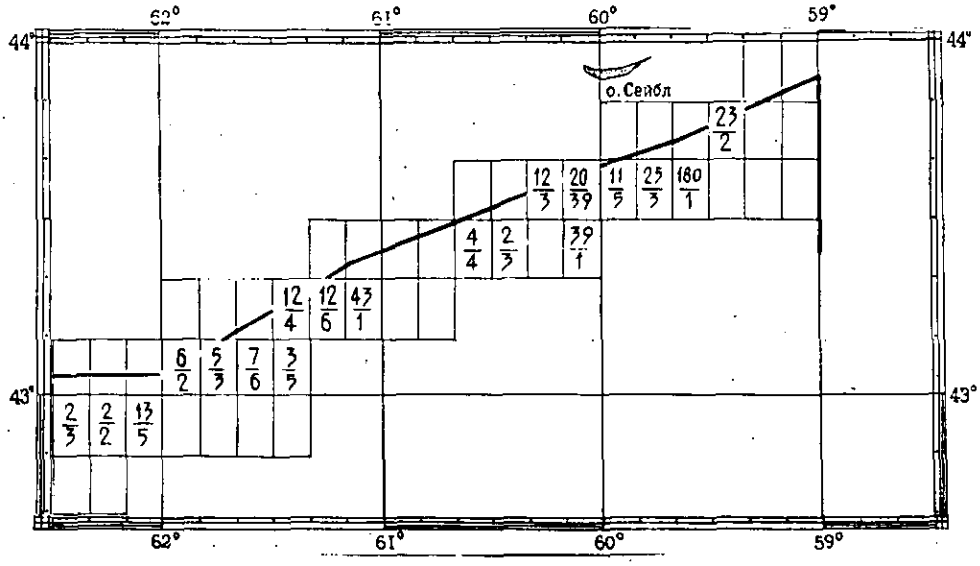

Fig. 20. Flounder catches per trawling hour (kg) in May 1988.

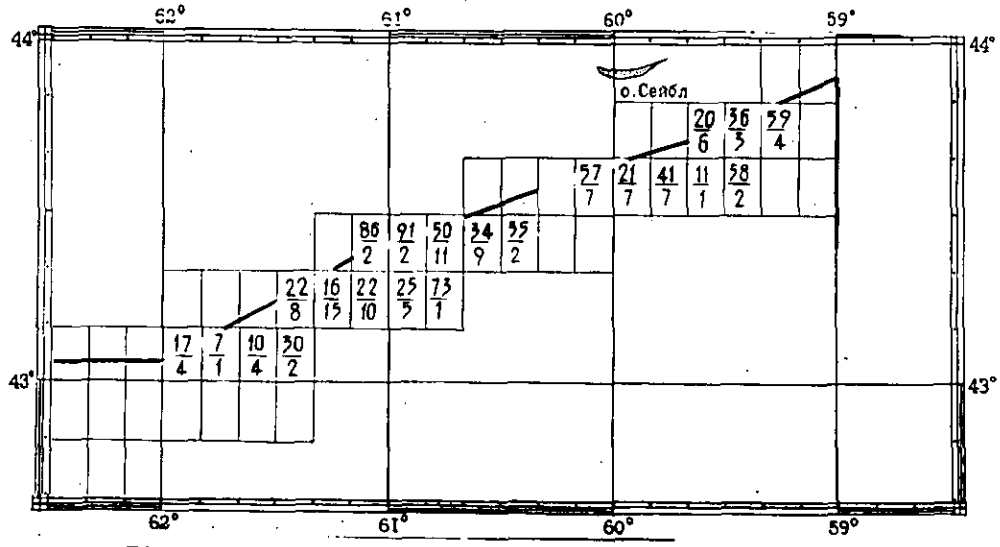

Fig. 21. Flounder catches per trawling hour (kg) in June 1988.

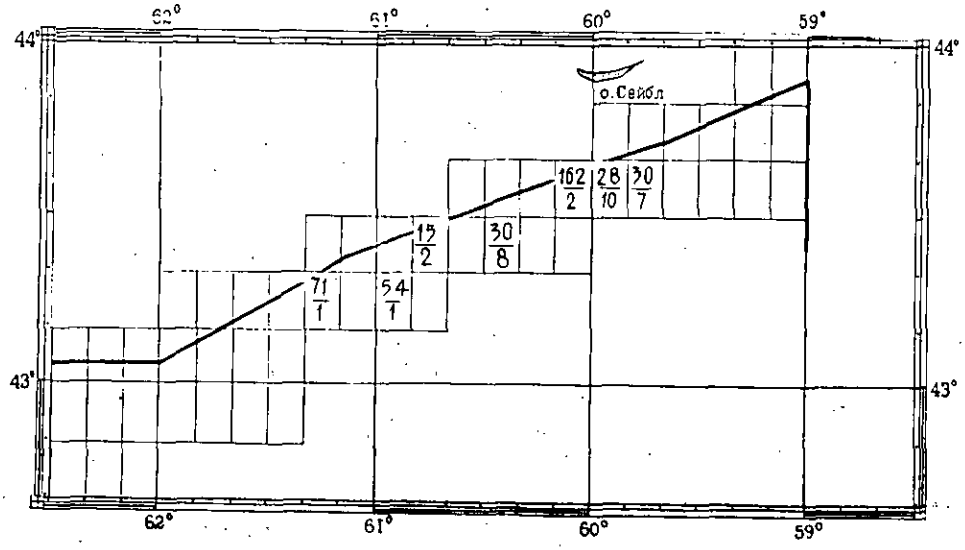

Fig. 22. Atlantic herring catches per trawling hour (kg) in April 1988.

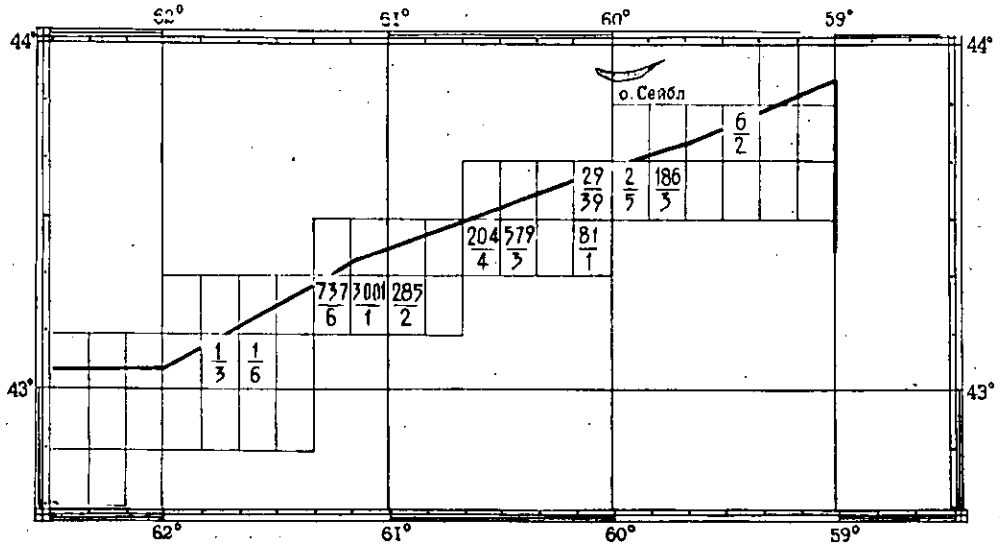

Fig. 23. Atlantic herring catches per trawling hour (kg) in May 1988.

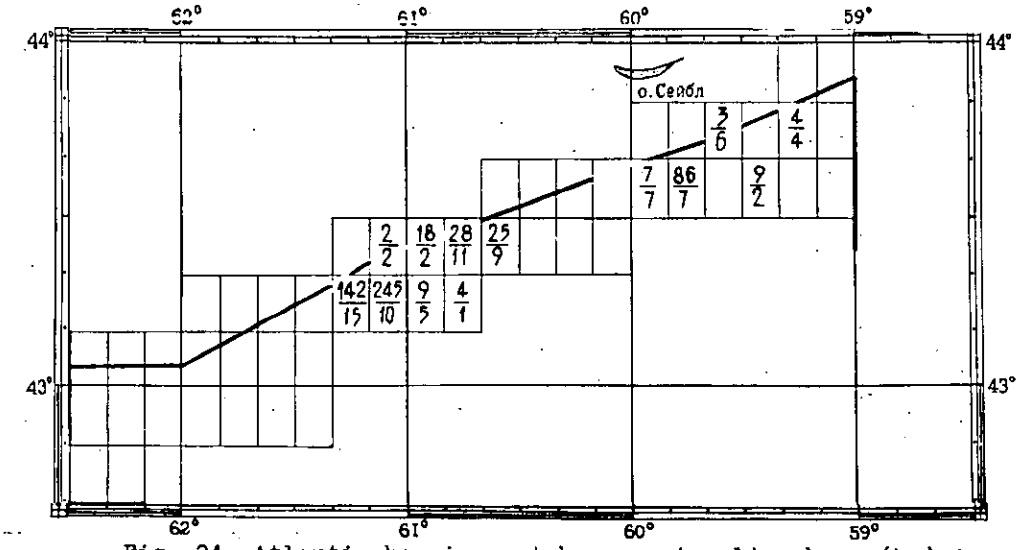

Fig. 24. Atlantic herring catches per trawling hour (kg) in June 1988.

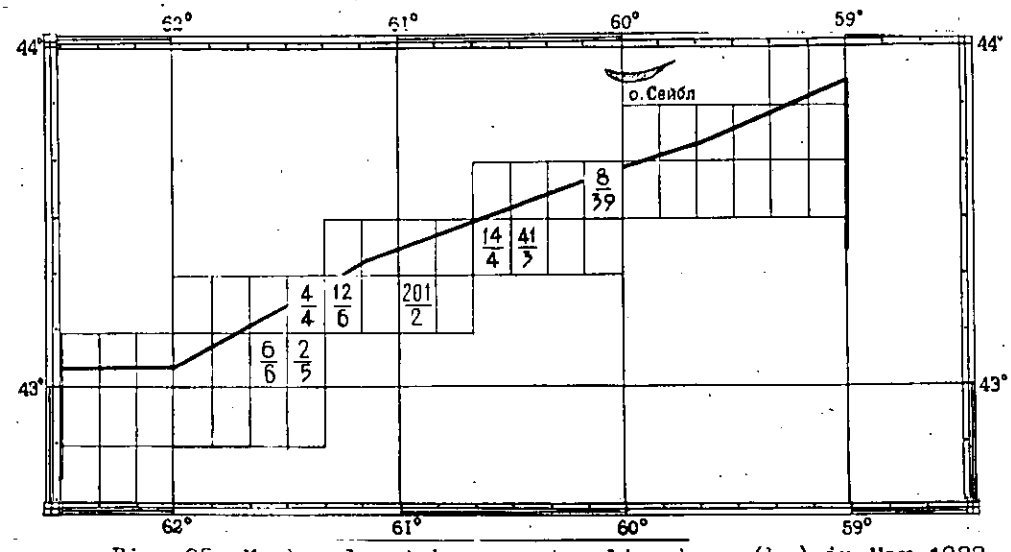

Fig. 25. Mackerel catches per trawling hour (kg) in May 1988.

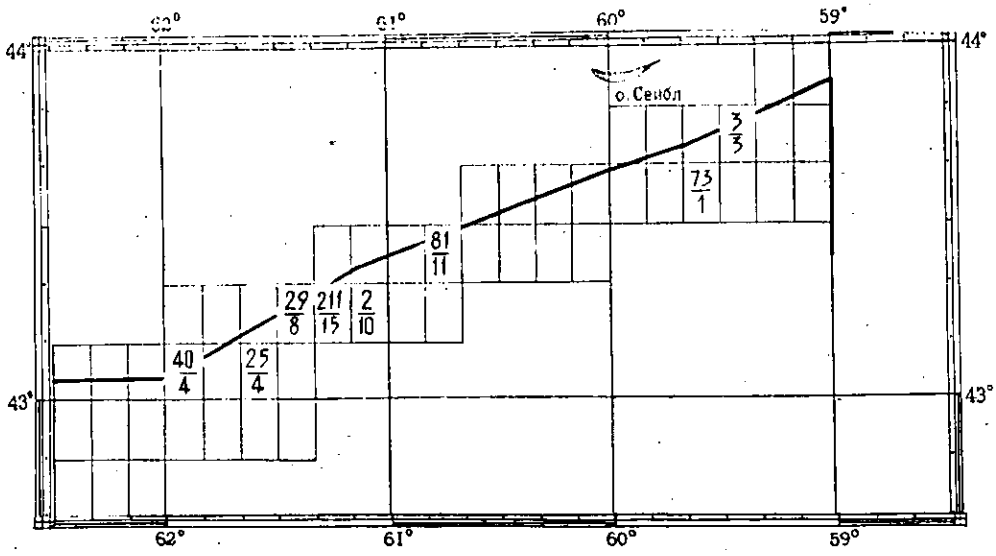

Fig. 26. Mackerel catches per trawling hour (kg) in June 1988.

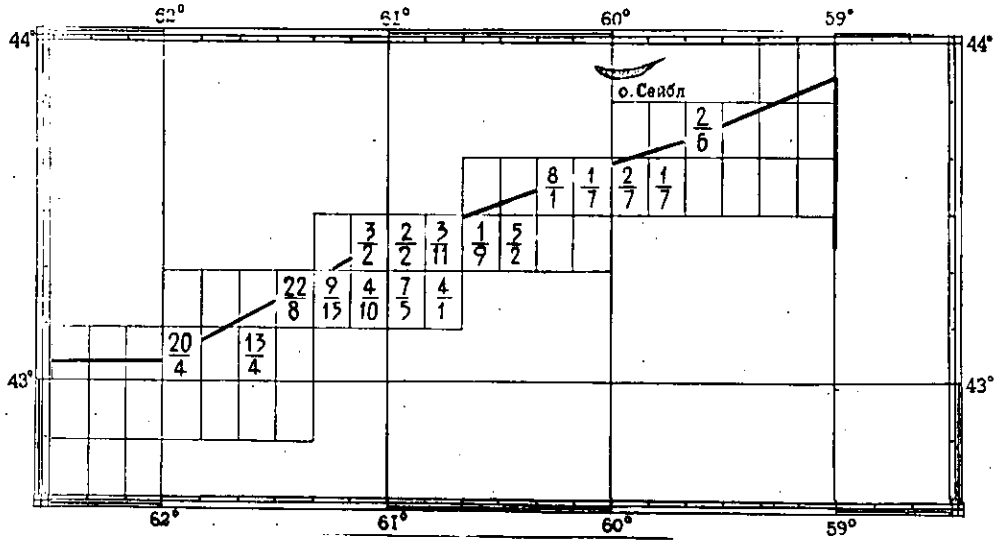

Fig. 27. Shortfin squid catches per trawling hour (kg) in June 1988.