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1991 Assessment of Redfishes (*Sebastes marinus and Sebastes mentella*) in NAFO Subarea 1

by

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Abstract

Based on survey results of the German groundfish survey in divisions 1B to 1F assessments are attempted for both species of redfishes (Sebastes marinus and Sebastes mentella) at West Greenland. The 1991 results compared to the time series from 1982 to 1990 show both stocks at a very low level. The stock of Sebastes marinus is estimated to 1800t resp. 6 million fish. Biomass and abundance of Sebastes mentella are estimated to 800t and 8.5 million fish respectively.

1. Introduction

The Federal Republic of Germany established a groundfish survey in Divisions 1B to 1F of NAFO Subarea 1 in 1982. The target species of the survey is cod. Although survey design, strategy and stratification are related to this target species the standard biological sampling allows compiling basic data also for other species. Sebastes marinus and Sebastes mentella were among those for which estimation of biomass and abundance were possible. Problems due to restrictions caused by survey design for a different target species are discussed in chapter 3. The survey is described in detail in Raetz (1991). A change in survey design from 1990 to 1991 happened in so far that the depth zone 400 to 600 m was not sampled in 1991. Survey area 1 covers part of the shelf down to 400m in 1B and 1C, area 2 the shelf down to 400m in 1D, area 3 the shelf down to 400m in 1E and area 4 the shelf down to 400m in 1F. The values in table 1 and 2 are recalculated in accordance to the new depth range in order to keep the time series comparable.

2. Redfish landings from NAFO Subarea 1

year	landings t
1982	8028
1983	6717
1984	5751
1985	4040
1986	5344
1987	1142
1988	1401
1989	835
1990	412
1991	300

month 1991	landings t
JAN	14
FEB	15
MAR	30
APR	34
MAY	20
JUN	14
JUL	16
AUG	18
SEP	48
OCT	33
NOV	45
DEC	11
only total	2
total	300

In the text table above the total international landings of redfish from Subarea 1 are given for the time period 1982 to 1991. For 1991 the landings could be split into monthly figures.

Landings of Greenland and Germany were reported by month whereas Japanese landings were reported as total for 1991.

In former years there was a directed fishery on redfish in Subarea 1 by the German trawler fleet. It became less important from 1988 onwards when good cod yearclasses entered the cod fishery in West Greenland waters. From this time onwards redfish was taken mainly as bycatch in this cod fishery. The effort in the cod fishery was reduced to nearly zero during 1990 and in 1991 due to very low cod abundance resulting in a redfish catch of only 7t in 1991.

From 1987 onwards there was also a redfish fishery by Japan. Redfish catches by Greenland were almost taken as bycatch in the cod and shrimp fisheries.

In 1991 there was no directed cod fishery and landings are the lowest on record since 1982. The development of landings at least from 1989 onwards reflects the development of the redfish stocks indicated by the surveys. But it was also to be considered a drastic decline in effort from 1990 to 1991.

3. Assessments

Because the survey design is fitted to the target species cod restrictions in the estimation of stock size of redfishes have to be considered (Messtorff and Cornus,1989).

In comparison to cod, redfishes are not living in a demersal environment exclusively. A survey design for cod does not cover the pelagic environment and hence not the total area of distribution of redfish. An underestimation of redfish stock sizes has to be expected for this reason. Large variations in stock size estimates due to variable availability to the survey gear can also explained by this.

The depth range of 0 - 400 m covered by the survey fits sufficiently with the depth distribution of Sebastes marinus. This is not the case in relation to Sebastes mentella which is abundand in much greater depth, too.

Stock size estimates therefore should be considered carefully taking into account the above mentioned restrictions. This is especially valid for Sebastes mentella.

Sebastes marinus.

The stock biomass decreased from about 56000t in 1982 to only 2000t in 1991. In terms of abundance this correspnds to a decrease from 134 million fish to about 6 million fish (table 1, fig. 1). However the development is different from north to south.

In the period 1982 to 1989 the northern parts (Div. 1B and 1C) were dominated by small fish resulting in very high abundance and low biomass. Divisions 1D and 1E were characterized representing the main part of the stock with relative high abundance and biomass. In division 1F only a small part of the stock was found, but there were the largest animals.

This characteristic has changed totally since 1990. Abundance and biomass decreased drastically from 1989 to 1990 in Divisions 1B,1C,1D,1E (figs. 3,4,5,6,7) where the stock has nearly vanished. In Division 1F, however, the abundance increased from only a few thousands to more than 3 million fish in 1991. This results also in an increase in terms of biomass which is back on nearly a medium level in this division. But in comparison to earlier years small fish are now dominating in this division (fig. 8). Length frequencies by area and years (1989-1991) are shown in figs. 2 to 8.

Sebastes mentella

Survey results indicate an unstable increase of the stock in the period 1982 to 1987 from 1000t to 11000t. In the following time period it decreased oscillating to less than 1000t (table 2, fig. 9). The highest abundance was observed in 1987, too, with more than 150 millon fish. In 1991 still 8.5 million were estimated to be abundand at West Greenland. The same development in the stock structure and distribution as described for Sebastes marinus could be observed for this stock.

In the northern areas normally the small fish are dominating and contributing the largest part to the biomass. In Divisions 1D and 1E the largest fish could be observed until 1988. In the contrary to Sebastes marinus, however, they are not representing the main part of the stock. In Division 1F the same feature as for Sebastes marinus showed up. From 1982 to 1988 no Sebastes mentella could be found in that division (table 1). But in 1990 and 1991 this species appeared here (fig. 16). This may be due to better coverage of the 200-400m depth zone in this years. In 1991 they contribute to the stock less than 50% of abundance but more than 50% of biomass. In the last two years the stock was most abundand in Divisions 1B,1C and 1F whereas in Division 1D a decreasing (fig. 14) and in Division 1E an increasing (fig. 15) trend can be stated. Length distributions by areas and years (1982-1991) are shown in figs. 10 to 16.

Juvenile redfish

Juvenile redfish in the length spectrum from 5 to 15 cm are very difficult to determine as Sebastes marinus or Sebastes mentella. In the survey these fish were handled as an extra species called Sebastes spec. Figs. 17 and 18 show that there were juvenile redfish in all divisions except for 1E in 1990 and 1B in1991. All juvenile redfish could be determined in 1989. An estimation of abundance and biomass was not considered as valuable because of the patchy distribution of the juveniles.

4. Conclusions

Taking the German groundfish survey as basis for estimation it appears that both redfish stocks in NAFO Subarea 1 (West Greenland) are on the lowest level on record. Substantially changes could be seen in distribution and structure of these stocks. Drastic declines in terms of abundance and biomass could be stated in the period 1988 to 1989 for both redfish stocks. This is due mainly to the decrease of abundance in the northern parts of Subarea 1 (Divisions 1B and 1C) for Sebastes mentella and in addition in Divisions 1D and 1E for Sebastes marinus. For both species an increase of abundance in Division 1F was observed in 1990 and 1991. In former years older age groups of Sebastes marinus were dominating in 1F which have now *nearly disappeared*.

Generally, the northern parts of Subarea 1 covered by this survey which were highly productive for redfish in the first part of the eighties seem to become of less importance. The increasing abundance of redfish in Division 1F may be due to increasing availability, but an immigration of redfish from the Irminger Sea or from the shelfs off East Greenland may not be excluded at present.

References

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Rätz, H.-J.,1991. NAFO Subarea 1 Golden and Beaked Redfish: Spatial Distribution Pattern, Survey Abundance and Biomass Estimates in 1982-1990 and Length Frequency in 1990. NAFO SCR Doc. 91/73 Ser. No. N1957: 11 p.

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Sebastes marinus
abundance * 1000

year	strat 1	strat 2	strat 3	strat 4	total	+/- %
1982	14,750	94,077	20,661	4,109	133,598	110
1983	11,647	10,031	9,943	1,719	33,340	34
1984	11,785	1,891	13,602	4,228	31,506	37
1985	26,368	10,493	17,748	5,028	59,636	44
1986	23,426	7,484	24,540	2,754	58,203	38
1987	2,995	1,331	9,620	677	14,623	52
1988	53,561	2,658	7,923	731	64,873	53
1989	16,062	9,886	6,508	430	32,886	44
1990	1,081	1,424	1,060	2,472	6,036	30
1991	671	1,048	1,075	3,238	6,032	55

Sebastes marinus
biomass t

year	strat 1	strat 2	strat 3	strat 4	total	+/- %
1982	3,203	36,967	13,001	2,533	55,704	101
1983	1,914	4,622	6,689	1,085	14,310	37
1984	1,611	721	7,225	2,089	11,646	45
1985	2,862	3,500	10,645	2,720	19,726	59
1986	2,993	2,058	11,832	1,763	18,647	45
1987	742	660	4,954	438	6,794	61
1988	2,064	1,061	3,912	382	7,420	37
1989	527	591	2,619	209	3,947	59
1990	244	355	479	1,422	2,500	45
1991	135	252	395	1,024	1,806	73

Table 1
Abundance and Biomasse of Sebastes marinus in NAFO SA 1

from Raetz (1992)

Sebastes mentella
abundance * 1000

year	strat 1	strat 2	strat 3	strat 4	total	+/- %
1982	390	365	2,360	0	3,115	106
1983	1,082	2,598	5,247	0	8,927	67
1984	9,586	1,300	1,124	0	12,010	50
1985	3,466	57	411	0	3,934	96
1986	20,241	330	560	0	21,131	46
1987	151,990	42	69	0	152,101	105
1988	27,989	848	4,808	0	33,645	55
1989	16,301	144	0	8	16,453	40
1990	28,294	1,689	50	3,336	33,369	45
1991	3,634	185	2,813	1,889	8,521	74

Sebastes mentella
biomass t

year	strat 1	strat 2	strat 3	strat 4	total	+/- %
1982	96	120	893	0	1,109	117
1983	231	1,185	2,857	0	4,273	78
1984	2,056	495	472	0	3,023	56
1985	523	26	138	0	687	78
1986	2,908	130	186	0	3,224	50
1987	10,481	8	32	0	10,521	89
1988	1,684	183	1,926	0	3,793	66
1989	951	24	0	1	975	34
1990	1,304	103	7	542	1,956	45
1991	175	3	174	446	798	85

Table 2
Abundance and Biomasse of Sebastes mentella in NAFO SA 1

from Raetz (1992)

Sebastes marinus NAFO Subarea 1
abundance and biomass

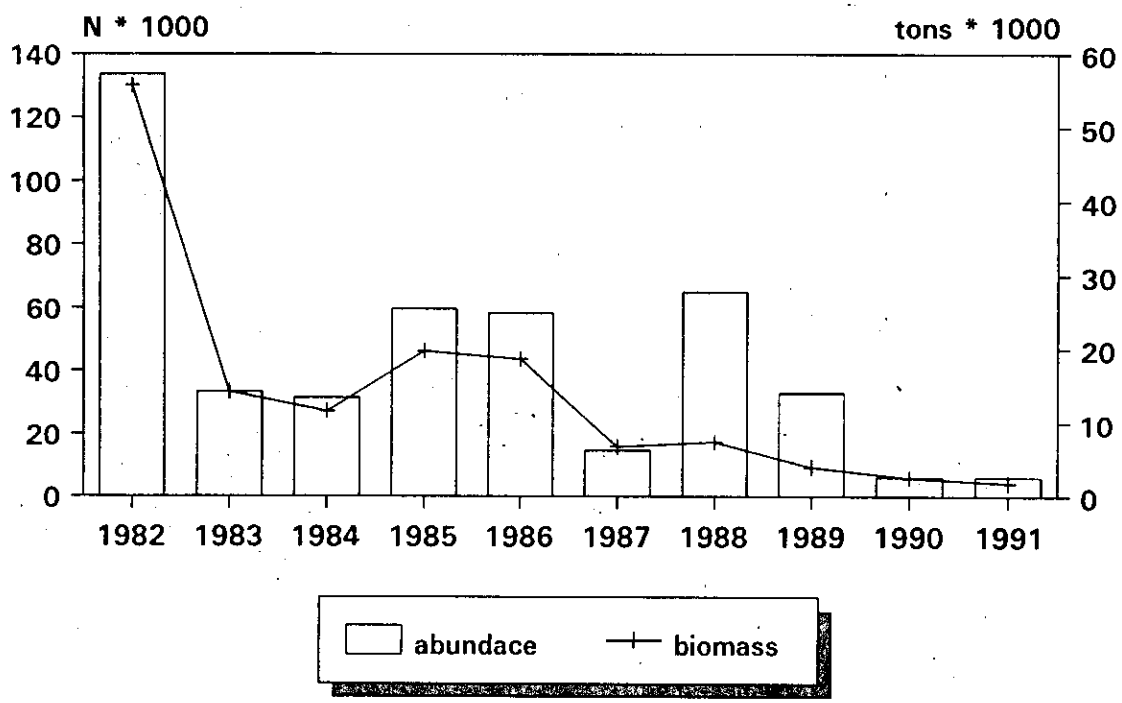

Fig. 1

Sebastes marinus West-Greenland 1989 survey results

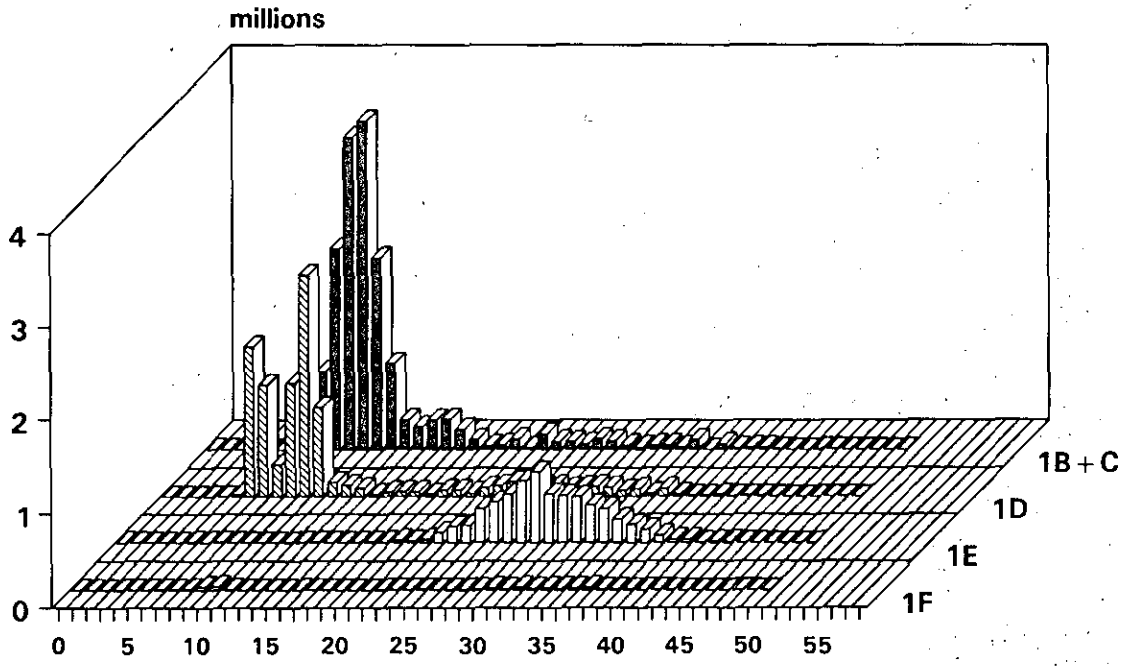

Fig. 2

Sebastes marinus West-Greenland 1990 survey results

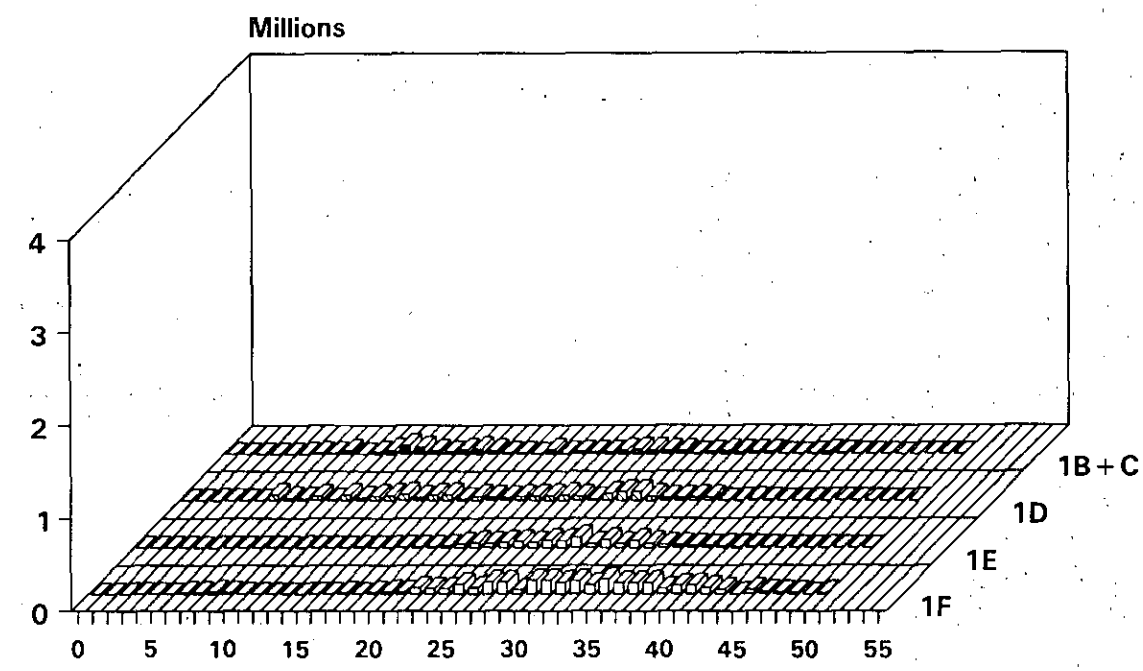

Fig. 3

Sebastes marinus West-Greenland 1991 survey results

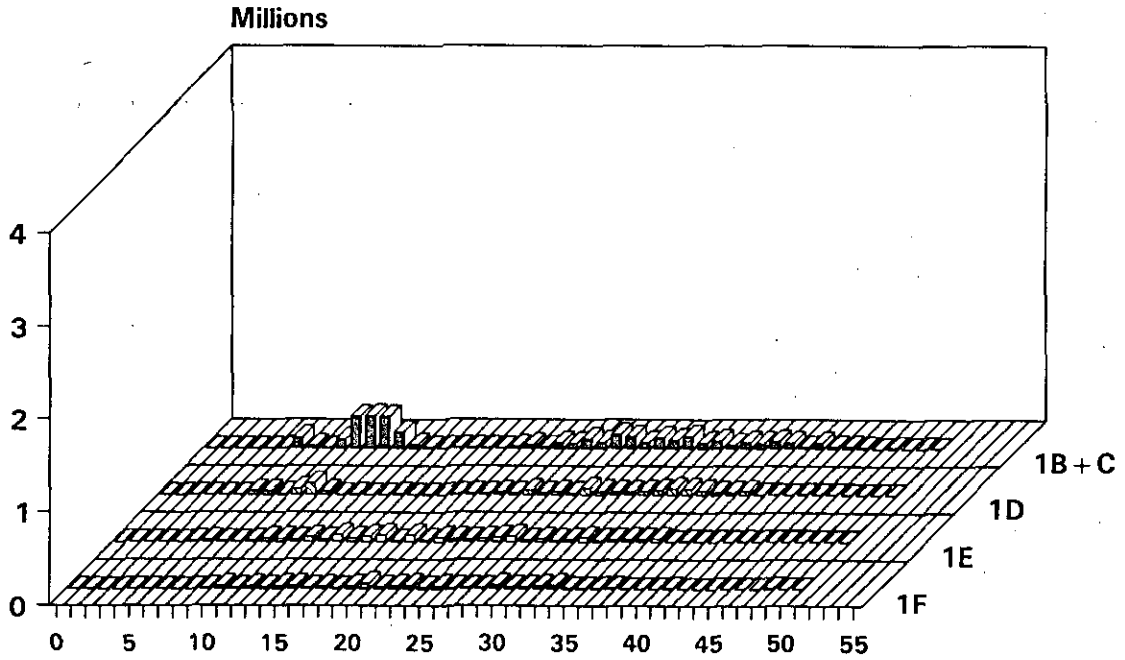

Fig. 4

Sebastes marinus West-Greenland survey results Div. 1B+C 1989-1991

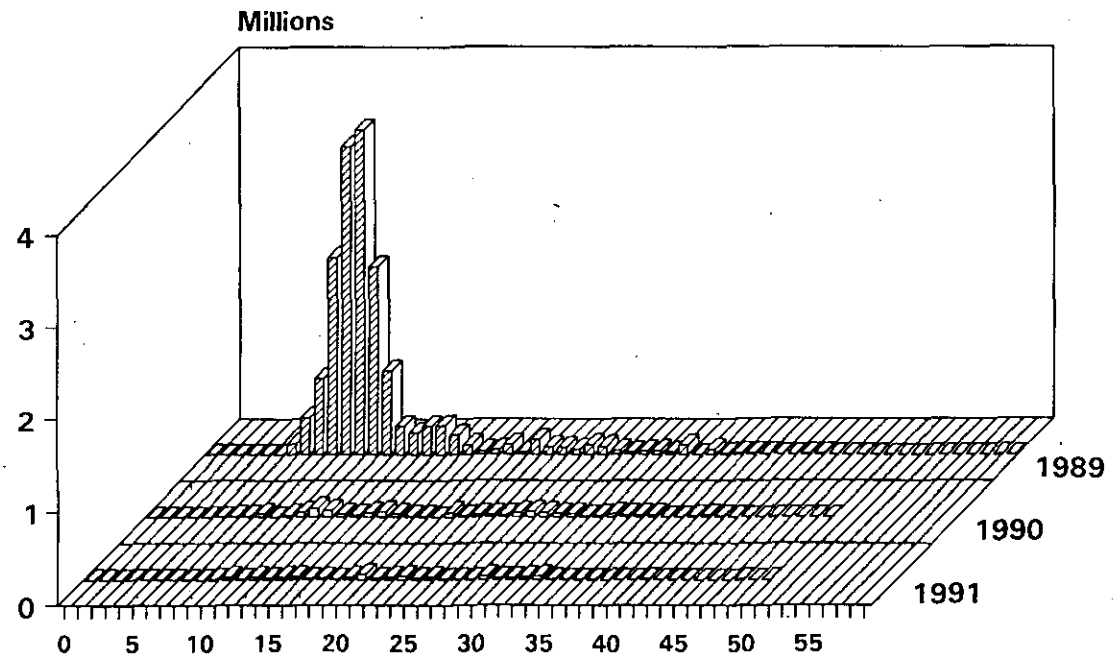

Fig. 5

Sebastes marinus West-Greenland survey results Div. 1D 1989-1991

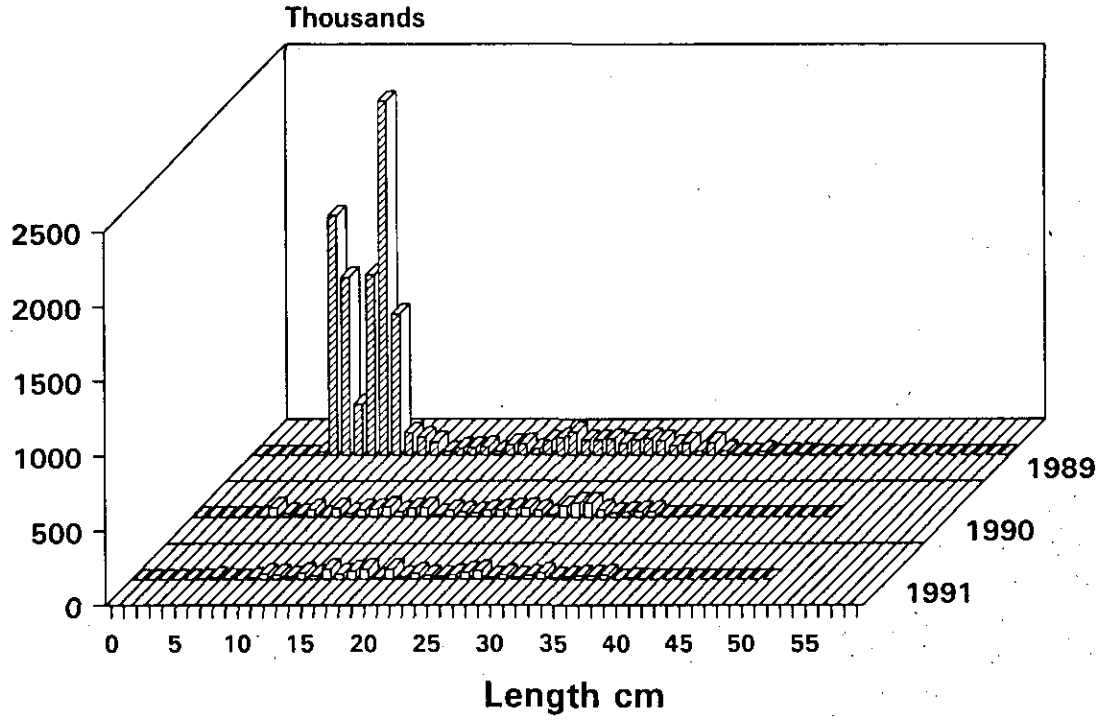

Fig. 6

Sebastes marinus West-Greenland survey results Div. 1E 1989-1991

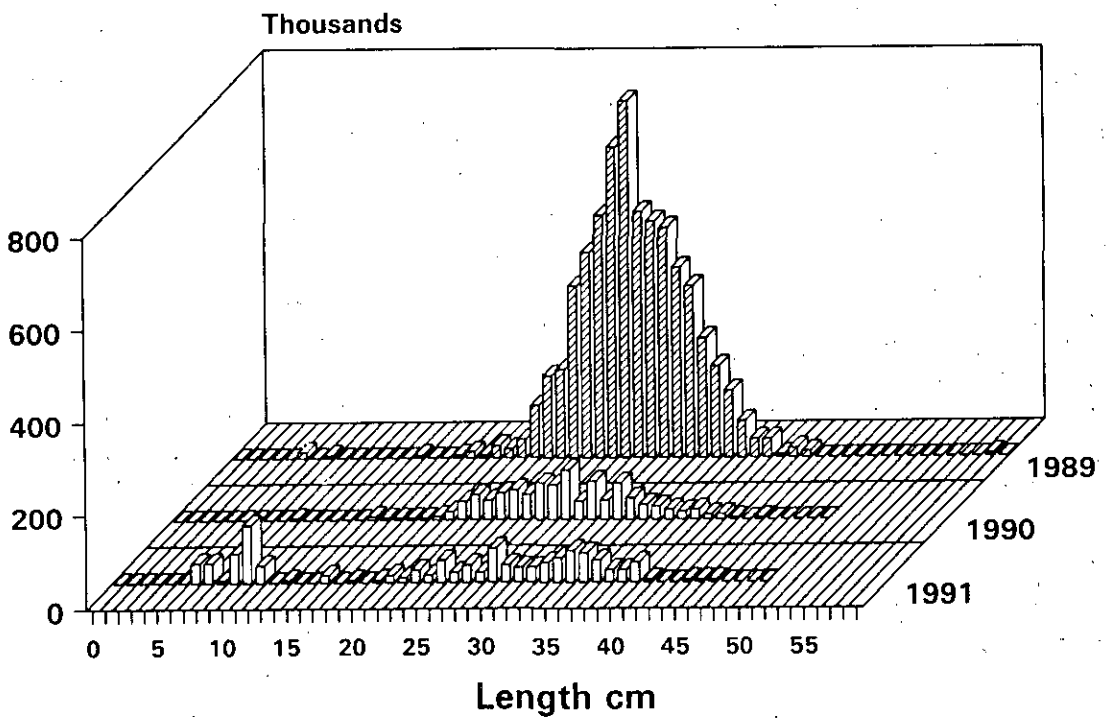

Fig. 7

Sebastes marinus West-Greenland survey results Div. 1F 1989-1991

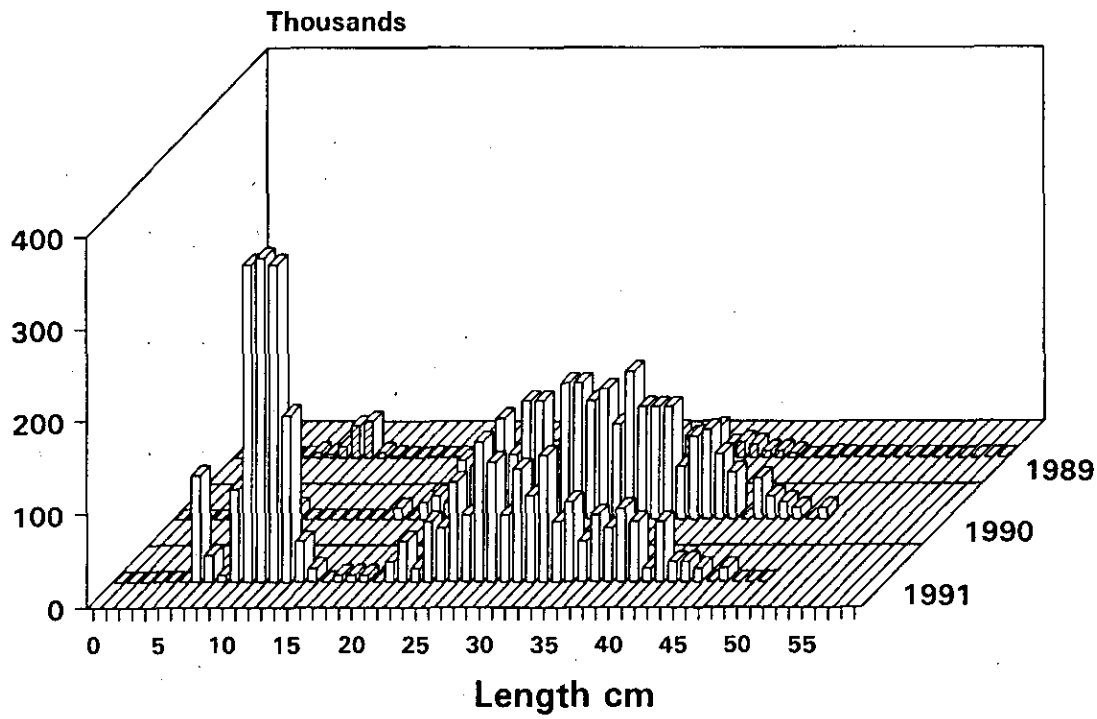

Fig. 8

Sebastes mentella NAFO Subarea 1
abundance and biomass

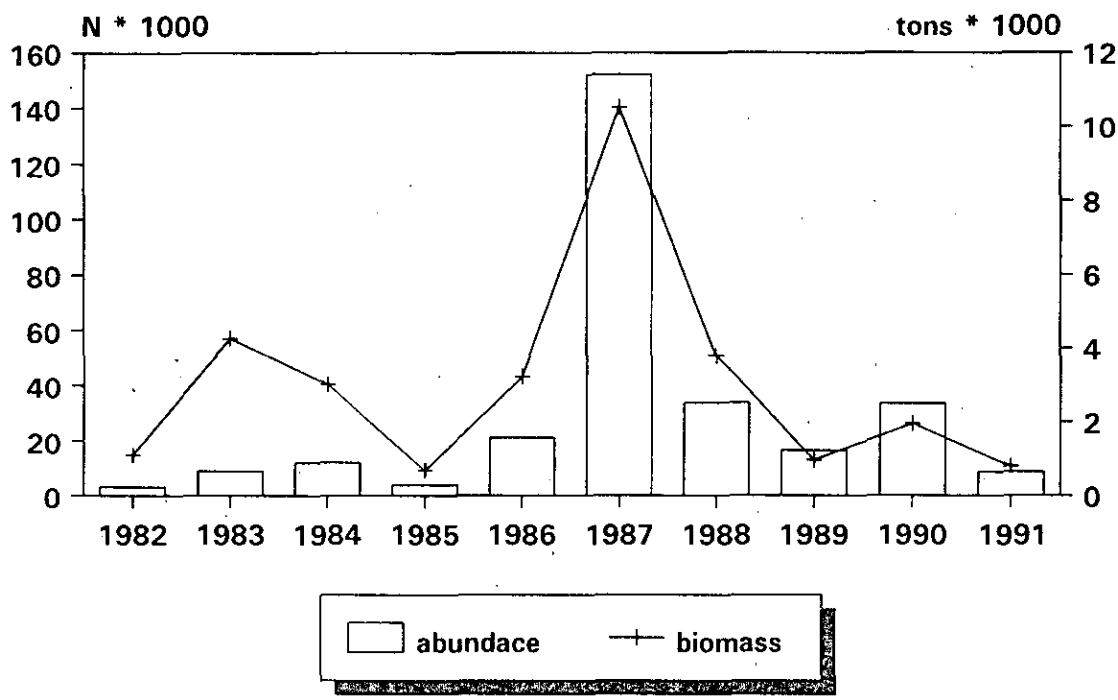

Fig. 9

Sebastes mentella West-Greenland 1989 survey results

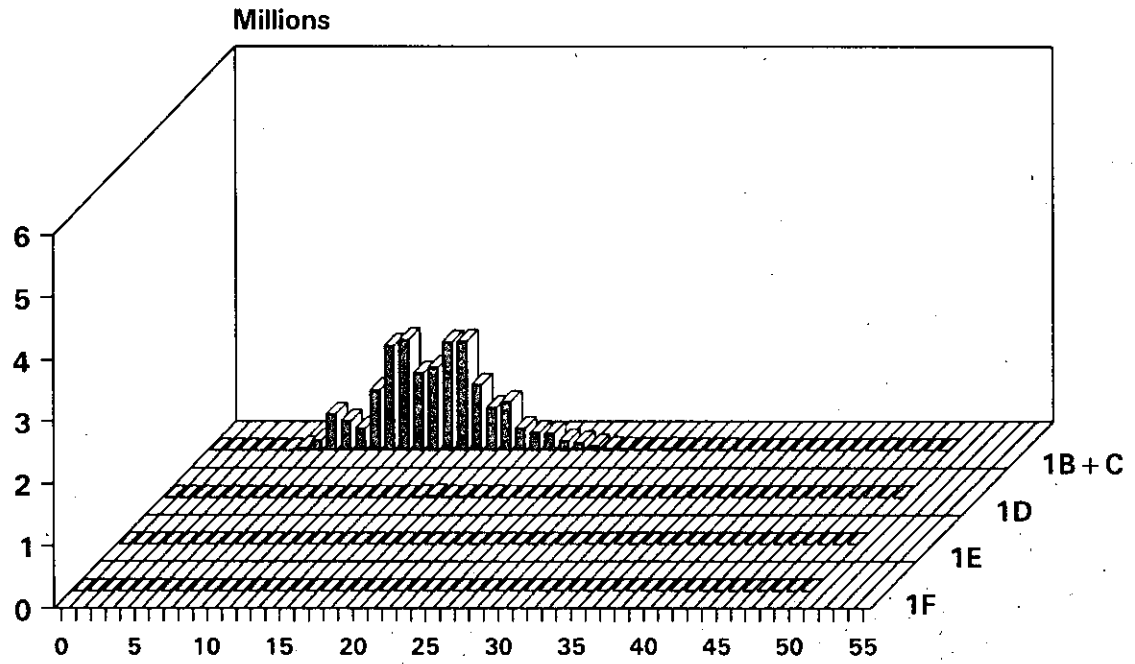

FIG. 10

Sebastes mentella West-Greenland 1990 survey results

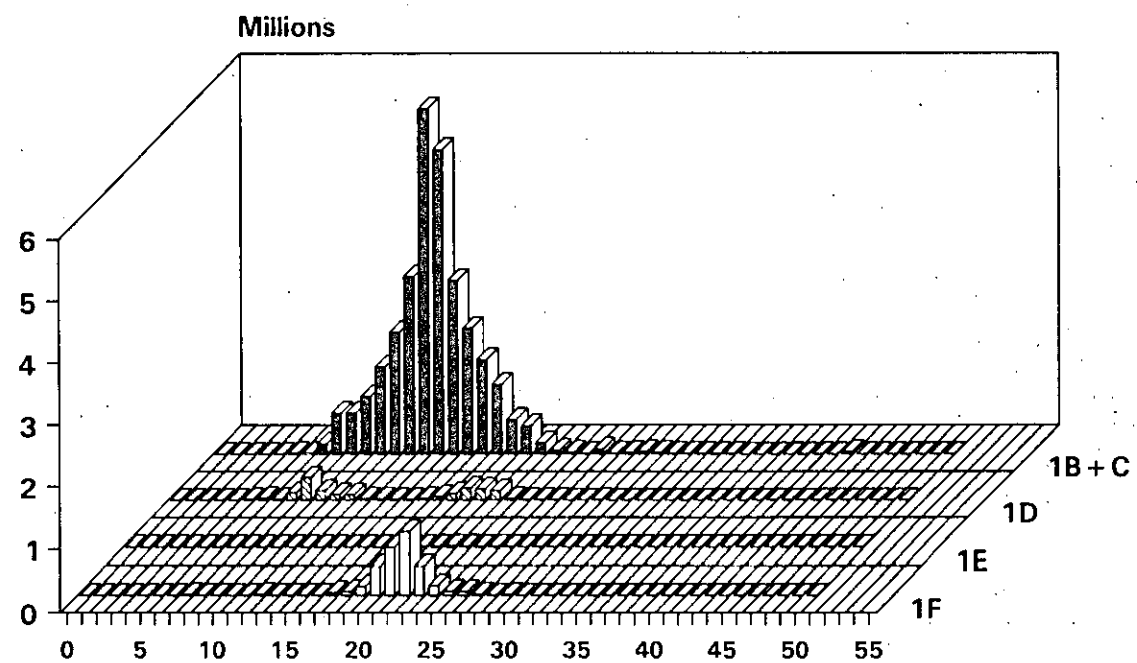

Fig. 11

Sebastes mentella West-Greenland 1991 survey results

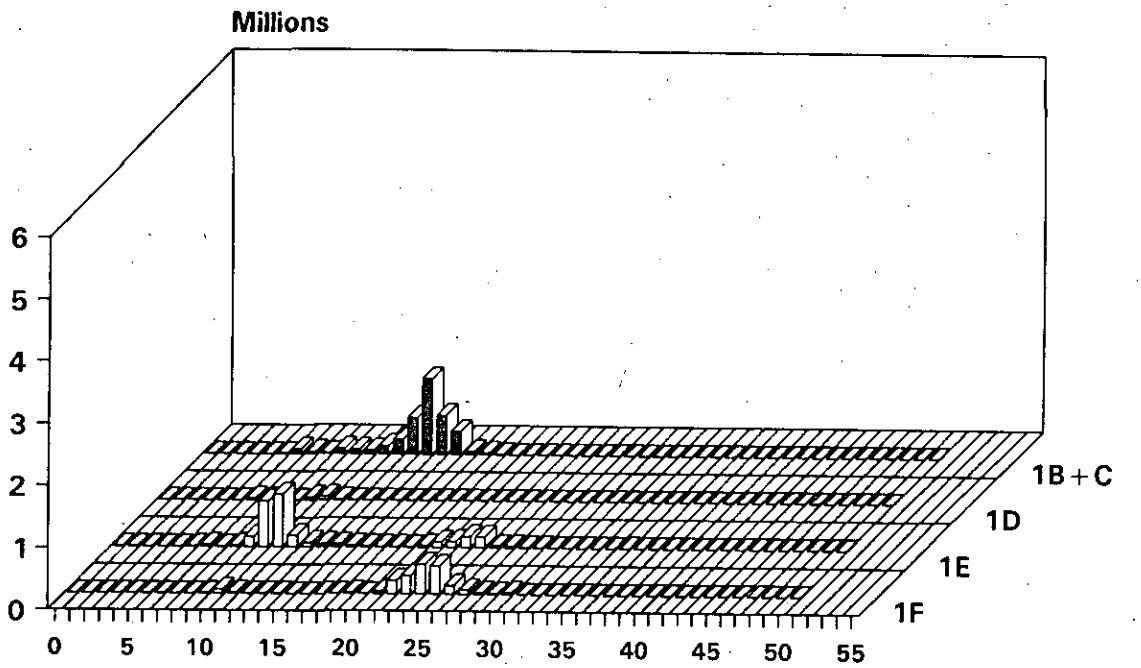

Fig. 12

Sebastes mentella West-Greenland survey results Div. 1B+C 1989-1991

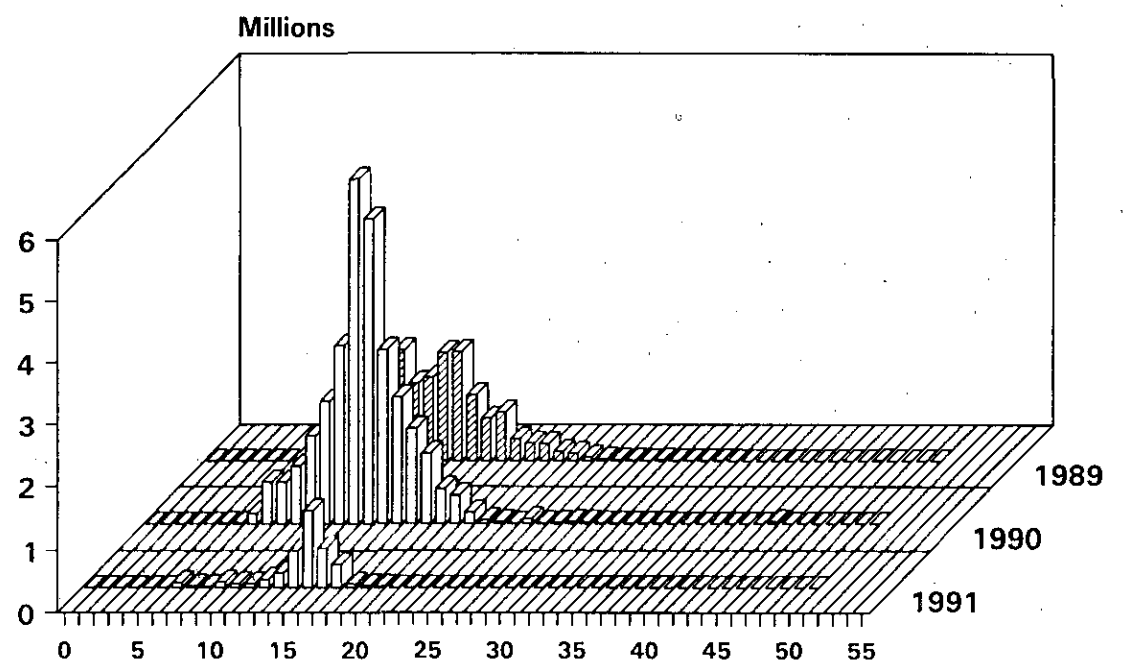

Fig. 13

Sebastes mentella West-Greenland survey results Div. 1D 1989-1991

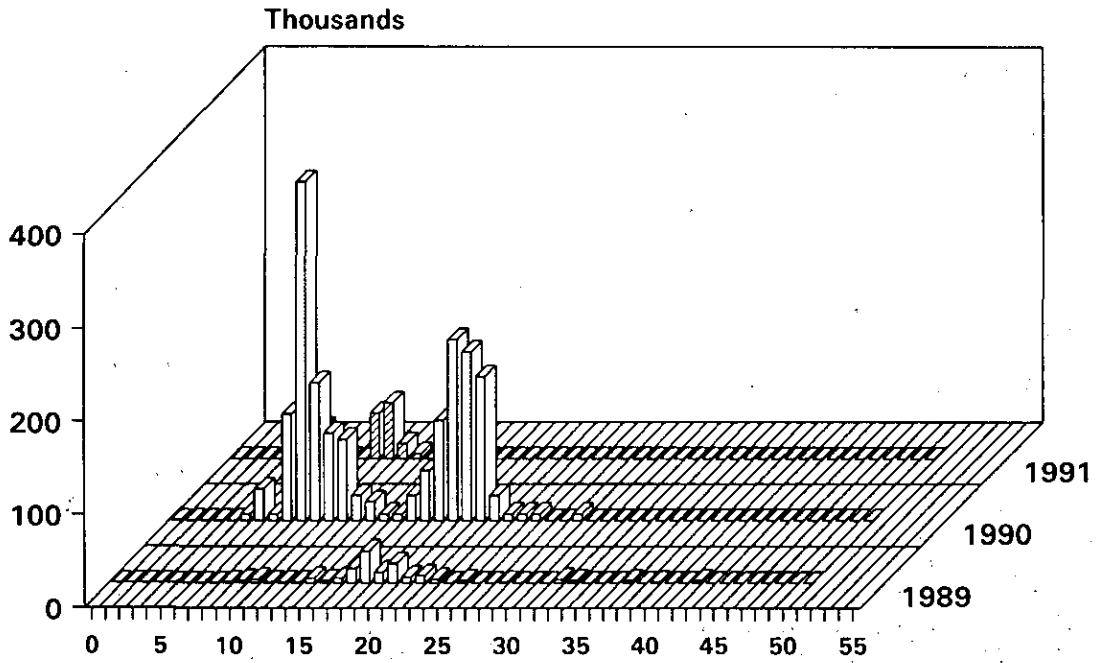

Fig. 14

Sebastes mentella West-Greenland survey results Div. 1E 1989-1991

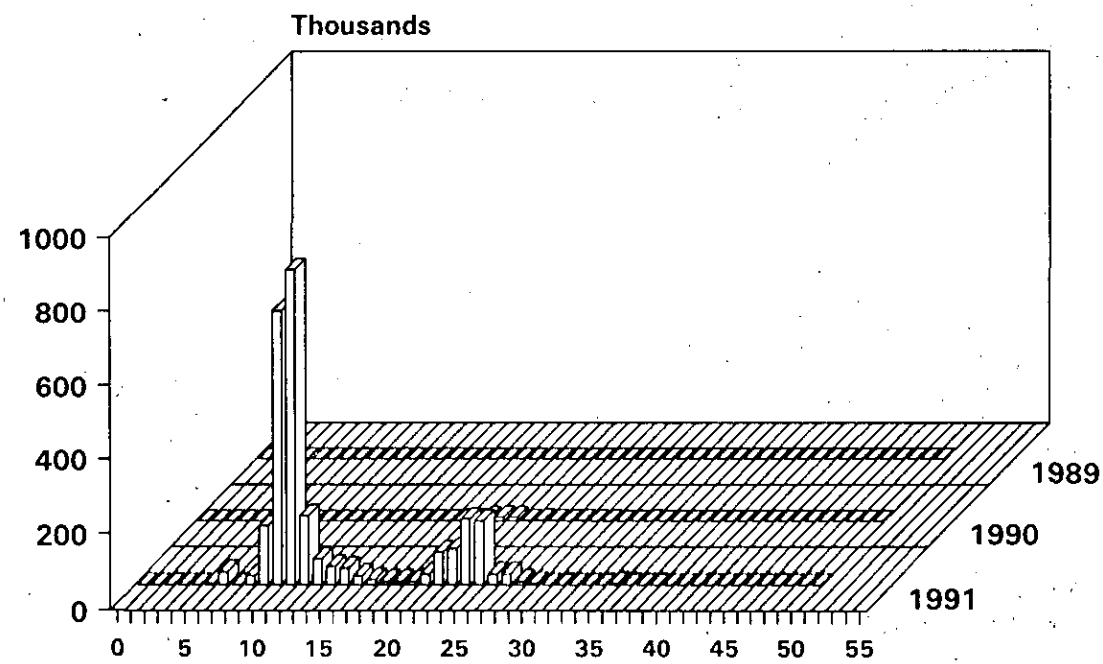

Fig. 15

Sebastes mentella West-Greenland survey results Div. 1F 1989-1991

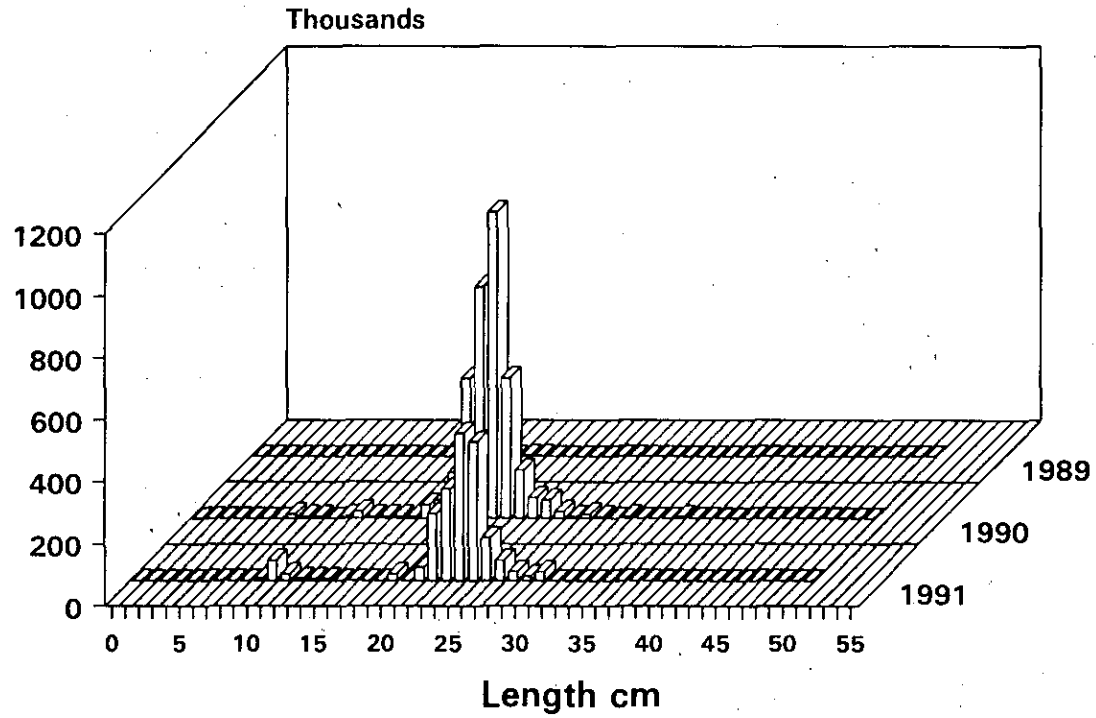

Fig. 16

Sebastes spec. West-Greenland 1990 survey results

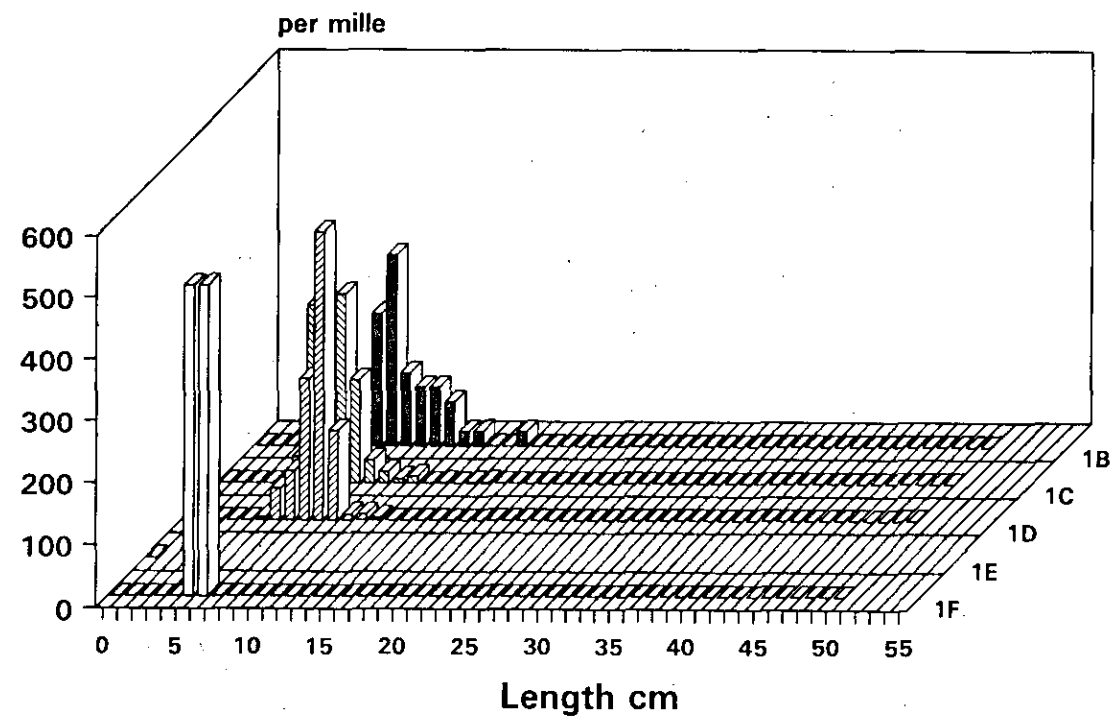

Fig. 17

Sebastes spec. West-Greenland 1991 survey results

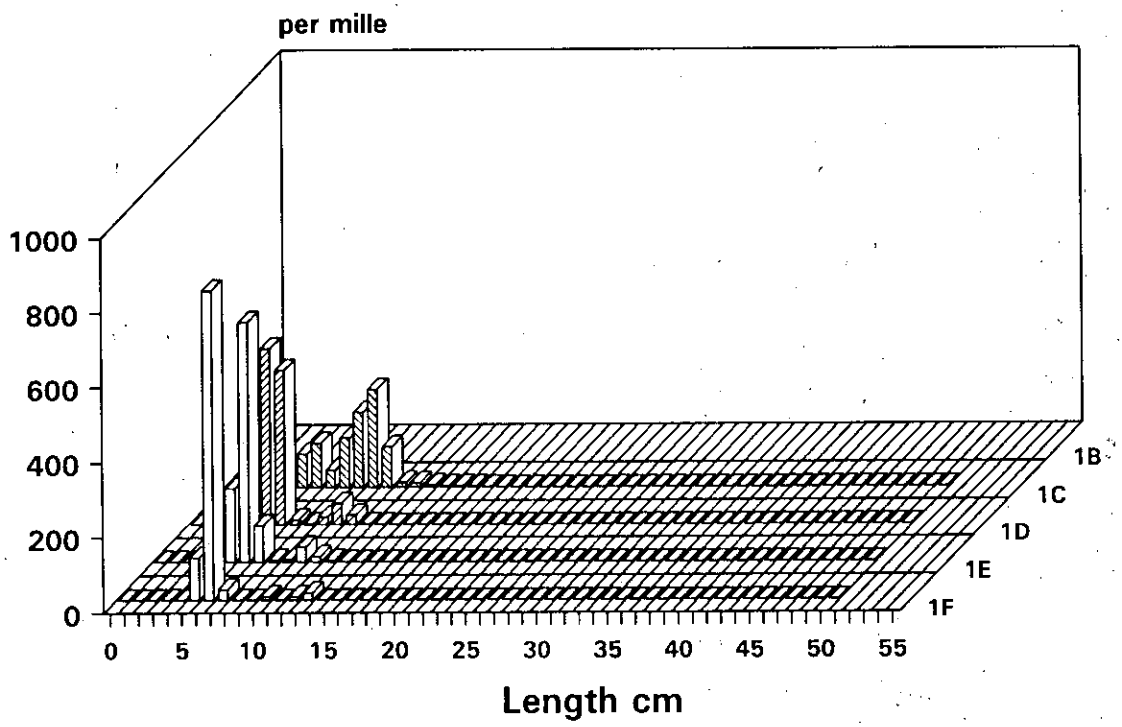

Fig. 18