



Northwest Atlantic Fisheries Organization

Serial No. N4815

NAFO SCR Doc. 03/9

SCIENTIFIC COUNCIL MEETING – JUNE 2003

Results from the Russian trawl survey on the Flemish Cap Bank (Division 3M) in 2002

by

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Abstract

Based on the results from the bottom trawl survey conducted by research and fishing vessel “Remoifjord” on the Flemish Cap Bank in May-June 2002, the estimations of groundfish species (redfishes, Greenland halibut, cod, flounders, grenadiers and skates) abundance and biomass and their distribution by depth are given. To compare the data, the results from the previous surveys since 1987 are presented in the paper. The data on length-age composition for the group of beaked redfishes *S. mentella* and *S. fasciatus* and for Greenland halibut are provided.

The investigations were carried out in accordance with area stratification adopted in NAFO.

Introduction

North-West Atlantic is a traditional area for Russian fishing fleet. The Russian Federation have been conducting research on status of fishery resources since 1961. The purpose of these works is to assess the stock status of main commercial species on the Flemish Cap Bank. The estimations of groundfish species (redfishes, Greenland halibut, cod, flounders, grenadiers and skates) abundance and biomass, their distribution by depth, length and age composition are given on the basis of the results from the bottom trawl surveys on the Flemish Cap Bank in 1987-2002.

Material and Methods

The results presented in the paper were obtained during Russian trawl survey for groundfish on the Flemish Cap Bank (Table 1). The survey was carried out by stratified-randomized method (Doubleday, 1981; Bishop, 1994). Hauls were made 24 hours a day. In the conventional research bottom trawl (Figure 1625A) a small size mesh insertion in the codend with a knot of knot - a = 10-12 mm was used (Bulatova and Chumakov, 1986).

In 1987-1996, the investigations were performed in the area of $10.6-12.0 \times 10^3$ miles² within 127-914 m. In 2001-2002, the survey covered the larger depth range – 127-1280 m and area – 15.8×10^3 miles².

Primary biological material was collected and processed according to methods approved in PINRO and NAFO.

Owing to complicated specific identification, redfishes were divided into two groups. The first one included mixed concentrations of *S. mentella* and *S. fasciatus*, the second one – those ones of *S. marinus*.

The age of redfishes was read by scale, of Greenland halibut – by scale and otoliths.

Figure 1 presents position of valid tows during the survey in 2002.

In the course of the surveys in 2001-2002, obtained were the estimations of abundance and biomass of ten groundfish species: redfishes, Greenland halibut, cod, long rough dab, witch flounder, roughhead and rock grenadiers, thorny and spiny-tail skates. The results of these estimations are given in Table 2.

Results and Discussion

Deep-water (beaked) redfishes (*S. mentella* and *S. fasciatus*). In the period of the survey in 2002, on the Flemish Cap Bank, beaked redfishes were recorded in the catches in all strata (excluding Strata 521, 526, 532 and 526) within 127 m-1 280 m depth range. Mean catch per a valid tow was not exceeding 10 kg, as a usual (Table 3). The maximum catches – 40-50 kg - were taken in Strata 509 and 514.

In the area surveyed, the total stock of beaked redfishes amounted to 64.0×10^6 individuals by abundance and to 6.5×10^3 t by biomass. More than 82% of estimated biomass was taken in the strata with 258-550 m depth range. The results obtained are below the level of stock estimations in 2001. More detailed information on estimations of redfish stock having been obtained during the surveys in 1987-2001 was presented at NAFO meeting in 2002 (Vaskov, 2002).

In catches, beaked redfishes (*S. mentella* and *S. fasciatus*) were represented by individuals as long as 6-42 cm (Fig.2). Male size varied from 12 to 38 cm, the mean length was equal to 22.1 cm. The age of males and females fluctuated from 3 to 16 years (Fig. 3). The length of females varied from 12 to 42 cm, as well as of males, the mean length was equal to 22.1 cm. In catches males prevailed, the sex ratio was 1.2:1.

The portion of juvenile redfishes equaled to 32.4%. Found were the juveniles with the length of 6-15 cm (the average length – 12.0 cm) aged 1-4 years. The modal group was represented by individuals with the size of 13 cm and at the age of 3 years. As compared to the rich year-classes of 1989-1990, those ones of 1999-2000 were considered as of moderate strength.

Immature fish (39.6% of males and 45.6% of females) made up the bulk of beaked redfish catches. The minor part of females (0.2%) were pre-spawning and had Gonad Developmental Stages VI and VII.

In the period investigated, redfishes fed, mainly, on shrimp (42.5%) and *Calanus* (30.0%).

Redfish (*S. marinus*). They occurred in catches at the depth to 914 m. During the survey more dense concentrations were registered at the depth of 258-550 m (Table 4). The maximal mean catch per a valid tow was taken in Strata 509 and equaled to 8.8 kg.

By the results from the survey in 2002, the abundance of *S. marinus* was equal to 7.2×10^6 fish., the biomass – to 1.3×10^3 t, that was, on the average, twice as high as the results from the survey in 2001 (Vaskov, 2002).

In catches, *S. marinus* was represented by individuals with the length of 11-45 cm. Among both males and females fish with 20 cm modal class prevailed. Male size varied from 14 to 36 cm, the mean length was 22.8 cm (Fig.4). Female length fluctuated from 11 to 45 cm, the mean one equaled to 24.4 cm. Males were slightly predominating in catches, sex ratio was 1.1:1.

The catches of *S. marinus* were, mainly, represented by immature fish. The portion of males with Gonad Developmental Stage II equaled to 37.9%, that one of females – to 54.1%. The minor part of females were pre-spawning and had Gonad Developmental Stages V-VII.

Primarily, *S. marinus* fed on shrimp (37.3%) and *Themisto* (24.0%).

The total abundance of redfishes from the genus *Sebastes* amounted in 2002 to 71.2×10^6 fish, the biomass – to 7.8×10^3 t (Table 5). As the data from the trawl survey showed, the estimations of redfish stock were characterized by

considerable year-to-year fluctuations. The main reason of this, in our view, consists in complicated determining the stock pelagic component, which may change within the considerable limits (Vaskov *et al.*, 1998).

Greenland halibut (*Reinhardtius hippoglossoides*). In 1987-1996, the indices of halibut estimations on the Flemish Cap Bank varied from 0.2 to 3.4 x 10⁶ fish by abundance and from 0.1 to 4.4 x 10³t by biomass (Savvatimsky and Vaskov, 1997; Savvatimsky and Vaskov, 1998). In 2001, the abundance was estimated at 14.3 x 10⁶ fish, the biomass – at 12.7 x 10³t (Igashov, 2002). In those years, halibut was not found in catches at the depth of less than 185 m.

In 2002, halibut occurred at each depth range (Table 6). The mean catch per a valid tow in the stratum at the 127-731 m depth did not exceed 11.6 kg (Tables 7, 8). More dense concentrations were registered in the strata below 732 m, where the catches varied from 9.3 kg to 50.7 kg. The largest halibut concentrations were registered within the depth range of 915 m-1 097 m, in Strata 529, 532 and 524, where a catch per a tow was 50.7 kg, 28.1kg and 24.5 kg, respectively.

As against the last year, in 2002, the reduction in abundance to 10.1 x 10⁶ fish – in 1.5 times and biomass – to 9.8 x 10³t - in 1.3 times was recorded. It was noticed that in 2002, biomass and abundance increased in the depth range of 127-549 m, but decreased in that one of 550-1 280 m (Tables 8, 9). So, in the depth range to 550 m, the abundance reduced from 2.5 to 1.9 x 10⁶ fish, the biomass – from 1.5 to 0.8 x 10³ t, and, at the depth below 550 m, - from 12.3 to 7.5 x 10⁶ fish and from 11.8 to 8.3 x 10³t, respectively.

In 2001, in catches registered were fish 13-90 cm in length aged 1-17 years with the prevalence of individuals as long as 43-48 cm (46.7%) (Table 10). The portion of halibut with the length of less than 30 cm was equal to 9.4%. Fish from 1994, 1995 and 1996 year-classes occurred in catches more often (78.8%) than the other ones, their percentage was 17.7%, 36.8% and 24.3%, respectively (Fig.5, 6).

In 2002, found were the individuals 15-88 cm in length aged 2-17 with the predominance of fish as long as 44-51 cm (47.6%). The number of individuals with the length of less than 30 cm was not great – 5.4%. Fish from 1994, 1995, 1996 and 1997 year-classes were registered more often (84.4%), their percentage was 10.8, 48.2, 15.9 and 9.5%, respectively (Fig.5, 6). In comparison with 2001, in 2002, the mean length of halibut increased from 42.2 to 45.0 cm, and the percentage of females – from 61.4 to 67.8%. As can be seen, in 2001 and 2002, fish from 1995 year-class made up the bulk of catches, the following year-classes were less reach.

Cod (*Gadus morhua*). On the Flemish Cap Bank, the stock of this species was in depression. During the survey, single fish were registered in catches above the depth of 550 m (Table 11).

The total abundance of cod amounted to 0.2 x 10⁶ individuals, the biomass – to 0.7 x 10³t. The results obtained were at the level of stock estimations in 2001 (Table 12).

The length of fish caught varied from 17 to 103 cm. In the catches, the male size fluctuated from 33 cm to 73 cm with the average length of 49.0 cm. The females were as long as 32-103 cm having the mean size of 69.5 cm.

Immature males with Gonad Developmental Stage II made up 20.0%, females – 35.7%. Mature fish were, mainly, post-spawning and had Gonad Developmental Stages VI and VI-II.

During the survey, cod actively fed, the bulk of the ration was made up by shrimp (48.4%), squids (9.7%), *Themisto* (9.7%) and different fish species.

American plaice (*Hippoglossoides platessoides*). They were distributed in the area surveyed, mainly, above the depth of 550 m (Table 13). The main concentrations were distributed in the shallow central area of the bank. The major part of estimated stock (73.7%) were taken in Strata 501 and 502, at the depth of 127-148 m.

The stock of American plaice amounted to 1.6 x 10⁶ fish by abundance and 1.4 x 10³t by biomass, that was, on the average, two times higher, than the results from the survey in 2001 (Table 14).

The size of males in catches fluctuated from 30 to 46 cm, the mean length was 40.1 cm. The female length varied from 38 to 56 cm with the average one of 49.4 cm. Females slightly prevailed in the ratio of 1.1:1.

The most of analyzed males were mature and with Gonad Developmental Stage V. Females (32.9%), primarily, had Gonad Developmental Stage VI.

Benthos organisms, among which ophiurans (68.8%) were the main feeding object, dominated by the frequency of occurrence in long rough dab stomachs.

Witch flounder (*Glyptocephalus cynoglossus*). During the survey witch flounder were caught as single individuals to the depth of 914 m. The average catch per a valid tow, as a rule, did not exceed 2 kg (Table 15).

The total abundance was estimated at 1.1×10^6 fish, the biomass – at 0.5×10^3 t, that, on the average, twice as many as the results from the survey in 2001 (Table 16).

The length of males varied from 28 to 50 cm, the average one amounted to 38.6 cm. Females were 26-51 cm in length, the mean size was equaled to 39.4 cm. Fish with 46 cm modal class dominated among both males and females. In the catches, males slightly prevailed over males in 1.2:1 ratio.

Caught witch flounder males were, primarily, represented by mature fish with Gonad Developmental Stage III (50.0%), among the females immature individuals at Maturity Stage II (50.0%) predominated. 27% of males and 19% of females were pre-spawning and had Gonad Developmental Stage IV.

Worms (70.4%), bivalves (7.4%) and shrimp (5.6%) made up the bulk of the ration.

Roughhead grenadier (*Macrourus berglax*). In the area surveyed, the fish were, mainly, distributed at the depth of over 366 m (Table 17). A mean catch per a valid tow was not more than 5-10 kg, as a rule. A maximum catch amounted to 25.9 kg and was obtained in Stratum 522, within the depth range of 1 098-1 280 m.

The stock of roughhead grenadier equaled to 5.3×10^6 by abundance and 3.9×10^3 t by biomass, that corresponded to the results from the survey in 2001 (Table 18).

In catches, the male size fluctuated from 17 to 58 cm with a mean length of 40.9 cm. Among males fish with 40 cm modal class prevailed. The length of females varied from 15 to 83 cm, the mean size amounted to 51.6 cm. Females predominated over males by abundance with a ratio of 1.8:1.

Analyzed males were, primarily, immature (55.3%) and had Gonad Developmental Stage II. 26.1% of males were at Maturity Stage III. The majority of females (78.9%) had Gonad Developmental Stage II. Recorded was a minor percentage of post-spawning females (1.4%) at Stage VI-II.

Shrimp (32.4%) and worms (19.8%) made up the bulk of feeding ration. It is interesting to notice a frequent occurrence of jellyfish, the portion of which equaled to 13.4% of feeding ration, in stomachs.

Roundnose grenadier (*Coryphaenoides rupestris*). They were found in catches in the areas of Div.3M, at the depth of more than 550 m (Table 19). Above 915 m the mean catch per a valid tow did not exceed 1 kg. The maximum catch was taken in Stratum 530 and amounted to 2.7 kg.

The total abundance of roundnose grenadier amounted to 3.2×10^6 fish, the biomass – to 0.5×10^3 t, that corresponded to the level of the stock assessed during the survey in 2001 (Table 20).

Thorny skate (*Raja radiata*). In catches they occurred as single fish in the depth range of 127-550 m (Table 21).

By the results from the survey, the abundance amounted to 0.6×10^6 fish, the biomass – to 0.7×10^3 t, that corresponded to the results from the survey in 2001 (Table 22).

In the catches the male size fluctuated from 14 to 78 cm with the average length of 45.3 cm. The length of females varied from 12 to 63 cm, the mean one equaled to 41.7 cm. Sexual ratio was close to 1:1.

Spinytail skate (*Bathyraja spinicauda*). During the survey, in the catches, this fish occurred as single individuals at the depth of over 366 m. The average catch per a valid tow, usually, did not exceed 1-2 kg (Table 23).

The stock of spinytail skate was equal to 0.2×10^6 fish by abundance and 0.8×10^3 t by biomass, that corresponded to the level of the stock assessed when surveying in 2001 (Table 24).

Spinytail skate was represented by fish 48-144 cm in length, with the average size of 87.3 cm.

References

- BISHOP, C.A. MS 1994. Revisions and additions to stratification schemes used during research vessel surveys in NAFO Subareas 2 and 3. NAFO SCR Doc. 94/43, Serial No. N2413, 23 p.
- BULATOVA, A.Y., and A.K.CHUMAKOV. MS 1986. USSR trawl surveys in NAFO Subarea 0,2,3. NAFO SCR Doc. 86/66, Serial No. N1183, 13 p.
- DOUBLEDAY, W.G. Editor. 1981. Manual on groundfish survey in the Northwest Atlantic. NAFO Scientific Council Studies. No 2. Dartmouth, Canada, 55 p.
- IGASHOV, T.M. MS 2002. Assessment of Greenland Halibut (*Reinhardtius hippoglossoides*) Stock on the Flemish Cap (Division 3M) by Data of the Russian Trawl Survey of 2001. NAFO SCR Doc. 02/27, Serial No. N4633, 9 p.
- SAVVATIMSKY, P.I., and A.A.VASKOV. MS 1997. Results of Russian surveys on assessment of Greenland halibut stock in the Flemish Pass and on the Flemish Cap in 1996. NAFO SCR Doc. 97/10, Serial No. N2837, 11 p.
- SAVVATIMSKY, P.I., and A.A.VASKOV. MS 1998. Results of Russian surveys on assessment of Greenland halibut stock on the Flemish Cap in 1987-1996. NAFO SCR Doc.98/13, Serial No. N2992, 10p.
- VASKOV, A.A., V.S.MAMYLOV, and S.V.RATUSHNY. MS 1998. Review of 1983-1996 Russian trawl acoustic surveys to assess redfish stock on the Flemish Cap Bank. NAFO SCR Doc. 98/15, Serial No. N2994, 16 p.
- VASKOV, A.A. MS 2002. Assessment of redfish stock on the Flemish Cap based on data from the Russian trawl survey in 2001. NAFO SCR Doc. 02/9, Serial No. N4610, 16 p.

Table 1. List of Russian trawl surveys in Div. 3M, 1983-2002.

Year	Vessel	Valid tows	Area, miles ²	Period
1983	MB-2645 "Suloy"	134	10555	06.05-24.05
1984	MB-2645 "Suloy"	165	10555	30.03-30.04
1985	MG-1363 "Genichesk"	129	10555	31.03-01.05
1986	MB-0422 "Kononov"	127	10555	17.06-05.07
1987	MB - 1202 "Persey - III"	131	10555	21.06 - 04.07
1988	MB - 1202 "Persey - III"	124	10555	04.06 - 16.06
1989	MB - 1202 "Persey - III"	129	10555	23.06 - 08.07
1990	MB - 1202 "Persey - III"	119	10555	21.06 - 03.07
1991	MG - 1362 "Vilnus"	100	10555	28.04 - 08.05
1992	MG - 1366 "K. Shajtanov"	53	10555	15.04 - 20.04
1993	MG - 1362 "Vilnus"	69	10555	26.06 - 07.07
1995	MI - 0708 "Olenica"	58	10555	20.05 - 29.05
1996	MI - 8339 "Olaine"	76	11961	30.04 - 12.05
2001	MG -1360 "Mozdok"	90	15760	10.05 - 04.06
2002	BI - 1466 "Remoyfjord"	94	15760	30.05 - 12.06

Note: No investigations were carried out in 1994, 1997-2000.

Table 2. Results from the trawl survey in Div 3M, 2001-2002.

Year	Redfish	Greenland halibut	Cod	American plaice	Witch flounder	Roughhead grenadier	Roundnose grenadier	Thorny skate	Spinytail skate
	Abundance, fish x 10 ⁶								
2001	157.917	14.248	0.498	0.693	0.500	5.019	2.931	0.705	0.129
2002	71.243	10.059	0.235	1.573	1.096	5.260	3.247	0.624	0.200
	Biomass, thousand tons								
2001	21.112	12.657	0.784	0.548	0.204	3.427	0.582	0.827	0.516
2002	7.839	9.842	0.694	1.398	0.463	3.877	0.461	0.717	0.798

Table 3. Results from the trawl survey for Beaked Redfish (*S. mentella* and *S. fasciatus*) in Div 3M, 2002.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000 fish	Biomass, tons
				fish	kg		
501	127-146	342	3	8.3	0.5	211.1	11.8
502	147-183	838	3	50.3	1.5	3124.4	95.4
503	185-256	628	3	78.3	2.3	3643.9	106.1
504	185-256	348	3	11.7	0.6	300.7	14.3
505	185-256	703	3	23.0	0.9	1197.7	45.3
506	185-256	496	3	131.0	4.8	4813.0	175.4
507	258-366	822	3	29.7	1.7	1806.4	104.8
508	258-366	646	3	33.3	1.7	1595.1	79.4
509	258-366	314	3	477.0	40.8	11094.7	948.3
510	258-366	951	3	131.3	6.3	9251.7	444.5
511	258-366	806	3	75.0	3.0	4477.8	178.7
512	367-549	670	3	57.0	10.2	2828.9	505.2
513	367-549	249	3	71.3	10.8	1315.7	199.1
514	367-549	602	4	268.3	50.3	11961.9	2243.8
515	367-549	666	3	41.0	3.1	2022.7	152.9
516	550-731	634	3	7.7	2.1	360.1	97.4
517	550-731	216	3	64.7	12.1	1034.7	193.2
518	550-731	210	3	15.0	4.0	233.3	62.1
519	550-731	414	4	60.7	18.3	1863.0	561.0
520	732-914	525	3	3.0	1.3	116.7	48.9
524	732-914	253	3	9.7	3.2	181.2	59.1
528	732-914	530	3	4.7	1.7	183.2	65.4
533	732-914	98	3	12.7	3.4	91.9	24.3
521	915-1097	517	3	0.0	0.0	0.0	0.0
525	915-1097	226	3	0.3	0.4	5.6	5.9
529	915-1097	488	3	1.3	0.4	48.2	14.3
532	915-1097	238	3	0.0	0.0	0.0	0.0
534	915-1097	486	3	0.0	0.0	0.0	0.0
522	1098-1280	533	3	3.7	0.8	144.8	30.0
526	1098-1280	177	2	0.0	0.0	0.0	0.0
530	1098-1280	1134	3	1.7	0.5	140.0	42.6
Total		15760	94			64048.3	6509.1

Table 4. Results from the trawl survey for *S. marinus* in Div 3M, 2002.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000 fish	Biomass, tons
				fish	kg		
501	127-146	342	3	1.0	0.3	25.3	7.5
502	147-183	838	3	2.7	0.3	165.5	16.35
503	185-256	628	3	1.7	0.2	77.5	7.0
504	185-256	348	3	0.7	0.2	17.2	5.5
505	185-256	703	3	1.3	0.3	69.4	17.2
506	185-256	496	3	7.7	0.7	281.7	27.3
507	258-366	822	3	9.7	1.8	588.6	111.3
508	258-366	646	3	3.7	0.6	175.5	28.7
509	258-366	314	3	45.0	8.8	1046.7	204.7
510	258-366	951	3	19.0	2.6	1338.4	180.1
511	258-366	806	3	14.3	2.8	855.8	165.1
512	367-549	670	3	10.3	2.2	512.8	107.9
513	367-549	249	3	3.7	1.3	67.6	23.2
514	367-549	602	4	28.3	6.1	1259.7	268.7
515	367-549	666	3	10.0	1.9	493.3	92.8
516	550-731	634	3	0.7	0.1	31.3	3.9
517	550-731	216	3	6.0	1.8	96.0	28.5
518	550-731	210	3	2.7	1.0	41.5	15.0
519	550-731	414	4	1.3	0.5	38.3	14.6
520	732-914	525	3	0.0	0.0	0.0	0.0
524	732-914	253	3	0.0	0.0	0.0	0.0
528	732-914	530	3	0.0	0.0	0.0	0.0
533	732-914	98	3	1.7	0.5	12.1	3.5
521	915-1097	517	3	0.0	0.0	0.0	0.0
525	915-1097	226	3	0.0	0.0	0.0	0.0
529	915-1097	488	3	0.0	0.0	0.0	0.0
532	915-1097	238	3	0.0	0.0	0.0	0.0
534	915-1097	486	3	0.0	0.0	0.0	0.0
522	1098-1280	533	3	0.0	0.0	0.0	0.0
526	1098-1280	177	2	0.0	0.0	0.0	0.0
530	1098-1280	1134	3	0.0	0.0	0.0	0.0
Total		15760	94			7194.4	1329.9

Table 5. Estimates provided by the trawl survey for Redfish in Div. 3M for 1987-2002*.

Year	<i>Sebastes marinus</i>		<i>Sebastes mentella</i> and <i>S. fasciatus</i>		Total	
	Abundance, fish x 10 ⁶	Biomass, thou. tons	Abundance, fish x 10 ⁶	Biomass, thou. tons	Abundance, fish x 10 ⁶	Biomass, thou. tons
1987	12.5	4.3	463.2	106.4	475.7	110.7
1988	29.7	14.4	183.1	47.0	212.8	61.4
1989	15.1	6.8	283.8	83.3	298.9	90.1
1990	6.4	3.0	74.7	17.7	81.1	20.7
1991	1.9	0.1	2006.1	45.4	2008.0	45.5
1992	0.6	0.3	119.5	18.2	120.1	18.5
1993	8.1	2.8	681.7	69.8	689.8	72.6
1995	2.7	0.9	137.9	20.7	140.6	21.6
1996	9.6	5.9	62.3	10.0	71.9	15.9
2001	2.4	0.7	155.5	20.4	157.9	21.1
2002	7.2	1.3	64.0	6.5	71.2	7.8

* No investigations were carried out in 1994, 1997-2000.

Table 6. Results from the trawl survey for Greenland halibut in Div. 3M, 2002.

	Depth, m	Area, mile ²	No. of tows	Mean catch per valid tow		Index	
				fish	kg	abundance '000	Biomass, tons
501	127-146	342	3	0.3	0.3	8.4	8.7
502	147-183	838	3	0.7	0.2	41.4	14.5
503	185-256	628	3	6.3	1.3	294.6	62.4
504	185-256	348	3	0.3	0.3	8.6	6.7
505	185-256	703	3	2.0	0.3	104.2	14.1
506	185-256	496	3	3.7	0.7	134.7	26.0
507	258-366	822	3	6.7	2.3	405.9	140.8
508	258-366	646	3	5.0	2.5	239.3	117.3
509	258-366	314	3	2.7	3.1	62.0	71.8
510	258-366	951	3	3.0	2.7	211.3	190.9
511	258-366	806	3	3.3	2.0	199.0	120.3
512	367-549	670	3	7.3	7.3	364.0	360.7
513	367-549	249	3	5.0	4.2	92.2	78.1
514	367-549	602	4	5.5	4.5	245.3	199.4
515	367-549	666	3	2.7	1.9	131.6	94.4
516	550-731	634	3	3.0	2.4	140.9	114.8
517	550-731	216	3	12.7	11.6	202.7	185.6
518	550-731	210	3	4.3	4.4	67.4	68.3
519	550-731	414	4	9.0	6.8	276.0	209.8
520	732-914	525	3	9.3	10.6	363.0	411.5
524	732-914	253	3	12.3	13.5	231.1	253.1
528	732-914	530	3	22.3	17.3	876.8	677.6
533	732-914	98	3	12.0	13.2	87.1	95.5
521	915-1097	517	3	12.0	22.1	460.0	847.2
525	915-1097	226	3	10.0	21.2	167.4	354.1
529	915-1097	488	3	44.3	50.7	1602.6	1831.0
532	915-1097	238	3	22.3	28.1	393.7	494.6
534	915-1097	486	3	29.7	24.5	1068.0	881.6
522	1098-1280	533	3	10.7	19.7	421.1	776.9
526	1098-1280	177	2	3.0	9.3	39.3	121.4
530	1098-1280	1134	3	13.3	12.1	1120.0	1014.0
Total		15760	94			10059.1	9842.0

Table 7. Abundance from the Russian trawl survey for Greenland halibut in Div. 3M by strata in 1987-2002.

Stratum	Depth, m	1987	1988	1989	1990	1991	1992	1993	1995	1996	2001	2002
501	127-146	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	8.4
502	147-183	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	41.4
	127-183	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	49.8
503	185-256	0.0	19.9	19.9	5.8	9.3	9.3	0.0	108.4	61.9	15.5	294.6
504	185-256	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	17.3	94.5	8.6
505	185-256	0.0	0.0	0.0	0.0	8.7	52.1	0.0	70.0	52.1	416.6	104.2
506	185-256	0.0	12.2	0.0	0.0	0.0	9.2	12.2	24.6	36.7	12.2	134.7
	185-256	0.0	32.1	19.9	5.8	18.0	70.6	12.2	203.0	168.0	538.8	542.1
507	258-366	18.3	13.5	20.3	0.0	20.3	48.7	243.6	263.6	548.0	324.7	405.9
508	258-366	47.9	17.9	12.0	21.3	0.0	0.0	35.9	15.8	175.5	191.4	239.3
509	258-366	116.3	0.0	204.7	40.7	5.8	-	69.8	7.8	7.7	7.8	62.0
510	258-366	29.4	7.0	21.1	0.0	0.0	0.0	93.9	164.1	234.6	187.9	211.3
511	258-366	35.8	0.0	14.9	0.0	29.9	11.9	119.4	238.8	19.7	99.5	199.0
	258-366	247.7	38.4	273.0	62.0	56.0	60.6	562.6	690.1	985.5	811.3	1117.5
512	367-549	231.6	142.7	657.6	85.1	9.9	0.0	704.7	99.3	82.9	281.2	364.0
513	367-549	18.4	79.9	18.4	13.8	0.0	-	92.2	0.0	12.4	135.3	92.2
514	367-549	89.2	38.2	89.2	33.4	5.6	44.6	111.5	14.7	0.0	118.9	245.3
515	367-549	135.7	86.3	645.9	61.7	0.0	69.1	888.0	32.6	33.1	49.3	131.6
	367-549	474.9	347.1	1411.1	194.0	15.5	113.7	1796.4	146.6	128.4	584.7	833.1
516	550-731	299.4	516.6	1315.0	140.9	54.8	164.4	258.3	892.3	187.9	657.5	140.9
517	550-731	53.3	80.0	101.3	5.8	0.0	-	53.3	80.0	8.0	80.0	202.7
518	550-731	7.8	254.1	2.8	67.4	0.0	0.0	3.9	93.3	0.0	67.4	67.4
519	550-731	76.7	582.7	306.7	128.8	24.5	51.1	153.3	439.5	61.3	138.0	276.0
	550-731	437.2	1433.4	1725.8	342.9	79.3	215.5	468.8	1505.1	257.2	942.9	687.0
520	732-914									68.1	725.9	363.0
524	732-914									45.0	655.9	231.1
528	732-914									1086.3	1347.9	876.8
533	732-914									31.4	352.1	87.1
	732-914									1230.8	3081.8	1558.0
521	915-1097										510.6	460.0
525	915-1097										217.6	167.4
529	915-1097										1072.4	1602.6
532	915-1097										258.6	393.7
534	915-1097										3888.0	1068.0
	915-1097										5947.2	3691.7
522	1098-1280										723.8	421.1
526	1098-1280										104.9	39.3
530	1098-1280										1512.0	1120.0
	1098-1280										2340.7	1580.4
Total		1159.7	1851.0	3432.8	604.7	168.8	460.4	2840.0	2543.9	2769.9	14247.5	10059.1

Table 8. Biomass from the Russian trawl survey for Greenland halibut in Div. 3M by strata in 1987-2002.

Stratum	Depth, m	1987	1988	1989	1990	1991	1992	1993	1995	1996	2001	2002
501	127-146	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	8.7
502	147-183	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	14.5
	127-183	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	23.2
503	185-256	0.0	26.6	17.1	3.2	4.7	0.9	0.0	3.5	8.1	1.8	62.4
504	185-256	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.3	18.1	6.7
505	185-256	0.0	0.0	0.0	0.0	0.9	6.8	0.0	19.2	5.2	10.1	14.1
506	185-256	0.0	1.5	0.0	0.0	0.0	2.0	1.9	0.9	3.7	0.5	26.0
	185-256	0.0	28.1	17.1	3.2	5.6	9.7	1.9	23.6	17.3	30.5	109.2
507	258-366	18.8	16.7	31.5	0.0	3.0	7.6	59.3	31.8	79.3	58.1	140.8
508	258-366	71.8	24.8	13.0	23.7	0.0	0.0	47.1	0.6	18.2	86.5	117.3
509	258-366	209.3	0.0	387.4	50.8	3.5	-	142.4	1.9	0.2	3.0	71.8
510	258-366	35.2	6.5	36.2	0.0	0.0	0.0	62.2	11.3	28.4	187.9	190.9
511	258-366	39.4	0.0	12.9	0.0	18.9	11.9	64.9	30.6	2.3	10.3	120.3
	258-366	374.5	48.0	481.0	74.5	25.4	19.5	375.9	76.2	128.4	345.8	641.1
512	367-549	343.5	213.8	646.0	74.7	6.9	0.0	565.5	27.2	15.9	211.1	360.7
513	367-549	36.9	71.1	36.9	26.9	0.0	-	103.3	0.0	0.8	101.8	78.1
514	367-549	200.7	74.5	161.0	39.2	5.4	30.1	148.8	0.4	0.0	118.9	199.4
515	367-549	244.8	96.5	528.3	46.3	0.0	37.2	782.9	12.3	4.8	16.9	94.4
	367-549	825.9	455.9	1372.2	187.1	12.3	67.3	1600.5	39.9	21.5	448.7	732.6
516	550-731	453.8	768.7	1896.7	154.9	42.3	145.1	273.2	600.5	95.9	526.5	114.8
517	550-731	99.2	133.6	182.9	6.4	0.0	-	76.3	90.0	3.3	63.3	185.6
518	550-731	19.4	412.4	4.3	107.1	0.0	0.0	2.6	76.4	0.0	54.4	68.3
519	550-731	168.7	775.3	403.2	162.1	22.1	32.0	148.8	152.1	25.5	93.9	209.8
	550-731	741.1	2090.0	2487.1	430.5	64.4	177.1	500.9	919.0	124.7	738.1	578.5
520	732-914									52.4	604.4	411.5
524	732-914									34.6	644.9	253.1
528	732-914									781.8	1085.8	677.6
533	732-914									17.0	311.2	95.5
	732-914									885.8	2646.3	1437.7
521	915-1097										558.1	847.2
525	915-1097										340.9	354.1
529	915-1097										903.8	1831.0
532	915-1097										211.7	494.6
534	915-1097										3888.0	881.6
	915-1097										5902.5	4408.5
522	1098-1280										882.1	776.9
526	1098-1280										140.6	121.4
530	1098-1280										1522.3	1014.0
	1098-1280										2545.0	1912.3
Total		1941.5	2622.0	4357.4	695.3	107.7	273.6	2479.2	1058.3	1177.7	12657.0	9842.0

Table 9. Data on average catches (fish) per one valid tow from the Russian trawl survey for Greenland halibut in Div. 3M by strata in 1987-2002.

Stratum	Depth, m	1987	1988	1989	1990	1991	1992	1993	1995	1996	2001	2002
501	127-146	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.3
502	147-183	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.7
503	185-256	0.0	0.4	0.4	0.1	0.2	0.2	0.0	2.3	1.3	0.3	6.3
504	185-256	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.7	3.7	0.3
505	185-256	0.0	0.0	0.0	0.0	0.2	1.0	0.0	1.3	1.0	8.0	2.0
506	185-256	0.0	0.3	0.0	0.0	0.0	0.3	0.3	0.7	1.0	0.3	3.7
507	258-366	0.3	0.2	0.3	0.0	0.3	0.8	4.0	4.3	9.0	5.3	6.7
508	258-366	1.0	0.4	0.3	0.4	0.0	0.0	0.8	0.3	3.7	4.0	5.0
509	258-366	5.0	0.0	8.8	1.8	0.3	-	3.0	0.3	0.3	0.3	2.7
510	258-366	0.4	0.1	0.3	0.0	0.0	0.0	1.3	2.3	3.3	2.7	3.0
511	258-366	0.6	0.0	0.3	0.0	0.5	0.2	2.0	4.0	0.3	1.7	3.3
512	367-549	4.7	2.9	13.3	1.7	0.2	0.0	14.2	2.0	1.7	5.7	7.3
513	367-549	1.0	4.3	4.3	0.8	0.0	-	5.0	0.0	0.7	7.3	5.0
514	367-549	2.0	0.9	2.0	0.8	0.1	1.0	2.5	0.3	0.0	2.7	5.5
515	367-549	2.8	1.8	9.4	1.3	0.0	1.4	18.0	0.7	0.7	1.0	2.7
516	550-731	6.4	11.0	28.0	3.0	1.2	3.5	5.5	19.0	4.0	14.0	3.0
517	550-731	3.3	5.0	6.3	0.3	0.0	-	3.3	5.0	0.5	5.0	12.7
518	550-731	0.5	16.3	2.8	4.3	0.0	0.0	0.3	6.0	0.0	4.3	4.3
519	550-731	2.5	19.0	10.0	4.2	0.8	1.7	5.0	14.3	2.0	4.5	9.0
520	732-914									1.8	18.7	9.3
524	732-914									2.4	35.0	12.3
528	732-914									27.7	34.3	22.3
533	732-914									4.3	48.5	12.0
521	915-1097										13.3	12.0
525	915-1097										13.0	10.0
529	915-1097										29.7	44.3
532	915-1097										14.7	22.3
534	915-1097										108.0	29.7
522	1098-1280										18.3	10.7
526	1098-1280										8.0	3.0
530	1098-1280										18.0	13.3

Table 10. Data on average catches (kg) per one valid tow from the Russian trawl survey for Greenland halibut in Div. 3M by strata in 1987-2002.

Stratum	Depth, m	1987	1988	1989	1990	1991	1992	1993	1995	1996	2001	2002
501	127-146	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.3
502	147-183	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.2
503	185-256	0.0	0.6	0.4	0.1	0.1	0.0	0.0	0.1	0.2	0.0	1.3
504	185-256	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.7	0.3
505	185-256	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.1	0.2	0.3
506	185-256	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.7
507	258-366	0.3	0.3	0.5	0.0	0.1	0.1	1.0	0.5	1.3	1.0	2.3
508	258-366	1.5	0.5	0.3	0.5	0.0	0.0	1.0	0.0	0.4	1.8	2.5
509	258-366	9.0	0.0	16.7	2.2	0.2	-	6.1	0.0	0.0	0.1	3.1
510	258-366	0.5	0.1	0.5	0.0	0.0	0.0	0.9	0.2	0.4	2.7	2.7
511	258-366	0.7	0.0	0.2	0.0	0.3	0.2	1.1	0.5	0.0	0.2	2.0
512	367-549	6.9	4.3	13.0	1.5	0.1	0.0	11.4	0.6	0.3	4.3	7.3
513	367-549	2.0	3.9	8.2	1.5	0.0	-	5.6	0.0	0.0	5.5	4.2
514	367-549	4.5	1.7	3.6	0.9	0.1	0.7	3.3	0.0	0.0	2.7	4.5
515	367-549	5.0	2.0	10.7	0.9	0.0	0.8	15.9	0.3	0.1	0.3	1.9
516	550-731	9.7	16.4	40.4	3.3	0.9	3.1	5.8	12.8	2.0	11.2	2.4
517	550-731	6.0	8.3	11.4	0.4	0.0	-	4.8	5.6	0.2	4.0	11.6
518	550-731	1.3	25.6	4.3	6.9	0.0	0.0	0.2	4.9	0.0	3.5	4.4
519	550-731	5.5	25.3	13.1	5.3	0.7	1.0	4.9	5.0	0.8	3.1	6.8
520	732-914									1.3	15.5	10.6
524	732-914									0.4	34.4	13.5
528	732-914									19.9	27.7	17.3
533	732-914									2.3	42.9	13.2
521	915-1097										14.6	22.1
525	915-1097										20.4	21.2
529	915-1097										25.0	50.7
532	915-1097										12.0	28.1
534	915-1097										108.0	24.5
522	1098-1280										22.3	19.7
526	1098-1280										10.7	9.3
530	1098-1280										18.1	12.1

Table 11. Results from the trawl survey for Cod in Div 3M, 2002.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	1.7	3.2	42.2	81.9
502	147-183	838	3	0.3	0.2	20.7	11.4
503	185-256	628	3	0.7	2.2	31.0	100.6
504	185-256	348	3	0.7	4.8	17.2	122.4
505	185-256	703	3	0.7	3.4	34.7	176.0
506	185-256	496	3	0.3	1.0	12.3	37.4
507	258-366	822	3	0.7	0.5	40.6	27.2
508	258-366	646	3	0.0	0.0	0.0	0.0
509	258-366	314	3	0.3	1.7	7.8	39.5
510	258-366	951	3	0.0	0.0	0.0	0.0
511	258-366	806	3	0.0	0.0	0.0	0.0
512	367-549	670	3	0.0	0.0	0.0	0.0
513	367-549	249	3	0.3	1.3	6.2	23.0
514	367-549	602	4	0.5	1.7	22.3	74.9
515	367-549	666	3	0.0	0.0	0.0	0.0
516	550-731	634	3	0.0	0.0	0.0	0.0
517	550-731	216	3	0.0	0.0	0.0	0.0
518	550-731	210	3	0.0	0.0	0.0	0.0
519	550-731	414	4	0.0	0.0	0.0	0.0
520	732-914	525	3	0.0	0.0	0.0	0.0
524	732-914	253	3	0.0	0.0	0.0	0.0
528	732-914	530	3	0.0	0.0	0.0	0.0
533	732-914	98	3	0.0	0.0	0.0	0.0
521	915-1097	517	3	0.0	0.0	0.0	0.0
525	915-1097	226	3	0.0	0.0	0.0	0.0
529	915-1097	488	3	0.0	0.0	0.0	0.0
532	915-1097	238	3	0.0	0.0	0.0	0.0
534	915-1097	486	3	0.0	0.0	0.0	0.0
522	1098-1280	533	3	0.0	0.0	0.0	0.0
526	1098-1280	177	2	0.0	0.0	0.0	0.0
530	1098-1280	1134	3	0.0	0.0	0.0	0.0
Bcero		15760	94			234.9	694.3

Table 12. Results from the trawl survey for Cod in Div 3M, 2001.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	2.7	4.3	67.6	109.7
502	147-183	838	3	1.0	0.6	62.1	36.0
503	185-256	628	3	0.7	2.1	31.0	96.8
504	185-256	348	3	2.7	1.3	68.7	33.0
505	185-256	703	3	0.0	0.0	0.0	0.0
506	185-256	496	3	1.3	3.3	49.0	122.8
507	258-366	822	3	0.7	1.1	40.6	66.2
508	258-366	646	3	0.3	1.1	16.0	52.5
509	258-366	314	3	1.0	1.6	23.3	37.2
510	258-366	951	3	0.3	1.0	23.5	69.7
511	258-366	806	3	0.0	0.0	0.0	0.0
512	367-549	670	3	2.0	2.8	99.3	137.7
513	367-549	249	3	0.0	0.8	0.0	15.0
514	367-549	602	3	0.0	0.0	0.0	0.0
515	367-549	666	3	0.3	0.1	16.4	6.9
516	550-731	634	3	0.0	0.0	0.0	0.0
517	550-731	216	2	0.0	0.0	0.0	0.0
518	550-731	210	3	0.0	0.0	0.0	0.0
519	550-731	414	4	0.0	0.0	0.0	0.0
520	732-914	525	3	0.0	0.0	0.0	0.0
524	732-914	253	3	0.0	0.0	0.0	0.0
528	732-914	530	3	0.0	0.0	0.0	0.0
533	732-914	98	2	0.0	0.0	0.0	0.0
521	915-1097	517	3	0.0	0.0	0.0	0.0
525	915-1097	226	2	0.0	0.0	0.0	0.0
529	915-1097	488	3	0.0	0.0	0.0	0.0
532	915-1097	238	3	0.0	0.0	0.0	0.0
534	915-1097	486	3	0.0	0.0	0.0	0.0
522	1098-1280	533	3	0.0	0.0	0.0	0.0
526	1098-1280	177	2	0.0	0.0	0.0	0.0
530	1098-1280	1134	3	0.0	0.0	0.0	0.0
Total		15760	90			497.5	783.5

Table 13. Results from the trawl survey for American place in Div 3M, 2002.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	33.3	30.6	844.4	776.1
502	147-183	838	3	3.0	2.3	186.2	141.1
503	185-256	628	3	1.7	2.2	77.5	103.1
504	185-256	348	3	0.3	0.5	8.6	13.2
505	185-256	703	3	1.3	1.3	69.4	65.1
506	185-256	496	3	1.7	1.2	61.2	42.9
507	258-366	822	3	1.0	1.0	60.9	61.7
508	258-366	646	3	1.0	0.9	47.9	45.9
509	258-366	314	3	0.7	0.7	15.5	16.2
510	258-366	951	3	1.7	1.2	117.4	85.7
511	258-366	806	3	0.3	0.2	19.9	8.8
512	367-549	670	3	0.0	0.0	0.0	0.0
513	367-549	249	3	0.3	0.2	6.2	3.6
514	367-549	602	4	0.3	0.1	11.2	3.7
515	367-549	666	3	0.3	0.3	16.4	14.1
516	550-731	634	3	0.0	0.0	0.0	0.0
517	550-731	216	3	0.0	0.0	0.0	0.0
518	550-731	210	3	0.0	0.0	0.0	0.0
519	550-731	414	4	0.0	0.0	0.0	0.0
520	732-914	525	3	0.0	0.0	0.0	0.0
524	732-914	253	3	0.0	0.0	0.0	0.0
528	732-914	530	3	0.0	0.0	0.0	0.0
533	732-914	98	3	0.3	0.5	2.4	3.8
521	915-1097	517	3	0.0	0.0	0.0	0.0
525	915-1097	226	3	0.0	0.0	0.0	0.0
529	915-1097	488	3	0.0	0.0	0.0	0.0
532	915-1097	238	3	0.0	0.0	0.0	0.0
534	915-1097	486	3	0.0	0.0	0.0	0.0
522	1098-1280	533	3	0.0	0.0	0.0	0.0
526	1098-1280	177	2	0.0	0.0	0.0	0.0
530	1098-1280	1134	3	0.3	0.2	28.0	13.4
Total		15760	94			1573.2	1398.4

Table 14. Results from the trawl survey for American place in Div 3M, 2001.

Stratum	Depth, m	Area, mile ²	Nos of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	8.7	5.5	219.6	138.4
502	147-183	838	3	0.7	0.6	41.4	39.7
503	185-256	628	3	0.0	0.0	0.0	0.0
504	185-256	348	3	2.0	0.9	51.6	23.1
505	185-256	703	3	0.0	0.0	0.0	0.0
506	185-256	496	3	0.0	0.0	0.0	0.0
507	258-366	822	3	0.0	0.0	0.0	0.0
508	258-366	646	3	0.0	0.0	0.0	0.0
509	258-366	314	3	1.0	0.9	23.3	19.8
510	258-366	951	3	0.0	0.0	0.0	0.0
511	258-366	806	3	0.0	0.0	0.0	0.0
512	367-549	670	3	0.3	0.1	16.5	3.5
513	367-549	249	3	0.0	0.0	0.0	0.0
514	367-549	602	3	1.7	1.1	74.3	48.7
515	367-549	666	3	0.7	0.4	32.9	19.2
516	550-731	634	3	0.0	0.0	0.0	0.0
517	550-731	216	2	0.0	0.0	0.0	0.0
518	550-731	210	3	0.7	0.6	10.4	9.4
519	550-731	414	4	0.5	0.5	15.3	13.9
520	732-914	525	3	0.0	0.0	0.0	0.0
524	732-914	253	3	0.3	0.4	6.2	7.0
528	732-914	530	3	2.0	2.0	78.5	79.3
533	732-914	98	2	0.0	0.0	0.0	0.0
521	915-1097	517	3	0.7	0.8	25.5	30.3
525	915-1097	226	2	0.0	0.0	0.0	0.0
529	915-1097	488	3	1.7	2.0	60.2	71.9
532	915-1097	238	3	0.0	0.0	0.0	0.0
534	915-1097	486	3	0.7	0.8	24.0	27.0
522	1098-1280	533	3	0.3	0.4	13.2	16.5
526	1098-1280	177	2	0.0	0.0	0.0	0.0
530	1098-1280	1134	3	0.0	0.0	0.0	0.0
Total		15760	90			692.9	547.7

Table 15. Results from the trawl survey for Witch Flounder in Div. 3M, 2002.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	1.7	0.9	42.2	22.2
502	147-183	838	3	1.3	0.6	82.8	37.5
503	185-256	628	3	0.7	0.3	31.0	16.0
504	185-256	348	3	1.0	0.5	25.8	12.0
505	185-256	703	3	3.3	2.1	173.6	108.5
506	185-256	496	3	1.7	1.1	61.2	38.5
507	258-366	822	3	3.3	1.1	203.0	63.6
508	258-366	646	3	0.3	0.2	15.9	8.3
509	258-366	314	3	1.0	0.4	23.3	9.1
510	258-366	951	3	2.7	0.9	187.8	64.9
511	258-366	806	3	2.0	0.8	119.4	47.0
512	367-549	670	3	0.0	0.0	0.0	0.0
513	367-549	249	3	0.3	0.2	6.2	2.9
514	367-549	602	4	0.0	0.0	0.0	0.0
515	367-549	666	3	1.7	0.5	82.2	24.5
516	550-731	634	3	0.0	0.0	0.0	0.0
517	550-731	216	3	0.0	0.0	0.0	0.0
518	550-731	210	3	0.0	0.0	0.0	0.0
519	550-731	414	4	0.0	0.0	0.0	0.0
520	732-914	525	3	0.0	0.0	0.0	0.0
524	732-914	253	3	0.0	0.0	0.0	0.0
528	732-914	530	3	1.0	0.2	39.3	7.7
533	732-914	98	3	0.3	0.1	2.4	0.7
521	915-1097	517	3	0.0	0.0	0.0	0.0
525	915-1097	226	3	0.0	0.0	0.0	0.0
529	915-1097	488	3	0.0	0.0	0.0	0.0
532	915-1097	238	3	0.0	0.0	0.0	0.0
534	915-1097	486	3	0.0	0.0	0.0	0.0
522	1098-1280	533	3	0.0	0.0	0.0	0.0
526	1098-1280	177	2	0.0	0.0	0.0	0.0
530	1098-1280	1134	3	0.0	0.0	0.0	0.0
Total		15760	94			1096.1	463.4

Table 16. Results from the trawl survey for Witch Flounder in Div. 3M, 2001.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	0.3	0.1	8.4	2.1
502	147-183	838	3	1.0	0.4	62.1	23.8
503	185-256	628	3	1.7	0.9	77.5	43.3
504	185-256	348	3	1.0	0.4	25.8	9.5
505	185-256	703	3	0.3	0.1	17.4	6.4
506	185-256	496	3	0.0	0.0	0.0	0.0
507	258-366	822	3	0.0	0.0	0.0	0.0
508	258-366	646	3	0.3	0.1	16.0	3.9
509	258-366	314	3	0.7	0.2	15.5	4.8
510	258-366	951	3	0.0	0.0	0.0	0.0
511	258-366	806	3	0.3	0.2	19.9	9.0
512	367-549	670	3	0.7	0.5	33.1	23.2
513	367-549	249	3	0.0	0.0	0.0	0.0
514	367-549	602	3	1.3	0.5	59.5	22.4
515	367-549	666	3	1.3	0.4	65.8	21.8
516	550-731	634	3	0.0	0.0	0.0	0.0
517	550-731	216	2	0.0	0.0	0.0	0.0
518	550-731	210	3	1.0	0.3	15.6	5.1
519	550-731	414	4	0.5	0.1	15.3	2.0
520	732-914	525	3	0.0	0.0	0.0	0.0
524	732-914	253	3	0.0	0.0	0.0	0.0
528	732-914	530	3	1.3	0.6	52.3	23.3
533	732-914	98	2	0.5	0.3	3.6	2.0
521	915-1097	517	3	0.0	0.0	0.0	0.0
525	915-1097	226	2	0.0	0.0	0.0	0.0
529	915-1097	488	3	0.3	0.04	12.0	1.7
532	915-1097	238	3	0.0	0.0	0.0	0.0
534	915-1097	486	3	0.0	0.0	0.0	0.0
522	1098-1280	533	3	0.0	0.0	0.0	0.0
526	1098-1280	177	2	0.0	0.0	0.0	0.0
530	1098-1280	1134	3	0.0	0.0	0.0	0.0
Total		15760	90			499.8	204.3

Table 17. Results from the trawl survey for Roughhead Grenadier in Div. 3M, 2002.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	0.0	0.0	0.0	0.0
502	147-183	838	3	0.0	0.0	0.0	0.0
503	185-256	628	3	0.0	0.0	0.0	0.0
504	185-256	348	3	0.0	0.0	0.0	0.0
505	185-256	703	3	0.0	0.0	0.0	0.0
506	185-256	496	3	0.0	0.0	0.0	0.0
507	258-366	822	3	0.0	0.0	0.0	0.0
508	258-366	646	3	0.0	0.0	0.0	0.0
509	258-366	314	3	0.0	0.0	0.0	0.0
510	258-366	951	3	0.3	0.2	23.5	11.3
511	258-366	806	3	0.0	0.0	0.0	0.0
512	367-549	670	3	3.7	1.7	182.0	84.0
513	367-549	249	3	4.3	1.4	79.9	26.3
514	367-549	602	4	0.8	0.4	33.4	17.7
515	367-549	666	3	0.0	0.0	0.0	0.0
516	550-731	634	3	6.3	3.1	297.4	143.6
517	550-731	216	3	7.3	3.7	117.3	59.5
518	550-731	210	3	16.0	10.2	248.9	158.8
519	550-731	414	4	5.8	1.8	176.3	55.3
520	732-914	525	3	4.7	1.9	181.5	73.0
524	732-914	253	3	15.3	10.3	287.4	192.2
528	732-914	530	3	5.0	2.8	196.3	107.9
533	732-914	98	3	7.7	3.4	55.7	24.3
521	915-1097	517	3	16.3	17.3	625.5	662.8
525	915-1097	226	3	7.0	5.3	117.2	88.7
529	915-1097	488	3	16.0	14.6	578.4	526.7
532	915-1097	238	3	10.0	3.3	176.3	57.7
534	915-1097	486	3	9.7	4.0	348.0	143.3
522	1098-1280	533	3	22.3	25.9	881.8	1024.2
526	1098-1280	177	2	5.0	3.7	65.6	49.0
530	1098-1280	1134	3	7.0	4.4	588.0	370.7
Total		15760	94			5260.3	3876.8

Table 18. Results from the trawl survey for Roughhead Grenadier in Div. 3M, 2001.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	0.0	0.0	0.0	0.0
502	147-183	838	3	0.0	0.0	0.0	0.0
503	185-256	628	3	0.0	0.0	0.0	0.0
504	185-256	348	3	0.0	0.0	0.0	0.0
505	185-256	703	3	0.0	0.0	0.0	0.0
506	185-256	496	3	0.0	0.0	0.0	0.0
507	258-366	822	3	0.0	0.0	0.0	0.0
508	258-366	646	3	0.0	0.0	0.0	0.0
509	258-366	314	3	0.0	0.0	0.0	0.0
510	258-366	951	3	0.0	0.0	0.0	0.0
511	258-366	806	3	0.0	0.0	0.0	0.0
512	367-549	670	3	0.7	0.3	33.1	16.8
513	367-549	249	3	2.3	0.8	43.0	14.6
514	367-549	602	3	0.7	0.1	29.7	6.0
515	367-549	666	3	0.0	0.0	0.0	0.0
516	550-731	634	3	1.0	0.3	47.0	12.3
517	550-731	216	2	3.5	1.1	56.0	17.8
518	550-731	210	3	15.7	10.9	243.7	169.4
519	550-731	414	4	3.8	2.3	115.0	71.7
520	732-914	525	3	5.7	2.3	220.4	87.7
524	732-914	253	3	15.3	8.7	287.4	163.7
528	732-914	530	3	5.3	2.7	209.4	104.6
533	732-914	98	2	9.0	3.6	65.3	25.9
521	915-1097	517	3	12.3	12.4	472.3	476.0
525	915-1097	226	2	16.0	14.5	267.9	242.8
529	915-1097	488	3	24.0	10.6	867.6	382.4
532	915-1097	238	3	6.0	1.9	105.8	33.9
534	915-1097	486	3	12.0	5.7	432.0	206.4
522	1098-1280	533	3	22.0	20.7	868.6	815.3
526	1098-1280	177	2	3.0	4.6	39.3	60.7
530	1098-1280	1134	3	7.3	6.2	616.0	519.4
Total		15760	90			5019.4	3427.4

Table 19. Results from the trawl survey for Roundnose Grenadier in Div. 3M, 2002.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	0.0	0.0	0.0	0.0
502	147-183	838	3	0.0	0.0	0.0	0.0
503	185-256	628	3	0.0	0.0	0.0	0.0
504	185-256	348	3	0.0	0.0	0.0	0.0
505	185-256	703	3	0.0	0.0	0.0	0.0
506	185-256	496	3	0.0	0.0	0.0	0.0
507	258-366	822	3	0.0	0.0	0.0	0.0
508	258-366	646	3	0.0	0.0	0.0	0.0
509	258-366	314	3	0.0	0.0	0.0	0.0
510	258-366	951	3	0.0	0.0	0.0	0.0
511	258-366	806	3	0.0	0.0	0.0	0.0
512	367-549	670	3	0.0	0.0	0.0	0.0
513	367-549	249	3	0.0	0.0	0.0	0.0
514	367-549	602	4	0.0	0.0	0.0	0.0
515	367-549	666	3	0.0	0.0	0.0	0.0
516	550-731	634	3	0.3	0.01	15.7	0.3
517	550-731	216	3	0.0	0.0	0.0	0.0
518	550-731	210	3	0.0	0.0	0.0	0.0
519	550-731	414	4	1.3	0.04	38.3	1.3
520	732-914	525	3	2.3	0.3	90.7	11.3
524	732-914	253	3	2.0	0.1	37.5	2.1
528	732-914	530	3	1.8	0.1	68.7	3.4
533	732-914	98	3	8.3	0.4	60.5	2.7
521	915-1097	517	3	5.7	0.8	217.0	31.3
525	915-1097	226	3	2.0	0.3	33.5	5.5
529	915-1097	488	3	9.0	0.8	325.3	27.8
532	915-1097	238	3	12.7	1.7	223.3	29.3
534	915-1097	486	3	4.3	0.2	156.0	8.8
522	1098-1280	533	3	10.0	2.3	394.8	90.4
526	1098-1280	177	2	3.5	1.1	45.9	14.6
530	1098-1280	1134	3	18.3	2.7	1540.0	232.4
Total		15760	94			3247.3	461.2

Table 20. Results from the trawl survey for Roundnose Grenadier in Div. 3M, 2001.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	0.0	0.0	0.0	0.0
502	147-183	838	3	0.0	0.0	0.0	0.0
503	185-256	628	3	0.0	0.0	0.0	0.0
504	185-256	348	3	0.0	0.0	0.0	0.0
505	185-256	703	3	0.0	0.0	0.0	0.0
506	185-256	496	3	0.0	0.0	0.0	0.0
507	258-366	822	3	0.0	0.0	0.0	0.0
508	258-366	646	3	0.0	0.0	0.0	0.0
509	258-366	314	3	0.0	0.0	0.0	0.0
510	258-366	951	3	0.0	0.0	0.0	0.0
511	258-366	806	3	0.0	0.0	0.0	0.0
512	367-549	670	3	0.0	0.0	0.0	0.0
513	367-549	249	3	0.0	0.0	0.0	0.0
514	367-549	602	3	0.0	0.0	0.0	0.0
515	367-549	666	3	0.0	0.0	0.0	0.0
516	550-731	634	3	0.0	0.0	0.0	0.0
517	550-731	216	2	0.0	0.0	0.0	0.0
518	550-731	210	3	1.3	0.3	20.7	4.8
519	550-731	414	4	0.0	0.0	0.0	0.0
520	732-914	525	3	0.0	0.0	0.0	0.0
524	732-914	253	3	0.7	0.1	12.5	2.0
528	732-914	530	3	0.3	0.03	13.1	1.5
533	732-914	98	2	14.0	1.0	101.6	7.1
521	915-1097	517	3	1.0	0.2	38.3	5.9
525	915-1097	226	2	3.0	0.8	50.2	12.9
529	915-1097	488	3	9.0	2.9	325.3	105.3
532	915-1097	238	3	3.3	0.4	58.8	6.9
534	915-1097	486	3	16.3	1.9	588.0	67.2
522	1098-1280	533	3	7.0	2.3	276.4	89.5
526	1098-1280	177	2	3.5	1.5	45.9	19.5
530	1098-1280	1134	3	16.7	3.1	1400.0	259.7
Total		15760	90			2930.8	582.3

Table 21. Results from the trawl survey for Thorny Skate in Div. 3M, 2002.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	0.3	0.6	8.4	14.4
502	147-183	838	3	0.3	0.4	20.7	22.8
503	185-256	628	3	0.0	0.0	0.0	0.0
504	185-256	348	3	0.7	0.7	17.2	17.4
505	185-256	703	3	0.0	0.0	0.0	0.0
506	185-256	496	3	1.0	0.8	36.7	29.6
507	258-366	822	3	1.7	1.9	101.5	113.3
508	258-366	646	3	0.3	0.5	15.9	23.6
509	258-366	314	3	1.0	0.6	23.3	13.5
510	258-366	951	3	0.7	1.5	47.0	102.1
511	258-366	806	3	1.3	1.1	79.6	68.4
512	367-549	670	3	1.3	1.1	66.2	52.3
513	367-549	249	3	0.0	0.0	0.0	0.0
514	367-549	602	4	0.0	0.0	0.0	0.0
515	367-549	666	3	2.0	0.9	98.7	46.3
516	550-731	634	3	0.3	0.2	15.7	11.0
517	550-731	216	3	0.3	1.3	5.3	20.0
518	550-731	210	3	0.0	0.0	0.0	0.0
519	550-731	414	4	1.8	1.4	53.7	43.9
520	732-914	525	3	0.0	0.0	0.0	0.0
524	732-914	253	3	0.3	0.7	6.3	12.3
528	732-914	530	3	0.0	0.0	0.0	0.0
533	732-914	98	3	0.0	0.0	0.0	0.0
521	915-1097	517	3	0.0	0.0	0.0	0.0
525	915-1097	226	3	0.0	0.0	0.0	0.0
529	915-1097	488	3	0.0	0.0	0.0	0.0
532	915-1097	238	3	0.0	0.0	0.0	0.0
534	915-1097	486	3	0.0	0.0	0.0	0.0
522	1098-1280	533	3	0.0	0.0	0.0	0.0
526	1098-1280	177	2	0.0	0.0	0.0	0.0
530	1098-1280	1134	3	0.3	1.5	28.0	126.0
Total		15760	94			624.1	716.7

Table 22. Results from the trawl survey for Thorny Skate in Div. 3M, 2001.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance '000	Biomass, tons
				fish	kg		
501	127-146	342	3	0.3	0.5	8.4	12.2
502	147-183	838	3	0.0	0.0	0.0	0.0
503	185-256	628	3	1.0	0.8	46.5	37.1
504	185-256	348	3	0.3	0.0	8.6	0.7
505	185-256	703	3	0.0	0.0	0.0	0.0
506	185-256	496	3	0.3	0.9	12.2	32.5
507	258-366	822	3	0.3	0.0	0.0	0.0
508	258-366	646	3	0.7	0.7	31.9	32.3
509	258-366	314	3	0.3	0.5	7.8	12.6
510	258-366	951	3	0.0	0.0	0.0	0.0
511	258-366	806	3	0.0	0.0	0.0	0.0
512	367-549	670	3	0.3	0.2	16.5	8.5
513	367-549	249	3	1.3	1.2	24.6	22.0
514	367-549	602	3	0.3	0.4	14.9	16.2
515	367-549	666	3	1.7	0.9	82.2	42.4
516	550-731	634	3	1.7	1.9	78.3	91.4
517	550-731	216	2	1.0	1.0	16.0	16.2
518	550-731	210	3	0.3	0.1	5.2	2.3
519	550-731	414	4	1.3	1.4	38.3	43.0
520	732-914	525	3	0.7	0.4	25.9	15.6
524	732-914	253	3	0.7	1.8	12.5	34.1
528	732-914	530	3	2.0	3.1	78.5	120.6
533	732-914	98	2	1.0	1.4	7.3	10.5
521	915-1097	517	3	0.3	0.3	12.8	11.2
525	915-1097	226	2	1.0	1.1	16.7	18.2
529	915-1097	488	3	2.3	3.0	84.3	108.5
532	915-1097	238	3	0.3	0.0	0.0	0.0
534	915-1097	486	3	1.3	1.4	48.0	50.4
522	1098-1280	533	3	0.0	0.0	0.0	0.0
526	1098-1280	177	2	0.3	0.0	0.0	0.0
530	1098-1280	1134	3	0.3	1.1	28.0	88.2
Total		15760	90			705.4	826.7

Table 23. Results from the trawl survey for Spinytail Skate in Div. 3M, 2002.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	0.0	0.0	0.0	0.0
502	147-183	838	3	0.0	0.0	0.0	0.0
503	185-256	628	3	0.0	0.0	0.0	0.0
504	185-256	348	3	0.0	0.0	0.0	0.0
505	185-256	703	3	0.0	0.0	0.0	0.0
506	185-256	496	3	0.0	0.0	0.0	0.0
507	258-366	822	3	0.0	0.0	0.0	0.0
508	258-366	646	3	0.0	0.0	0.0	0.0
509	258-366	314	3	0.3	0.5	7.8	10.9
510	258-366	951	3	0.0	0.0	0.0	0.0
511	258-366	806	3	0.0	0.0	0.0	0.0
512	367-549	670	3	0.0	0.0	0.0	0.0
513	367-549	249	3	0.0	0.0	0.0	0.0
514	367-549	602	4	0.3	1.3	11.2	57.2
515	367-549	666	3	0.7	1.3	32.9	63.9
516	550-731	634	3	0.0	0.0	0.0	0.0
517	550-731	216	3	1.7	4.4	26.7	71.0
518	550-731	210	3	0.0	0.0	0.0	0.0
519	550-731	414	4	0.3	0.7	7.7	22.1
520	732-914	525	3	0.3	1.0	12.9	37.9
524	732-914	253	3	0.7	8.4	12.5	156.9
528	732-914	530	3	0.3	0.7	13.1	28.8
533	732-914	98	3	0.3	1.1	2.4	8.2
521	915-1097	517	3	0.3	4.1	12.8	157.0
525	915-1097	226	3	0.3	2.5	5.6	42.4
529	915-1097	488	3	0.0	0.0	0.0	0.0
532	915-1097	238	3	0.0	0.0	0.0	0.0
534	915-1097	486	3	0.0	0.0	0.0	0.0
522	1098-1280	533	3	0.7	2.2	26.3	86.9
526	1098-1280	177	2	0.0	0.0	0.0	0.0
530	1098-1280	1134	3	0.3	0.7	28.0	55.2
Total		15760	94			199.8	798.3

Table 24. Results from the trawl survey for Spinytail Skate in Div. 3M, 2001.

Stratum	Depth, m	Area, mile ²	Nos. of tows	Mean catch / 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	0.0	0.0	0.0	0.0
502	147-183	838	3	0.0	0.0	0.0	0.0
503	185-256	628	3	0.0	0.0	0.0	0.0
504	185-256	348	3	0.0	0.0	0.0	0.0
505	185-256	703	3	0.0	0.0	0.0	0.0
506	185-256	496	3	0.0	0.0	0.0	0.0
507	258-366	822	3	0.0	0.0	0.0	0.0
508	258-366	646	3	0.0	0.0	0.0	0.0
509	258-366	314	3	0.0	0.0	0.0	0.0
510	258-366	951	3	0.0	0.0	0.0	0.0
511	258-366	806	3	0.0	0.0	0.0	0.0
512	367-549	670	3	0.7	1.4	33.1	70.5
513	367-549	249	3	0.3	1.5	6.1	26.9
514	367-549	602	3	0.0	0.0	0.0	0.0
515	367-549	666	3	0.0	0.0	0.0	0.0
516	550-731	634	3	0.0	0.0	0.0	0.0
517	550-731	216	2	0.0	0.0	0.0	0.0
518	550-731	210	3	0.0	0.0	0.0	0.0
519	550-731	414	4	0.0	0.0	0.0	0.0
520	732-914	525	3	0.3	2.0	13.0	76.4
524	732-914	253	3	0.0	0.0	0.0	0.0
528	732-914	530	3	0.0	0.0	0.0	0.0
533	732-914	98	2	0.0	0.0	0.0	0.0
521	915-1097	517	3	0.0	0.0	0.0	0.0
525	915-1097	226	2	0.5	2.2	8.4	36.7
529	915-1097	488	3	0.7	0.7	24.1	23.5
532	915-1097	238	3	0.0	0.0	0.0	0.0
534	915-1097	486	3	0.3	0.8	12.0	28.7
522	1098-1280	533	3	0.7	4.3	26.3	168.6
526	1098-1280	177	2	0.5	6.5	6.6	85.2
530	1098-1280	1134	3	0.0	0.0	0.0	0.0
Total		15760	90			129.6	516.5

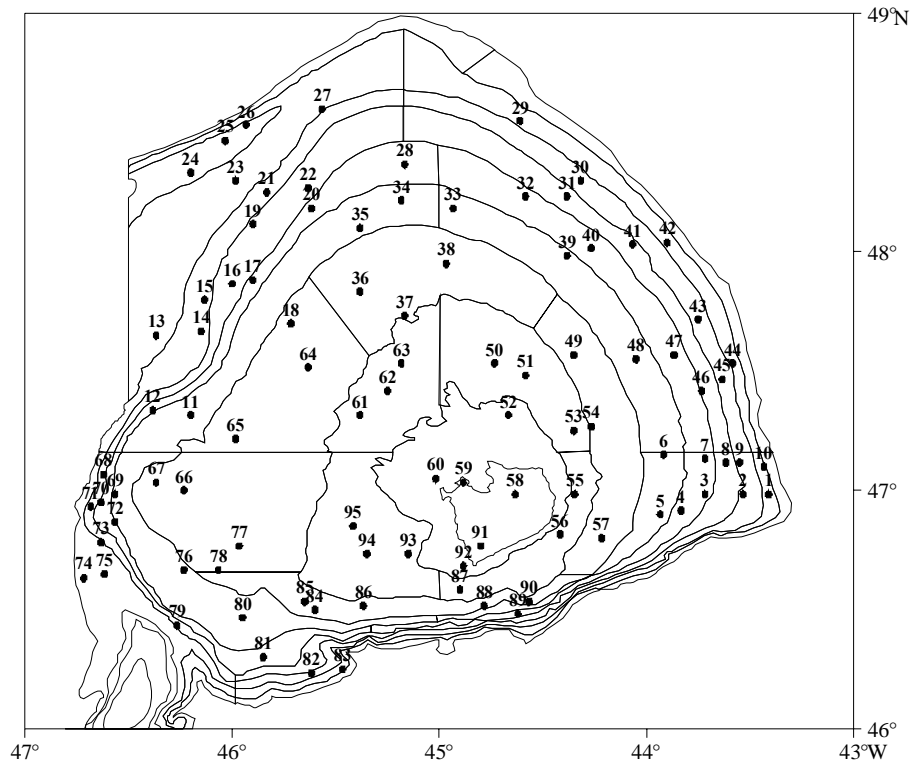


Fig. 1. Position of trawl stations in Div. 3M in 2002.

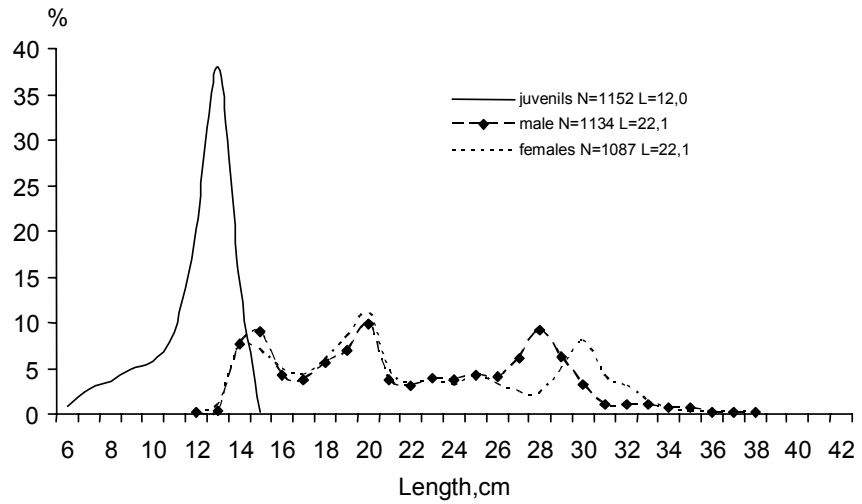


Fig. 2. Length composition of Beaked Redfish in Div. 3M in 2002.

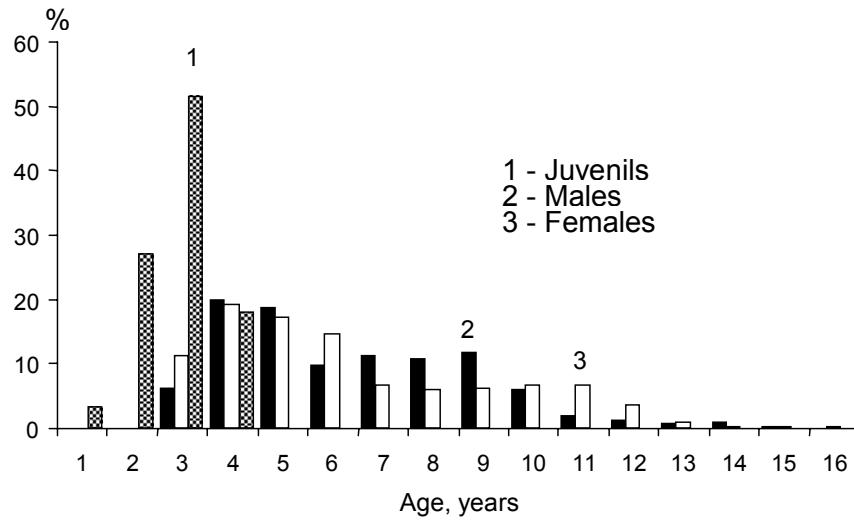


Fig. 3. Age composition of Beaked Redfish in Div. 3M in 2002.

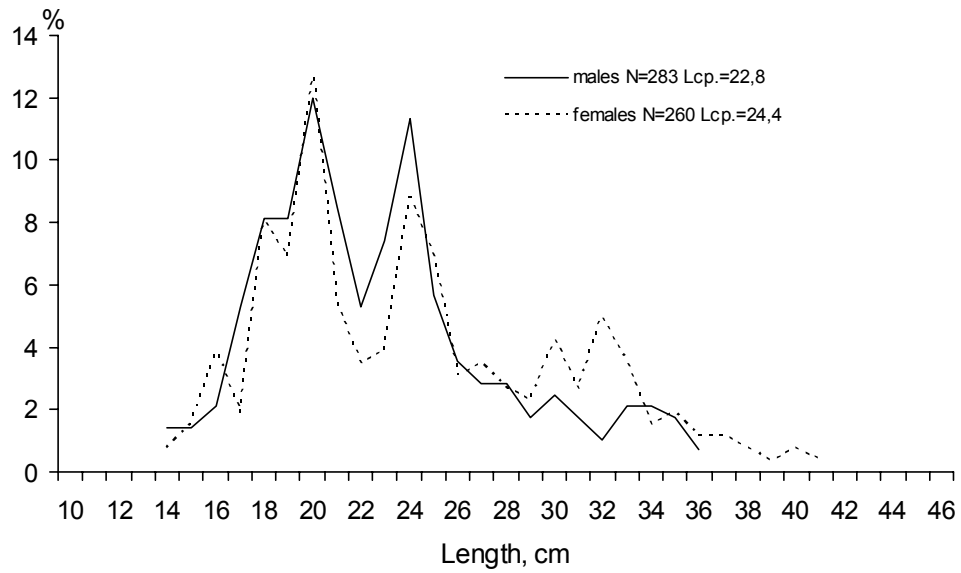


Fig. 4. Length composition of *S. marinus* in Div. 3M in 2002.

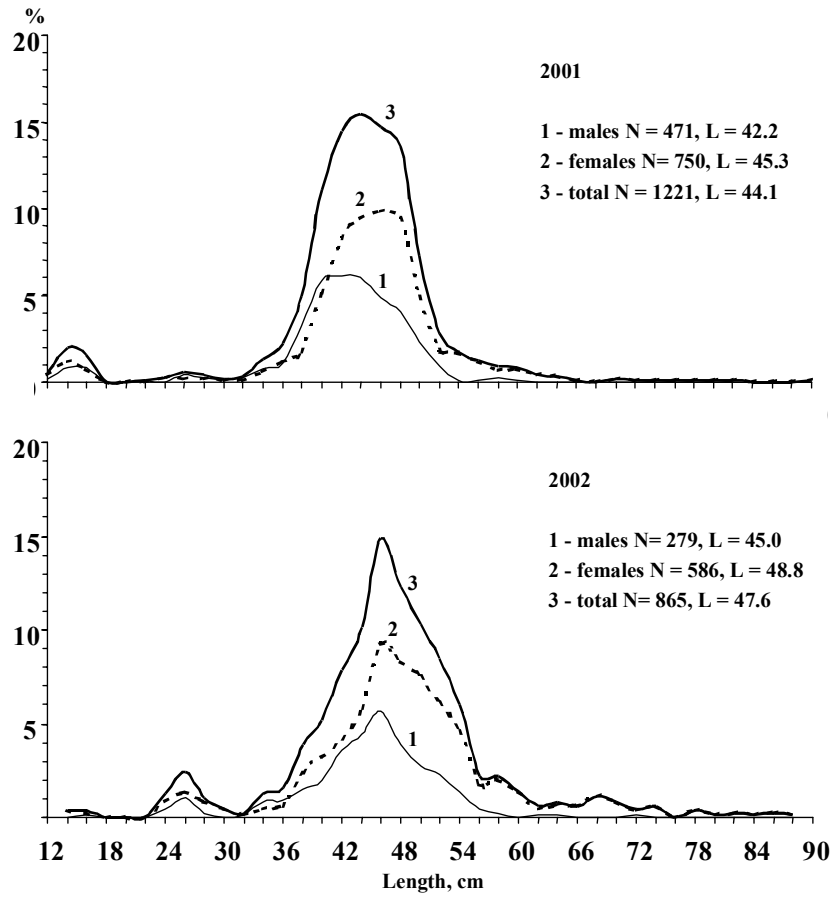


Fig. 5. Length composition of Greenland halibut in Div. 3M in 2001-2002.

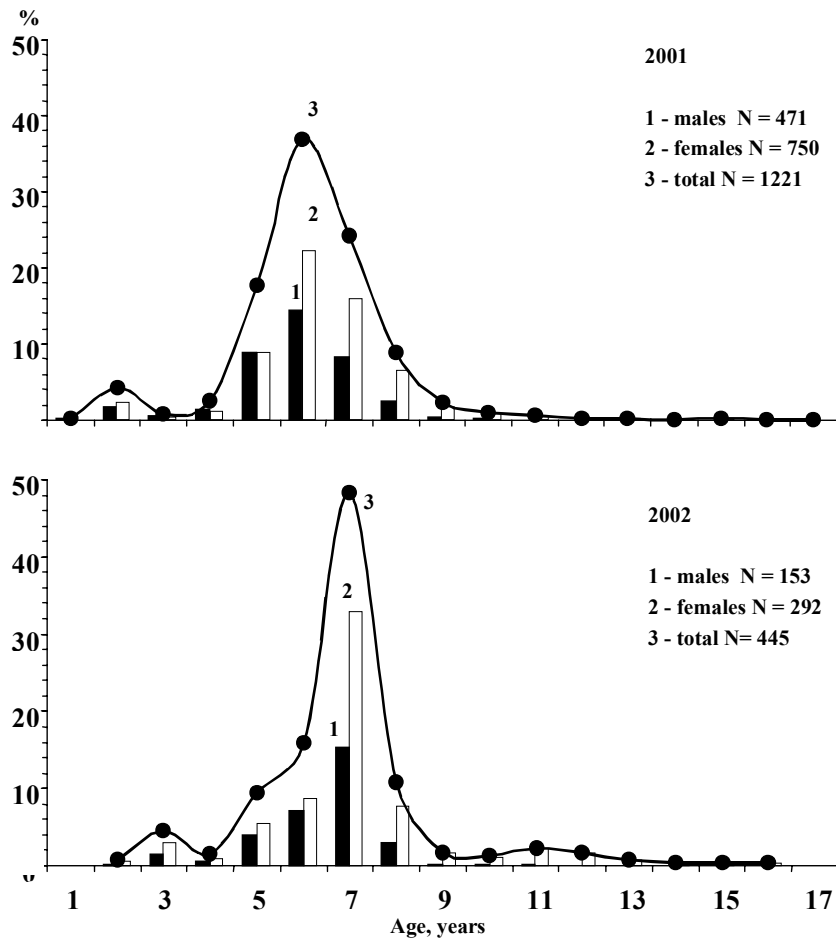


Fig. 6. Age composition of Greenland halibut in Div. 3M in 2001-2002.