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O-group saithe and herring off the Norwegian coast in April - May 1988



HAVFORSKNINGSINSTITUTTETS EGG- OG LARVEPROGRAM (HELP)

O-GROUP SAITHE AND HERRING OFF THE NORWEGIAN COAST IN APRIL - MAY 1988.

by

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ABSTRACT

In 1985 investigations were started to try to measure the abundance of 0-group saithe before the main concentrations entered the inshore waters. In 1986-1988 the investigation area was expanded to also cover the eastern part of the northern North Sea. This report gives some results from the cruise in April-May 1988. In 1987 the results indicated that the end of April was too late to get a good measurement of the 0-group from the North Sea. The cruise indicate, however, that this is too early to start. For the northern stock (north of 62^{0} N) the chosen time seems to be all right.

INTRODUCTION

One of the biggest problems in assessing the saithe stocks in the North Atlantic is the lack of good recruitment estimates. The O-group saithe are very early distributed in the inshore waters and it is almost impossible to measure the abundance when the fish are so close to the shore. In 1985 a cruise was undertaken with the aim of measuring the abundance of postlarvae of the Northeast Arctic saithe before the main concentrations reached the shore (Nedreaas 1986). In 1986 and 1987 the investigation was expanded to also cover the North Sea (Nedreaas and Smedstad 1987). To what extent it is possible to tell whether the index of abundance will show the right picture of the year class strength, a time series of such indices is needed. Then it will be possible to compare the index with the number of saithe of that year class entering the fishery 2-3 years later. This report gives some results from the investigation in 1988.

MATERIALS AND METHODS

In 1988 the investigation was carried out with R/V "Eldjarn" in the periods 5-17 April in the North Sea (trawl stations no. 81-133) and 30 April-24 May further north.

A 16 \times 16 fathoms mid-water capelin trawl with a 30 meter long codend with 8 mm stretched mesh was used. Height and depth sensors from SCANMAR A/S together with sensors measuring the distance between the wings of the trawl have given information about the trawl geometry on the different cruises.

Six extra 70'' floats were tied to the headrope. The trawl was towed with 3 knots for 10 minutes with the headrope at the surface, then 10 minutes in 20 meter and 10 minutes in 40 meter depth. The time and distance it took to lower the trawl from one depth to another was included in the total distance towed of 1.5

nautical miles.

The investigated area was covered by a rectangular survey grid. The distance between the tracks is generally 30 nautical miles, and the distance between two stations on the same track is generally 15 nautical miles (Figure 1). Hydrographical (CTD-sonde down to 500 meter) and egg/larvae (big Juday-net, 200-0 meter) stations were taken on each trawl station.

Measurements of the trawl geometry gave results similar to the investigation in 1987. The height, spread and area of the trawl opening were as follows (nautical miles in parenthesis):

Depth	Height	Spread	Area
0	20.0 (0.0108)	10.7 (0.0058)	$214.0 (6.3 \times 10^{-5})$
20	18.3 (0.0099)	14.2 (0.0077)	$260.0 (7.6 \times 10^{-5})$
40	15.0 (0.0081)	17.5 (0.0094)	$260.0 (7.6 \times 10^{-5})$

The volume of a trawl haul taken by R/V "Eldjarn" is calculated to be V_1 = 1.075 x 10^{-4} nm³. The trawl on R/V "Eldjarn" has a height of about 15 meter at 40 meter depth, which means that the trawl fishes down to 55 meter. A square around each trawl station of 15 x 30 nm will then have a volume of V_2 = 13.36 nm³.

The abundance index (I) is then calculated by the formula:

$$I = \Sigma V_2/V_1 \times X_i = V_2/V_1 \Sigma X_i$$

where $X_{\hat{t}}$ is the number of 0-group on station i.

RESULTS

Hydrography

Horizontal distributions of temperature at the surface, in 25 and 50 meter are shown in Figs. 2-4. The horizontal distribution of temperature was in 1988 very similar to the distribution in 1985 and 1987. In 1986 warmer water had moved further northwards, north of 66° N large areas down to below 25 meter showed in 1986 temperatures of above 8° C.

Horizontal distribution of salinity in 25 meter is shown in Fig. 5. The boundary for Atlantic water, > 35.0, is similar to the previous years. Coastal water make sharp fronts outside Western Norway. Seawater with salinity > 35.3 is intruding the investigated area from north of the Faroes.

Saithe, Pollachius virens

The distribution of 0-group saithe is shown in Fig.6. The distribution area seems to be well covered. However, south of Stad the investigations started too early, only 4 specimens of 0-group saithe were caught. The number of 0-group saithe caught in 1988 north of 62° N, was only 58% of the number caught in 1987, and the saithe were also more spread out in the Norwegian Sea.

	7	lear of in	nvestigat:	ion
	1985	1986	1987	1988
Index x 10 ⁻⁶ Reduction in %	828	545 34	280 48	165 41

The table above shows that a reduction of about 40% has occurred every year since the investigations started in 1985.

Table 1 shows length distributions of 0-group saithe from different areas from south to north. These distributions give information about how current transport and/or migration take place. The length distributions show an increase in the mean length northwards. This points to the fact that very little 0-group saithe from areas north of Møre have contributed to the total.

Herring, Clupea harengus

The horizontal distribution of herring larvae is shown in Fig.7. The herring larvae had not yet metamorphosed. There are two clearly separated areas of distribution, one from Stad $(62^{0}\,\mathrm{N})$ and southwards and one from Haltenbanken $(65^{0}\,\mathrm{N})$ and northwards. Table 2 shows a clear difference in the length distribution of herring larvae from these areas.

This year we caught 4213 herring larvae south of N 62⁰20' compared to 1261 in 1987. North of N 62⁰20' we caught 517 specimens this year compared to 1127 in 1987. We doubt and we have no basis for telling whether these numbers and fluctuations illustrates real year class variations of the herring stocks. In other herring investigations the 1988 year class has turned out to be much richer than the previous two ones. The mean length of the larvae is in both areas similar to the 1987 results.

Catfish, Anarhichas lupus

Scattered catches of catfish postlarvae were done all over the surveyed area as usual (Fig.8). North of 62° N the total catches in 1985, 1986, 1987 and 1988 were 256, 297, 253 and 218, respectively, indicating a very stable situation. South of 62° N the catches in 1986, 1987 and 1988 were 44, 106 and 33, respectively. Length distributions are given in Table 2.

Krill

Fig. 9 shows the distribution of krill (<u>Thysanoessa</u> spp. and <u>Meganyctiphanes</u> sp.). In 1986 we caught a lot of krill north of 65°N, in 1987 and 1988, however, there were very small amounts of krill so far north. This year we caught 126 litre krill north of 62°N, the corresponding amounts for 1986 and 1987 were 320 litre and 240 litre, respectively. South of 62°N we caught more krill this year than in the previous years. The catches in 1986, 1987 and 1988 were 62, 277 and 426 litre, respectively.

Other species

An account of all species or fauna categories caught on each trawl station is given in Appendix.

Larvae of <u>Chirolophis ascanii</u> and <u>Lumpenus</u> sp. which were common in the catches north of 62^{0} N both in 1985 and 1986, were only occasionally caught in 1987 and 1988. The same is the case for Argentina-larvae.

Larvae of Ammodytes spp. were scattered caught throughout the surveyed area, mainly north of 62^{0} N. The length distributions are shown in Table 2.

Larvae of redfish, <u>Sebastes</u> spp., were in 1985-1987 regulary caught from Røst $(68^{\circ}N)$ and northwards. In 1988 only one specimen was caught (station no. 279).

Postlarvae of cod (55 specimens) and haddock (26 specimens) were scattered caught from $62^{0}\,\mathrm{N}$ and northwards. The length distributions are shown in Table 2.

REFERENCES

NEDREAAS, K. 1986. Abundance and distribution of postlarvae in the O-group saithe survey in the north-east Arctic in 1985. ICES Doc. C.M. 1986/G:87, 32 pp.

NEDREAAS, K. AND O.M. SMEDSTAD 1987. Abundance and distribution of postlarvae in the O-group saithe survey in the North Sea and the northeast Arctic in 1986 and 1987. <u>ICES Doc. C.M. 1987/G:31, 27 pp.</u>

Tabell 1. Length distribution (1) of 0-group saithe.

Length group mm	S of 61 00'	61 ⁰ 00, -62 ⁰ 59'	63 ⁰ 00' -64 ⁰ 59'	65 ⁰ 00' -66 ⁰ 59'	N of 67 ⁰ 00'
10-14		1	1		
15-19	50	36	28	3	2
20-24	50	47	49	26	26
25-29		12	17	40	22
30~34		3	4	25	14
35~39		1	1	5	29
40-44			+	1	7
45-49				+	
Mean					
length	21.50	21.18	21.77	27.22	30.33
St.dev.	3.54	3.91	3.87	4.71	6.80
Tot.catch	2	320	640	332	4 2

Tabell 2. Length distribution (%) of other 0-group species south (S) and north (N) of 62 $^{0}\,$ N.

Length	HEI	RRING	CATE	ISH t	SANI	DEEL	COD	HADDOCI
group mm	S	N	S	N	S	N	N	N
5- 9				and the second s		A Company of the Comp	and the second	ngga a saya asawa asak ki ba 2009 yani a maga ba sak ki ba da sa
10-14							3	
15-19		1	4	1			26	8
20-24		49	18	14	14		44	31
25-29	+	38	37	17		3	24	46
30-34	1	2	22	15	14	14	3	4
35-39	30	5	15	12	72	27		7
40-44	62	2	4	18		32		
45-49	6	4		13		21		
50-54	+	1		7		3		4
55-59		+		3		÷		
60-64		1						
Mean	and the second s		The state of the s			- CONTRACTOR OF THE PROPERTY AND ADDRESS OF THE PROPERTY OF TH	A CONTRACTOR OF THE PARTY OF TH	
length	40.36	26.13	29.55	36.05	35.11	40.03	21.89	26.54
St.dev.	2.53	6.74	5.65	9.86	4.59	5.65	4.21	7.32
Tot.catch	4167	563	33	218	7	236	55	26

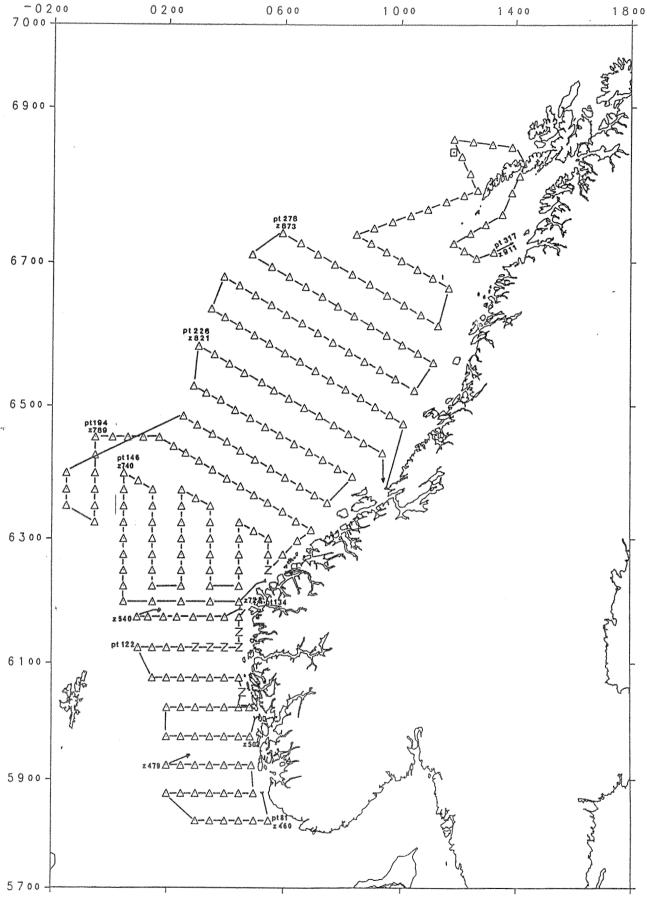


Figure 1. Survey tracks and station map R/V "Eldjarn", 5/4 - 18/4 and 30/4 - 24/5 1988.

 \triangle = Pelagic trawl station + CTD-sonde + Juday-net.

Z = CTD-sonde + Juday-net.

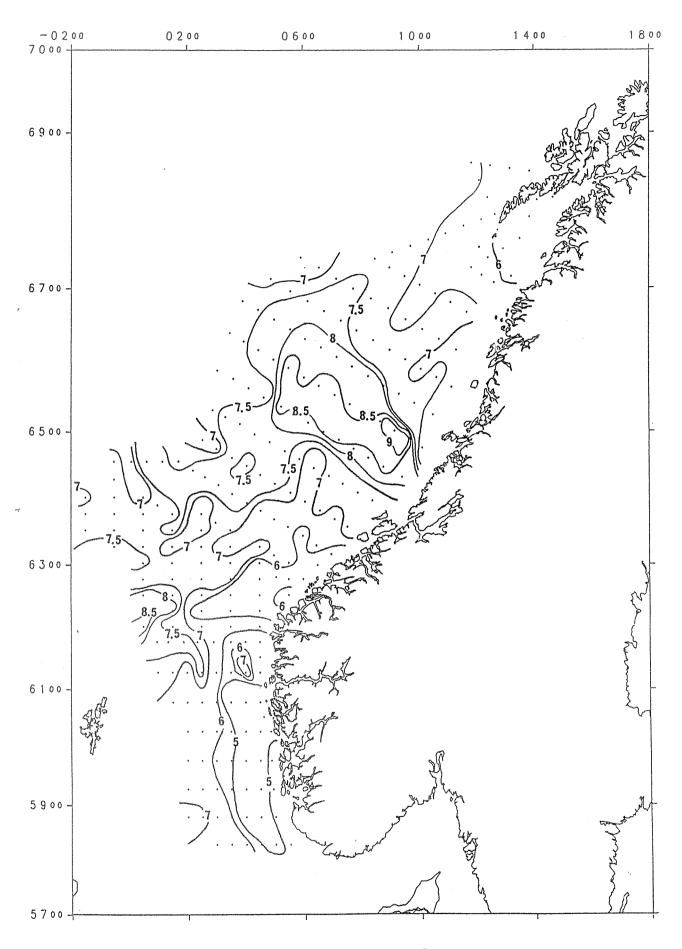


Figure 2. Temperature distribution (°C) at the surface.

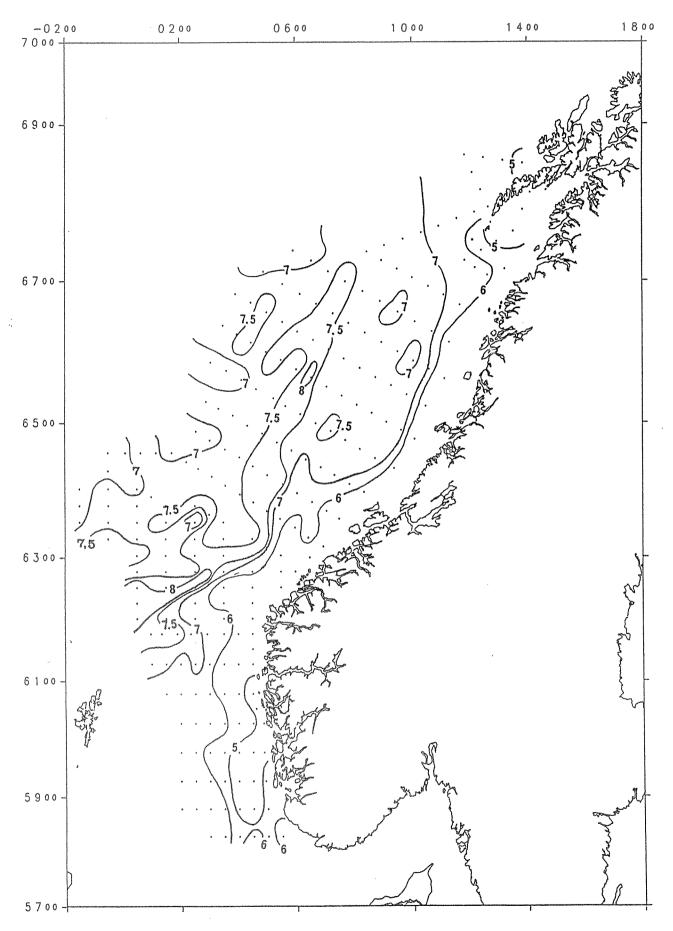


Figure 3. Temperature distribution ($^{\circ}$ C) at 25 m depth.

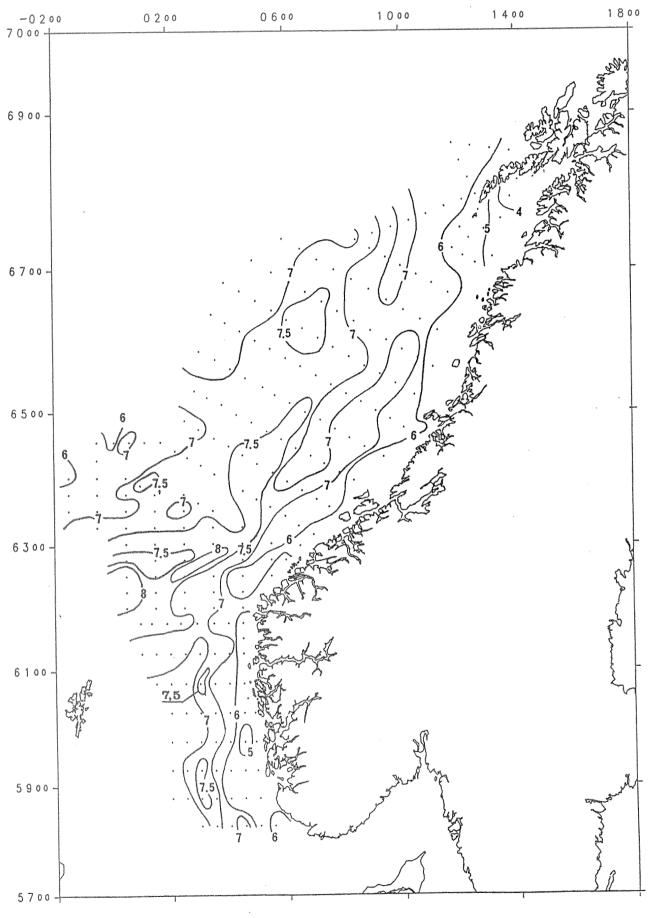


Figure 4. Temperature distribution ($^{\circ}$ C) at 50 m depth.

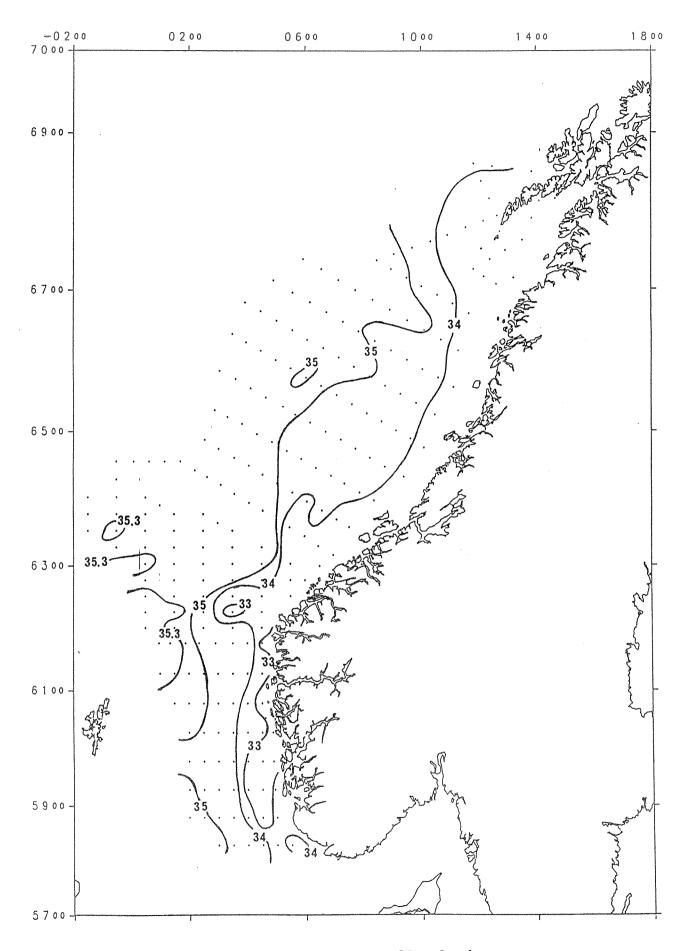


Figure 5. Salinity distribution at 25 m depth.

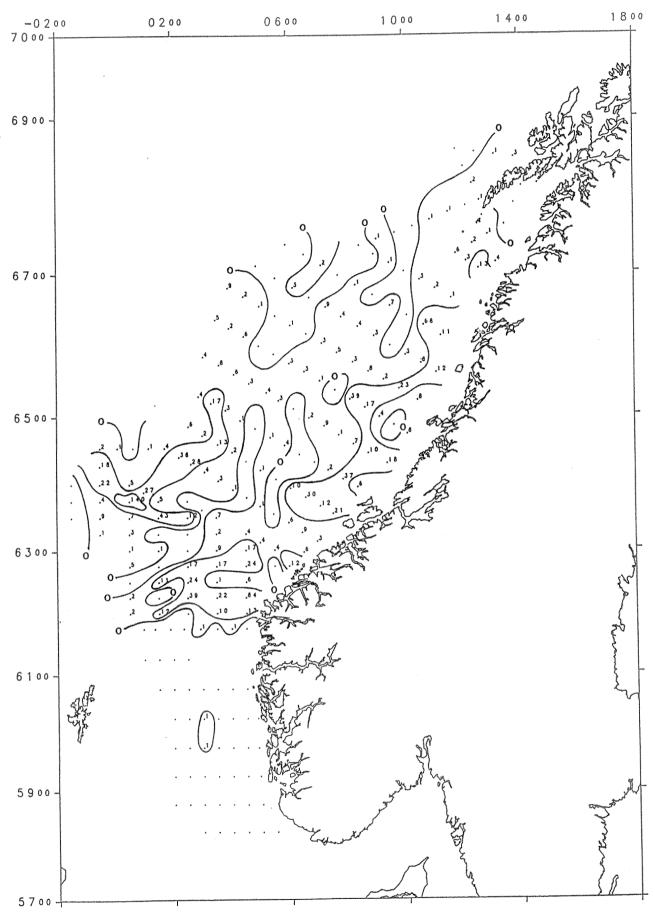


Figure 6. Distribution of 0-group saithe (number caught per 1.5 n.m. trawling). Stations without catch are only marked.

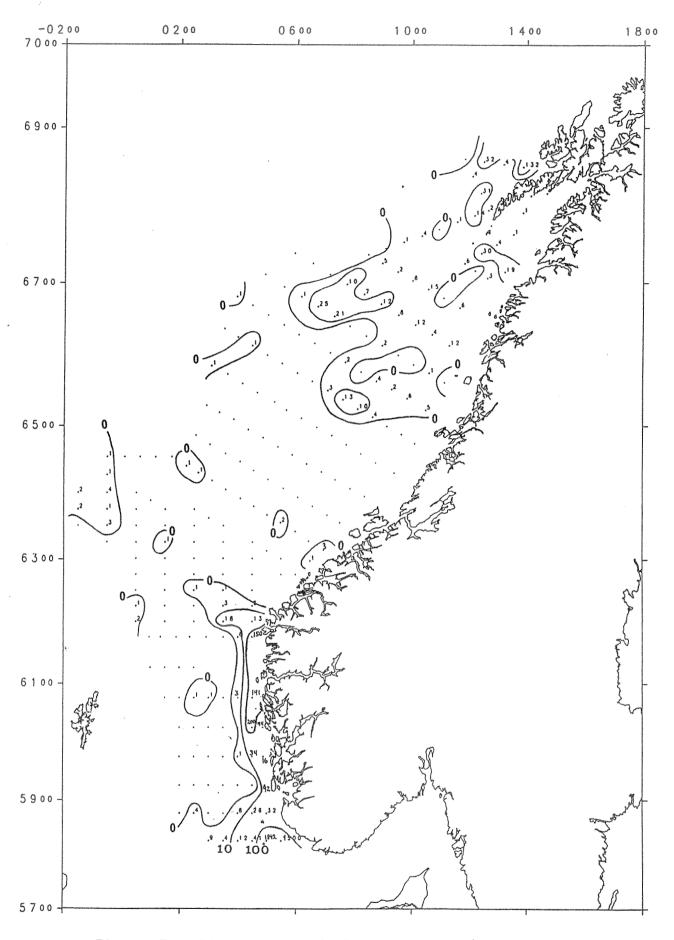


Figure 7. Distribution of 0-group herrin (number caught per 1.5 n.m. trawling). Stations without cetch are only marked.

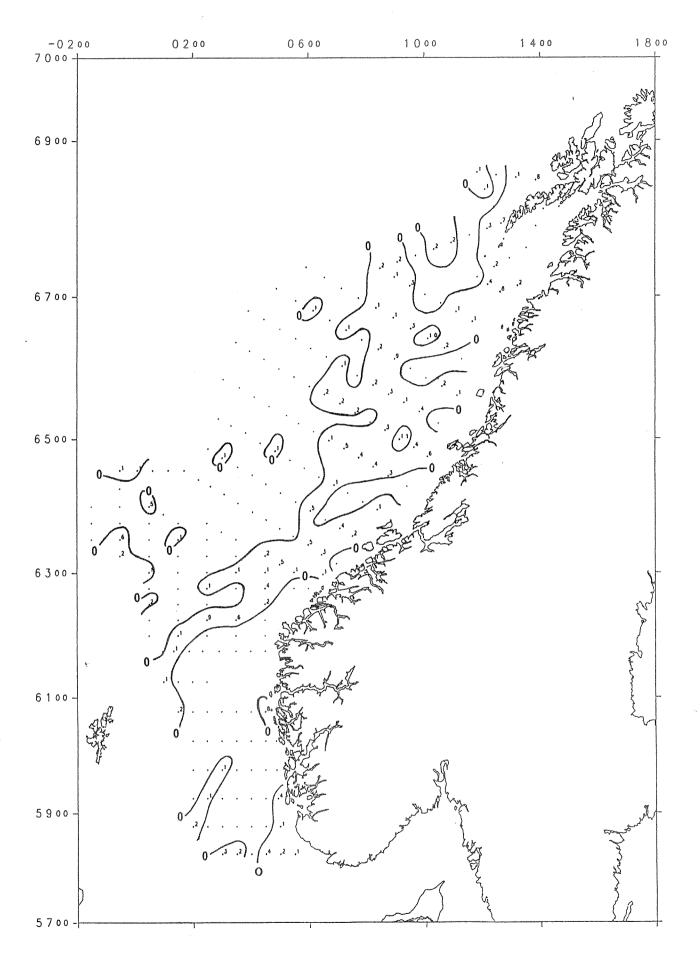


Figure 8. Distribution of 0-group catfish (number caught per 1.5 n.m. trawling). Stations without catch are only marked.

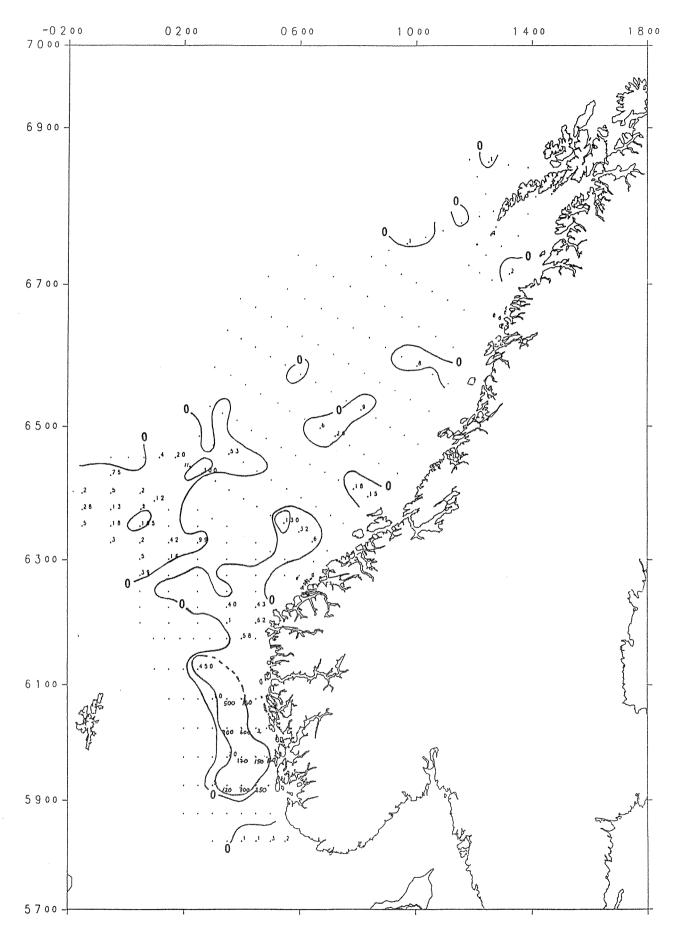


Figure 9. Distribution of krill (decilitre caught per 1.5 n.m. trawling). Stations without catch are only marked.

Appendix. Catch in number of different species on each trawl station. Krill is measured in decilitre.

					STA	TION	NUMBE	R				
SPECIES	8 1	82	83	84	85	86	87	88	89	90	91	92
HERRING	1500	1842	4 1	12	4	9	273	4	0	0	8	26
SQUID	0	0	0	0	0	0	0	3	0	0	0	0
SAITHE	0	0	0	0	0	0	0	0	0	0	0	0
LUMPSUCKER	4	4	3	5	0	0	0	0	0	0	1	0
SANDEEL	1	0	0	0	0	0	0	0	0	0	0	0
CATFISH	1	2	4	0	2	3	2	0	0	0	0	0
CRYSTAL GO	0	1	18	4	0	3	8	4	2	0	4	18
HADDOCK	_	0		0	1	0	0	0	0	0	0	0
	0		0				_					
LONG ROUGH	0	0	0	0	0	0	2	1	0	0	. 0	0
SAND GOBY	0	0	0	0	0	0	6	15	2	0	1	0
DAB	0	0	0	0	0	0	4	0	0	0	0	0
WHITING	0	0	0	0	0	0	0	2	0	0	0	0
POGGE	0	0	0	0	0	0	0	1	0	0	0	0
					STA	TION	NUMBE	R				
SPECIES	93	94	95	96	97	98	99	100	101	102	103	104
LANTERN FI	0	0	0	0	0	0	0	0	2	0	0	0
GREATER SI	0	0	0	14	0	0	0	0	0	0	0	0
HERRING	32	92	0	0	636	0	0	ō	16	3 4	1	1
SAITHE	0	0	0	0	0	0	0	0	0	0	0	2
LUMPSUCKER	1	0	2	3	0	0	0	o	1	0	1	1
KRILL	Ö	0	250	700	120	5	0	0	160	150	170	20
PEARLSIDE	0	0	2.30 6	0	0	0	0	0	0	0	0	294
CATFISH	0	4	0	0	0	0	1	0	0	0	0	0
CRYSTAL GO	15	26	0	0	0	0	ò	0	11	4	0	8
WHITING	0	20	0	0	12	0	0	0	0	0	0	0
WILLTING		ď	0	0		J	Ü	ū		Ü	Ŭ	ŭ
					STA	TION	NUMBE	R				
SPECIES	105	106	107	108	109	110	111	112	113	114	115	116
LANTERN FI	0	0	0	0	0	0	0	0	0	0	0	21
GREATER SI	0	0	0	0	0	3	0	0	0	0	0	0
HERRING	0	0	0	0	0	1	40	25	44	200	141	3
BLUE WHITI	0	0	0	0	0	0	1	0	0	0	0	0
SAITHE	2	0	0	0	0	1	o	0	0	0	0	0
LUMPSUCKER	0	0	0	0	0	0	1	2	0	1	0	0
SANDEEL	0	0	0	0	0	0	Ó	0	0	0	1	5
PEARLSIDE	0	0	0	0	0	0	0	0	0	0	0	5 5
CATFISH	1	0	0	0	0	0	0	0	0	0	8	0
CRYSTAL GO	0										1	υ 1
		0	0	0	0	22	0	0	2	28		
HADDOCK	1	0	0	0	0	0	0	0	0	0	0	0
WHITING	0	0	0	0	1	0	0	0	0	0	0	0

1 0 0 0

WHITING 0 0 HORSE MACK 0 1

SPECIES	117	118	119	120	121	122	123	124	125	126	127	128
LANTERN FI	0	0	0	0	0	0	0	0	0	0	4	6
GREATER SI	0	0	0	0	0	0	0	0	0	0	3	0
HERRING	20	18	4	0	0	O	0	0	3	150	6	0
BLUE WHITI	0	0	0	0	0	0	0	0	600	0	1	0
SQUID	0	0	0	0	0	0	0	0	0	0	2	1
SAITHE	0	0	0	0	0	0	0	0	0	0	1	0
LUMPSUCKER	0	2	0	0	0	0	0	0	0	0	2	1
COBIES	0	0	0	0	0	0	0	0	0	0	0	2
SANDEEL	0	0	0	0	0	0	0	0	0	0	0	1
PEARLSIDE	0	0	0	0	0	0	0	0	60	0	0	0
CATFISH	0	0	0	0	2	1	0	0	0	0	0	0
HADDOCK	0	0	0	0	0	1	0	0	0	0	0	0
LAMPREYS	1	0	0	0	0	0	0	0	0	0	0	0
GARFISH	0	2	0	0	0	0	0	0	4	4	0	0
					STA	NOITA	NUMBE	ER				
SPECIES	129	130	131	132	133	134	135	136	137	138	139	140
LANTERN FI	0	18	1	0	0	0	0	0	0	0	0	0
GREATER SI	0	0	0	0	0	5	0	0	0	0	0	0
HERRING	0	0	0	0	0	13	18	0	0	2	1	0
SQUID	0	0	0	0	0	0	3	0	2	0	0	0
SAITHE	1	0	0	0	0	13	10	0	12	2	2	0
LUMPSUCKER	1	0	0	0	0	0	0	0	0	0	0	0
KRILL	0	0	0	0	0	62	1	0	0	0	0	0
COBIES	4	0	0	0	0	0	0	0	0	0	0	0
SANDEEL	0	0	0	0	0	1	0	0	0	0	0	0
PEARLSIDE	4	0	0	0	0	0	0	0	0	0	0	0
MACKEREL	0	1	0	0	0	0	0	0	0	0	0	0
CATFISH	0	0	0	1	0	0	0	0	1	0	0	2
CRYSTAL GO	0	0	0	0	0	1	0	0	0	0	0	0
HADDOCK	0	0	0	0	0	0	0	0	4	0	0	0
					STA	MOITA	NUMBE	ER				
SPECIES	141	142	143	144	145	146	147	148	149	150	151	152
LANTERN FI	715	51	0	0	0	0	0	0	0	2730	392	0
GREATER SI	1	1	0	0	0	0	0	0	0	1	0	0
HERRING	0	0	0	0	0	0	0	0	0	1	0	0
SQUID	0	0	l _s	0	0	0	0	0	36	0	0	0
SAITHE	5	1	3	7	140	5	27	5	43	0	4	0
LUMPSUCKER	0	0	0	0	0	0	1	0	0	0	0	0
KRILL	39	5	2	105	2	2	12	0	0	42	16	0
COBIES	0	0	0	0	0	0	0	0	0	0	0	1
SANDEEL	1	0	0	0	0	0	2	0	0	1	0	1
PEARLSIDE	331	9	0	0	0	0	0	0	1	70	272	0
CATFISH	0	1 0	0	0	0	5	0	0	1	0	0	0
BULLHEADS PARALEPIDA	υ 0	U 0	0	0	1	0	0	0	0	0	0	0
INNALETIUA	U	U	U	U	U	0	0	0	0	2	0	0

SPECIES	153	154	155	156	157	158	159	160	161	162	163	164
LANTERN FI	2	0	0	0	0	0	2080	0	0	0	0	0
HERRING	0	0	0	1	0	0	0	0	0	0	0	0
SQUID	260	2	11	1	31	0	3	0	144	9	5	1
SAITHE	11	0	39	24	17	0	0	12	0	0	7	2
LUMPSUCKER	0	0	2	0	0	0	0	0	1	1	0	0
KRILL	0	0	0	0	0	0	98	0	0	0	0	0
COBIES	0	0	10	1	0	0	0	0	0	0	0	0
SANDEEL	1	0	14	46	2	0	3	1	0	5	0	0
PEARLSIDE	0	0	0	0	0	0	1716	0	0	0	0	0
CATFISH	0	0	9	0	1	0	0	0	0	0	0	0
HADDOCK	0	0	3	0	0	0	0	0	0	1	0	6
BULLHEADS	0	0	0	0	0	0	0	0	0	1	0	0
PARALEPIDA	0	0	1	1	0	0	0	0	0	0	0	8
CONGER EEL	0	0	1	0	0	0	0	0	0	0	0	0
					CTA	T 7 AN	NUMBE	n				
					21A	IIUN	NUMBE	к				
SPECIES	165	166	167	168	169	170	171	172	173	174	175	176
LANTERN FI	0	0	0	2	0	0	0	0	0	0	0	0
GREATER SI	0	0	0	0	8	1	0	0	0	0	0	0
HERRING	0	0	1	3	9	0	0	O	0	0	0	0
SQUID	0	0	0	4	2	0	0	0	0	11	0	0
SAITHE	9	17	1	22	8 4	6	24	17	4	4	4	0
LUMPSUCKER	0	1	0	1	0	0	0	0	2	1	0	0
KRILL	0	0	0	40	43	0	0	0	0	0	0	0
COBIES	0	0	0	26	1	0	0	0	0	0	0	0
SANDEEL	0	8	0	20	12	7	2	15	34	9	Ö	0
CATFISH	1	0	0	6	0	2	4	1	2	5	1	0
HADDOCK	0	0	0	0	1	2	0	0	0	0	0	0
BULLHEADS	0	0	0	1	0	0	0	0	0	0	0	0
COD	0	0	0	19	19	0	0	0	0	0	0	0
GARFISH	0	0	0	2	0	0	0	0	0	0	0	0
	_	_	-	•								
					SIA	ITON	NUMBE	ĸ				
SPECIES	177	178	179	180	181	182	183	184	185	186	187	188
LANTERN FI	0	0	0	0	0	40	4	0	0	0	0	0
GREATER SI	1	0	0	0	0	0	0	0	0	0	0	0
HERRING	0	12	3	0	4	10	0	0	0	0	0	1
BLUE WHITI	0	0	0	0	0	48	0	0	0	0	0	0
SQUID	5	1	0	1	0	0	0	5	0	0	1	0
SAITHE	12	6	3	9	6	0	1	0	dens	3	4	28
LUMPSUCKER	1	0	0	1	1	0	0	0	0	0	0	0
KRILL	0	0	0	6	32	130	0	0	0	0	0	300
COBIES	2	1	0	0	0	0	0	0	0	0	0	0
SANOEEL	7	0	0	0	0	2	0	0	0	0	8	0
PEARLSIDE	0	0	0	0	3	0	0	0	0	0	0	0
CATFISH	0	1	0	3	5	0	0	0	0	0	0	0
HADDOCK	2	0	0	4	1	0	0	0	0	0	0	0
COD	5	3	0	0	0	0	0	0	0	0	0	0
LONG ROUGH	0	0	0	0	1	0	O	0	0	0	0	0

SPECIES	189	190	191	192	193	194	195	196	197	198	199	200
LANTERN FI	0	4	23	0	0	0	0	0	0	1	78	300
GREATER SI	0	0	0	0	0	0	1	0	0	0	0	0
HERRING	1	0	0	0	0	1	1	4	1	3	0	0
SQUID	0	30	1	4	1	5	5	43	0	3	5	0
SAITHE	36	4	1	0	1	2	18	22	4	9	1	0
LUMPSUCKER	0	0	0	0	0	0	1	0	0	0	0	2
KRILL	11	20	4	0	0	0	75	5	13	18	3	5
SANDEEL	1	0	0	0	0	0	1	0	1	0	0	0
PEARLSIDE	0	0	720 0	475 0	0 1	0 1	0 0	0 0	0	0 6	0 2	3250 0
CATFISH	U	U	υ	u	ı	1	U	U	U	Q	4	U
					STA	TION	NUMBE	R				
SPECIES	201	202	203	204	205	206	207	208	209	210	211	212
LANTERN FI	0	5	0	0	0	0	0	0	0	0	0	0
HERRING	2	2	0	0	0	0	0	0	0	0	0	0
BLUE WHITI	0	0	0	0	18	0	0	0	0	0	0	0
SQUID	27	43	53	400	3	1	4	1	0	0	1	0
SAITHE	0	0	6	2	13	2	0	1	0	10	30	12
LUMPSUCKER	0	0	0	1	0	0	0	0	0	2	0	1
KRILL	28	2	0	0	53	0	0 0	0	0	0 5	0 2	0 0
SANDEEL PEARLSIPE	0 8114	0 0	1 0	0	0 3	0	0	0	0	0	0	0
CATFISH	0114	0	0	1	0	0	0	0	0	5	0	4
HADDOCK	0	0	0	Ó	0	0	0	0	0	2	0	1
PARALEPIDA	0	0	0	0	1	1	0	0	0	0	0	0
COD	0	0	0	0	0	0	0	0	0	3	1	1
GARFISH	0	0	0	0	0	0	0	0	0	0	1	0
LONG ROUGH	0	0	0	0	0	0	0	0	0	1	0	0
					STA	TION	нимве	R				
SPECIES	213	214	215	216	217	218	219	220	221	222	223	224
HERRING	0	0	0	0	1	0	29	0	0	0	0	0
SQUID	0	0	0	3	0	2	208	13	14	1110	12	239
SAITHE	2 1	6	37	2	0	0	l _p	1	0	1	3	17
LUMPSUCKER	2	2	1	2	1	1	3	1	0	0	0	0
KRILL	0	15	18	0	0	0	0	0	0	0	0	0
SANDEEL	2	0	0	0	0	0	0	0	2	0	0	0
PEARLSIDE	0	1	0	0	0	0	0	0	0	0	0	0
CATFISH	2	1	0	0	1	0	0	0	1	0	0	0
HADDOCK	4	0	0	0	0	0	0	0	0	0	0	0
COD	3	0	0	0	0	0	0	0	0	0	0	0

SPECIES	225	226	227	228	229	230	231	232	233	234	235	236
HERRING	0	1	0	0	0	0	0	0	0	2	0	1
SQUID	13	200	70	43	71	4	0	14	3	0	1	1
SAITHE	4	4	8	6	3	4	3	0	2	9	1	7
LUMPSUCKER	0	0	0	0	1	0	0	0	0	0	0	0
KRILL	0	0	0	0	0	0	0	0	6	26	0	0
SANDEEL	0	1	1	1	9	2	1	0	0	0	0	0
PEARLSIDE	0	0	0	0	0	0	0	0	115	27	0	0
CATFISH	0	0	0	0	0	0	0	0	1	5	4	4
BULLHEADS	0	0	0	0	0	0	0	0	0	0	1	0
					STA	TION	NUMBE	R				
SPECIES	237	238	239	240	241	242	243	244	245	246	247	248
HERRING	0	0	0	11	12	4	10	13	3	0	0	2
SQUID	1	0	1	0	0	7	0	0	0	28	0	3
SAITHE	10	18	8	0	4	17	39	0	1	3	3	0
LUMPSUCKER	0	2	0	0	0	0	0	0	0	1	2	2
KRILL	0	0	0	0	0	0	9	0	0	0	Đ	0
SANDEEL	0	3	0	0	0	0	0	0	0	0	0	0
CATFISH	3	0	6	4	11	3	0	2	2	2	0	0
HADDOCK	0	0	1	0	0	0	0	0	0	0	0	0
GARFISH	0	0	0	0	0	0	1	0	0	0	0	0
SPURDOG	0	0	0	1	0	0	0	0	0	0	0	0
					STA	TION	NUMBE	R				
SPECIES	249	250	251	252	253	254	255	256	257	258	259	260
SPECIES HERRING	249	250 1	251	252	253	254	255 0	256 0	257 0	258 1	259 0	260 14
HERRING	0	1	0	0	1	0	0	0	0	1	0	14
HERRING SQUID	0 29	1 230	0 4 0	0 190	1 1 1 0	0 50	0 1120	0 42	0 74	1	0 48	1 4 0
HERRING SQUID SAITHE	0 29 0	1 230 6	0 4 0 2	0 190 5	1 110 9	0 50 2	0 1120 1	0 4 2 0	0 7 4 1	1 1 0	0 48 3	1 4 0 5
HERRING SQUID SAITHE LUMPSUCKER	0 29 0	1 230 6 0	0 4 0 2 0	0 190 5 0	1 110 9 0	0 50 2 0	0 1120 1 0	0 4 2 0 0	0 7 4 1 2	1 1 0 0	0 48 3 1	1 4 0 5
HERRING SQUID SAITHE LUMPSUCKER SANDEEL CATFISH HADDOCK	0 29 0 0	1 230 6 0	0 4 0 2 0	0 190 5 0	1 110 9 0	0 50 2 0 0 0	0 1120 1 0	0 42 0 0	0 74 1 2 0	1 1 0 0	0 48 3 1	1 4 0 5 2
HERRING SQUID SAITHE LUMPSUCKER SANDEEL CATFISH HADDOCK PARALEPIDA	0 29 0 0 0 0	1 230 6 0 0 0	0 4 0 2 0 0	0 190 5 0 1	1 110 9 0 0 0	0 50 2 0 0	0 1120 1 0 0 0	0 42 0 0 0 0 1	0 74 1 2 0 0	1 1 0 0 0 0	0 48 3 1 0 1 0	1 4 0 5 2 0 0
HERRING SQUID SAITHE LUMPSUCKER SANDEEL CATFISH HADDOCK	0 29 0 0 0 0	1 230 6 0 0	0 40 2 0 0	0 190 5 0 1 0	1 110 9 0 0	0 50 2 0 0 0	0 1120 1 0 0	0 4 2 0 0 0 0	0 74 1 2 0 0	1 1 0 0 0 0	0 48 3 1 0	14 0 5 2 0 0
HERRING SQUID SAITHE LUMPSUCKER SANDEEL CATFISH HADDOCK PARALEPIDA	0 29 0 0 0 0	1 230 6 0 0 0	0 40 2 0 0 0	0 190 5 0 1 0	1 110 9 0 0 0 0	0 50 2 0 0 0 0	0 1120 1 0 0 0	0 42 0 0 0 0 1 1	0 74 1 2 0 0	1 1 0 0 0 0	0 48 3 1 0 1 0	1 4 0 5 2 0 0
HERRING SQUID SAITHE LUMPSUCKER SANDEEL CATFISH HADDOCK PARALEPIDA	0 29 0 0 0 0	1 230 6 0 0 0	0 40 2 0 0 0	0 190 5 0 1 0	1 110 9 0 0 0 0	0 50 2 0 0 0 0	0 1120 1 0 0 0 0	0 42 0 0 0 0 1 1	0 74 1 2 0 0	1 1 0 0 0 0	0 48 3 1 0 1 0	14 0 5 2 0 0
HERRING SQUID SAITHE LUMPSUCKER SANDEEL CATFISH HADDOCK PARALEPIDA GARFISH SPECIES HERRING	0 29 0 0 0 0 0 0	1 230 6 0 0 0 0 0	0 40 2 0 0 0 0 0	0 190 5 0 1 0 0 0	1 110 9 0 0 0 0 0 0	0 50 2 0 0 0 0	0 1120 1 0 0 0 0	0 42 0 0 0 0 1 1 0	0 74 1 2 0 0 1 0	1 1 0 0 0 0 0 0	0 48 3 1 0 1 0 0	14 0 5 2 0 0 0
HERRING SQUID SAITHE LUMPSUCKER SANDEEL CATFISH HADDOCK PARALEPIDA GARFISH SPECIES HERRING SQUID	0 29 0 0 0 0 0 0 0	1 230 6 0 0 0 0 0	0 40 2 0 0 0 0 0 0	0 190 5 0 1 0 0 0	1 110 9 0 0 0 0 0 STA	0 50 2 0 0 0 0 0 TION	0 1120 1 0 0 0 0 0 0 0 0	0 42 0 0 0 0 1 1 0 R	0 74 1 2 0 0 1 0 0	1 1 0 0 0 0 0 0	0 48 3 1 0 1 0 0 0	14 0 5 2 0 0 0 1
HERRING SQUID SAITHE LUMPSUCKER SANDEEL CATFISH HADDOCK PARALEPIDA GARFISH SPECIES HERRING SQUID SAITHE	0 29 0 0 0 0 0 0 0	1 230 6 0 0 0 0 0	0 40 2 0 0 0 0 0	0 190 5 0 1 0 0 0	1 110 9 0 0 0 0 0 STA 265	0 50 2 0 0 0 0 0 TION 266	0 1120 1 0 0 0 0 0 0 NUMBE	0 42 0 0 0 1 1 0 R	0 74 1 2 0 0 1 0 0	1 1 0 0 0 0 0 0 0	0 48 3 1 0 1 0 0 0	14 0 5 2 0 0 0 1
HERRING SQUID SAITHE LUMPSUCKER SANDEEL CATFISH HADDOCK PARALEPIDA GARFISH SPECIES HERRING SQUID SAITHE LUMPSUCKER	0 29 0 0 0 0 0 0 0 0	1 230 6 0 0 0 0 0 0 0 262 4 12 8 1	0 40 2 0 0 0 0 0 0	0 190 5 0 1 0 0 0	1 110 9 0 0 0 0 0 0 STA	0 50 2 0 0 0 0 0 TION 266	0 1120 1 0 0 0 0 0 0 0 NUMBE 267	0 42 0 0 0 0 1 1 0 R	0 74 1 2 0 0 1 0 0 0	1 1 0 0 0 0 0 0 0	0 48 3 1 0 1 0 0 0	14 0 5 2 0 0 0 1 1 272
HERRING SQUID SAITHE LUMPSUCKER SANDEEL CATFISH HADDOCK PARALEPIDA GARFISH SPECIES HERRING SQUID SAITHE LUMPSUCKER KRILL	0 29 0 0 0 0 0 0 0 0	1 230 6 0 0 0 0 0 0 0 262 4 12 8 1	0 40 2 0 0 0 0 0 0 0	0 190 5 0 1 0 0 0 0	1 110 9 0 0 0 0 0 STA 265 5 0 8 0	0 50 2 0 0 0 0 0 0 TION 266 0 12 0	0 1120 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 42 0 0 0 1 1 1 0 R	0 74 1 2 0 0 1 0 0 0	1 1 0 0 0 0 0 0 0 0 0	0 48 3 1 0 1 0 0 0	14 0 5 2 0 0 0 1 1 272
HERRING SQUID SAITHE LUMPSUCKER SANDEEL CATFISH HADDOCK PARALEPIDA GARFISH SPECIES HERRING SQUID SAITHE LUMPSUCKER KRILL PEARLSIDE	29 0 0 0 0 0 0 0 0 0 0	1 230 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 40 2 0 0 0 0 0 0 0	0 190 5 0 1 0 0 0 0	1 110 9 0 0 0 0 0 STA 265	0 50 2 0 0 0 0 0 0 0 0 0 12 0	0 1120 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 42 0 0 0 1 1 1 0 R 268	0 74 1 2 0 0 1 0 0 0	1 1 0 0 0 0 0 0 0 0 0 0	0 48 3 1 0 1 0 0 0	14 0 5 2 0 0 0 1 1 272 0 1 4 1 0
HERRING SQUID SAITHE LUMPSUCKER SANDEEL CATFISH HADDOCK PARALEPIDA GARFISH SPECIES HERRING SQUID SAITHE LUMPSUCKER KRILL	0 29 0 0 0 0 0 0 0 0	1 230 6 0 0 0 0 0 0 0 262 4 12 8 1	0 40 2 0 0 0 0 0 0 0	0 190 5 0 1 0 0 0 0	1 110 9 0 0 0 0 0 STA 265 5 0 8 0	0 50 2 0 0 0 0 0 0 TION 266 0 12 0	0 1120 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 42 0 0 0 1 1 1 0 R	0 74 1 2 0 0 1 0 0 0	1 1 0 0 0 0 0 0 0 0 0	0 48 3 1 0 1 0 0 0	14 0 5 2 0 0 0 1 1 272

SPECIES	273	274	275	276	277	278	279	280	281	282	283	284
HERRING	21	25	1	0	0	0	0	0	10	7	12	8
SQUID	0	0	5	10	2200	1836	1600	1	23	18	151	1
SAITHE	9	0	3	0	0	0	0	2	0	1	0	7
LUMPSUCKER	0	0	0	0	0	0	1	0	0	0	1	0
PEARLSIDE	0	0	0	0	0	2	0	0	0	0	0	0
CATFISH	1	0	1	0	0	0	0	0	0	1	1	3
REDFISH	0	0	0	0	0	0	1	0	0	0	0	0
					STA	ATION	NUMBE	:R				
SPECIES	285	286	287	288	289	290	291	292	293	294	295	296
HERRING	12	4	12	25	26	15	12	2	5	0	0	10
SQUID	20	0	0	0	0	0	0	0	17	5	0	0
SAITHE	0	68	11	1	2	3	0	1	0	0	1	0
LUMPSUCKER	2	0	0	0	0	0	0	1	0	0	0	0
KRILL	0	0	0	0	0	0	0	0	0	0	. 0	1
PEARLSIDE	0	0	0	0	0	0	0	0	0	0	0	1
CATFISH	10	2	0	1	1	0	0	3	1	2	2	0
COD	0	0	1	0	0	0	0	0	0	0	1	0
					STA	TION	нимве	R				
SPECIES	297	298	299	300	301	302	303	304	305	306	307	308
HERRING	4	0	1	14	2	31	4	0	0	32	5	132
SQUID	0	0	0	0	0	0	0	0	0	0	1	0
SAITHE	0	1	1	0	1	2	0	0	0	0	1	3
LUMPSUCKER	0	0	1	0	0	1	0	0	1	0	0	0
KRILL	0	0	0	0	0	0	0	0	0	1	0	0
CATFISH	2	2	0	3	7	0	1	0	1	0	1	8
HADDOCK	0	0	0	1	1	0	0	0	0	0	0	0
					STA	TION	NUMBE	R				
SPECIES	309	310	311	312	313	314	315	316	317			
HERRING	1	1	1	4	30	6	0	3	19			
SAITHE	0	0	0	1	2	6	3	13	4			
LUMPSUCKER	0	0	0	0	0	0	1	0	0			
KRILL	0	0	0	0	0	0	0	0	2			
CATFISH	0	0	0	0	2	0	4	8	2			
HADDOCK	0	0	0	0	0	0	1	0	0			
BULLHEADS	0	0	0	3	0	0	0	1	1			
LANGEBARN	0	0	0	0	0	0	0	2	2			

Oversikt over tidligere utkomne rapporter.

1987

- Nr. 1 P. Solemdal og P. Bratland: Klekkeforløp for lodde i Varangerfjorden 1986.
- Nr. 2 T. Haug og S. Sundby: Kveitelarver og miljø. Undersøkelser på gytefeltene ved Sørøya.
- Nr. 3 H. Bjørke, K. Hansen og S. Sundby: Postlarveundersøkelser i 1986.
- Nr. 4 H. Bjørke, K. Hansen og W. Melle: Sildeklekking og seigyting på Møre 1986.
- Nr. 5 H. Bjørke and S. Sundby: Abundance indices for the Arcto-Norwegian cod in 1979-1986 based on larvae investigations.
- Nr. 6 P. Fossum: Sult under larvestadiet en viktig rekrutteringsmekanisme?
- Nr. 7 P. Fossum og S. Tuene: Loddelarveundersøkelsene 1987.
- Nr. 8 P. Fossum, H. Bjørke and R. Sætre: Studies on herring larvae off western Norway in 1986.
- Nr. 9 K. Nedreaas and O.M. Smestad: O-group saithe and herring off the Norwegian coast in 1986 and 1987.
- Nr. 10 P. Solemdal: Gytefelt og gyteperiode hos norsk-arktisk hyse.
- Nr. 11 B. Ellertsen: Kopepodnauplier på Møre våren 1986 næringstilbudet til sildelarver.
- Nr. 12 H. Bjørke, P. Fossum, K. Nedreaas og R. Sætre: Yngelundersøkelser - 1985.
- Nr. 13 Faglig profil og aktivitetene i 1986-87.

Denne rapportserien har begrenset distribusjon. Opplysninger om programmet og rapportene kan rettes til

Programledelsen for HELP Fiskeridirektoratets Havforskningsinstitutt Postboks 1870 5024 Bergen

1988

- Nr. 14 H. Bjørke, K. Hansen, M. Johannessen og S. Sundby: Postlarveundersøkelser juni/juli 1987.
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- Nr. 16 H. Bjørke, K. Bakkeplass og K. Hansen: Forekomster av fiskeegg fra Stad til Gimsøy i februar-april 1987.
- Nr. 17 T. Westgård: A model of the vertical distribution of pelagic fish eggs.
 A computer realization.
- Nr. 18 T. Westgård, A. Christiansen og T. Knudsen: Forskerkart. EDB-presentasjon av marine data.
- Nr. 19 R. Sætre og H. Bjørke: Oljevirksomhet på Møre. Konsekvenser for fiskeressursene.