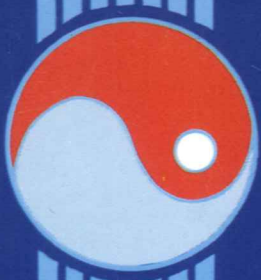


J. Strømstad  
1988  
nr. 20



helø

havforskningsinstituttets  
egg- og larveprogram

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



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## 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 O-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 O-group from the North Sea. The cruise indicate, however, that this is too early to start. For the northern stock (north of  $62^{\circ}\text{N}$ ) 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 0-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 x 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  $V_1 = 1.075 \times 10^{-4} \text{ nm}^3$ . 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  $15 \times 30 \text{ nm}$  will then have a volume of  $V_2 = 13.36 \text{ nm}^3$ .

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

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

where  $X_i$  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.

	Year of investigation			
	1985	1986	1987	1988
Index x 10 <sup>-6</sup>	828	545	280	165
Reduction in %		34	48	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 ( $62^{\circ}\text{N}$ ) and southwards and one from Haltenbanken ( $65^{\circ}\text{N}$ ) 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  $\text{N } 62^{\circ}20'$  compared to 1261 in 1987. North of  $\text{N } 62^{\circ}20'$  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  $62^{\circ}\text{N}$  the total catches in 1985, 1986, 1987 and 1988 were 256, 297, 253 and 218, respectively, indicating a very stable situation. South of  $62^{\circ}\text{N}$  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 (Thysanoessa spp. and Meganyctiphanes 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 Chirolophis ascanii and Lumpenus sp. which were common in the catches north of 62°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°N. The length distributions are shown in Table 2.

Larvae of redfish, Sebastes spp., were in 1985-1987 regularly caught from Røst (68°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°N and northwards. The length distributions are shown in Table 2.

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

Length group mm	S of 61° 00'	61° 00', -62° 59'	63° 00', -64° 59'	65° 00', -66° 59'	N of 67° 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	42

Tabell 2. Length distribution (%) of other 0-group species south (S) and north (N) of 62° N.

Length group mm	HERRING		CATFISH t		SANDEEL		COD	HADDOCK
	S	N	S	N	S	N	N	N
5- 9								
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	+		13		21		
50-54	+	1		7		3		4
55-59		+		3		+		
60-64		1						
Mean								
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

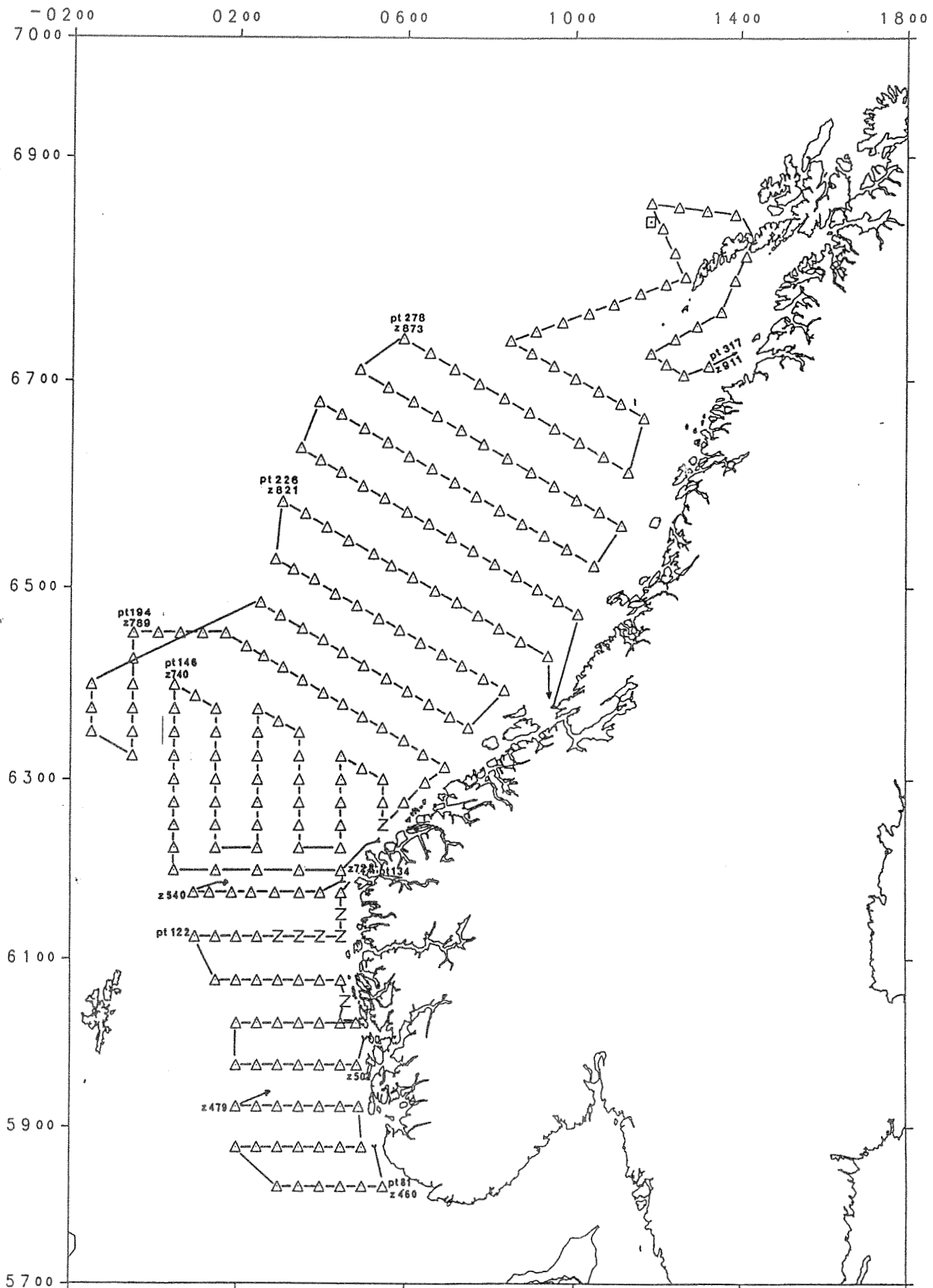


Figure 1. Survey tracks and station map R/V "Eldjarn",  
5/4 - 18/4 and 30/4 - 24/5 1988.

△ = Pelagic trawl station + CTD-sonde + Juday-net.

Z = CTD-sonde + Juday-net.

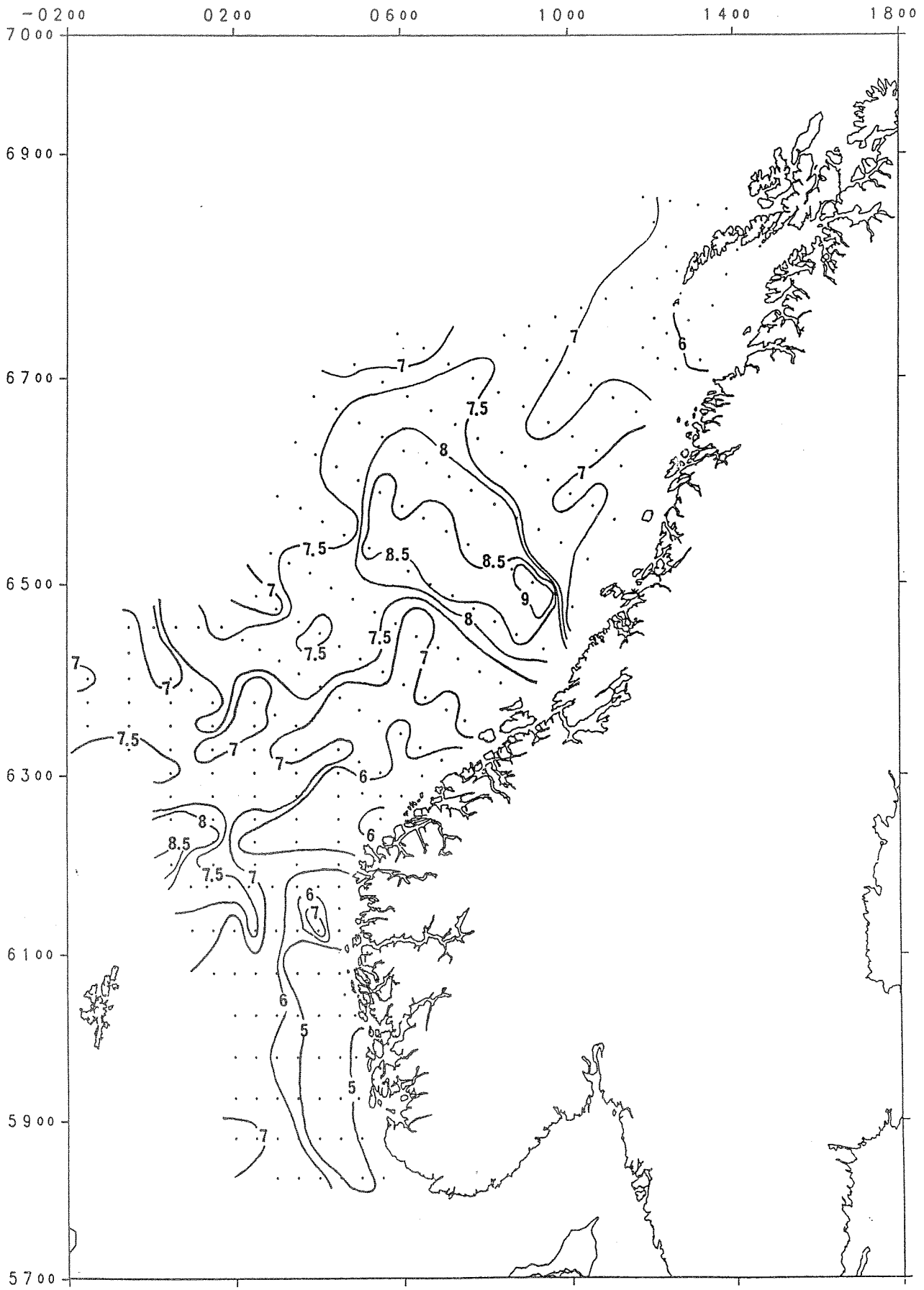


Figure 2. Temperature distribution ( $^{\circ}\text{C}$ ) at the surface.

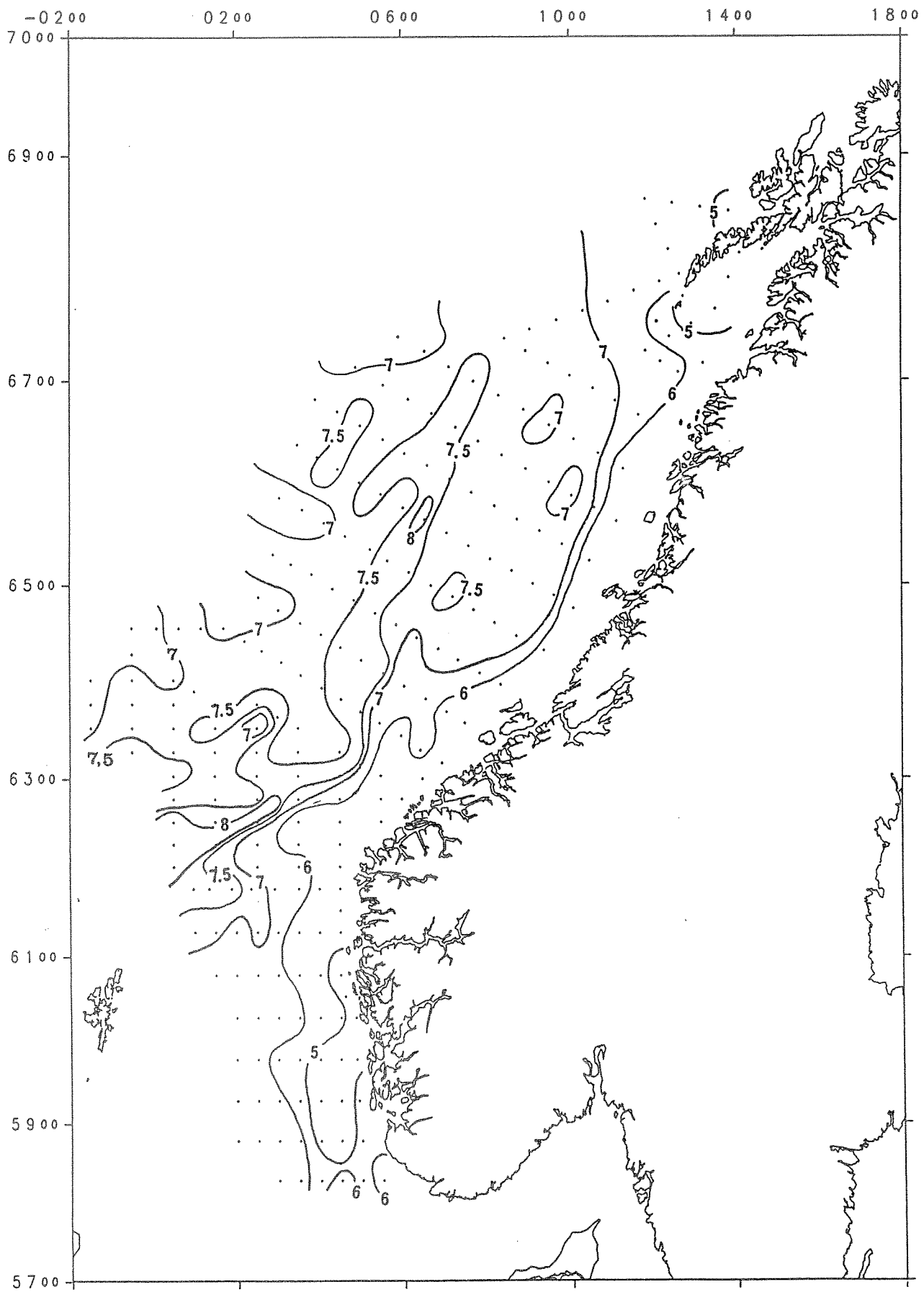


Figure 3. Temperature distribution ( $^{\circ}\text{C}$ ) at 25 m depth.

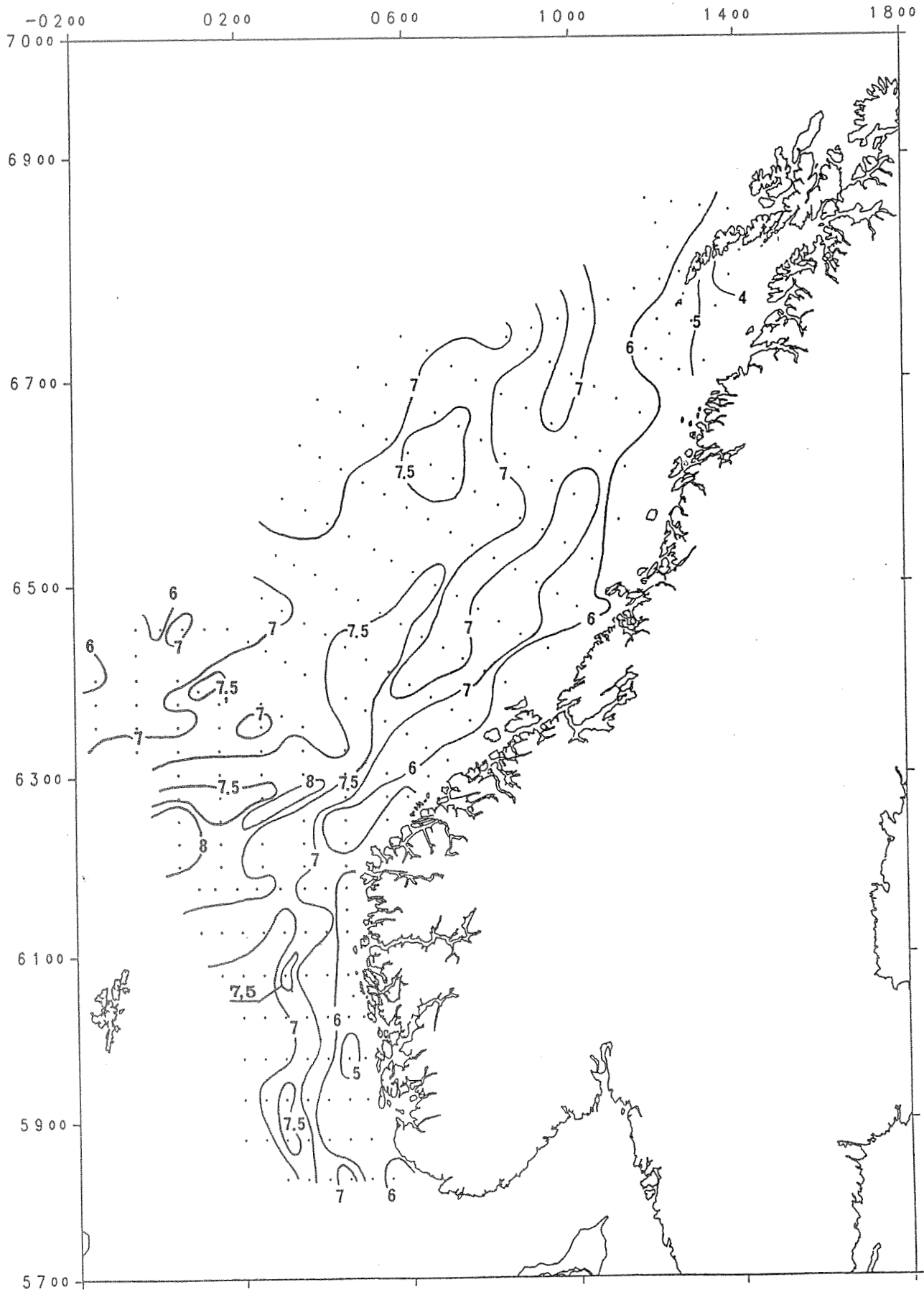


Figure 4. Temperature distribution ( $^{\circ}\text{C}$ ) at 50 m depth.

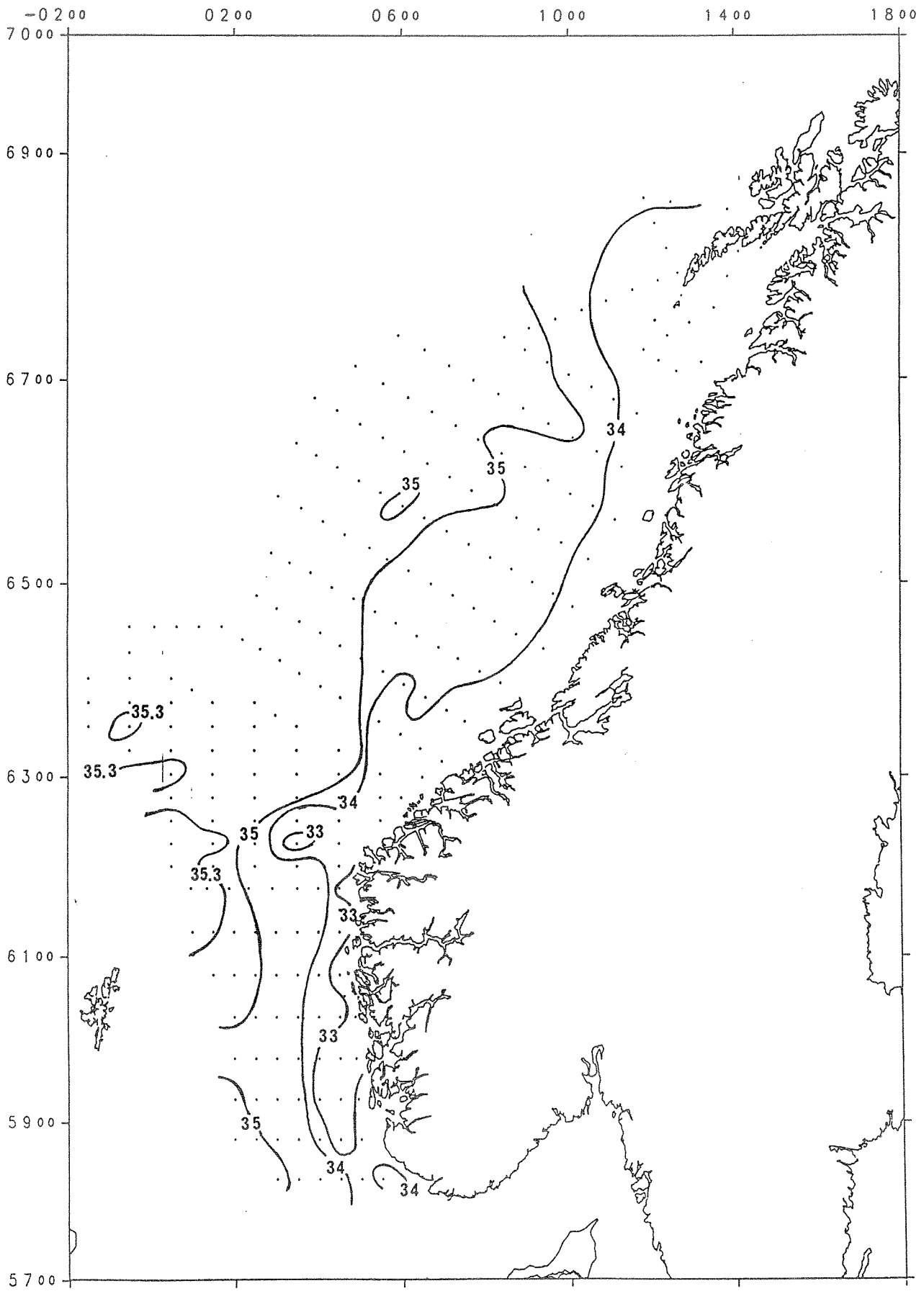


Figure 5. Salinity distribution at 25 m depth.

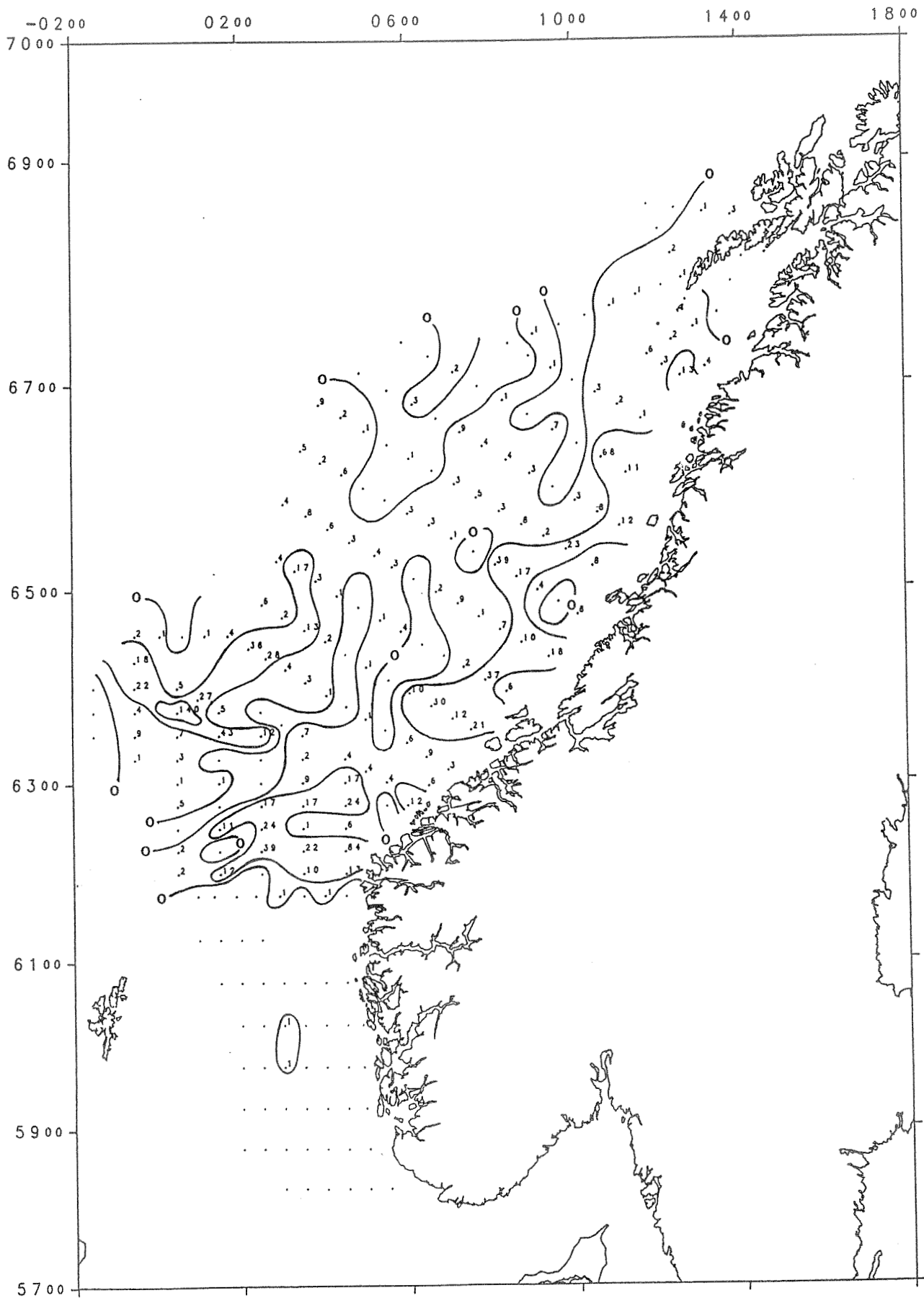


Figure 6. Distribution of 0-group saithe (number caught per 1.5 n.m. trawling). Stations without catch are only marked.

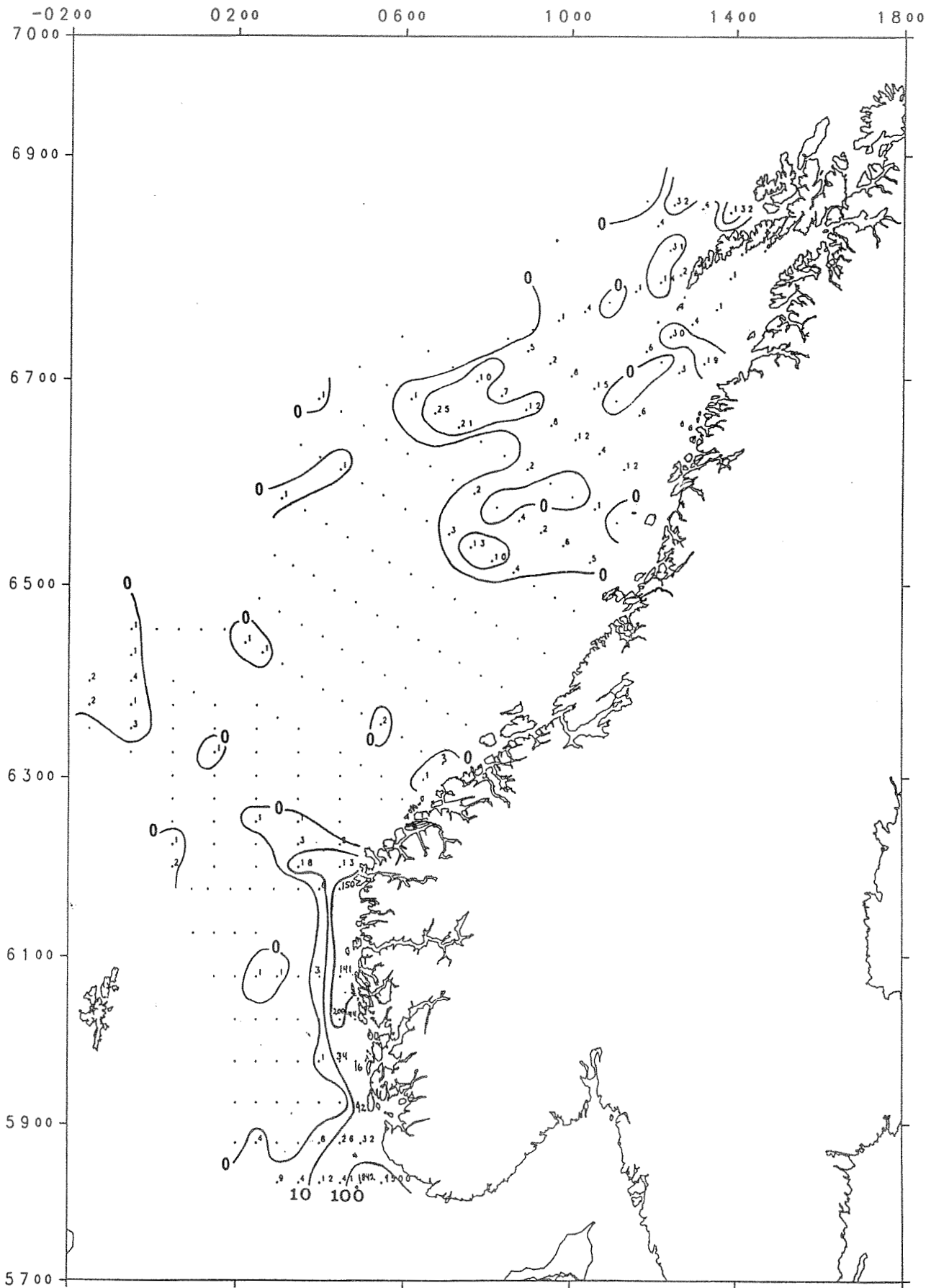


Figure 7. Distribution of 0-group herring (number caught per 1.5 n.m. trawling). Stations without catch are only marked.



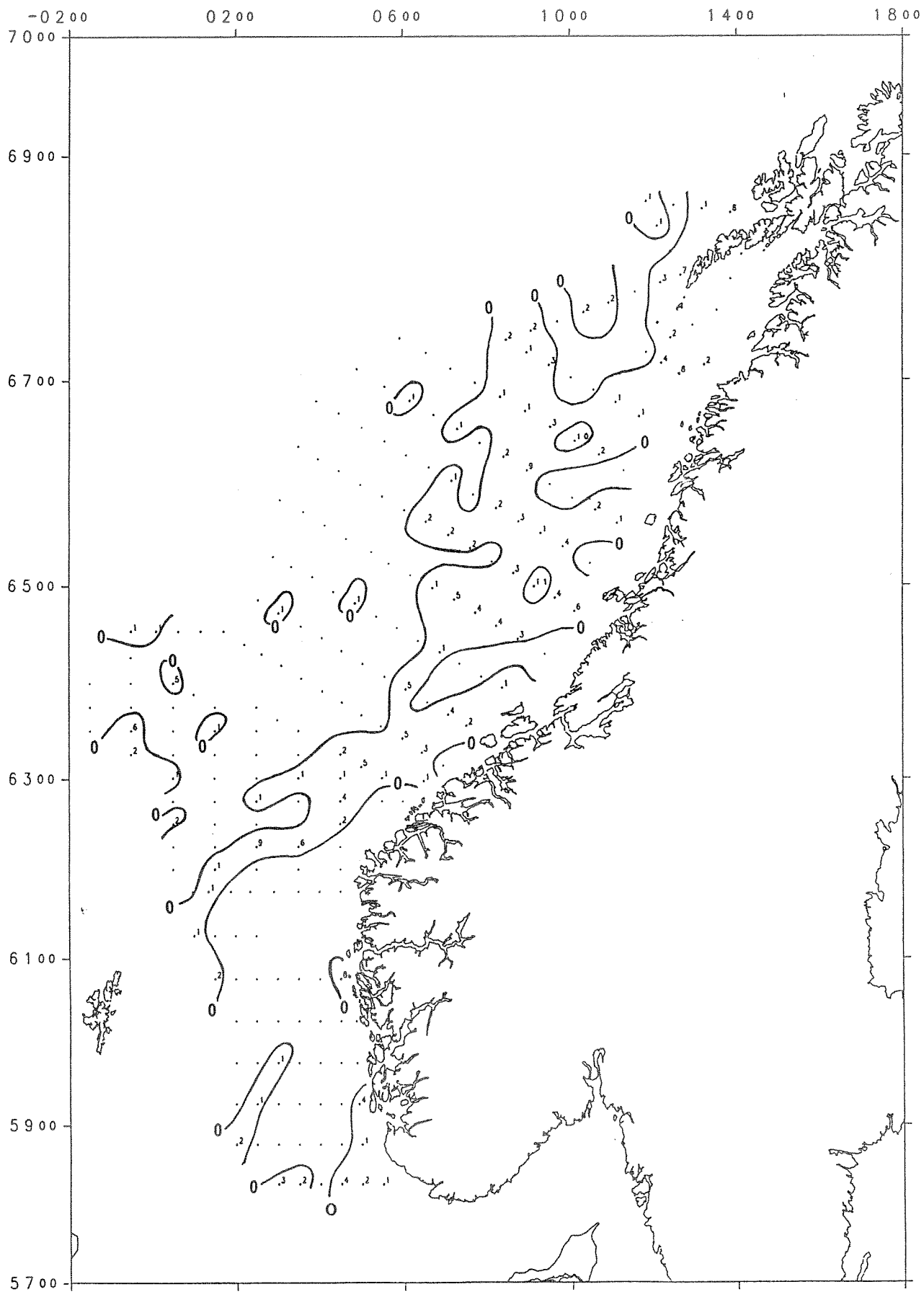


Figure 8. Distribution of 0-group catfish (number caught per 1.5 n.m. trawling). Stations without catch are only marked.

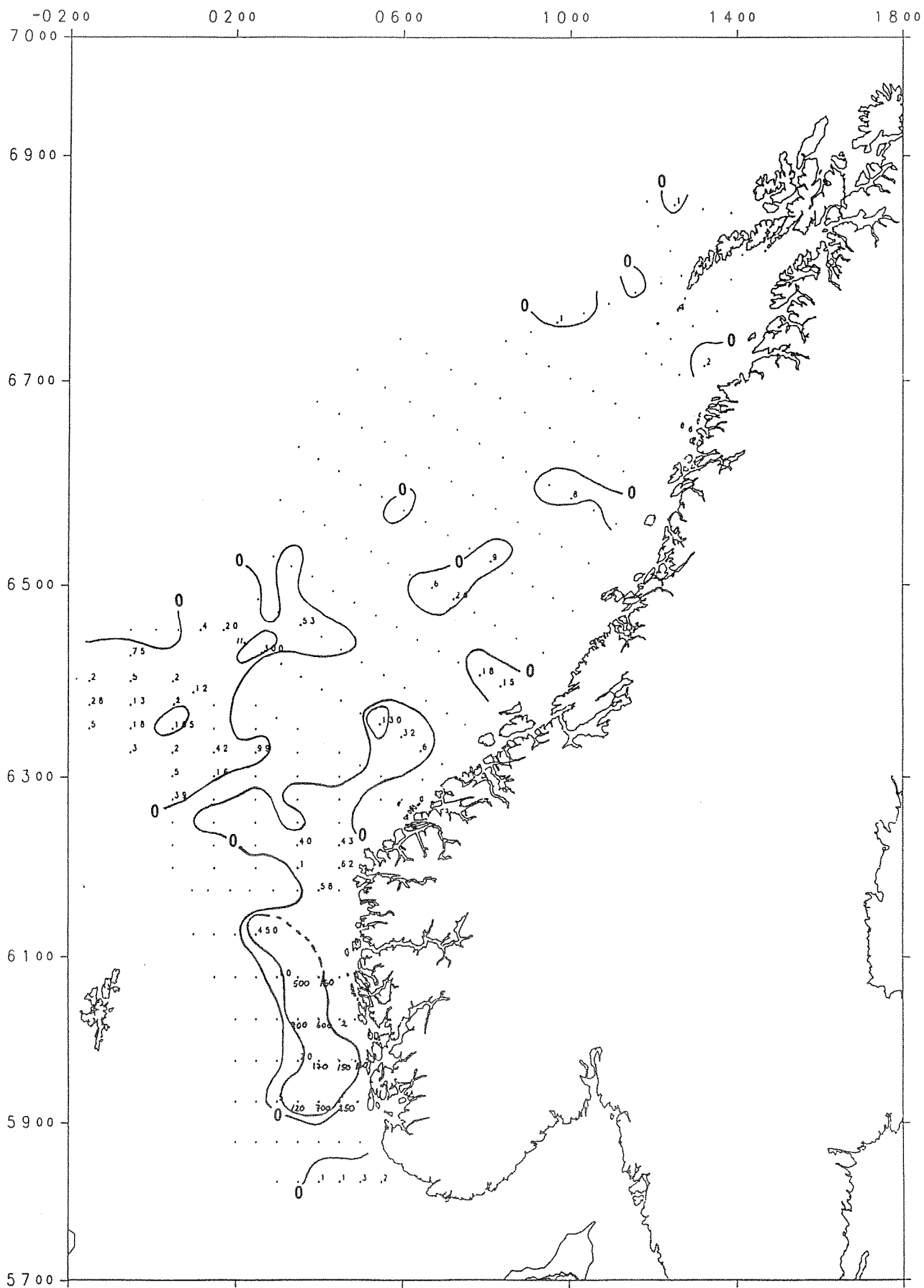


Figure 9. Distribution of krill (decilitre caught per 1.5 n.m. trawling). Stations without catch are only marked.



## STATION NUMBER

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	0	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

## STATION NUMBER

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	1	0	0	0

## STATION NUMBER

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	4	0	0	0	0	0	36	0	0	0
SAITHE	5	1	3	7	140	5	27	5	43	0	1	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	5	0	0	1	0	0	0
BULLHEADS	0	0	0	0	1	0	0	0	0	0	0	0
PARALEPIDA	0	0	0	0	0	0	0	0	0	2	0	0

## STATION NUMBER

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	0
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	0
CONGER EEL	0	0	1	0	0	0	0	0	0	0	0	0

## STATION NUMBER

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	0	0	0	0	0
SQUID	0	0	0	4	2	0	0	0	0	11	0	0
SAITHE	9	17	1	22	84	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	0	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

## STATION NUMBER

SPECIES	177	178	179	180	181	182	183	184	185	186	187	188
LANTERN FI	0	0	0	0	0	40	1	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	1	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
SANDEEL	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	0	0	0	0	0	0









Oversikt over tidligere utkomne rapporter.

1987

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- Nr. 13 Faglig profil og aktivitetene i 1986-87.

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