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Reappearance of Norwegian spring spawning herring  
on spawning grounds south of 60°N

by

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ABSTRACT

In spring 1989 herring spawned west of Karmøy (near Haugesund) on the Norwegian west coast. Prior to 1945 the coastal areas around Haugesund were among the most important spawning (and fishing) grounds of the Norwegian spring spawning herring, but since 1959 there has been no reports of spawning herring in that area. This paper gives an account of the recordings in 1989, and of the length and age distributions of the herring. Possible migration routes are also discussed.

BACKGROUND

Prior to the collapse of the stock of Norwegian spring spawning herring in the late 1960's, prespawning concentrations of this stock migrated from the wintering grounds off eastern Iceland towards the Norwegian coast in December-January (Devold 1963). The herring usually arrived at the Norwegian coast of Statt and spread further north, and prior to 1959, also further south to spawn. This is visualized schematically in Fig 1.

North of Bergen the herring first appeared with hard roe and milt and were not ready to spawn. This herring was called "large herring" and a there was traditionally a fishery on this herring. Later in the season the roe and milt became looser. The fishery on this herring (and on spawning and spent herring) was termed the "spring herring fishery".

South of Bergen the herring appeared immediately before spawning began. From the beginning of this century to about 1945 it was the "spring herring fishery" south of Bergen which gave the largest yield of all of the herring fisheries on the Norwegian coast. In contrast to the situation further north there was never a "large herring" fishery in the areas south of Bergen.

There was a gradual northwards displacement of the spawning grounds of the Norwegian spring spawning herring, and consequently the amount of herring which appeared on the spawning grounds south of Bergen began to decrease. Since 1959 there has been no records of Norwegian spring spawning herring appearing on these spawning grounds (Devold op.cit.).

## THE SITUATION IN 1989

Due to the recruitment of the 1983 year class the spawning stock increased from approximately 400 thousand tonnes in 1987 to over 1.3 million tonnes in 1988 (Anon 1989). The 1983 year class originated from the spawning grounds off Møre, and the main part of this strong year class had its nursery area in the Barents Sea. The same year class migrated from the Barents Sea in May-June 1986 (Røttingen 1986). Since 1986 the the summer feeding areas of this year class have been off the Norwegian coast between  $64^{\circ}\text{N}$  and  $70^{\circ}\text{N}$ , and the wintering has taken place in fjord areas in Northern Norway. (Røttingen 1987). The 1983 year class has thus not resumed the "old" migration routes to the Iceland/Jan Mayen area. The main part of the year class were recruit spawners on the spawning grounds off Møre in 1988 (Røttingen 1988).

In 1989, the main part of the herring left the wintering areas medio January. On January 20 schools of herring were reported off Bodø in outer Vestfjord, and on January 27 catches of prespawning herring were reported from Halten Bank.

The former spawning migration routes and wintering areas off East Iceland were surveyed for herring in the first half of January 1989 with negative result (Sangolt 1989). But on February 8 echo recordings of herring (although not verified by fishing) were reported by purse seiners homeward bound to Møre from a capelin fishery off East Iceland. Some days later large schools of herring appeared on the spawning ground off Møre. Further, at about February 20 there were also reports of herring some 20 nautical miles south off Statt, and at about March 1 spawning herring were taken on gill nets west of Karmøy near Haugesund. Based on the observations given above, some possible migration routes for the Norwegian spring spawning herring in 1989 are indicated in Fig 2.

The herring west of Karmøy appeared on a location which was an important spawning ground ( and important fishing ground) prior to 1959. The area was surveyed by the research vessel "Eldjarn" in the period 11.3-12.3, and Fig 3 shows the location where schools of spawning herring were recorded. Later in March there were observations of spawning herring also south of Karmøy. Fig 4 (from Runnstrøm 1941) is included to give a picture of important former spawning fields of this species. This figure gives the result from an egg sampling survey on the main spawning field in the "spring herring district" in 1937. As can be seen from the figure the herring in 1989 appeared on the exact location of a former spawning site.

Fig 5 shows an echogram recording (day-time) of a dense school of spawning herring in the area west of Karmøy. Due to the high density of herring in the school and to the behaviour (hard down to the bottom also during daytime) it was impossible, by echo integrator technique, to obtain an acoustic biomass estimation of the herring which was present in this area.

Fig 6A gives the length and age distribution of the herring off Karmøy. Age and length distributions for spawning herring further north is given for comparison. The length and age distribution of the herring at Karmøy is similar to that of the herring which spawned further north, so it is reasonable to conclude that the herring which spawned off Karmøy in 1989 belonged to the Norwegian spring spawning herring stock.

## DISCUSSION

On the west coast of Norway, "herring periods" when the fishery gave large yields, have alternated through the centuries with periods with extreme scarcity of herring. It is also well known that within a herring period, there usually was a gradual displacement of the fishery (and thus probably of the main spawning grounds) along the coast (Boeck 1871).

Since the stock collapse at the end of the 1960's the main spawning grounds of this stock has been off Møre, but in 1989 herring of the Norwegian spring spawning herring stock appeared on the spawning ground south of 60°N for the first time in 30 years. The underlying mechanisms of the spawning migration, and the exact migration routes, to the spawning fields at Karmøy are not known. However, the following biological features can be listed:

- A) The herring which spawned off Karmøy in 1989 did not originate from that area.
- B) The scales from the herring at Karmøy showed that the herring were not recruit spawners. There are, however, no reports of spawning herring off Karmøy in 1988. The herring spawned for the first time in 1988, probably off Møre where the main spawning fields are located.
- C) There was no significant change in abundance or year class composition of the spawning stock of Norwegian spring spawning herring in 1989 compared with 1988.

These factors suggest that the appearance of Norwegian spring spawning herring on the "old" spawning grounds south of 60°N in 1989 is not linked to changes in abundance or year class composition.

The coming years will show if these southern spawning fields will regain their former importance. However, in a short time view (at least to 1992), the spawning stock of Norwegian spring spawning herring is expected to decrease. This is due to weak year classes since 1983 (Anon 1989). So, if the amount of herring on the southern spawning grounds will increase in the next few years, it will be as a southward displacement in spawning grounds and not as a consequence of increasing spawning stock.

## REFERENCES

- Anon. 1970. Report of the Working Group in Atlanto-Scandian Herring. Coop.Res.Rep.Cons.int.Explor.Mer,Ser.A,17: 1-48
- Anon. 1989. Report of the Atlanto-Scandian Herring and Capelin Working Group. ICES C.M. 1989/Assess: 7: 1-48 (Mimeo).
- Boeck, A. 1871. Om Silden og Sildefiskerierne, navlig om det norske Vaarsildfiske. Indberetning til Departementet for det indre. Christiania: 1-131 (In Norwegian).
- Devold, F. 1963. The life history of the Atlanto-Scandian herring. Rapp.P.-v.Reun.Cons.perm.int.Explor.mer,154: 89-108.

- Runnstrøm, S. 1941. Quantitative investigations on herring spawning and its yearly fluctuations at the west coast of Norway. FiskDir.Skr.Ser.HavUnders.,6(8): 1-71.
- Røttingen, I. 1986. Data on the 1983 year class of Norwegian spring spawning herring from the period June 1985-August 1986. ICES C. M. 1986/H:19: 1-13 (Mimeo).
- Røttingen, I. 1987. Data on the 1983 year class of Norwegian spring spawning herring from the period August 1986-August 1987. ICES C.M. 1987/H:36: 1-14 (Mimeo).
- Røttingen, I. 1988. Distribution and migration of the 1983 year class of Norwegian spring spawning herring in the period July 1987-August 1988. ICES C.M. 1988/H:41: 1-15 (Mimeo).
- Sangolt, G. 1989. Toktrapport F/F "Michael Sars" 4.1-29.1 1989. Unpublished cruise report, Directorate of Fisheries. (Mimeo., in Norwegian).

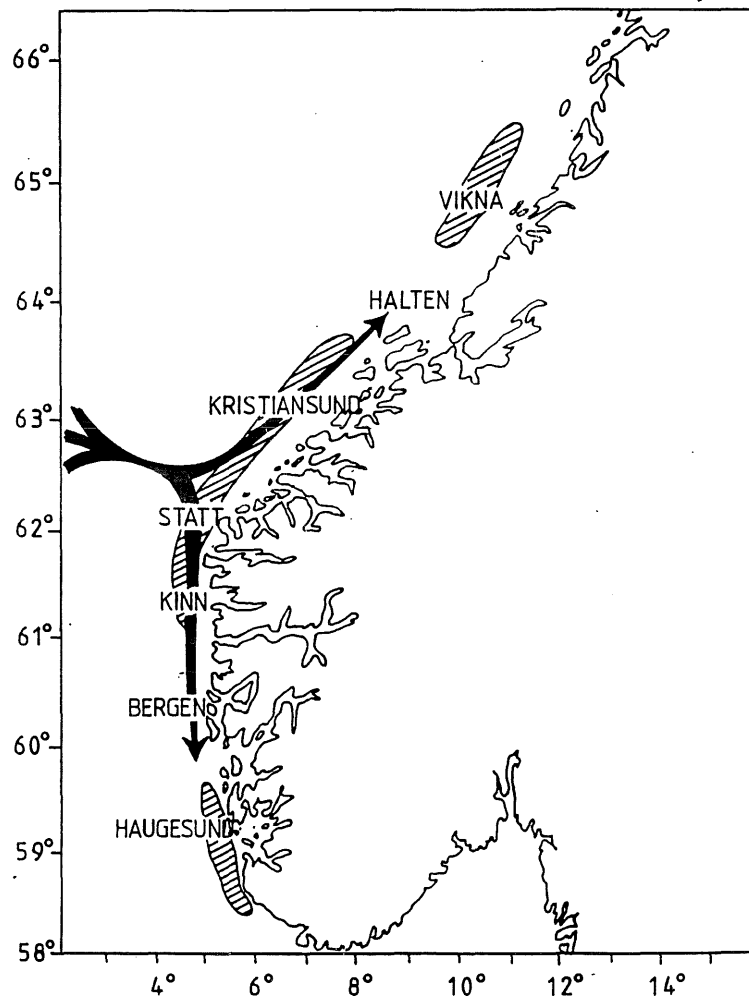


Fig 1 Norwegian spring spawning herring. Schematic presentation of the terminating stages of the spawning migration prior to 1959. Spawning areas are shaded. (Modified from Anon. 1970).

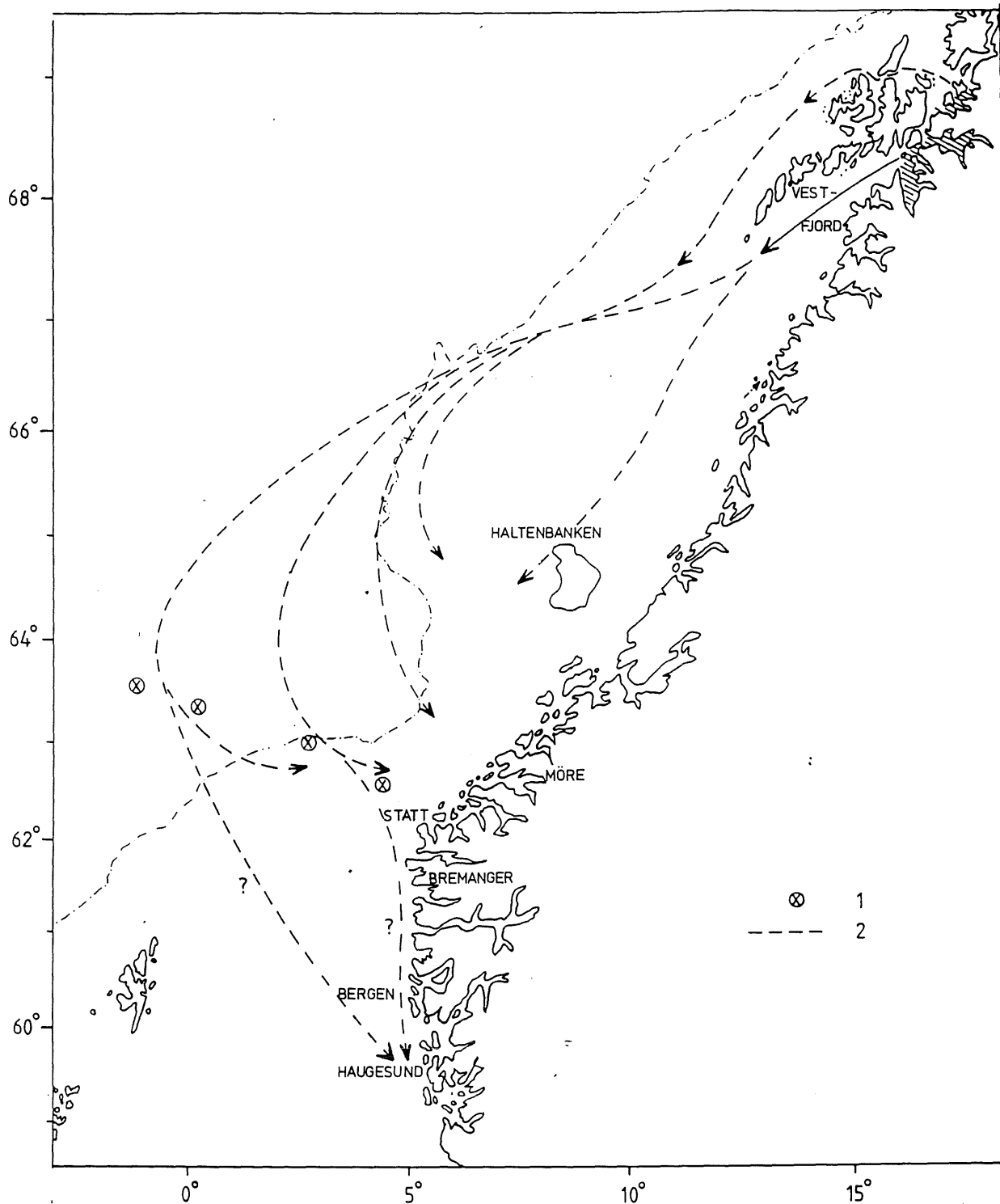


Fig 2 Norwegian spring spawning herring.  
 1) Echo recordings, probably herring, made by purse seiners in the period 8.2-10.2 1989.  
 2) Possible spawning migration routes in winter 1989.  
 The wintering areas are shaded.

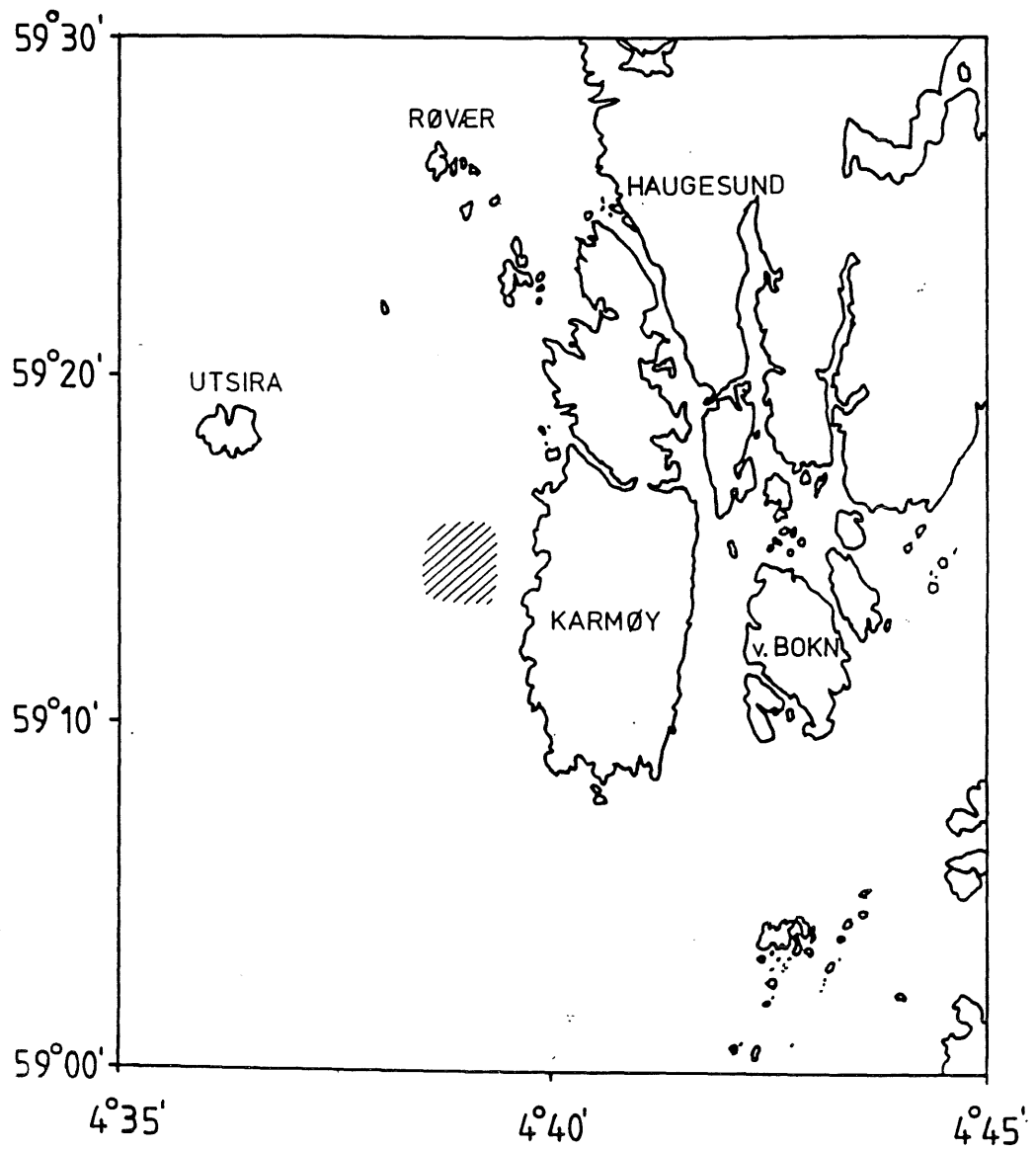


Fig 3 Location of schools of spawning herring (shaded area) recorded by R/V "Eldjarn" 11.3-12.3 1989.

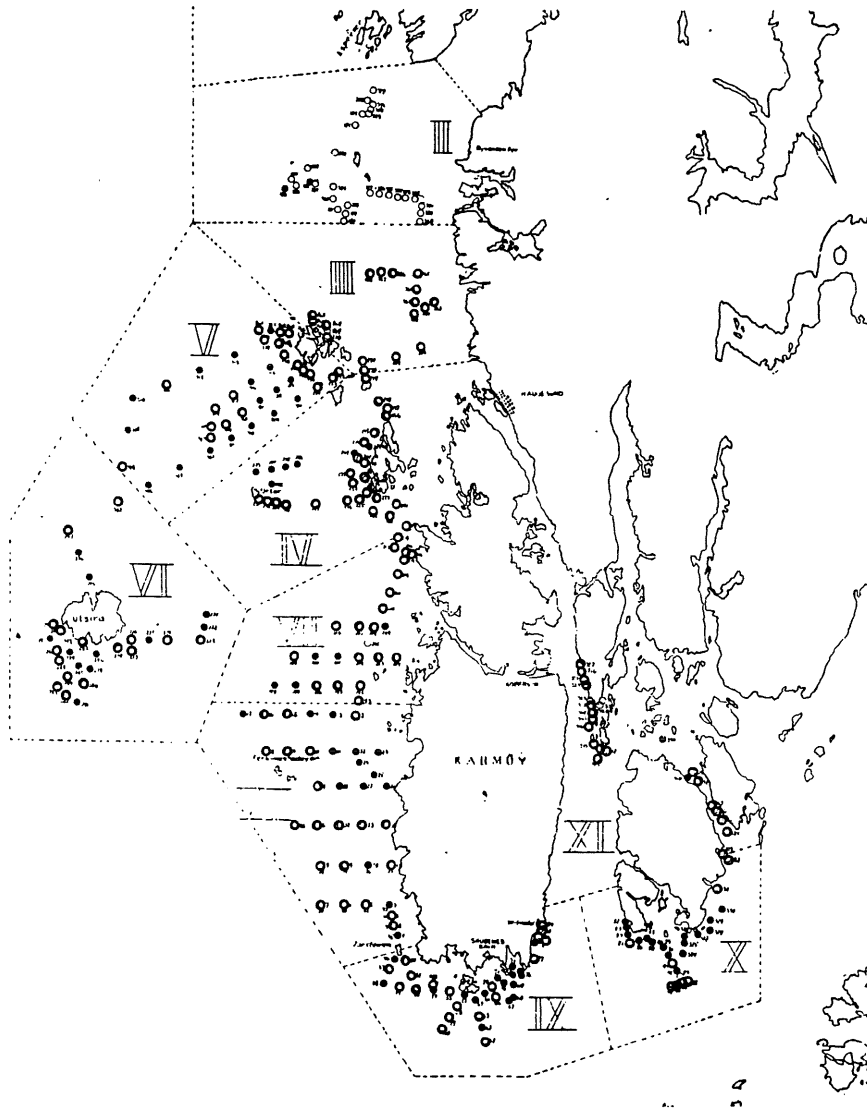


Fig 4 Bottom-grab stations in 1937 on the spawning grounds in the Karmøy-Utsira-Haugesund area. Black dots denote finds of herring roe, open circles negative hauls (from Runnstrøm 1941).

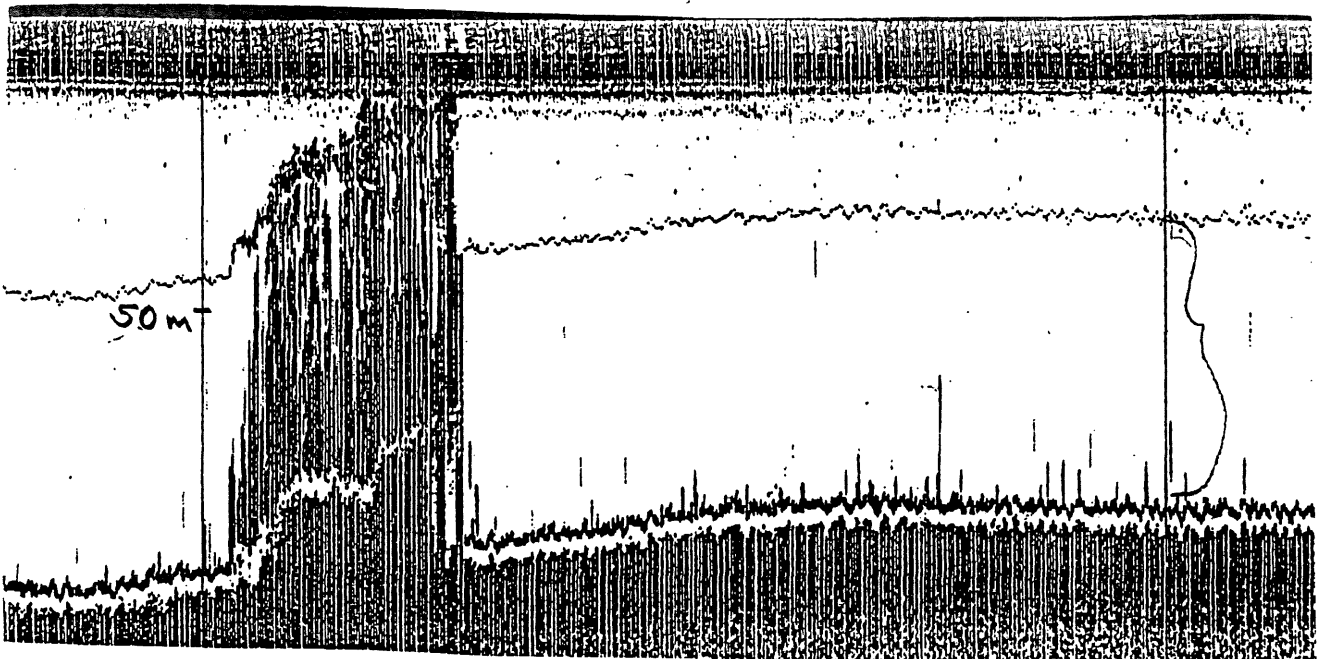


Fig 5 Echo recording of a school of spawning herring west of Karmøy, 11.3-1989.

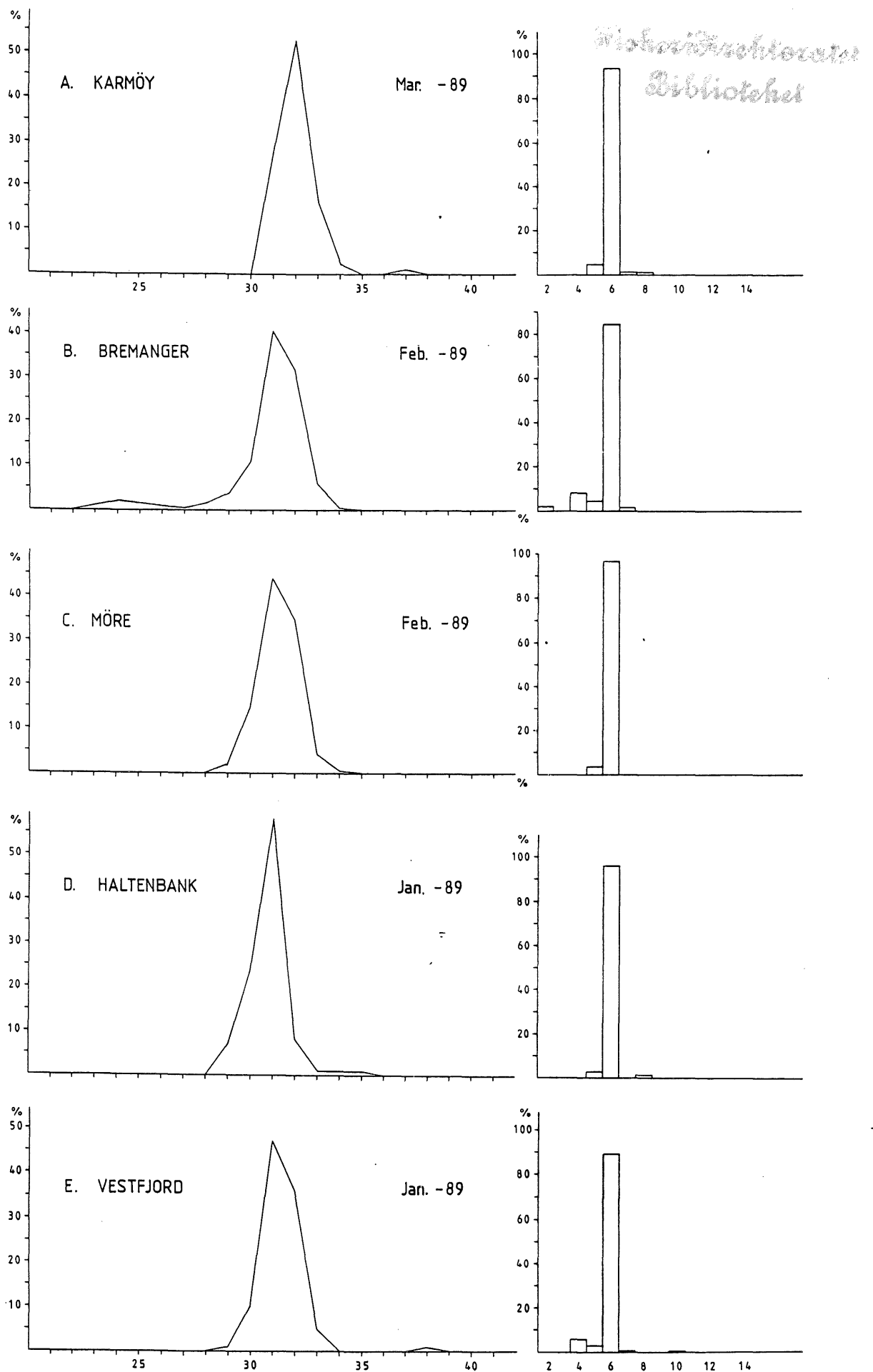


Fig 6 Norwegian spring spawning herring.  
Age and length composition of the spawning stock in 1989 from various areas (the geographical names are also given in Fig 2) on the Norwegian coast.