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**How surface distribution may reduce the acoustic
estimate of a herring concentration.**

by

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Abstract

Repeated mini-surveys were conducted in Auresundet, North Western Norway, September 1987 to study the vertical distribution and its effect on the acoustic estimates of a herring concentration. Night-time surface distribution reduced the acoustic estimates drastically, and indication of depth dependent acoustic estimates were recorded during vertical migration of the herring.

Introduction

The difficulties arising of an unfavourable vertical distribution of the fish during acoustic surveys, have long been recognized (Olsen 1987a). Also the vertical migration of the fish, especially of physostome species, may be a source of ambiguity for acoustic abundance estimation (Olsen 1987b). Increasing effort has been given to collect knowledge of the distribution and vertical migration behaviour of the actual species, and thereby surveying the fish when it is most favourably distributed to obtain reliable acoustic estimates. Traditionally, herring are surveyed as it occurs dispersed in midwater at night. This short contribution deals with some acoustic observations of a bottom-surface migrating herring concentration where surveys at night appeared unfavourable.

Material and Method

A mini-survey in Auresundet, North Western Norway (Fig. 1), was repeated 9 times at dusk, in darkness or at dawn between 27-30 September 1987. The survey was carried out by M/V "Fjordfangst", equipped with a 150 kHz Furuno CH-12 multibeam sonar, and a Simrad EY-M echo sounder connected to a Simrad QM echo integrator. The instrument settings and calibration results are given by Misund & Øvredal (1988). The vessel was running the surveys with a speed of 6 knots. The pattern of vertical distribution of the herring concentration is described by Beltestad & Misund (1988). The herring in purse seine catches in the area was from 28 to 38 cm long. No surveys were run at daytime as the herring was concentrated close to the bottom at 120-140 m depth, and out of the TVG-range of the Simrad EY-M sounder.

Results and Discussion

On the first survey, no herring was recorded by the echo sounder (Fig. 2), but concentrations of herring were recorded close to the surface by the sonar. This behaviour pattern

causing no or small echo sounder recordings were observed in 3 consecutive nights. A survey during dusk gave minor recordings as the herring already was dispersed close to the surface.

Substantially higher acoustic estimates were obtained during surveys at dawn when the herring was descending towards the bottom (Fig. 2). However, there were some indications that these estimates decreased as the herring approached the bottom (Fig. 3). Assuming a constant herring abundance in the fjord during these surveys, this may indicate a depth variation in the acoustic scattering properties of the herring (Ona 1984).

These observations point to the importance of using acoustic equipment to record the volume close to the surface in addition to ordinary integration equipment during night-time surveys on herring in autumn.

References

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Fig. 1. Survey track during the investigations in Auresundet, September 1987.

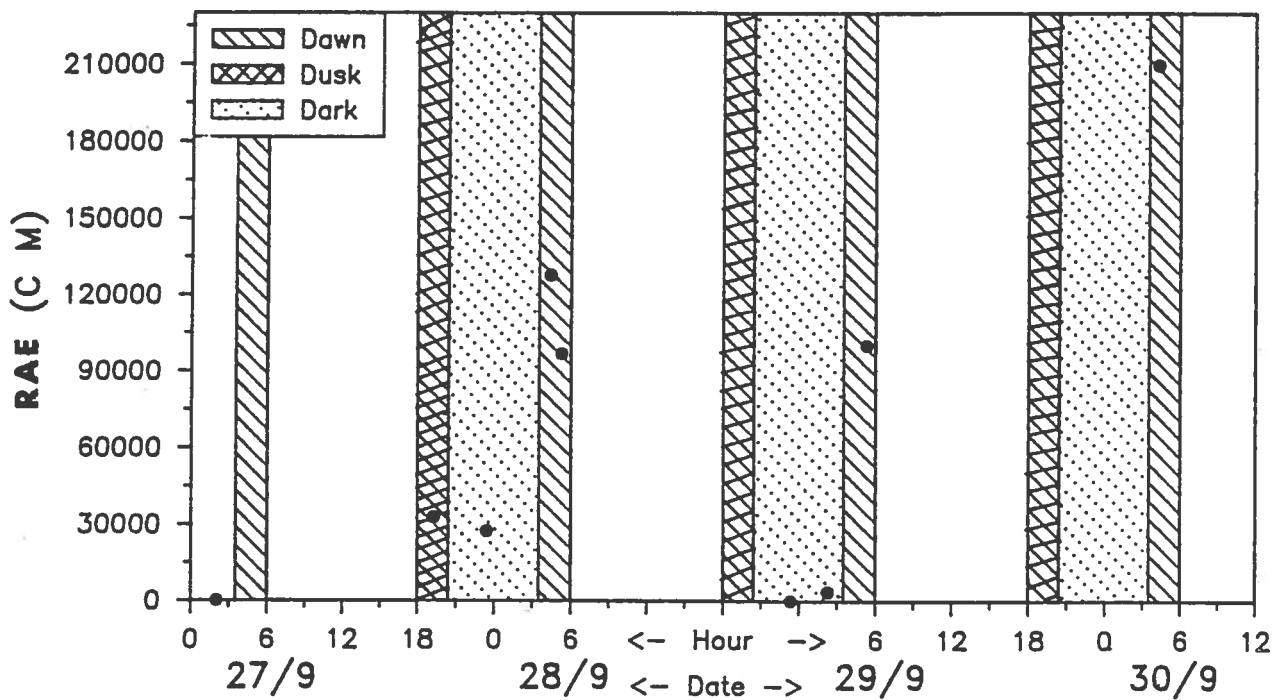


Fig. 2. Relative acoustic estimates (RAE) in relation to time of day and light level (C : instrument calibration constant, M: integrator output).

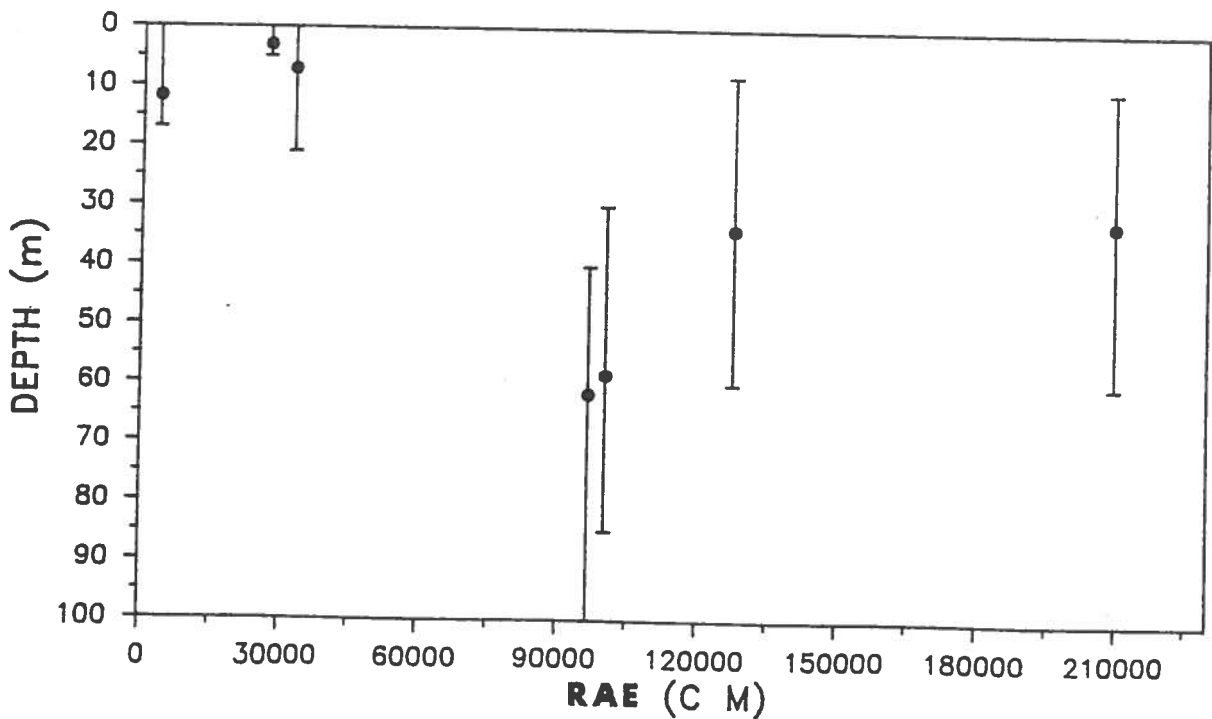


Fig. 3. Relative acoustic estimates (RAE) related to average depth of the herring during a survey (vertical bars: depth interval of the herring during a survey).