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Pelagic Fish Committee

CHARACTERISTICS OF HERRING SPAWNING GROUNDS.

by

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ABSTRACT

Characteristics of spawning beds of Atlantic Herring described in five published investigations are tabulated. Problems of delineation of spawning grounds by direct methods are discussed. It is suggested that a small area be defined by indirect methods and many close-spaced hauls with a grab be taken within this area in order to find herring spawn on the seabed.

Les caractéristiques des zones de ponte du hareng de l'Atlantique décrites dans cinq investigations publiées sont dressées en tableau synoptique. Les problèmes de la délinéation des zones de ponte par des méthodes directes sont considérés. Il est reccommandé que des recherches pour trouver des oeufs de hareng soient poursuivies par des methodes indirectes afin de definir une zone de faible superficie suivies d'un programme intensif de prises de benne.

INTRODUCTION

Spawning grounds of Atlantic Herring have usually been identified from studies on the distribution of newly hatched larvae, of adult herrings with gonads in spawning condition and of predatory fish (usually haddock and cod) with herring eggs in their stomachs (Postuma, Saville and Wood, 1977). Such investigations delineate fairly extensive spawning areas rather than exact spawning locations. There seem to be few records of herring eggs found *in situ* on the sea bed in European and Scandinavian waters.

A search of published literature (but excluding Report Literature) was made after the Secretary General ICES drew the attention of working groups to Council Resolution 1979/4:13. Five relevant papers were found, some of which extended and consolidated earlier observations.

CHARACTERISTICS OF SPAWNING GROUNDS.

Characteristics of the herring spawning grounds are summarised in Table 1. Some details not given by authors have been extracted from British Admiralty Charts and ICES Hydrographic publications. The spawning grounds have few characteristics in common. Substrate varied from coarse sand to rock: all the investigations indicated the presence of gravel on at least part of the spawning grounds; fine sand and mud appear to be avoided by spawning herrings. Depth varied between 13m and 95m, salinity between 33‰ and 35‰. Temperature at the spawning grounds of spring spawning herrings was 5° to 7°, and of autumn herrings 11° to 14°. With the notable exception of the Norwegian spawning, egg patches were small in area.

METHODS OF DELINEATING SPAWNING GROUNDS.

In all the investigations noted in Table 1 a grab was used to detect spawn on the sea bed. Grab samples were taken in areas for which there was considerable indirect evidence of spawning. It would appear that intensive sampling over a small area is necessary; a general survey of bottom deposits may not be helpful becuase the preferred substrate can occur in small isolated patches and the number of positive samples is likely to be low. If spawning beds or patches of spawn are only $0.1Km^2$ in area, scattered over an area of investigation $100Km^2$, the chances of dropping a grab on a patch of spawn are small even when sampling stations are only 1Km apart. The period of time that spawn remains on the sea bed is short, which increases the difficulties. It is notable that all the investigations except that in the English Channel took more than one spawning season to complete successfully.

It is suggested that a useful technique for directly locating patches of spawn is

1. Encourage fishermen working in a known or suspected spawning area to report quickly any occurrence of spawn on nets or gear and catches of bottom-feeding fish with spawn in their stomachs, and to record the position accurately, if possible with Decca fixes.

2. Make many grab hauls in the area indicated by such reports. Successive hauls should be taken as closely spaced as possible, as the research vessel drifts with the tide. In the Isle of Man and in the Channel the long axis of egg patches lay in line with the main direction of the tide. This approach presupposes the presence of a fishing fleet in

the spawning area for at least part of the spawning period. It would not be practicable if fishing in the area at that time were prohibited or severely restricted.

A few experiments with underwater television moved slowly over the sea bed (unpublished) indicated that definition was barely adequate to detect herring spawn, but this technique needs to be further evaluated.

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TABLE I. Characteristics of herring spawning grounds

Region	ICELAND	NORWAY	CLYDE : SCOTLAND	ISLE OF MAN	ENGLISH CHANNEL
Area Investigated	4 known spawning areas on SW coast of Iceland each approx 250 km^2	14 known spawing areas on W coast of Norway total 425 km^2	1 known spawning area in Firth of Clyde on W coast of Scotland approx 52 km^2	1 known spawning area on E coast of Isle of Man in N Irish Sea 72 km^2	1 area at 51°06'N, 01°40'30"E
Gear Used	Petersen 0.2 m^2 grab	Petersen 0.1 m^2 grab	Dredge, small spring grab mouth aperture 20cm x 20cm, and underwater camera	Van Veen 0.1 m^2 grab and small spring grab	Van Veen 0.2 m^2 grab
Spawn located	Herring eggs in 8 samples out of 377; only 2 samples with appreciable numbers of egg	Eggs in 273 samples out of 781; 9% of samples with continuous layer of spawn 1 or more eggs thick	One patch of spawn	2 patches of spawn 4 samples out of 244 with appreciable numbers of eggs	Several patches
Month(s) & Year	March & April 1950	February & March 1931-37	February & March 1957-58	October 1968	November 1956
Depth	60 - 95m. Most eggs at 60 - 70m.	Richest spawning in 20-80m.	13-24m.	44m.	29m
Temperature	6°C	5° - 6°C	6° - 7°C	14°C	11°C
Salinity	35.1‰	33‰ - 34‰	33.4‰	33.9‰	33.3‰
Substrate	Dark coarse sand and gravel	Rock, stones, gravel and sand; also calcareous deposits of broken shell serpulid tubes and calcareous algae	Gravel and small stones	Coarse gravel (0.5 cm x 0.5 cm to 1.5 cm x 1.5 cm) small stones, shell and shell fragments	Flints overlying gravel
Comments	Eggs glued to largest sand particles "some few mm in diameter" Distribution of spawn patchy. Sampling in 1935 and 1936 unsuccessful	Stony or rocky bottom preferred for spawning	Continuous carpet of spawn 1 - 8 eggs thick over an egg patch 320m x 320m	Continuous carpet of spawn 1 - 9 eggs thick over patches 200m x 100m and 100m x 60m in 1968 Very few eggs found in 1967	Eggs attached to flints in patches distributed along a strip 3 km x 350 m Long axis of strip lay in line with main direction of tide
Reference	Fridriksson & Timmermann, 1951	Runnström, 1941	Parrish, Saville, Craig Baxter & Priestley, 1959	Bowers, 1969	Bolster & Bridger, 1957