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Programmes and Priorities for Herring Research
in the ICNAF Area

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Introduction

At their present level of exploitation the west Atlantic herring fisheries are only a few years old and the total research effort that has been applied to the solution of biological problems underlying assessment and management is only a fraction of that applied to herring of the Eastern Atlantic. Yet West Atlantic herring are no less complex in their stock structure, life history and migration patterns than their eastern counterparts. In addition catch and effort data for the West Atlantic fisheries are far from complete and, of course, cover a short historical period so that knowledge of the stocks and of the fisheries they support is in the initial stages. Even so, signs of over exploitation and stock depletion are apparent in some areas and there are as a result many aspects of study of herring which require urgent attention in the ICNAF area.

In planning programmes of co-ordinated research for the area priorities must be decided and this document is intended to serve as a basis for discussion amongst herring biologists during the course of the meeting of STACRES in Halifax between May 20-25, 1971.

Programmes and priorities can be considered under the following general headings:

1. Stock identification and interrelationships. Several major stocks can be recognised at their time and place of spawning but for many of them, little is known of their distribution and movement outside the spawning period. The life history from the larval stage through the juvenile stages until recruitment to the adult stock has not been followed for any major stock.
2. Monitoring the fisheries. Catch and effort data is not comprehensive and some areas and stocks are poorly covered.
3. Biological sampling. Probably the most important problems at the present time are those relating to age, growth and year class allocation.
4. Research vessel surveys and field studies.

Stock Identification and Interrelationships

The most important problems in this field are:

1. The interrelationships of fall-spawning populations on Georges Bank, Jeffreys Ledge and off the south-west coast of Nova Scotia. The extent to which each contributes to the juvenile herring fisheries of the Gulf of Maine and Bay of Fundy is of particular importance.

2. The origin of herring fished on the Nova Scotia Shelf in winter (i.e. in the Chedabucto Bay area, the Banquereau-Misaine area, and the Middle Bank, Emerald Bank area). These fisheries are quite recent and nothing definite is known of the movements of adults from this area to spawning grounds.

The first of these can best be dealt with by systematic larval surveys.

Larval surveys on Georges Bank and in the Gulf of Maine have been carried out in the past but there is a need to extend their scope so as to follow larval dispersion from each of the spawning grounds on a near synoptic basis and to determine the extent to which larvae originating from different spawning grounds become mixed in their subsequent distribution. At the same time it may be possible to determine or confirm likely areas of overwintering aggregations of larval populations so that inshore studies on late-larval and post-larval stages (see below) will have a sound stock basis.

Such surveys, to be carried out each year, would cover a wide area and require large research vessels over a period of from about the beginning of September to about the end of November. Surveys would have to be repeated during this period.

Decisions should be made on the following:

1. The extent of the survey area, cruise tracks and station positions and the number of separate cruises required within the survey period.
2. Standardization of survey and sampling methods and of plankton sampling gear. It is important that as much of the water column be sampled as possible and as evenly as possible so as to include the whole of the larval population.

Sampling and surveying methods have been standardized for ICES herring larval surveys and these might be used as a guide. In any case it is essential that all participating vessels should use the same sampling gear or, if this is not possible, that conversion factors be established by comparative tows so that results from different vessels can be pooled and/or compared.

It is understood that some specific proposals on these points will be presented for discussion at the meeting in May.

It may not be possible to organise a full scale co-ordinated survey for the fall of 1971, to involve all those member countries who have an interest in this area, but it is hoped that individual countries who plan cruises for this year can arrange to co-operate as far as possible.

The study of larval aggregations in estuaries and other partly enclosed bodies of water and of the movements and abundance of post-larval and juvenile stages is also of great

importance in determining the origin of the herring fished as "sardines" in the Gulf of Maine and Bay of Fundy and studies in this field planned by U.S. and Canadian scientists should be co-ordinated.

Other fields of study which can contribute to the solution of problems of stock interrelationships are:

1. Biochemical Genetics. A meeting of experts on the Biochemistry of Marine Animals is being held in Halifax on June 1st and 2nd and will be followed on June 3rd by an informal workshop dealing with the application of electrophoretic methods to marine populations. This will take place at the Halifax Laboratory of the Fisheries Research Board of Canada and anyone interested is invited to attend. Dr. Paul Odense, Halifax Laboratory, Fisheries Research Board of Canada, P. O. Box 429, Halifax, N.S. will be pleased to receive notification of attendance. It is suggested that a document be prepared by an expert or small group of experts who have been working on herring setting out the present state of knowledge in this field and indicating future lines of research.

2. Meristic and Morphometric Studies. A number of different meristic and morphometric characteristics have been used in the past to define and discriminate between stocks, but there is a need to discuss these results so as to decide on those most likely to give the best discrimination for stocks in the different areas.

It should then be possible to co-ordinate sampling schedules between member countries so as to give the best coverage and it is suggested that an attempt be made to do this for sampling on the Nova Scotia Shelf in 1972 to investigate the interrelationships of stocks in this area.

3. Other methods. Attention is drawn to Research Document 71/6, reporting on the incidence of the larval nematode Anisakis in herring populations. There may be other promising studies in progress which can be brought to the attention of the herring group so that their application can be extended.

Monitoring of the Fisheries

There is an urgent need for improvement in the degree of coverage and of the standard of reporting of catch and effort data, particularly in Sub-areas 3 and 4. Reliable assessment of herring stocks in the ICNAF area will not be possible until reasonable standards are achieved.

For the Georges Bank areas, for which data are available over a reasonable time period, it is suspected that the simple catch/effort index gives a biased estimate of relative abundance. A possible way of reducing this bias was suggested in the report of the Mid-Year meeting of the Assessment Sub-Committee in January, 1971. This involves a sub-division of the whole area into equal area units and comparison for time periods when diversion of effort from herring can be assumed to be negligible, and depends on reasonably precise catch location data. The possibility of carrying out such an analysis of the available data should be discussed.

The opportunity should also be taken to discuss details of reporting of catch and effort data for the ICNAF area as a whole.

Age Determination

Ad hoc scale and otolith exchange programmes have shown that otolith samples should be relied upon as the major source of data and that a good measure of agreement is most likely to be reached if experts from different laboratories who are involved in routine ageing can meet to study material. It is desirable that ageing studies be put on a more formal basis by setting up a group of such experts so that regular exchange of material and regular workshops be arranged to deal with specific problems.

Other Field Studies

1. Sonar and echo sounder surveys.

The possibility that regular and systematic sonar or echo sounder surveys of pre-spawning and overwintering herring concentrations be carried out should be considered.

2. Tagging experiments.

Successful tagging experiments have been carried out on both juvenile and adult herring by U.S. and Canadian scientists; more recently these have contributed greatly to our knowledge of migrations in the Gulf of St. Lawrence area. However, these experiments using internal tags depended for their success on obtaining and maintaining herring in viable condition and on efficient arrangements for tag detection and recovery.

A large scale tagging experiment for other important areas would require major and special financial support and would have to be preceded by preliminary experiments to establish reliable techniques. While an operation of this kind could not be planned for the immediate future discussion could indicate the most likely area of operation.

Symposium on Herring in the ICNAF Area

There has never been an opportunity for a comprehensive survey of the herring situation for the ICNAF area as a whole. The possibility of arranging a symposium devoted to herring problems should be discussed and a date suggested for some time in the future, possibly in 1973.