Northwest Atlantic Fisheries Organization

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SCIENTIFIC COUNCIL MEETING - JUNE 1995

Proposal for Scientific Council Special Session, September 1996

by

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During the 1994 Meetings of the Council and more completely during the present meeting of the Council, discussions with representatives provided the basis for the following proposed design of the workshop for September 1996:

The Scientific Council Special Session of September 1996 is planned to be a Workshop on 'Assessment of Groundfish Based on Bottom Trawl Survey Results".

Convener: Hans Lassen (EU - Denmark)

Dates: 4-6 September 1996 **Place**: Dartmouth, Nova Scotia, Canada (in conjunction with the 18th Annual Meeting of NAFO during 9-13 September 1996)

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1. Introduction

The importance of abundance survey for fish stock assessment is increasing. There are serious problems with the quality of the catch statistics, and there are several important stocks under moratoria. In these cases, abundance survey data are the only available reliable source of information on stock status. The NAFO Scientific Council is fortunate that there are extensive survey data available for most of the important fish stocks in the Regulatory Area.

The states of most groundfish stocks in Subareas 1-3 are very poor, and the urgent need for fishery independent assessment is felt for these stocks. We are therefore focusing on the groundfish stocks. We will also focus on bottom trawl surveys because of the availability of good time-series of data.

2. Objectives

a) To further the Council's assessments by improving on analyses of fish distributions observed during abundance surveys. The relation between distribution of fish and the environmental condition during the survey shall get special attention.

b) To further the work on how to assess stocks under moratoria, i.e. assessment of fish stocks based on survey data only.

c) To present an overview of techniques available for these types of analyses. The lecturing material will be considered for publication in NAFO Studies/Journal.

3. **Participation**

The Workshop is primarily aimed at Scientific Council members (mainly fish stock assessment experts). The Workshop will be open to the interested Scientific Community but advertisement of this Workshop will be restricted, and total number of participants will be limited.

4. **Format**

The Workshop will be in two sessions, each for a little more than one day. Each session will be introduced by a keynote speaker. The Workshop will be concluded by a general discussion, in an attempt to summarize the findings.

The format for each topic will be as follows:

a) Keynote speaker (followed by discussion)
b) Overview of the topic in a lecture setting with discussions
c) Introduction to the software available for the particular analysis
d) Based on four data sets (case studies) the participants will analyze the data, with hands-on work on their own portable PC.
e) The experiences gathered will be discussed in plenum.

5. **Program**

Session 1:

The influence of survey/trawl design, standardization and performance (duration, wing- and door-spread, warp length, etc.) on catchability. Relation to horizontal and vertical fish distribution (trawl/acoustic survey techniques) and fish behaviour will be discussed.

Keynote Speaker: Stephen J. Walsh, Department of Fisheries and Oceans, Northwest Atlantic Fisheries Centre, St. John's, Newfoundland, Canada AlC 5X1

Estimation of geographical distribution of fish (kriging, isoline, spline) and its relation to environmental parameters observed during the surveys.

Invited Lecturers: H.-J. Ratz and Manfred Stein, Bundesforschunganstalt für Fisherei, Hamburg, Republic of Germany

Software:

SURFER

Session 2:

Deriving estimates of absolute biomass and abundance from bottom trawl surveys.

Keynote Speaker: Stephen Smith, Department of Fisheries and Oceans, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada B2Y 4A2

Estimate of absolute abundance from bottom trawl survey results (swept area, q projection). Effect of biotic and abiotic factors on catchability to obtain unbiased abundance indices for a time series.

Invited Lecturers: Hans Lassen, Danmark Fiskeri-og Havundersogelser, Charlottenlund Slot, K-2920 Charlottenlund, Denmark

Invited Lecturers: (continued)

Stephen Smith, Department of Fisheries and Oceans
Bedford Institute of Oceanography
Dartmouth, Nova Scotia, Canada B2Y 4A2

Software:

Standard Statistical packages, (S+, SYSTAT, SAS) - STRAP (special Canadian developed package)

The workshop is planned to conclude with a general discussion on the last day focusing on:

a) design considerations of bottom trawl surveys to obtain absolute estimates of abundance
b) adequacy of the available tools for analysis of data from trawl surveys and method deficiencies
c) design for obtaining relevant environmental parameters from abundance surveys

Case studies:

The Workshop will deal with 3-4 case studies with the following target species:

a) e.g. Cod (EU survey on Flemish Cap, German survey on West Greenland)
b) e.g. Shrimp (Greenland survey in Div. 3L)
c) e.g. A. plaice (Canadian survey in Div. 3L)

The data needed for the Workshop would be haul-by-haul information supplemented by environmental data (S, T, O_2 and current (if available)).

6. Background

The importance of abundance survey for fish stock assessment is increasing. There are serious problems with the quality of the catch statistics, and there are several important stocks under moratoria. In these cases, abundance survey data are the only available reliable source of information on stock status. The NAFO Scientific Council is fortunate that there are extensive survey data available for most of the important fish stocks in the Regulatory Area. The main example of surveys which do not yet reach the appropriate quality are those surveys directed for the Greenland halibut stocks in Subarea 0+1 and in Subareas 2+3. In Subareas 0+1 the surveys do not cover the entire area of abundance, while surveys in Subareas 2+3 are essentially not coordinated.

The states of most groundfish stocks in the NAFO Subareas 1-3 are deplorable, and the need for fishery independent assessments is urgently felt for these stocks. Therefore, there is an identified need to focus on these and so the subsequent discussion is restricted to groundfish surveyed with bottom trawls. The restriction to bottom trawl is mainly because of the availability of good time series of data. There are also integrated trawl and acoustic survey methodology which are applicable to groundfish being rapidly developed in some laboratories.

The standard approach used by the Scientific Council in assessing fish stocks is based on VPA tuning techniques, mainly ADAPT. This and similar techniques, however, focus on the catch data as the means to establish an absolute estimate. The survey and commercial CPUE results are used to establish the relative level of abundance between years and age groups. Therefore, when catch data are either unreliable or when there is no catch taken from the stocks, the estimation procedure must be changed to allow direct derivation of absolute estimates from survey results.

The object of a new approach is to estimate the length composition of the stock (the application of ALK will not be dealt with in this workshop).

The key to this analysis is the catchability q linking the CPUE observation to the abundance N:

$$CPUE = q * N + noise$$

Catchability q can be obtained from:

a) direct estimate of q by fishing on a known population e.g. a tagged population or repeated fishing operations until a closed population has been fished to extinction (and the total stock is therefore known)
b) VPA estimate of q for periods when catch data were reliable and then apply the estimated q for the subsequent period
c) modelling gear and fish behaviour to establish the efficiency of an operative gear

There are obvious problems with all three approaches.

The catchability depends on the distribution of the fish. The standard multiplicative analysis:

$$\log(CPUE) = year + area + vessel + noise$$

assumes that the distribution pattern is independent of time. Therefore, the distributional aspect of the analysis should be considered in more detail than is often done.

Stock distribution and catchability depends on the environment, e.g. oxygen deficiency change distribution of fish, or the degree to which these fish become pelagic.

It would be a major step forward if the catchability could be related to environmental parameters. Attempts to explore these possible relationships would be included in the Workshop. It would be valuable even if environment data could be used to indicate years for which bias in the abundance estimate is likely.

7. Tentative Time Schedule

Wednesday, 4 September	09:00	Registration
	10:00	Opening
	10:30	Keynote lecture: Stephen J. Walsh
	11:30	Discussion
	12:00	Lunch
	13:00	Invited lectures: Manfred Stein and H.-J. Rätz
	14:00	Case studies on estimation fish distributions and relating these to environment parameters (hands-on)
Thursday, 5 September	0:900	Case studies continued (hands-on)
	11:00	Winding up of the fish distribution/environment session
	12:00	Lunch
	13:30	Keynote lecture:. Stephen Smith
	14:30	*Discussion*
Friday, 6 September	09:00	Invited lecture and case studies on estimation of catchability (hands-on)
	12:00	Lunch

Friday (continued)	13:30	Winding up of the catchability session
	14:30	Discussions, conclusions and recommendations
	16:30	Wrap-up

8. Further Information

For further information, please contact:

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