

# Herring stocks at risk from climate change. Implications for management and assessment.

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## Introduction

Eastern Atlantic herring *Clupea harengus* is commercially exploited across the northern European continental shelf and the fisheries are closely associated with seasonal migration patterns. Between and within stocks, the subcomponents show different spawning characteristics that influence amongst other things, the meristic traits of those subcomponents. Therefore, climate change will influence both the exploitation and general ecology of local herring stocks.

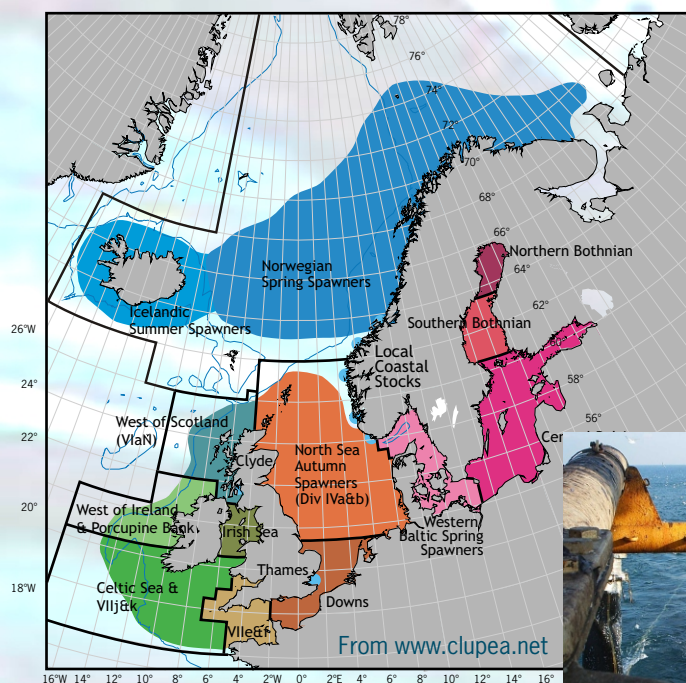


Photo Mario Stoker

## Management

Current management of herring stocks is based on ecosystem stability, e.g. constant carrying capacity, fixed reference points, unvarying natural mortality. From the determination of growth, the pertinence of surveys, the selection of fisheries and the very presence of a stock in a region, the management assumes ecosystem *status quo*.

### The major herring stocks in the northeast Atlantic



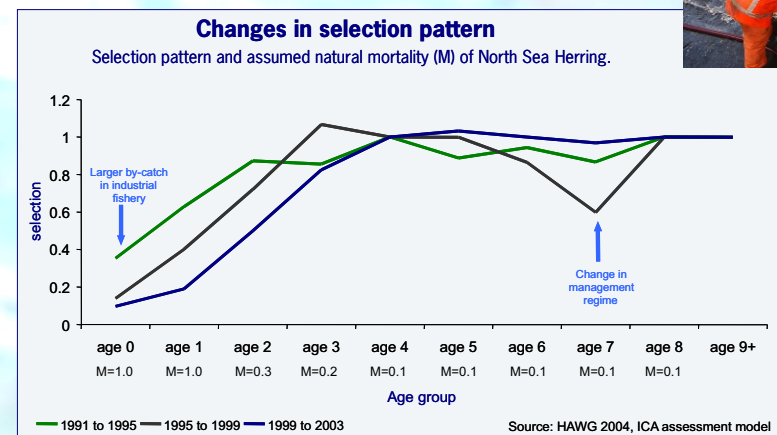
From www.clupea.net



Photo Mario Stoker

## Assessment

The separable models currently used require short term stability in the selection of the fishery. Management already influences selection at age and climate change will confound these signals.



Source: HAWG 2004, ICA assessment model

## Impact of climate change

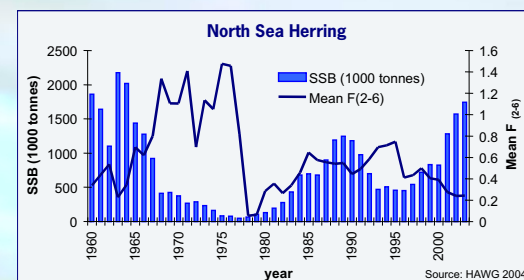
Climate change will impact in two ways;

- I. it will affect the ecology of the stocks and change their productivity
- II. it will confound some of the assumptions of the assessment models. *Clupea harengus* is a northern temperate species, therefore stocks in the southern latitudinal range are at risk from increasing temperatures (e.g. Celtic Sea).

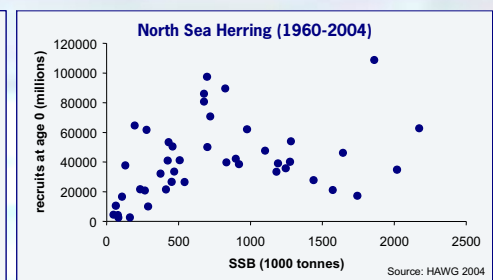
Feeding migration patterns are at risk from changes in zooplankton production and distribution.

Recruitment and its monitoring are at risk from changing water movements.

Any changes in fishing fleet behaviour will corrupt the assumptions about constant selection in the stock assessment model.



Source: HAWG 2004



Source: HAWG 2004

## Conclusions

Assessment methods and the implementation of management measures must remain flexible and adaptive to the dynamics of the system.

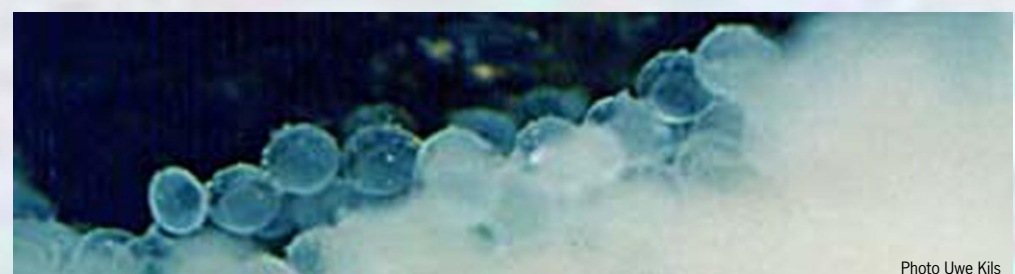


Photo Uwe Kils

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