

THE KILLING OF THE NORTH-EAST ATLANTIC PLANKTON FEEDERS:  
 MAN THE MURDERER OR ACCESSORY TO THE CRIME?

by

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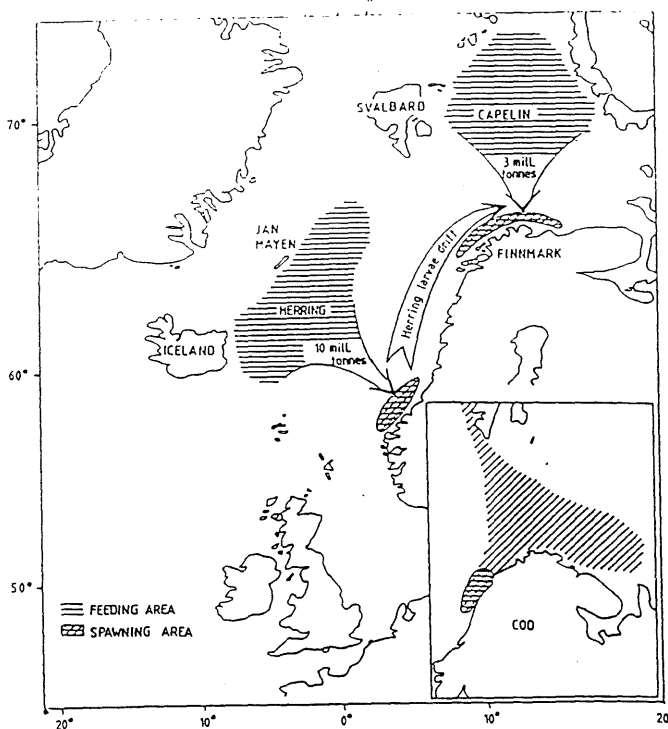
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THE CONSEQUENCES OF THE CRIME



The herring were literally fished out, through a far too extensive fishery on both adults and juveniles. The capelin stock was depleted by other causes than the fishery, but the extensive fishing in 1983-86 contributed substantially to the collapse of the stock. Man is therefore found guilty of the crime of herring murder and is an accessory to the death of the capelin stock. The extenuating circumstances of the crime are lack of knowledge of the sustainable yield of stocks, and lack of insight into species interactions and the impact of the environment. Aggravating circumstances are the neglect of the destructive effects of the weapon used, and managers' tendencies to overlook scientists' warning of overexploitation for the benefit of a short-term profit gain. Man is therefore sentenced to produce knowledge on the interactions between the fisheries, the stocks and the environment to help manage fish resources better and to use this knowledge in a fishery management policy which aims at a maximum long term yield.

## THE CONVICTION

Herring, capelin and cod are key species in the food chain of the ecosystem in the Barents Sea. Since the end of the 1960's, the natural distribution and migration patterns of herring have been distorted and the stock has been grossly recruitment overexploited. This situation implies a latent imbalance in the state of the predator-prey relationship in the Barents Sea. The consequences of a reduced herring stock were triggered in the mid-80's, when excellent recruitment conditions for herring and cod did occur. Extraordinarily abundant year-classes of cod were recruited, but the herring stock was not sufficiently large to take full advantage of the favourable recruitment conditions. Given the lack of juvenile herring the rapidly growing cod stock grazed down all other available prey species in the area, including its own progeny, and starved cod, seabirds and seals have in later years appeared on the north Norwegian coast. The capelin fishery has collapsed and the traditional coastal cod fisheries have been struck by the most serious crisis on record.

## STATE OF KNOWLEDGE

The present state of our knowledge of species interactions, and of the impact of the environment on the development of species:

The stocks are regularly surveyed.

Quantification of the cod stock's predation on other species. The most important prey species in a management context are capelin, herring, cod, redfish and crustaceans.

Isolated studies of plankton development, capelin maturation, capelin growth and cod migration.

Vital aspects of the dynamics and interaction processes of fish stocks not known or only qualitatively understood. These aspects include:

Fish migration.

The influence of environmental conditions on the recruitment processes.

Long-term oceanographic dynamics.

#### WHAT DO WE DO NOW?

To study species interactions a multispecies model is under construction at present, this comprises cod, capelin, herring and polar cod. The model has the following characteristics:

Geographically distributed, seven areas.  
Fine distribution in biological space.  
One month time step.  
Dynamic use of stomach content data.

Since 1985, two institutes, PINRO in Murmansk and IMR in Bergen have extended their cooperation, which was previously on field work, to comprise species interaction studies. The future cooperation will be along the following lines:

Field work.  
Common stomach content data base (already in operation).  
Joint modeling of the ecosystem; first deadline 1991.

The cooperation will be followed up through regular exchange of scientists.

Management in the future:

IMR AND PINRO COOPERATES ON IMPROVING THE BASIS FOR  
MANAGEMENT THROUGH JOINT RESEARCH ON SPECIES INTERACTIONS.