

THE INSTITUTE OF MARINE RESEARCH IN THE ARCTIC



INSTITUTE OF MARINE RESEARCH
HAVFORSKNINGSINSTITUTTET

Long experience

Decades of research in the Arctic

Fish stocks and the Barents Sea ecosystem have enjoyed the highest priority among the activities of the Institute of Marine Research (IMR) for several decades.

Regular annual research cruises have enabled us to monitor how the most important fish stocks have been developing.

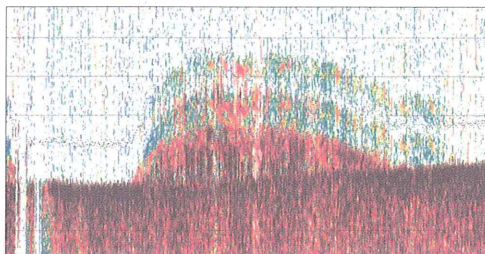
- ▶ Fry of all species - since 1965
- ▶ Shrimp - since 1965
- ▶ Capelin - since 1973
- ▶ Cod - since 1980
- ▶ Juvenile herring - since 1984
- ▶ Whale - since 1987
- ▶ Seal - since 1990
- ▶ Greenland halibut - since 1992
- ▶ King crab - since 1994

In 2003, a number of these surveys were gathered together in a major ecosystem cruise which now goes to the Barents Sea three times a year (see p. 8).

This cruise also covers several of the regular “sections” in the Arctic, where water temperature, salinity and currents are measured along fixed courses. Some of these observations and samplings have been made continuously since 1929, while other started during the 1930s and 50s.

IMR has carried out regular surveys of pollution in the Barents Sea since the 60s, focusing on non-biodegradable environmental toxins, mercury and radioactivity.

The Barents Sea covers an area of more than 1.4 million square kilometres, and IMR collaborates extensively at national and international level in following the pollution situation in this huge area.



The Soviet submarine “Komsomolets” sank in 1989. During a routine survey in the Barents Sea in 1991, the crew on board the IMR vessel “Johan Hjørt” discovered a mysterious signal on the echogramme and found the submarine at 1700 meters.



We already know that the ecosystems of the Arctic are easily influenced by human activities such as fishing, hunting and military operations, and even by industrial activity further south on the Continent, via the long-range transport of pollutants.





Long experience

Fifty years of collaboration with Russia

In 1957, the collaboration between Norwegian and Russian marine scientists was launched, when Soviet researchers visited Bergen and our own marine scientist, Finn Devold, visited Murmansk with a Norwegian delegation.

In 1958, Norway's new marine research vessel "Johan Hjort" called at Murmansk. This visit marked the beginning of an annual series of meetings at which scientists exchange their findings and make plans for joint research cruises.

In 1965, the first 0-group survey took place in the Barents Sea. What was initially an international research cruise, with participants from a number of European countries, gradually developed into a purely Russo-Norwegian cooperative effort. This survey continues to this day on an annual basis, but it is now integrated into the Russo-Norwegian ecosystem cruise. Every year, the survey provides the first indication of the level of production of cod, haddock, herring, capelin, Greenland halibut and redfish. The International Council for the Exploration of the Sea (ICES) does not possess time series of equivalent length or quality.

In 1973, IMR initiated acoustic surveys of capelin following the autumn 0-group surveys. The Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO) became increasingly involved in these surveys. By the late 70s, they had become joint cruises and are now part of the ecosystem cruise.

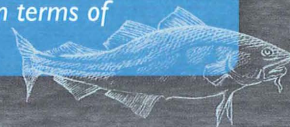
Russian scientists have measured the temperature and salinity of the water in what is known as the "Kola Section" every month since 1900. Exchanges of data between PINRO and IMR have enabled Norwegian scientists to demonstrate the link between high temperatures in the Kola Section and good year classes of North-East Arctic cod.

The range of cooperation between the Institute of Marine Research and PINRO now also includes regular symposia as well as a joint report series that publishes articles from both institutions and jointly written cruise reports.

In many ways the capelin surveys are the flagship of Russo-Norwegian cruise cooperation.



Cooperation with PINRO has contributed to a management advice system which has ensured that the Barents Sea is among the world's wealthiest in terms of fish resources.



IMR on oil drilling in the Arctic

Short food chains are vulnerable

In the open, ice-free Barents Sea, the major fish stocks are distributed over huge areas, and a large oil spill in any given area will only affect limited parts of the stocks. Fish in these areas will be large enough to swim away from polluted areas. However, chemicals and produced water may have long-term negative effects on fish, and possibly on other types of marine fauna.

Arctic food chains are short, with relatively few but extremely numerous species, a structure that makes food chains rather unstable. They can easily be affected by temperature changes, fisheries and pollution. Furthermore, many of the key species in the food chain store large amounts of fat as energy reserves for the long winters. Fat-soluble foreign substances thus easily accumulates in the food chain.

Physical conditions such as low temperatures and the long, dark winters mean that foreign substances are probably broken down more slowly in the Barents Sea than in other regions of offshore hydrocarbon production. We still know little about this aspect.



Arctic food chains are short and unstable.

IMR on oil drilling in the Arctic

Eggs and larvae are also vulnerable

The most vulnerable stages in the life of a fish are as eggs and larvae, when these drift passively in the water column. The eggs and larvae of all the most important fish species in the North-East Atlantic spawn close to our coastline, and are transported northwards with the Coastal Current to the nursery grounds in the Barents Sea and near Svalbard.

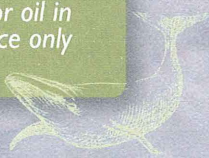
In the area between Lofotodden and Tromsøflaket the continental shelf is narrow, and the seabed topography also causes the Coastal Current to narrow here. This means in turn that the vulnerable eggs and larvae are concentrated into a long column in this area and are thus more liable to be affected by any untoward influences than in other places along the coastline, where they are spread out more widely.

A large oil-spill at a critical point in time could force the spawning fish to move away and disturb spawning. Eggs and larvae will also suffer damage. At worst, whole year classes of the most important fish stocks in the Barents Sea could be affected.



The large gadoid fish stocks in the Barents Sea migrate to Lofoten to spawn.

IMR recommends that drilling for oil in the Barents Sea should take place only on condition of zero emissions.



IMR advises against oil drilling in the area between Lofoten and Tromsøflaket.



Better research for better management advice

Studying the ecosystem as a whole

Until recently, traditional marine research and ocean monitoring programmes have focused on individual elements of the ecosystem, such as a single fish species or a single environmental factor. With our modern research vessels and a willingness to think holistically, IMR is now making cruises on which we monitor and study the whole marine ecosystem.

Measuring all the components of the ecosystem simultaneously offers us new and improved prospects of understanding ecological relationships. It is easier to study predator-prey relationships and their extent, with respect to physical conditions such as temperature and currents.

The ecosystem cruise to the Barents Sea is the most important individual cruise undertaken by IMR, covering the whole of the Barents Sea from the coast of Troms and Finnmark to the ice edge to the north of Svalbard. The cruise is carried out three times a year in collaboration with scientists from PINRO.

The individual surveys that comprise the cruise:

- ▶ The year's fry of cod, haddock, capelin, herring and saithe
- ▶ Capelin
- ▶ Herring
- ▶ Benthic species (*cod, haddock, catfish, etc.*)
- ▶ Greenland halibut
- ▶ Blue whiting
- ▶ Shrimp
- ▶ Plankton
- ▶ Seabed organisms
- ▶ Marine mammals
- ▶ Seabirds
- ▶ Pollution
- ▶ Temperature
- ▶ Salinity
- ▶ Currents

Ecological relationships in the ecosystem have a large influence on the development of each single stock.





Foto: Hans Hagen, Stockphoto.com

Monitoring and research of this sort will provide us with a better understanding of how our marine ecosystems operate, and will give us a better basis for offering good management advice.



Better research for better management advice

Mapping the seabed with MAREANO

The Institute of Marine Research is the coordinator of the MAREANO Programme, which will survey the seabed and carry out basic studies of its physical, chemical and biological environment and systematise this information into a marine area database for the Norwegian coastal and ocean region.

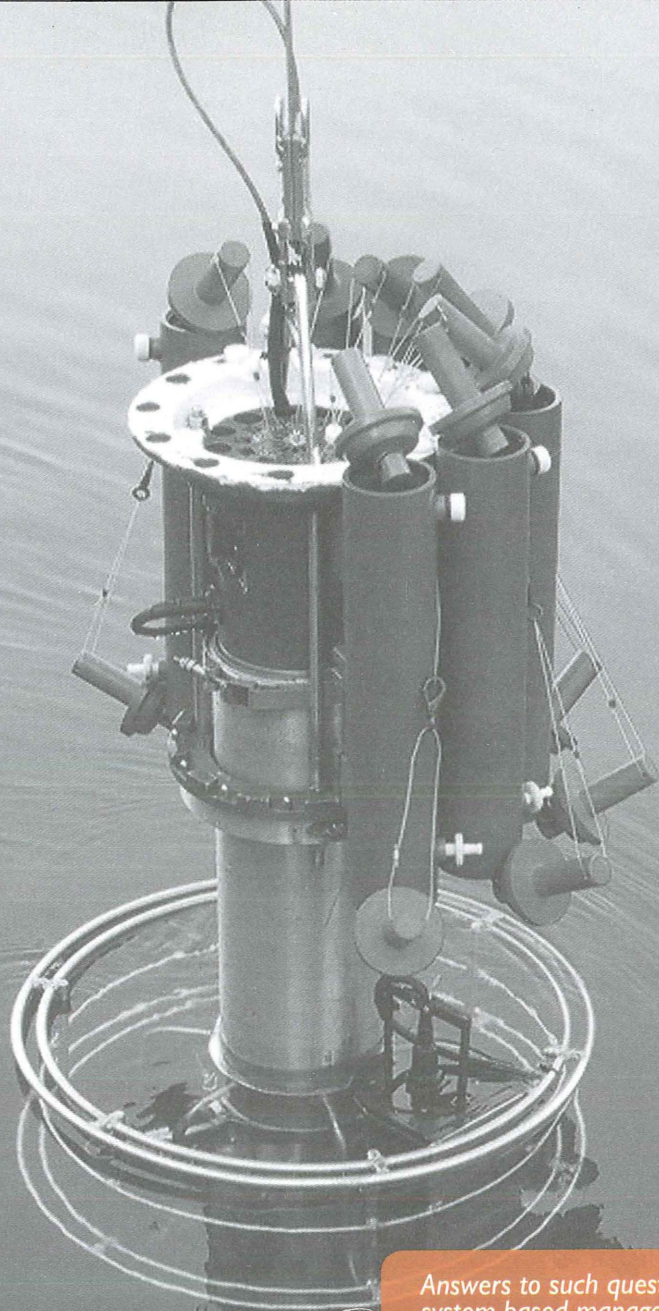
MAREANO is being carried out by IMR, the Norwegian Geological Survey and the Norwegian Hydrographic service.

The initial phase of the Programme will prioritise the mapping of the Barents Sea and Lofoten.

The aim of the Programme is to obtain answers to such questions as: What is the landscape of the Norwegian continental shelf like? What does the seabed consist of? How is pollution stored in seabed sediments? Where are the coral reefs located? What is the relationship between the physical environment, species diversity and biological resources?



The past few years IMR has discovered large cold water coral reefs off the Norwegian coast.



Answers to such questions are essential for an ecosystem-based management of our marine resources. The survey started in 2005.

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