

Ocean climate

In 2002 the Barents Sea was warmer than average in most parts. However a relatively strong cooling in the fall and the conditions at the start of 2003 indicate a decrease of the temperature in the first half of 2003. The strength of the inflow of Atlantic water is a crucial and uncertain factor, but most likely the Barents Sea will experience a temperature decrease throughout the year.

In the Norwegian Sea no major changes in the main patterns for circulation or transport of heat are expected in 2003 and 2004. The inflow of Atlantic water to the eastern part is expected to be normal or higher in 2003. The south-western part will continue to be dominated by Arctic water. In the central and northern Norwegian Sea the influence of Atlantic water will increase.

The temperatures in the North Sea and the coastal areas were relatively high in 2002. A strong atmospheric cooling towards the end of the year with weaker inflow of Atlantic water than in 2002 will probably result in quite normal ocean climate conditions in 2003.

Ocean production

The biomass of zooplankton in the Barents Sea, including overwintering *Calanus finmarchicus*, during autumn 2002, was slightly higher than the year before. Based on this and an anticipation of reduced inflow from the Norwegian Sea, we expect similar or better ocean production in 2003 compared to 2002. The basis for production of capelin, herring and juvenile fish will be much the same as in 2003.

The spawning stocks of herring and capelin, including the egg production, will probably be reduced in 2003 compared to 2002. However, both stocks have sufficient abundance for producing strong year classes if the environmental conditions in 2003 turn out to be favourable. The uncertainty lies mainly in the amount of inflowing Atlantic water.

Fish distribution

The Norwegian spring spawning herring spawn along the Norwegian coast, mainly between Møre and Halten. Few larvae were found south of 61°N. In recent years the area of Røstbanken has become an important spawning ground, with half the observed herring larvae in 2002 found north of 68°N. We expect the tendency of more northerly spawning to be maintained.

One of the most important climate indices for the North Atlantic is the average north-south difference in air pressure between Iceland and the Azores, known as the "North Atlantic Oscillation" (NAO) index. The distribution of water masses in the Norwegian Sea is related to the mean NAO index for the winter months. It is shown that the biomass of zooplankton in the Norwegian Sea is directly correlated with the NAO index of the same winter and of the preceding year (see *Havets miljø 2001*). The NAO index for the winter of 2001-2002 was slightly below the mean of the past 13 years. Thus, we expect an average biomass of zooplankton in the central and southern part of the Norwegian Sea in 2003, unless the NAO index for 2002-2003 becomes unusually high. Since we are in the middle of this period, that seems unlikely.

The condition of the herring feeding on zooplankton in the Norwegian Sea has also shown a direct correlation with the NAO index for the present and preceding year. We expect an average condition of the herring in 2003 after the feeding season unless the NAO index for the winter 2002-2003 becomes unusually high.

In recent years the Arctic water masses in the south-western part of the Norwegian Sea have resulted in poor feeding conditions for the herring in these areas. The herring have instead migrated to feed in the northern areas of the Norwegian Sea. The high transport of *Calanus* (the favorite food of the herring) with the Atlantic water to the northern Norwegian Sea in recent years, indicates that the herring will continue to feed there and not north of Iceland. Thus, we expect a similar feeding migration pattern for the herring in the Norwegian Sea in 2003 as in 2002.