

# Barents Sea–Lofoten area

## Innholdsfortegnelse

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The Barents Sea is one of the world's most productive sea areas, supporting varied benthic communities and large populations of fish, seabirds and marine mammals. It is still clean and rich in resources, but is under pressure from human activity, climate change and acidification.



Orcas at sea outside Troms county. Photo: Stein Ø. Nilsen tromsofoto.net



Humpback whale hunting for herring. Photo: Stein Ø. Nilsen, tromsofoto.net



Humpback whale on its way into the deep. Photo: Stein Ø. Nilsen / tromsotfoto.net



Kongsøya, Svalbard. Photo: Ø. Overrein, Norsk Polarinstitut



Ivory gull, Svalbard. Photo: Stein Ø. Nilsen, Norwegian Polar Institute



Steller's Eider (*Polystica stelleri*) in the Varangerfjord. Photo: Stein Ø. Nilsen, tromsofoto.net



Kitiwake (*Rissa tridactyla*). Photo: Stein Ø. Nilsen / tromsotfoto.net



Northern Fulmar (*Fulmarus glacialis*). Photo: Stein Ø. Nilsen, Norwegian Polar Institute



Glacier in Svalbard. Photo: Stein Ø. Nilsen, Norwegian Polar Institute



The island Kongsøya in the Barents Sea. Photo: Øystein Overrein, Norwegian Polar Institute

## STATE

### Rich resources in the Barents Sea

The environment of the Barents Sea–Lofoten area is rich and varied. The inflow of warm Atlantic water ensures that the Norwegian coast and large parts of the Barents Sea are ice-free all year round.

The zone where warm Atlantic water and colder Arctic water meet and mix is called the polar front. Such front zones are highly productive, supporting huge numbers of planktonic algae. These are grazed by a variety of zooplankton, which in turn are food for fish, seabirds and marine mammals.

The Barents Sea is relatively shallow, with a continental shelf area in the west bordering on the Norwegian Sea, and large shallow bank areas. At the edge of the continental shelf and the bank areas, warm, nutrient-rich Atlantic water is forced up to the surface. Biological production is high in these areas too, and supports large fish stocks that provide the basis for Norway's fishing industry.

Distribution of North East Arctic cod. Vesterålen/Lofoten are the main spawning areas for the cod. The eggs are spawned pelagically in February-April. Egg and larvae are carried with the current into the Barents Sea. Most of the stock is found in the Barents Sea, on the warm side of the Polar Front. The Northeast Arctic cod stock is the largest cod stock in the world. You can zoom to explore further.

## Large fish stocks and seabird populations

Herring, capelin and cod use the Barents Sea–Lofoten area throughout their lives or for part of their life cycle, and all of these species migrate towards the Norwegian coast to spawn. The most concentrated spawning grounds are near the Lofoten and Vesterålen Islands. From here, eggs and larvae drift northwards along the coast and into the Barents Sea, where the juvenile fish grow and mature. Capelin spawn along the coast north to Finnmark, and herring spawn south to the coast of Møre og Romsdal.

Haddock, redfish and Greenland halibut also use the area, but spawn further from the coast, along the edge of the continental shelf, and feed on concentrations of drifting plankton in the central and northern parts of the Barents Sea.

The large fish stocks in the Barents Sea provide food supplies for some of the densest seabird populations in the world. In addition, the Barents Sea is an important habitat for a number of marine mammal species, several of which are of national and international importance.

Some of the most productive parts of the Barents Sea and certain areas of importance for biodiversity have been identified as particularly valuable areas in the management plan for the Barents Sea–Lofoten area.

### IMPACT

## Marine mammals, seabirds and benthic communities vulnerable

The most serious impacts on the Barents Sea–Lofoten area are being caused by fisheries, climate change and long-range transport of hazardous substances. The effects are most marked for benthic communities, seabirds and marine mammals.

Bottom trawling can have major impacts on benthic communities. There is currently some bottom trawling in areas where the benthic fauna, including coral reefs, is liable to be damaged by fishing gear. This has indirect impacts on food supplies for birds, seals and Harbour porpoises – all of which may also become entangled in fishing gear.

Climate change is already apparent – temperatures are rising, the extent of the sea ice is shrinking, and the ice is becoming thinner in some areas. This will cause problems for species that are dependent on the ice, such as seals and polar bears. With rising CO<sub>2</sub> levels in the atmosphere, the seas will absorb more CO<sub>2</sub> in the coming years, gradually increasing the acidity of seawater. This will primarily affect organisms that need calcium to build calcareous skeletons and shells, including corals and many plankton species.

Environmentally hazardous substances are carried by winds and ocean currents to the Barents Sea–Lofoten area. Some of these substances bioaccumulate, becoming more concentrated at each stage of the food chain, and therefore have serious impacts on seabirds and marine mammals at the top of the food chains.

In addition, illegal discharges and oil spills from shipping in the Barents Sea have moderate impacts on seabirds. Littering also has a moderate impact, mainly along the shoreline. In addition, small particles of plastic in water from partially decomposed waste appears to be a growing environmental problem.

### PRESSURE

## Climate change, fisheries and hazardous substances

Climate change is expected to put increasing pressure on the Barents Sea ecosystems in the future, but at present the fishing industry is most important.

### Fishing industry exerts most pressure

Fishing industry is by far the largest and most important industry in the Barents Sea–Lofoten area. Fishing vessels account for almost two-thirds of all shipping in the Barents Sea. The rest consists mainly of traffic to and from ports in North Norway, which follows fixed routes along the coast. The volume of Russian oil and gas transported through the Barents Sea, and especially along the Norwegian coast, is expected to increase in the coming years.

## Rapid climate change in the Arctic

The climate is changing most rapidly in the Arctic, and modelling shows that the temperature is rising about twice as fast here as it is on average in the rest of the world. Climate change is accompanied by changes in ice conditions, salinity, turbulence and ocean currents, all of which will have impacts on ecosystems. There has been little ice cover in the Barents Sea in recent years, particularly in the fjords on Spitsbergen, where there have been several winters with no ice cover at all.

## Oil and gas

Until recently, oil and gas activity in the Norwegian part of the Barents Sea has been limited to exploration drilling, but the Snøhvit gas field is now on stream, and development of the Goliat field has started. Higher levels of some pollutants have already been detected around Snøhvit. There have also been discoveries of oil and/or gas at several other locations in the Barents Sea (Skrugard, Norvarg and Havis). In addition, the mapping of previously disputed areas has started.

## Hazardous substances

Persistent hazardous substances can be transported over long distances by winds and ocean currents. In the Barents Sea–Lofoten area, temperatures are generally low, and such pollutants tend to be deposited on snow and in water. They are then absorbed by plankton and other organisms at the bottom of the food chain. They can then bioaccumulate, increasing in concentration for each step up the food chain to harmful levels in animals such as polar bears and killer whales.

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## RESPONSE

# Ecosystem-based management and monitoring

## Management plan for the Barents Sea–Lofoten area

On 31 March 2006, the Ministry of the Environment presented an integrated management plan for the Barents Sea–Lofoten area. It was based on several years of work, including surveys of resources and studies to identify particularly vulnerable and valuable areas and endangered and vulnerable species. In March 2011, an updated plan was presented that confirms the valuable and vulnerable status of the areas and species.

The management plan provides a framework for commercial and other activities in the area and a basis for a management regime designed to prevent pressures on ecosystems from exceeding sustainable levels. For this to be successful, natural resources and the environment need to be closely monitored.

## Gaps in our knowledge

There are still substantial gaps in our knowledge of the area, which makes it difficult to assess the likely impacts of climate change and human activities in the future.

A combination of surveys, monitoring programmes and research, including impact studies, is needed to achieve a better understanding of the patterns we identify, and to evaluate the vulnerability of species and areas and the stability of ecosystems.

Climate change and overfishing may result in considerable changes in species composition and ecosystem dynamics. It is particularly important to learn more about how resilient the Barents Sea is to such pressures, which may be either natural or the result of human activity. We also need to know more about areas that have been identified as particularly valuable, for example about processes in the marginal ice zone and the polar front.

## Integrated monitoring system

One goal of the management plan is to ensure a monitoring system that is closely coordinated and can be expanded as needed. A group of representatives from all relevant institutions and sectors has been appointed to ensure that the monitoring is well coordinated.