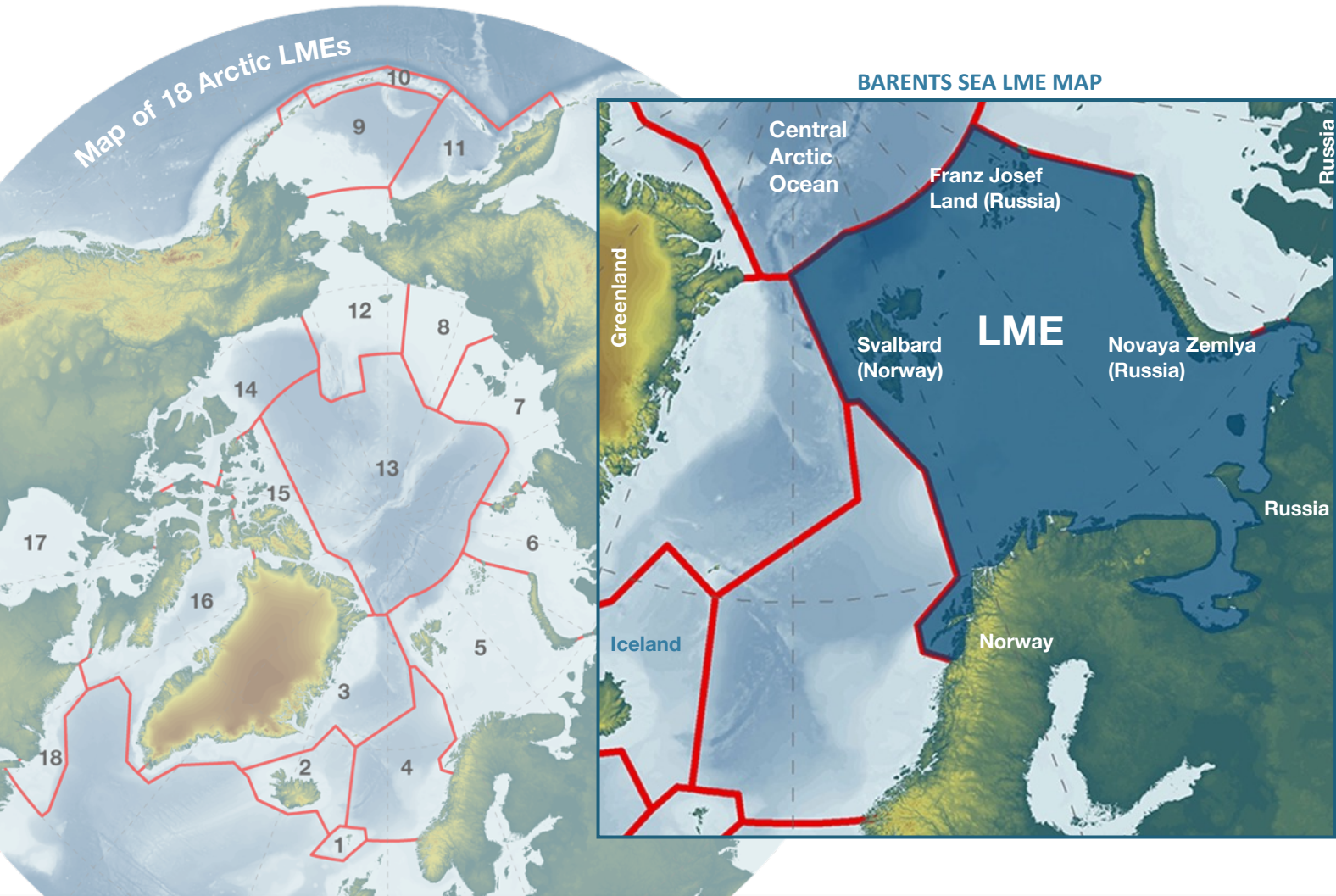


BARENTS SEA LME



ARCTIC LMEs

Large Marine Ecosystems (LMEs) are defined as regions of ocean space of 200,000 km² or greater, that encompass coastal areas from river basins and estuaries to the outer margins of a continental shelf or the seaward extent of a predominant coastal current. LMEs are defined by ecological criteria, including bathymetry, hydrography, productivity, and trophically linked populations. PAME developed a map delineating 17 Arctic Large Marine Ecosystems (Arctic LME's) in the marine waters of the Arctic and adjacent seas in 2006. In a consultative process including agencies of Arctic Council member states and other Arctic Council working groups, the [Arctic LME map was revised in 2012](#) to include 18 Arctic LMEs. This is the current map of Arctic LMEs used in the

work of the Arctic Council in developing and promoting the Ecosystem Approach to management of the Arctic marine environment.

Joint EA Expert group

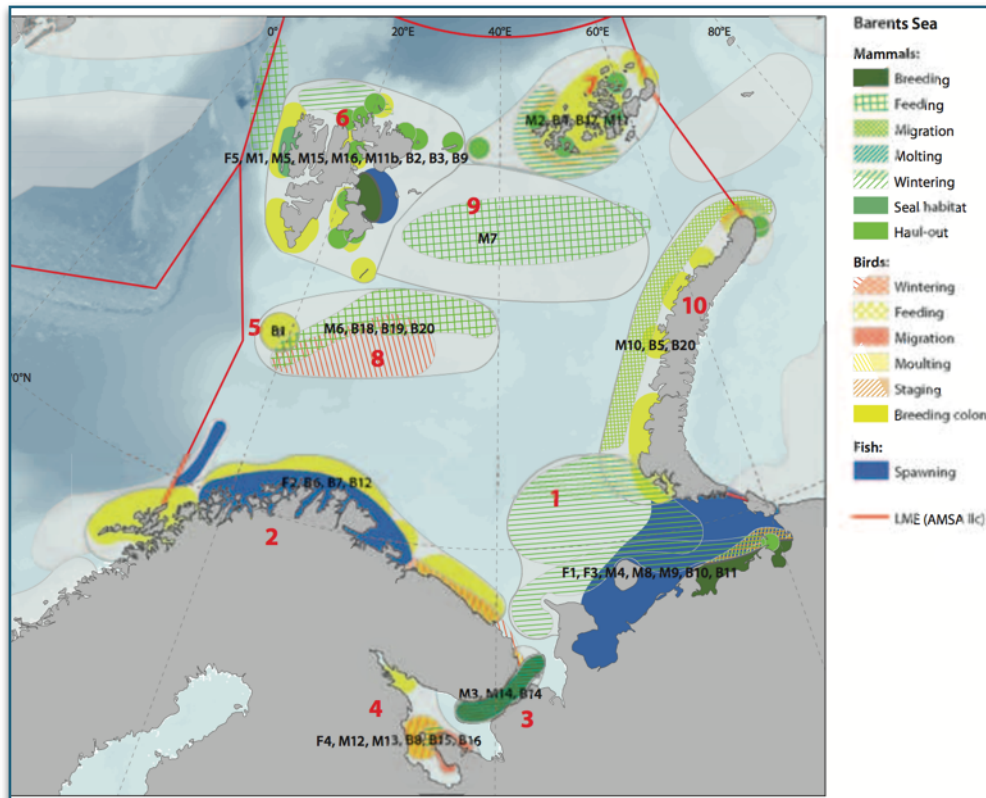
PAME established an Ecosystem Approach to Management expert group in 2011 with the participation of other Arctic Council working groups (AMAP, CAFF and SDWG). This joint Ecosystem Approach Expert Group (EA-EG) has developed a [framework for EA implementation](#) where the first step is identification of the ecosystem to be managed. Identifying the Arctic LMEs represents this first step.

This factsheet is one of 18 in a series of the Arctic LMEs.

OVERVIEW: BARENTS SEA LME

The Barents Sea is a large shelf area (about 1.5 million km²) located at high latitudes between about 70 and 80°N to the north of Norway and Russia. The mean depth is about 230 m and the maximum depth in the western Barents Sea is about 500 m. The bottom topography is complex with several larger and smaller banks and deeper trenches and basins in between. Dominant features are the Svalbard and Franz Josef Land archipelagos located in the northwestern and northeastern corners of the Barents Sea, and the Great Bank and Central Bank in the central part.

The Atlantic water on its way to the Arctic Ocean flows with one branch around the Barents Sea and with another branch across the Barents from southwest to northeast. This flow pattern dictates the oceanographic and biogeographic characteristics of the Barents Sea LME.



Map: The Barents Sea LME.

Source: AMSA IIC Report

Large areas of the northern and eastern Barents Sea are typically ice-covered in winter. Most of the ice is annual ice which forms seasonally, but multi-annual ice is found in the northern Barents Sea where it is partly advected in from the Arctic Ocean. The minimum ice extent is usually in late August or September when the whole of the Barents Sea may become ice-free in warm years. The maximum extent of the sea ice usually occurs in April, when it extends south to about 75-76°N in the western Barents Sea. The thickness of the annual ice which forms during winter is about 1 m in the central areas at latitudes 75-76°N, while being about 1.5 m at around 79°N.

The inflowing Atlantic water is relatively mild and gives boreal conditions in the southern part of the Barents Sea, while cold Arctic water resides over most of the northern part. The boreal and Arctic regimes are separated by a sharp oceanographic polar front in the western part of the Barents Sea. The small pelagic fish capelin, which is a key component of the food web of the Barents Sea, migrates across this boundary and integrates the southern and northern parts in a functional ecological sense. Other migratory species such as polar cod, harp seal and beluga contribute also to the ecological integration.



MARINE MAMMALS

The Barents Sea is an important area for marine mammals. A total of about 25 species have been recorded from the area, including rare visitors. The total includes 7 species of baleen whales, 10 species of toothed whales, 6 species of seals plus walrus, and polar bear. Nine of the species are ice-associated: bowhead whale, beluga whale, narwhal, walrus, ringed seal, bearded seal, harp seal, hooded seal, and polar bear. All these species except hooded seal are year-round residents of the Barents Sea. Two more seals, harbour seal and grey seal, and two toothed whales, harbour porpoise and white-beaked dolphin, are also year-round residents but in the open water areas of the southern Barents Sea (and at Svalbard for one population of harbour seal).

Humpback whale (about 500 individuals) and **fin whale** (about 1700 individuals) use the Barents Sea as a seasonal feeding area. Both these species may remain in the northern feeding areas during winter, although there is uncertainty about the extent to which this takes place. Both species are known for following capelin on their spawning migrations as an important stock for their prey. **Blue whale** was severely depleted by the commercial whaling which started off Finmark in the late 1860s. Up to 1904, about 3,500 blue whales may have been killed in north Norwegian waters. Blue whale is listed as endangered and the present abundance in the northeast Atlantic is probably in the few hundreds as indicated by low but regular sightings.

Bowhead (or Greenland right whale): The Spitsbergen (or Svalbard-Barents Sea) stock of bowhead whales is considered 'Critically Endangered' by IUCN. A research in 1992 considered that any remaining stock probably numbered in the low 10s. A large population used to feed on Arctic zooplankton in the northern Barents Sea prior to their severe depletion by whaling in the preceding centuries. The bowheads of the Spitsbergen stock counted up 100,000 individuals prior to extensive whaling which started in 1611. More than 100,000 bowheads were estimated killed during 300 years of whaling, most of them from about 1650 to 1750 – mostly in the Greenland Sea. The relatively consistent and regular sightings of bowheads at Svalbard and Franz Josef Land suggest that the stock could be larger than in the 10s, possibly of the order of 100 whales.

The **Minke whale** stock is estimated to be about 85 thousand individuals in the Northeast Atlantic, the

majority of them moving into the Barents Sea seasonally where they feed largely on capelin, herring and krill. **Beluga** or white whale is a common species in the northern and eastern Barents Sea and in the White Sea. The main preys of belugas in these areas are polar cod and coregonid whitefish. There is considerable uncertainty regarding the size of the populations of belugas in the Barents and the White Seas, it has been estimated up to 20,000 belugas. Historically they have been harvested, with catches of about 1,500 individuals annually when the catch was at its highest during the 1950s and 60s. In 1999 commercial whaling was banned and there is now only a limited subsistence harvest.

Narwhal occurs with a small population (estimated at about 200 individuals) in the northern Barents Sea. There are limited observations and knowledge about this population. In addition to the arctic species beluga and narwhal, other toothed whales occur in the Barents Sea mainly in the open waters. **White-beaked dolphin** is distributed mainly in the southwestern and central parts of the sea and may occur seasonally with about 25,000 individuals. White-sided dolphin also occurs in the Barents Sea with roughly similar number of individuals.

Killer whale occurs in the Barents Sea but in fairly low numbers. Most killer whales are found in the Norwegian Sea to the south and west where they feed on herring of the Norwegian spring-spawning stock. **Harbour porpoise** are common in the southern Barents Sea. They are widely distributed but occurs most concentrated in the coastal areas along the southern shores of the Barents Sea. The distribution of harbour porpoise extends north to the Bear Island and the waters of the southwestern Svalbard. **Ringed seal** follows generally the seasonal rhythm of the ice, being most abundant in the ice edge region and into the pack ice during summer and autumn. The main breeding habitat is stable first-year ice containing irregular features such as pressure ridging or frozen chunks of ice that facilitate snow accumulation. Ringed seals maintain breathing holes by using the strong claws of their foreflippers. They excavate lairs in compacted snow-drifts over the breathing holes, and individual seals use a complex of several lairs in an area, providing shelter from weather and predators, such as polar bears. The population size of ringed seals in the Barents Sea is not well known but has been given as the order of 100 thousand individuals.



Harp seal is the most common and abundant marine mammal in the Barents Sea ecosystem. Seals of the two latter stocks occur in the Barents Sea. They feed on a variety of prey, taking broadly what is available in their areas of distribution. They feed mainly on small fish and pelagic crustaceans, and the main prey are krill, amphipods, capelin, polar cod and herring. The total annual food consumption by the Barents/White Sea harp seal population has been estimated to be about 3.5 million tonnes. Surveys in 2009 and 2010 gave estimates of annual production of about 160.000 pups, which suggested a total population size of about 1.4 million seals.

Bearded seal is an ice-associated species with wide circumpolar distribution. Bearded seals are solitary animals and are generally found scattered in low densities in drifting pack ice in coastal and shelf waters. Bearded seal is a demersal feeder on various fishes, crustaceans, and mollusks. The 'beard' of bearded seals is a set of elaborate long and sensitive whiskers that are used to locate prey at or in the bottom. The population number of bearded seals in the Barents Sea is not well known but has been indicated as 10 thousand or some 10s of thousand individuals.

Harbor seal is a coastal seal with a wide distribution in the temperate and subarctic zones in both the North Atlantic and North Pacific. The population is protected and lives within a protected area. There is no hunting or fishing activities and low level of disturbance by human presence. The seals are therefore unafraid and easy to approach. Harbor seals can live more than 30 years and individuals older than 15 years are common in other populations, such old individuals are not found in the Svalbard population.

Gray seal (or grey seal) is a relatively large North Atlantic species found with three main populations in the Northeast Atlantic, Northwest Atlantic, and the Baltic Sea. They have a characteristic long head with a 'Roman profile' reflected in the Latin species name (*grypus*) which means 'hook-nosed'. Gray seals usually dive to moderate depths and feed largely at the sea floor on a variety of fish species and cephalopods.

Atlantic walrus is one of two (or three if Laptev walrus is included) subspecies of walrus found in Barents Sea LME. Hunting, which started in 1604 and continued until 1952 when walrus was protected, decimated the population to near extinction. Walrus are generally found in areas of shallow water (<80 m) with suitable bottom substrate that can support productive bivalve community within reasonably close proximity to suitable haul-out areas. Walrus segregate according to sex and almost all the animals observed at Svalbard during summer are males. Females and cows occur further east in the distribution area towards Franz Josef Land. Walrus feeds mainly on bivalves and other benthic invertebrates, notably the burrowing clams. The walrus population of Svalbard and Franz Josef Land has clearly increased significantly since being at the verge of extinction in the 1950s. Their numbers were estimated based on surveys in 1992-93 to be a minimum of about 2.000 individuals. More recent estimate well over 5000 individuals.

Polar bear are widely distributed in the ice-covered parts of the Barents Sea and follow the seasonal rhythm of the ice cover. They have been extensively studied. The size of the Barents Sea subpopulation of polar bears was estimated to be approximately 2.650 individuals based on a large-scale survey in August 2004. The survey was stratified and included Svalbard, Franz Josef Land and the ice edge zone north of these archipelagos (from about 81 to 83°N).



FISH

The Barents Sea LME contains several large stocks of fish which contribute importantly to its system characteristics. These include the Barents Sea capelin stock, and also large (and commercially important) stocks of cod, haddock, Greenland halibut, and northern shrimp. There are two stocks of polar cod and a stock of long-rough dab which are utilized to little or no extent commercially but which are very important ecologically.

The number of fish species registered in the Barents Sea has risen as the ichthyologic research effort has increased. In 1916 a research noted 114 species in this area while recent data shows more than 200 fish species from 66 families recorded in the Barents Sea. Many of the species are rare and have only occasionally been found in the Barents Sea.

There are around 90 of the more commonly found species in the Barents Sea. The predominant fish families are: eelpouts, snailfishes, codfishes, sculpins, flatfishes, and rockling, ling, and tusk. These families account for nearly 80% of the species that occur regularly in the Barents Sea, and more than 40% of the species recorded in this region.

The fish fauna is dominated by 10-12 very abundant and commercially exploited fish species including some of the world's largest fish stocks. These are Atlantic cod, haddock, saithe, capelin, and Atlantic herring. Other commercial species include Greenland halibut, two species of redfish, and three species of wolffish.

The commercial fish species are also ecologically important due to their generally high abundance and biomass. Other ecologically important species include polar cod (which is fished commercially to some extent by Russia), long-rough dab, lesser sandeel, and Greenland shark.



SHOREBIRDS

A total of 32 species of shorebirds breed regularly in the Barents Sea area. Many of these (15 species) are largely boreal or temperate species that extend their breeding range north to the southern parts of the Barents Sea, particularly in northern Norway and the White Sea region in Russia. These include three species of snipes (common, Jack and great), 6 shanks (common redshank, common greenshank, and green, wood, common and Terek sandpipers), and 3 species of godwits and curlews (black-tailed godwit, whimbrel, and Eurasian curlew). Seven high Arctic species breed on Svalbard (sanderling, purple sandpiper, dunlin, red knot, ruddy turnstone, red phalarope and common ringed plover), and two of these (sanderling, purple sandpiper) breed also on Franz Josef Land. Ten more Arctic species that occur primarily in the low arctic tundra zone are found on the mainland side of the Barents Sea. They include little and Temmick's stints, ruff, Eurasian golden plover, Eurasian dotterel, bar-tailed godwit and spotted redshank.

The low-lying coasts with adjacent tundra in the southeastern Barents Sea offer breeding, post-breeding and migrating habitats for many shorebirds, including birds that breed further east in the Kara Sea region and on Taimyr. Most of the shorebirds from the Barents Sea region belong to populations that migrate south to winter in western and southern Europe and in West Africa.





The Barents Sea LME holds some of the largest concentrations of seabirds in the world and is an important breeding and feeding area for many species. About 20-25 million seabirds harvest approximately 1.2 million tonnes of biomass annually from the area. The high density of seabirds is a consequence of relatively high primary production and large stocks of pelagic fish species such as capelin, herring, and polar cod. A total of 37 seabird species breed regularly in the Barents Sea LME. The Barents Sea also serves as an important migration and wintering area for seabirds. The warmer and ice-free waters south of the polar front and along the coast of northern Norway serve as wintering grounds for many seabirds from colonies in the cold northern part of the Barents Sea as well as for birds breeding in the Russian Arctic further east in the Kara and Laptev Seas.

Several of the seabird populations in the Barents Sea LME are of international importance. The most numerous species are Atlantic puffin (2 million pairs), thick-billed murre (1.75 million pairs), dovekie (or little auk, >1.3 million pairs), black-legged kittiwake (0.9 million pairs), northern fulmar (0.1-1 million pairs), and common eider (120,000-150,000 pairs) among the sea ducks. Atlantic puffin, black-legged kittiwake, and common guillemot dominate the seabird communities south of the polar front, while more Arctic species such as thick-billed murre and little auk dominate in the north.

The mostly rocky coasts of northern Norway, Svalbard and Novaya Zemlya contain many cliffs suitable for seabird breeding. Important breeding habitats include several large seabird colonies mainly found on steep sea-facing cliffs or screes. The largest colonies, with more than 100,000 birds, are mainly found along the Polar front, the transition zone between the Atlantic and Arctic water masses, and along the Norwegian Coastal Current in the southern Barents Sea.

The marginal ice-zone in the Barents Sea is an important feeding habitat where seabirds forage on migrating capelin, polar cod, and zooplankton. In winter, the coastal and shelf waters in the southern part of the region are extremely important wintering grounds for seabirds mainly from

breeding populations within the Barents Sea LME. The main species are common murre, thick-billed murre, little auk, common eider and many gull species, totalling several million individuals. These wintering seabirds are supplemented with large segments of waterbirds from inland breeding sites, e.g. diving ducks and divers. The most numerous are king eider (45,000 ind.) and long-tailed duck (>30,000 ind.), while the Steller's eider also winter here in significant numbers. In spring, when many seabirds migrate towards breeding grounds in the northern part of the region, concentrations of mainly auks and northern fulmars occur along the drift ice margin.

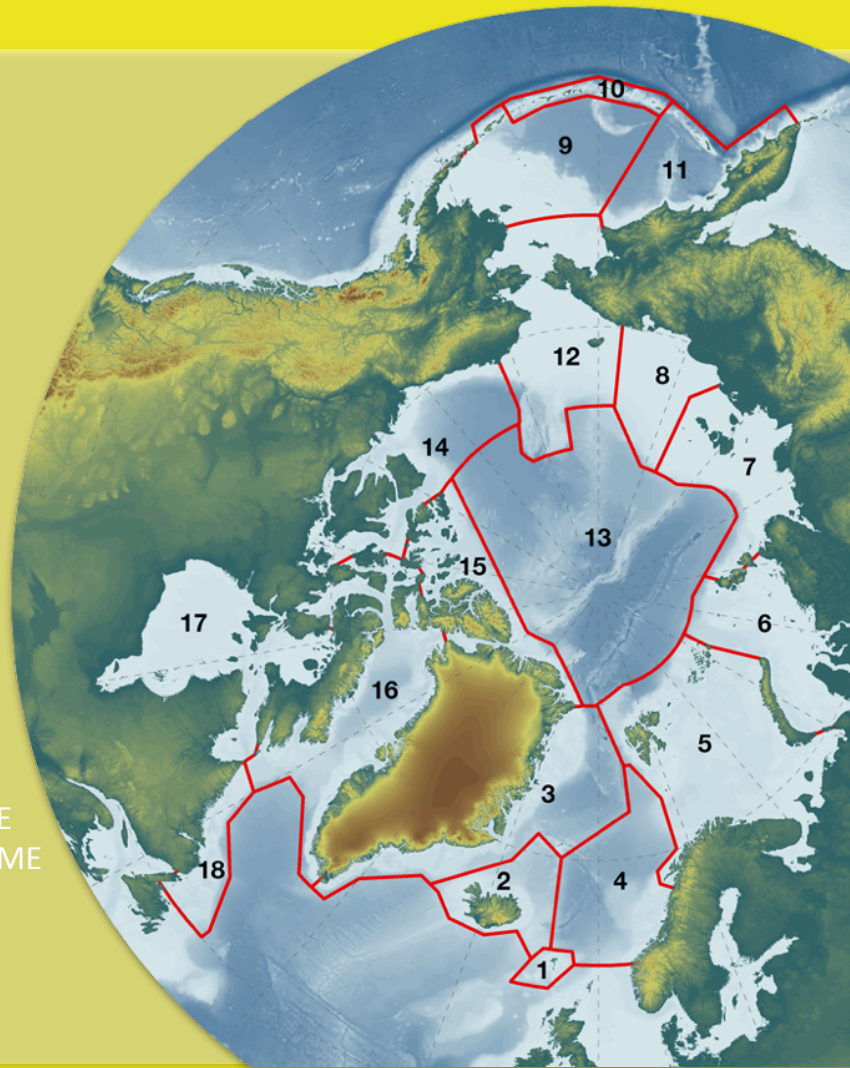


The Barents Sea LME provides important habitats for waterfowl both during breeding, migration and wintering periods. The Svalbard archipelago is home to a large number of sea ducks and geese during the breeding period. The tundra and wetlands in northwestern Russia adjacent to the low-lying coasts of the Pechora and White Seas are also important breeding grounds for geese and ducks of various species. Many of these breeding birds use coastal marine habitats for staging during spring and fall migration, and this is also the case for waterfowl that breed further east in the Kara Sea region and on Taimyr. Novaya Zemlya and the high Arctic Franz Josef Land archipelago are breeding places for Arctic sea ducks and geese.

The Barents Sea area is used commonly or regularly by 27 species of waterfowl, the majority of which breed in the area and feed and stage in marine habitats during the breeding and/or migration periods. The species include 7 geese (barnacle, brent, bean, greylag, greater white-fronted, lesser white-fronted, pinked-legged), 2 swans (tundra, whooper), 10 sea ducks (common, king and Steller's eiders, long-tailed duck, black and white-winged scoters, red-breasted merganser, goosander, smew, and common goldeneye), 2 pochards (greater scaup and tufted duck), and 6 dabbling ducks (Eurasian wigeon, common teal, mallard, northern pintail, northern shoveler, and garganey). In addition, there are 3 species of divers (red-throated, black-throated, and white-billed) and 2 grebes (red-necked and horned) that are part of the waterbird fauna in this area.

ARCTIC LMEs

1. Faroe Plateau LME
2. Iceland Shelf and Sea LME
3. Greenland Sea-East Greenland LME
4. Norwegian Sea LME
5. Barents Sea LME
6. Kara Sea LME
7. Laptev Sea LME
8. East Siberian Sea LME
9. East Bering Sea LME
10. Aleutian Islands LME
11. West Bering Sea LME
12. Northern Bering-Chukchi Sea LME
13. Central Arctic Ocean LME
14. Beaufort Sea LME
15. Canadian High Arctic - North Greenland LME
16. Canadian Eastern Arctic - West Greenland LME
17. Hudson Bay Complex LME
18. Labrador-Newfoundland LME



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