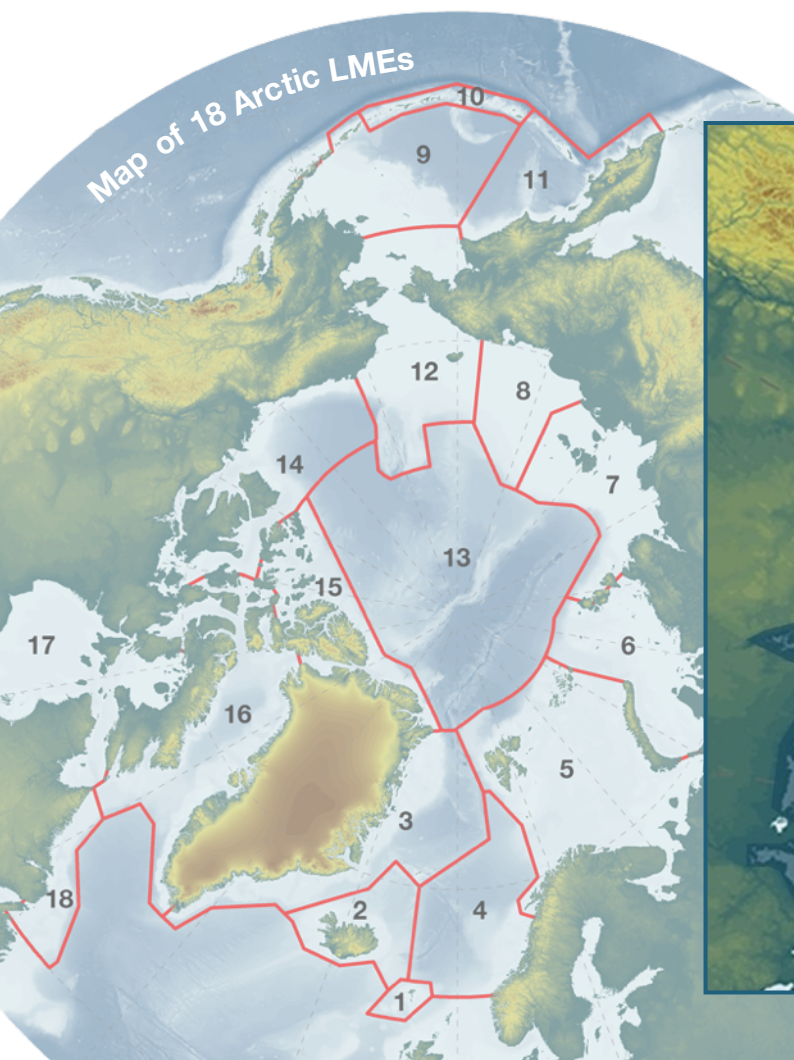
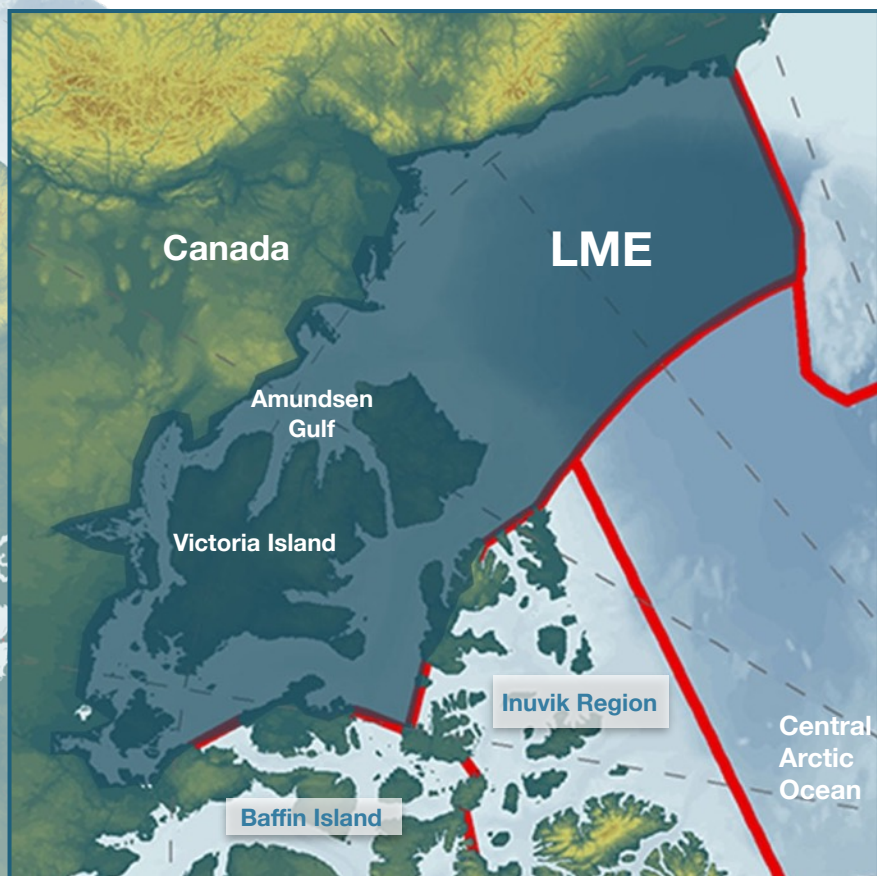


BEAUFORT SEA LME



BEAUFORT SEA LME MAP



ARCTIC LMEs

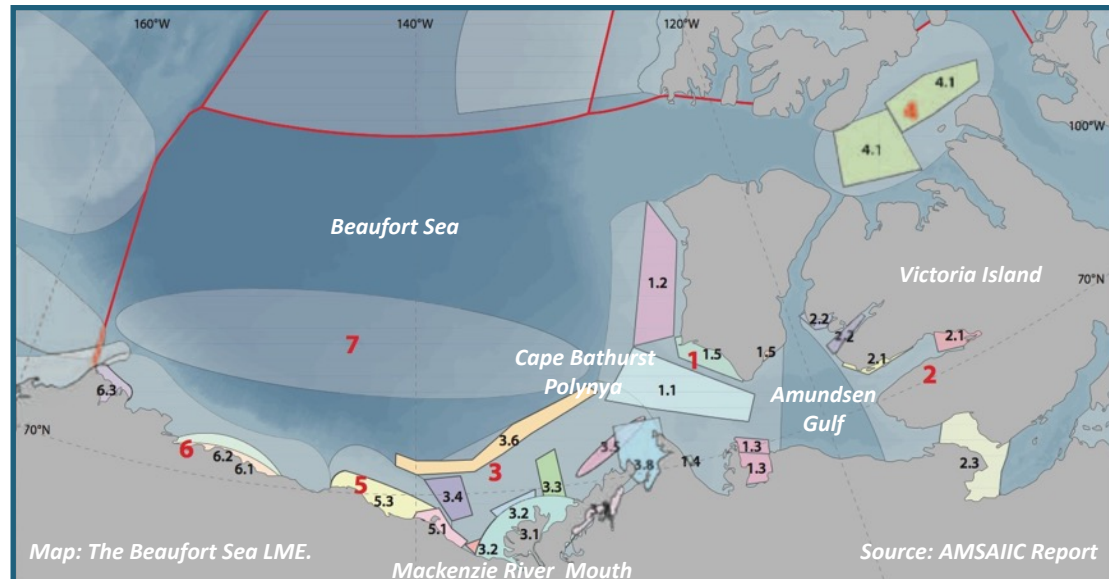
Large Marine Ecosystems (LMEs) are regions of ocean space of 200,000 km² or greater, that encompass coastal areas from river basins and estuaries to the outer margins of a continental shelf or the seaward extent of a predominant coastal current. LMEs are defined by ecological criteria, including bathymetry, hydrography, productivity, and trophically linked populations. The LME concept for ecosystem-based management has 5-module approach focused on productivity, fish and fisheries, pollution and ecosystem health, socioeconomics, and governance.

PAME developed a working 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 during 2012. The revised boundaries of the 18 current LMEs were mapped by the Ecosystem Approach Expert Group (EA-EG) in a report of the consultative process. This is the working map of Arctic LMEs and used for descriptive purposes in the work of the Arctic Council.

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

OVERVIEW: BEAUFORT SEA LME

The Beaufort Sea LME consists of two main parts: the shallow shelves around the margins in the south and east adjacent to a deep basin with depths greater than 3 km. The shelves are separated from the deep basin by steep slopes which constitute a third main topographic feature. The deepest parts are around 3.500m deep. Prominent features are the **Mackenzie delta river** and estuary and the **Cape Bathurst Polynya** in the Amundsen Gulf.



The Mackenzie River is the most sediment-rich river in the Arctic and transports annually about 130 million tons of sediments into the Beaufort Sea.

The Mackenzie and Amundsen Gulf region provides important breeding, feeding and migration habitats for birds, as do areas in the Coronation and Queen Maud gulfs south of **Victoria Island**. Three subpopulations of polar bears inhabit this LME: the southern and northern Beaufort and M'Clintock subpopulations.

The primary production is relatively high due to influence of nutrient-rich Pacific water, and zooplankton residing in the deeper offshore areas. There is probably a large migratory population of polar cod in the eastern Beaufort Sea, which is a major summer feeding area for large numbers of bowheads and belugas from migratory populations wintering in the Bering Sea.

Ice begins to form in early to mid-October, initially in the nearshore zones and extends outward to expand and eventually establish the landfast ice zone, usually by November, generally extending out to 20m depth growing to a 2m thick level. A mobile ice pack occupies the bulk of the Beaufort Sea region in winter.

As elsewhere in the Arctic, lack of light and nutrients are the two main factors limiting phytoplankton growth in the Beaufort Sea. Phytoplankton are, along with zooplankton, the base of marine food webs in the Beaufort LME, as most other marine ecosystems.



MARINE MAMMALS

Five species of marine mammals occur regularly in the Beaufort Sea: the bowhead whale, beluga whale, ringed seal, bearded seal, and polar bear.

Bowhead and beluga whales

The recurrent polynya and ice-edge habitat make the Cape Bathurst Polynya an important beluga, bowhead whale, polar bear, and ringed seal feeding ground. Beluga (around 40,000 individuals) and bowhead whales (about 10,000 individuals) of the large migratory Beaufort Sea and Bering-Chukchi-Beaufort Sea populations, respectively, use the polynya area in the eastern Beaufort Sea as their main feeding ground in the early part of summer (May–June).

The Bering-Chukchi-Beaufort Sea stock of bowhead whales winters in the Bering Sea, and most of the stock summers in the Canadian Beaufort Sea and Amundsen Gulf. The spring migration across the western Beaufort Sea occurs through offshore ice leads, generally from mid April to mid June, depending on ice conditions. Most remain in offshore waters (>200 m deep) among the offshore pack ice in the central and eastern Beaufort Sea until late July to mid August, when they begin to move gradually toward coastal and nearshore areas.

Generally, adults move into Amundsen Gulf into water depths 50–200 m off Bathurst Peninsula, small (<10 m) sub adults move into coastal and nearshore waters at water depths 10–50 m along the Yukon coast, and large sub adults move into nearshore and shelf waters at water depths 20–200 m off the Yukon coast, Mackenzie Delta, and Tuktoyaktuk Peninsula.

Ringed and bearded seals

During the spring breeding and molting seasons, ringed seals are dispersed at low densities in the ice throughout the southeastern Beaufort Sea. Prime breeding habitat are in areas with a high proportion of ice cover and moderate water depths of 50–75 m. Ringed seal pups are born in April, mostly on landfast ice.

During summer, ringed seals are dispersed throughout open-water areas. Seasonal concentrations of seals (related to food sources) are known in offshore waters of the Amundsen Gulf region off the Tuktoyaktuk Peninsula and off Cape Dalhousie in summer. In the Canadian Beaufort Sea, the bearded seal is most abundant over depths 25–50 m. During the summer open-water period, much of the Canadian Beaufort is unsuitable for feeding because the pack-ice habitat preferred by bearded seals typically retreats north to waters deeper than those used by bearded seals. In most areas, numbers are low, but bearded seals are relatively common in certain nearshore areas along southern Banks Island, Cape Parry, and Herschel Island. The abundance of bearded seals is relatively low (1200–3100 in the eastern Beaufort Sea).

Polar bear

Two subpopulations of polar bears occur in the BS LME: the Northern Beaufort Sea (1000 individuals) and Southern Beaufort Sea (1500) subpopulations. During winter and spring, most polar bears are found on the sea ice, tending to concentrate along pressure ice that parallels the coasts, and in the vicinity of floe edges.

In summer, when the pack ice retreats offshore, polar bears are found along the edge of the pack ice. During years with little or no pack ice near the coast, polar bears are often found along the coastline and on barrier islands. In late March and early April, females that have denned on land return with their cubs to the sea ice to hunt seals. In early summer, they are relatively concentrated in areas with irregular coastlines such as bays, particularly those within which ice remains longer than in other areas.

Polar bears of the Southern Beaufort population move north with the retreating pack ice in summer and move south in the autumn as ice develops to areas where they can hunt ringed and also bearded seals. Bears of the northern population move north with the retreating ice off western Banks Island and M'Clure Strait in summer and south and east into Amundsen Gulf when ice develops in fall.

BIRDS

Sea-associated birds are widespread in substantial numbers in coastal, nearshore, and offshore waters of the Beaufort Sea LME. The greatest numbers of marine birds, at least several million, occur in coastal and nearshore zones. The most numerous among the marine birds are ducks and geese including eiders and other sea ducks, and various species of shorebirds.

Seabirds, waterfowl (ducks, geese and swans), and **shorebirds** (plovers, snipes, sandpipers, phalaropes and others) use coastal and marine habitats to larger or lesser degree during the annual cycle and are collectively called marine birds. Marine birds are widespread in substantial numbers in coastal, nearshore, and offshore waters of the Beaufort Sea LME. The greatest numbers, at least several million, occur in coastal and nearshore zones, with the most numerous being ducks and geese including eiders and other sea ducks, and various species of shorebirds.

The Cape Bathurst Polynya and the associated leads along the Tuktoyaktuk Peninsula and Banks Island are used as spring staging and feeding areas for several species of sea ducks, divers and seabirds including common (Pacific) and king eiders, long-tailed duck, red-throated diver, Pacific loon, glaucous gull and Arctic tern.

Cliffs are a rare habitat along the southern Beaufort Sea, and cliffs at Cape Perry in the Amundsen Gulf area hold the only breeding colony of thick-billed murre in the Beaufort Sea. A few black guillemots also nest at Cape Perry and there is a small breeding colony at Herschel Island of this species which is otherwise rare in the Beaufort Sea.

The low-lying coasts along the southern Beaufort Sea with barrier islands, spits, beaches and other coastal features offer breeding habitats for glaucous gull, Arctic tern, and Pacific eider. The low-lying tundra and wetland areas of the North Slope of Alaska and Yukon, the Mackenzie Delta area, and tundra areas on Victoria and Banks islands provide breeding habitats for large numbers of ducks, geese and divers. After breeding many of these birds and their young move to coastal areas for brood rearing, feeding and molting. The coastal islands and wetlands with marshes and mud- and sand-flats

in the estuaries of the Mackenzie, Anderson, Colville, Sagavanirktok, and Canning rivers, and numerous other smaller rivers and streams, support large numbers of nesting, brood-rearing, molting, and feeding waterfowl and shorebirds during the summer season.

Important nesting and molting habitats for geese (greater white-fronted goose, Richardson's cackling goose, lesser Canada goose, snow goose) are found on Kendall and Richards islands in the outer Mackenzie Delta, on bays along the Tuktoyaktuk Peninsula (Kukjuktuk Bay, Hutchinson Bay, McKinley Bay-Phillips Island), and on bays and river deltas in the Liverpool Bay area. The outer Mackenzie Delta provides critical habitat during the autumn migration for black brant. River deltas and adjacent coastal wetlands along the North Slope of Alaska, notably the Colville and Sagavanirktok estuaries, are also used as nesting and molting habitats for geese.

Long-tailed ducks are the most abundant and widespread sea duck throughout the Beaufort Sea region. During summer, males and non-breeding females aggregate in coastal lagoons and bays where they undergo an extensive feather molt. Together with lesser numbers of scoters, scaup, red-breasted mergansers, and some common eiders, these molting birds are flightless and vulnerable during this period. Important molting areas for sea ducks in the eastern Beaufort Sea are the McKinley Bay-Phillips Island and Kukjuktuk and Hutchinson Bay areas along the Tuktoyaktuk Peninsula, several bays and estuaries in the Liverpool Bay area, and Workboat Passage between Herschel Island and the mainland.

There are also post-breeding molting and feeding areas for sea ducks in coastal lagoons in Alaska. Coastal waters off western Banks Island and the Mackenzie Delta area are major feeding areas for breeding and post-breeding Pacific and king eiders and long-tailed ducks. King eiders on molt migration from the Beaufort Sea to the main molting areas in the Chukchi and Bering seas have been observed to pass through the western Beaufort Sea along a migration corridor close to the coast, where they may stage to feed in the western Beaufort shelf waters for two weeks or more.



SHOREBIRDS

Around 22 species of shorebirds breed in the Beaufort Sea area, with about half of them being calidrine sandpipers. The most widespread and common shorebirds in the Beaufort Sea area are Arctic species which breed on tundra, including Baird's, pectoral and semipalmated sandpipers, dunlin, red and red-necked phalaropes, ruddy turnstone, American golden and grey plovers, and long-billed dowitcher. Some species also breed in coastal littoral habitats, including western, semipalmated and Baird's sandpipers. After breeding many species move from tundra to littoral habitats for part or most of the population. This is the case for red and red-necked phalaropes, ruddy turnstone, sanderling, dunlin, western, semipalmated and Baird's sandpipers, and long-billed dowitcher.

The Beaufort Sea coasts offer several types of costal and littoral habitats used by shorebirds, which differ in their habitat association. Staging and migrating dunlins and sanderlings are found largely on silt barrens, beaches and tidal flats, while many other species are found on sparsely vegetated saltmarshes and mud flats. The Mackenzie Delta is a large area that constitutes important breeding, post-breeding and staging habitats for many shorebirds. The Colville River Delta in Alaska and the Anderson River Delta east of the Tuktoyaktuk Peninsula are other prominent areas for shorebirds in the Beaufort region.



SEABIRDS

Seabirds occur with relatively small populations in the Beaufort Sea. Ten species of seabirds are regular breeders in the Beaufort Sea area. These include two species of auks (thick-billed murre, black guillemot), four gulls (glaucous, Sabine's and Thayer's gulls, and black-legged kittiwake), Arctic tern, and three species of skuas or jaegers (Arctic, long-tailed and pomarine skuas). In addition, about 11 species are more or less regular summer visitors to the Beaufort Sea.



WATERFOWL

Around 30 species of waterfowl and 4 species of divers (or loons) are found in the Beaufort Sea area, eighteen of them being more or less common and regular breeders. The most common and widespread species are long-tailed duck, king eider, and common eider among the seaducks, northern pintail and green-winged teal among the dabbling ducks, brent goose, cackling goose, snow goose, and greater white-fronted goose among the geese, tundra swan, red-throated diver, Pacific (or black-throated) diver and white-billed diver.

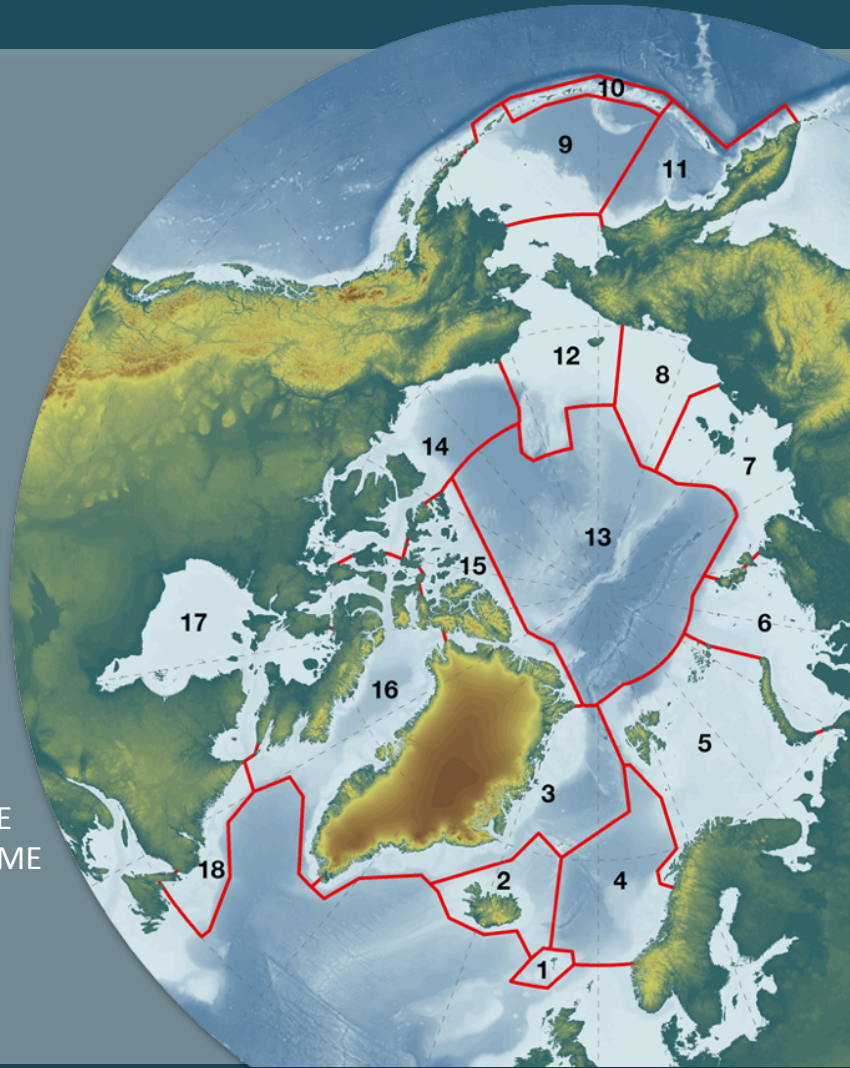


FISH

A total of 101 fish species has been documented to occur in the Beaufort Sea LME, many of them being rare or scarce.. Fish species of the Beaufort Sea are characterized by four basic life-history patterns: freshwater (rivers, streams and lakes), marine, anadromous (hatched and initially reared in freshwater river systems before migrating to sea) and amphidromous (spawn in freshwater but spend most of the time growing in marine waters before they return to freshwater to reproduce). Polar cod is probably the most abundant and important fish in the Beaufort Sea ecosystem.

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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Acknowledgements

PAME gratefully acknowledges the financial support provided to this project by the Nordic Council of Ministers and the OAK Foundation.



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