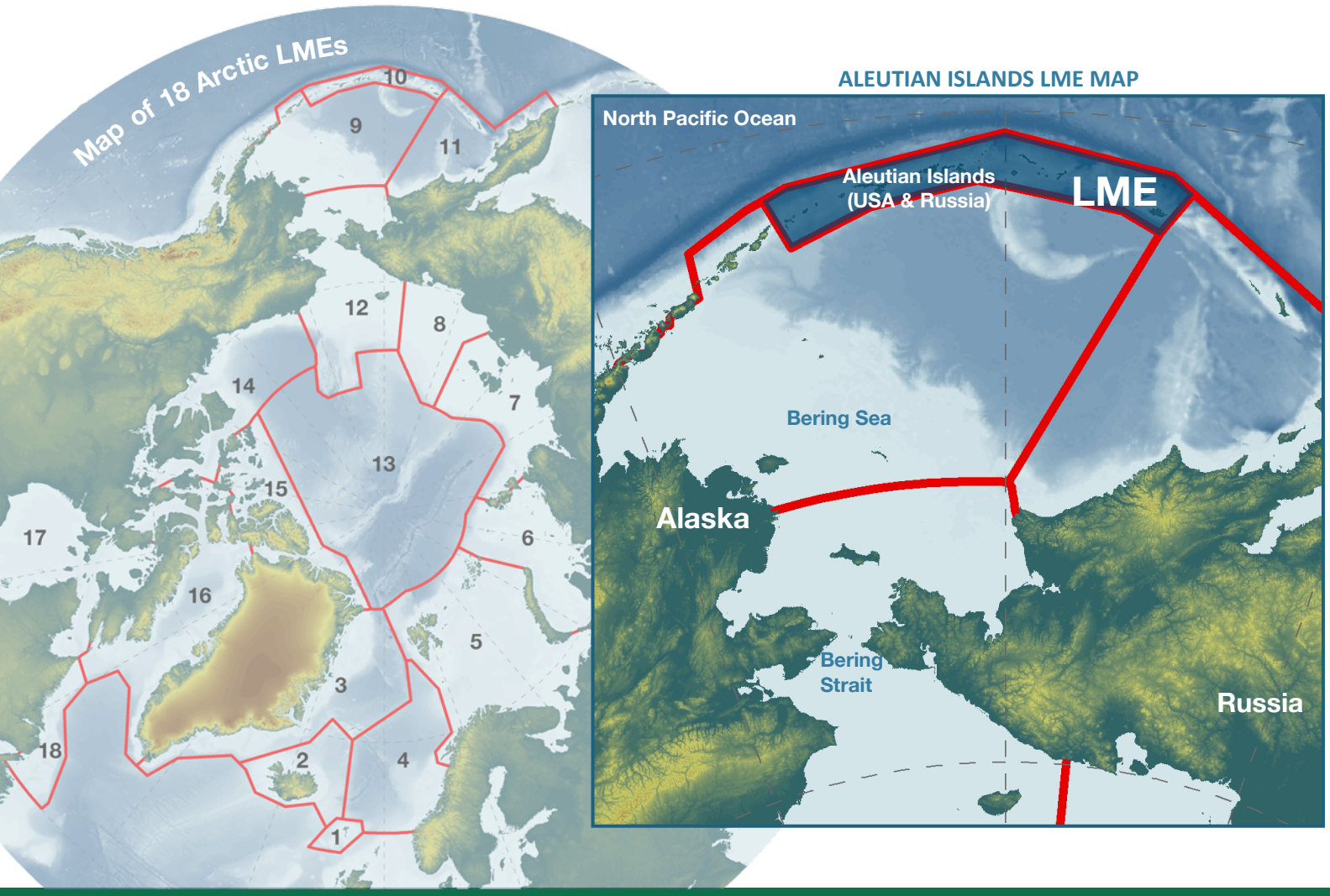
ALEUTIAN ISLANDS LME



10

PAME

Protection of the Arctic Marine Environment

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 tropically 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.

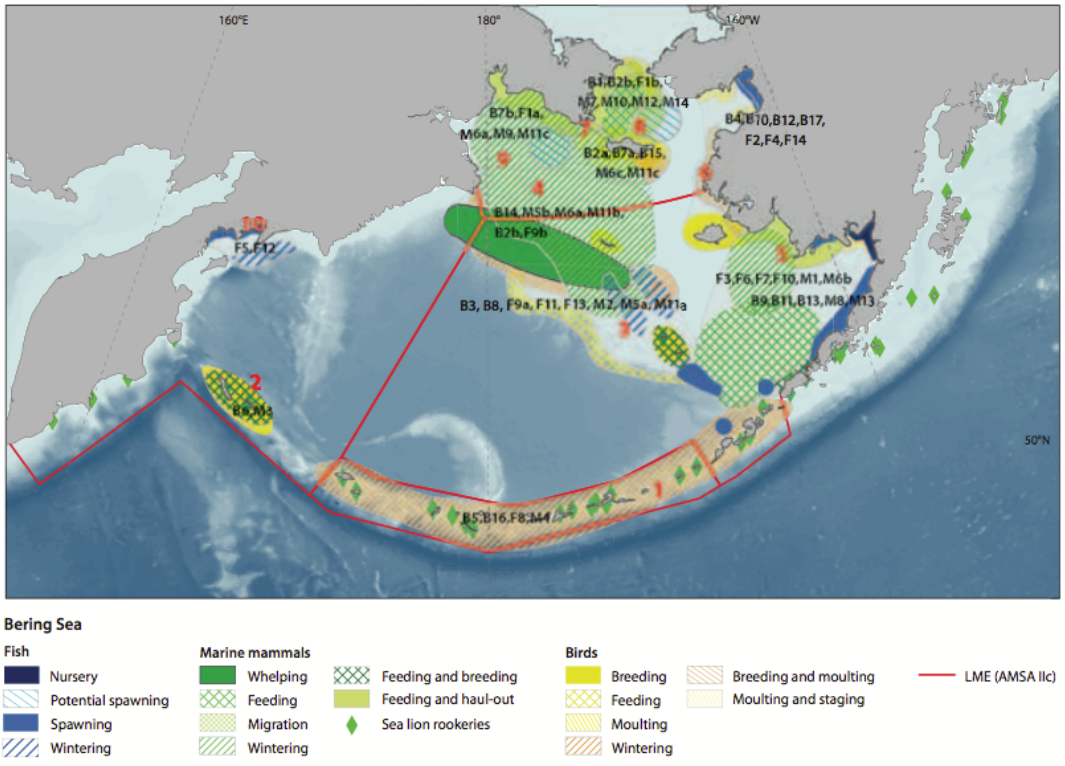
Joint EA Expert group

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: ALEUTION ISLANDS LME

The Aleutian Islands is a curved volcanic archipelago extending from the Alaska Peninsula to the Komandorskiye Islands off Kamchatka, south of the Bering Sea. The chain is a submerged mountain range and the islands are peaks extending above the sea surface. South of the archipelago a slope continues down into the deep Aleutian Trench with depths exceeding 6,000 m. The Aleutian Chain is a porous boundary between the North Pacific and the Bering Sea, with a large number of straits and passages, ranging in width from about 1 to 363 km.



Map: The Aleutian Islands LME. *Source: AMSAIIC*

The water circulation is characterized by inflow of Pacific water from the Alaskan Stream that runs westwards south of the Aleutians. The inflows through Amchitka and Amukta Passes turns east and continue as the Aleutian North Slope Current (ANSC) along the north side of the Aleutians. When it meets the shelf off Bristol Bay, the ANSC is deflected northwestward where it continues along the slope as the Bering Slope Current.

Freeze-up usually starts in late October or November and the ice progressively develops and extends southwards during winter. The average position of the ice-edge in March extends from inner Bristol Bay to the outer shelf north of the Pribilof Islands, and south along the western shelf to the Kamchatka Strait. The seasonal advance and retreat of sea ice represents a distance of about 900 km south of the Bering Strait in an average year.

The polynyas south of St. Lawrence Island and along the southern coast of the Chukotka Peninsula (Sireniki Polynya) are particularly important wintering habitats for marine mammals (walrus, bowhead, beluga) and birds such as eiders.

MARINE MAMMALS

The grey whale occurs with two populations in the eastern and western North Pacific. The size of the eastern grey whale population is currently estimated to be a minimum of about 19,000 individuals. The much smaller western North Pacific grey whale population numbers just over 100 individuals and is listed as critically endangered.

The North Pacific right whale species was severely depleted by previous whaling and is estimated to exist with only about 500 animals and assessed to be endangered. The National Marine Fisheries Service has designated critical habitat for the North Pacific right whale in the southeastern Bering Sea and northwestern Gulf of Alaska, where right whales have been consistently spotted in the past ten years.

Fin whales arrive in the southern Bering Sea in the waters around the Aleutians in May or June. Copepods form an important part of the diet of fin whales early in the season; krill are important later in the summer. Commercial whaling from the 1950s to the 1970s caused a severe decline of the fin whale population in the North Pacific. Currently, around 4,000 fin whales are estimated to come to the central and southeastern shelf of the Bering Sea for summer feeding.

Humpback whale was also severely depleted by whaling. About a few hundred humpback whales come to feed in the Bering Sea in summer, where their range includes the waters around the Aleutians and shallow shelf waters north to the Gulf of Anadyr and Bering Strait. The seasonal migration northward from winter breeding grounds in the southern North Pacific starts in March or April and the animals may reach the northern Bering Sea in July.

Sperm whales occur with three stocks in the North Pacific: the eastern, northwestern, and southwestern stocks. Sperm whales segregate according to sex, with mature males migrating to northern feeding grounds, while females and younger individuals remain at lower latitudes. Sperm whales are abundant but there are no good estimates of their populations.

Killer whales a fairly low population, estimated to be about 400 animals on the southeastern shelf of the Bering Sea. Killer whales migrate north in the Bering Sea in summer where they feed on fish including herring, capelin, polar cod, Pacific cod, skates, sharks, halibut, and salmon species. They attack and eat a wide range of mammals including beluga, minke, humpback and grey whales, seals, Steller sea lion, northern fur seal, sea otter, and walrus.

Harbor seals are distributed in the western Pacific from the Japan Sea north to the Kamchatka Strait area and further eastward across the Komandorskiye and Aleutian Islands towards the Alaska Peninsula. The numbers in the Aleutians and at the Komandorskiye Islands and southeastern Kamchatka are estimated at around 3,400 and 1,700 seals, respectively.

Sea otter occur in nearshore coastal waters in the Aleutian Islands. Sea otters play an important role in maintaining the coastal ecosystems they inhabit. Sea otters are considered a keystone species in nearshore kelp beds because their presence maintains kelp forests that provide habitat for a wide diversity of species. Sea otters prey extensively on sea urchins, a dominant herbivore in the Aleutian archipelago, which in turn feed on kelp. Without sea otters, urchins overpopulate and overgraze kelp, causing kelp forests to disappear. This results in exposure of the remaining fish, crustaceans, and bivalves, and ultimately in declines of many fish and other. Following the recovery of sea otters from earlier fur hunting, there was a dramatic decline by 80% to 90% in the abundance of sea otters in the central Aleutian Islands during the 1990s. This was possibly caused by increased predation from killer whales, switching from feeding on seals when populations of Steller sea lions and harbor seals collapsed in western Alaska during the 1970s and 1980s. This may have had a cascading effect in the ecosystem, reducing the predatory control of sea urchins which responded by a strong increase that resulted in overgrazing and depletion of the kelp forests.

The northern fur seal lives pelagically in the North Pacific for most of the time, with most migrating north to the Bering Sea for breeding and feeding during the summer season. The majority of northern fur seals breed in the Bering Sea, with approximately 3/4 of the worldwide population breeding on the Pribilof Islands and the majority of the remaining population breeding on the Komandorskiye Islands. There is also a smaller colony on the Bogoslof Island in the eastern Aleutians. The occurrence of the vast majority of breeding in the Bering Sea highlights the importance of this area to the survival of the northern fur seal.

Steller sea lions are distributed along the North Pacific Ocean rim from California to Japan. The eastern stock is distributed from California to southeastern Alaska, while the western stock occurs in the Gulf of Alaska, Aleutian Islands and Bering Sea region. Sea lions generally use well-defined breeding rookeries and haul-out sites, with sixteen rookeries identified in the eastern Aleutian Islands, on the Alaska Peninsula, and on Amak Island. There are also several rookeries in the western Aleutians and along the coast of Kamchatka north to the area of Cape Olyutorski. Many of the rookeries are used as haulout areas throughout the year. There has been a major decline in the western population since the 1950s, when the population was estimated to be at least 140,000 individuals, to a recent level of about 38,500 individuals. The reasons for this decline are not known.

FISH

The Bering Sea, north of the Aleutian Islands is a very rich fisheries area with a wide range of fish and shellfish stocks targeted. The total catch from the eastern Bering Sea has been 1.1 to 1.9 million tonnes since the mid-1970s. The main species in the fisheries is walleye pollock, Pacific cod , yellowfin sole, Greenland halibut, Pacific halibut, Pacific ocean perch, sablefish, and Pacific salmon species. There is also a sizable fishery for crabs, notably red and blue king crabs and snow and Tanner crabs.

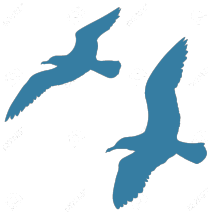
The fish fauna of the Bering Sea comprises about 300 species from 45 families. Most of these species live at or close to the bottom, with the largest number of species in the families sculpins (Cottidae) and sea snails (Liparididae), making up 22% and 15% of the total number of fish species, respectively. The majority of species are boreal forms distributed in the warmer parts of the Bering Sea adjacent to the Aleutian Islands, with only about 15 species of Arctic origin living in the cold waters of the northern shelf (the 'Anadyr cold region').

WATERFOWL

The Bering Sea is a very important area for waterfowl, with a total of more than 10 million individuals of about 30 species (and subspecies) dependent on habitats in this area. Waterfowl use Bering Sea habitats variously for breeding, feeding, staging, and wintering. The eastern Bering Sea in particular offers large areas of intertidal and shallow subtidal habitats. This is related to the combination of the very wide and shallow shelf gradually sloping off from land, and a fairly high tidal range (about 3 m) in the southeastern Bering Sea. Ice-free waters of the southern Bristol Bay and the Aleutians are important wintering areas for several species of ducks including common, king and Steller's eiders, long-tailed and harlequin ducks, and black, surf, and white-winged scoters.

Pacific eiders breed localized along the coasts of both the eastern and western sides as well as in the Aleutians. Nearshore, ice-free waters along the Alaska Peninsula and the Aleutian Islands form the main wintering area, where eiders from both the Siberian and the North American breeding areas probably concentrate in winter. King eiders are migratory and the Bering Sea is the wintering area for birds that breed in the adjacent parts of the Arctic, with the Aleutian Islands chain as the main wintering area. After molt, large aggregations of Steller's eiders disperse along the Alaska Peninsula and the eastern Aleutian Islands and also further south.

The Aleutian Islands is probably the main wintering area that holds the largest number of harlequin ducks. Estimates of winter abundance suggested about 150,000 harlequin ducks wintering in the Aleutians. Large numbers of long-tailed ducks and white-winged scoter also winter in the Aleutian Islands and along the Alaska Peninsula, and in the southwestern Bering Sea along the Kamchatka coast. Common goldeneye winters in coastal waters in lagoons, estuaries and inshore marine waters. In the Bering Sea, they are found along the Aleutians and Alaska Peninsula in the east and the Komandorskiye Islands and the coast of Kamchatka in the west.



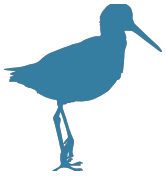
SEABIRDS

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.



SHOREBIRDS

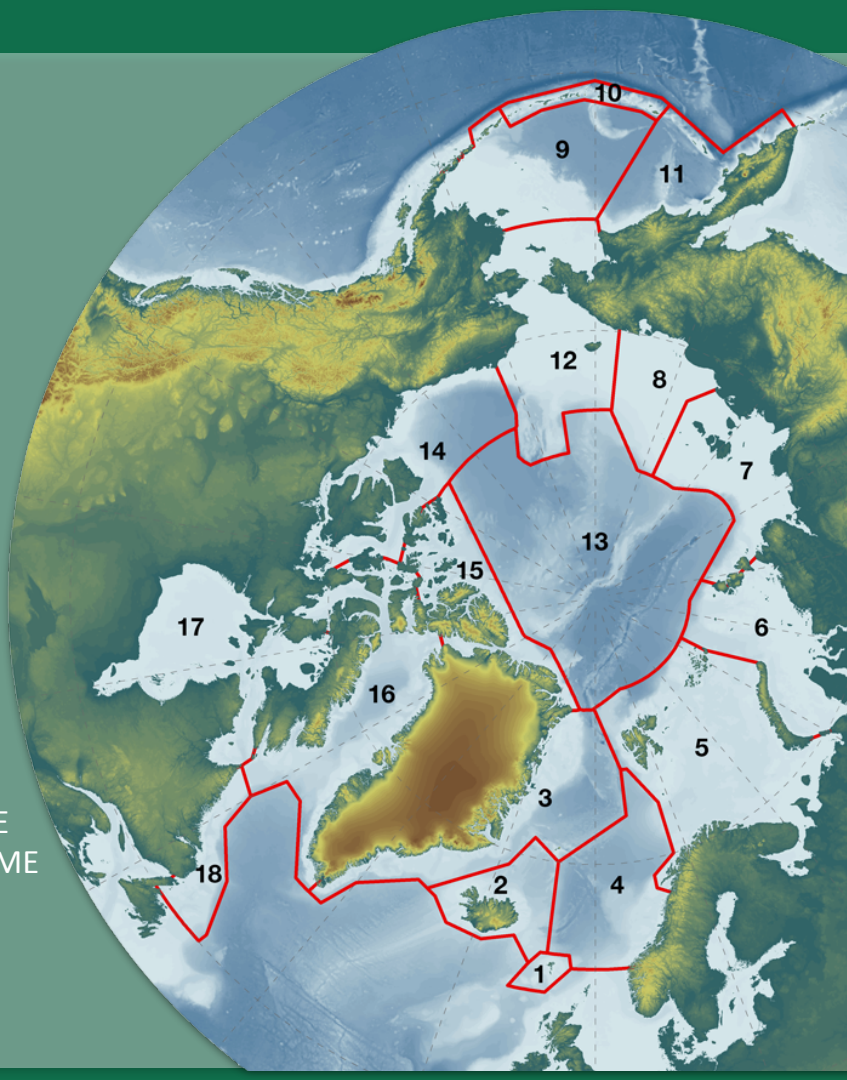
The vast majority of shorebird species in the Bering Sea region are migratory and leave the area to winter along coasts or inland at lower latitudes and in the southern hemisphere. However, a few species or subspecies remain to winter in the Bering Sea area, primarily on the Aleutian Islands. Rock sandpiper is resident year-round on the Aleutians with subspecies couesi, and on the Komandorskiye Islands with subspecies quarta. Sanderling (C. alba) also winters on the Aleutians, although the bulk of the population moves much further south.

PAME

Protection of the Arctic Marine Environment

ARCTIC LMEs

1. Faroe Plateu 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



LITERATURE REFERENCES

- *The 2007 assessment of Oil and Gas in the Arctic (OGA) - AMAP (2007)*
- *AMAP OGA 2007 - Updated description of the Barents Sea LME. Lead author: Hein Rune Skjoldal.*
- *Arctic Marine Areas of Heightened Ecological and Cultural Significance: Arctic Marine Shipping Assessment (AMSA) IIC - AMAP/CAFF/SDWG (2013)*
- *Large Marine Ecosystems (LMEs) of the Arctic area Revision of the Arctic LME map - PAME (2013)*

Acknowledgements

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

norden
Nordic Council of Ministers

OAK FOUNDATION

Text: David J. Prieto

PAME INTERNATIONAL SECRETARIAT
BORGIR
NORDURSLOD
600 AKUREYRI
ICELAND

TEL.: +354 4611355
EMAIL: PAME@PAME.IS
WWW.PAME.IS

2018