

Sea ice forms at the ocean surface when water cools to about 29°F (-2°C) in the winter, mostly toward the poles. It is the only kind of ice found in the Arctic.

The Antarctic also has 'land-fast' ice formed from snow that fell on land, compacting to form glaciers that slowly flow onto the sea, floating as large ice shelves attached to the continental edge. Land-fast ice contains no salt, because it originates as snow. However, sea ice is slightly salty, because although most of the salt is pushed out as the ice crystallizes, about 30% remains.

The expelled salt makes the seawater denser so that it sinks toward the bottom, beginning a 1000 year journey that takes it all around the world, bringing oxygen-rich surface water to bottom animals throughout the ocean and powering a return flow of warm surface water from the Equator to higher latitudes, making places like western Europe much warmer than they would otherwise be.

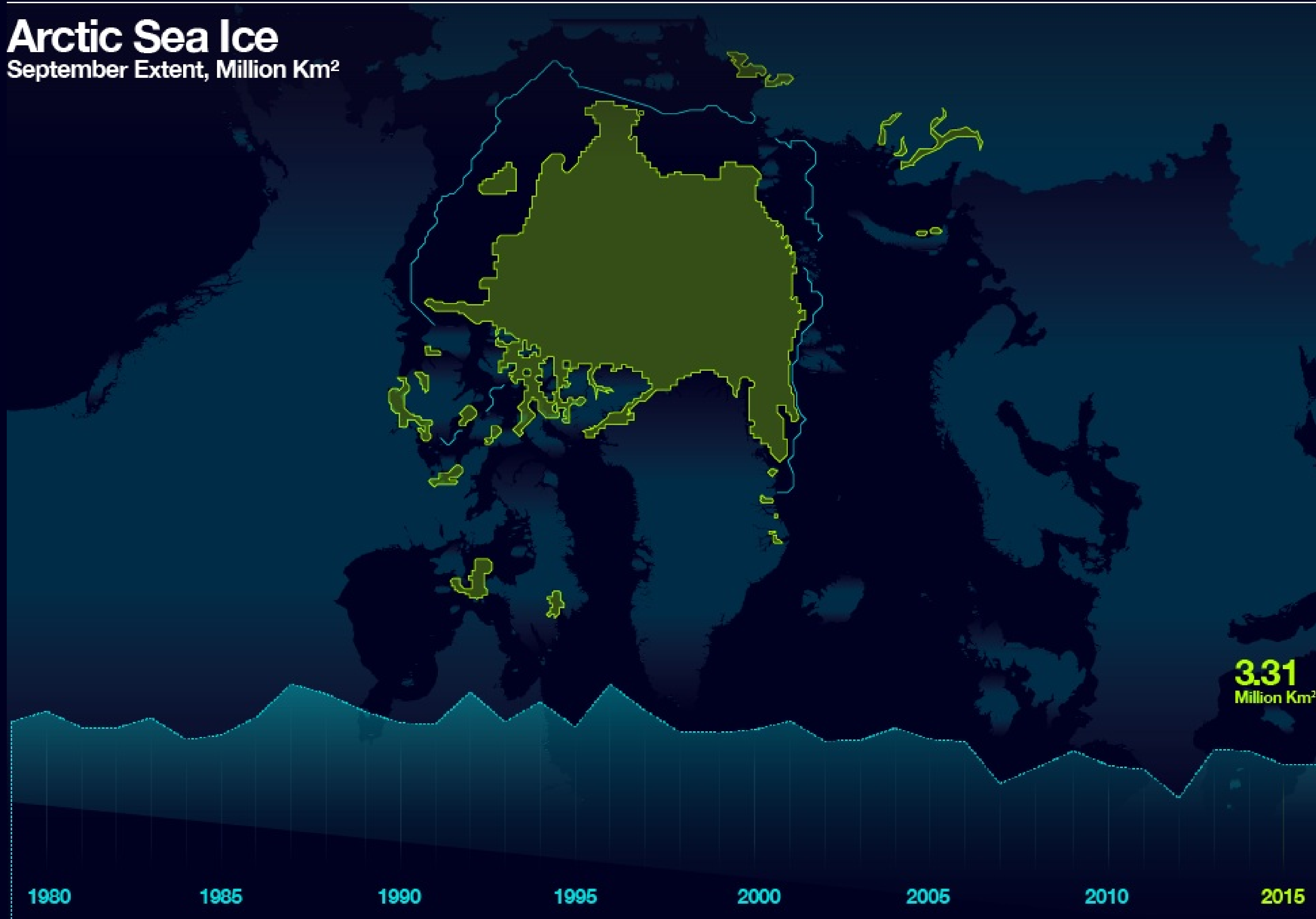
Sea ice has important biological functions, offering places for rest, reproduction or hunting for various seals, seabirds, penguins (Antarctica) and walrus and polar bear (Arctic). Algae colonize the underside of sea ice, providing grazing for krill and fish. Openings between floes of sea ice offer shelter from polar winds and good places to forage. When sea ice melts in spring, release of those algae jumpstarts the spring bloom of primary production.

In the Arctic, sea ice protects the coastline and native peoples who live along it from flooding and erosion caused by violent storms.

Sea ice gains its maximum extent and thickness during winter, partially melts during summer and reaches its minimum extent and thickness at the beginning of autumn. Global warming caused by emissions of greenhouse gases and deposition of airborne soot have accelerated melting to the point that the Arctic Ocean may soon be ice free during summer.

MINIMUM EXTENT OF SEA ICE: 1985 - 2005 (HIGHLIGHTED (3) YEARS, 1990, 2000, 2009)

ARCTIC SEA ICE



SOURCE:
NSIDC: National Snow & Ice Data Center

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HOW WAS IT MEASURED?

The Ocean Health Index measures historical extent (area) of sea ice using sea ice concentrations from the U.S. National Snow and Ice Data Center from 1996 to present. Data are 25km in resolution (625km² per pixel) in a stereographic polar projection. Status was calculated as the smoothed average of the percent of monthly pixels with ice coverage of 15% or more during specified 3-year periods. Both ice extent and thickness are important, but the Ocean Health Index only measured extent.

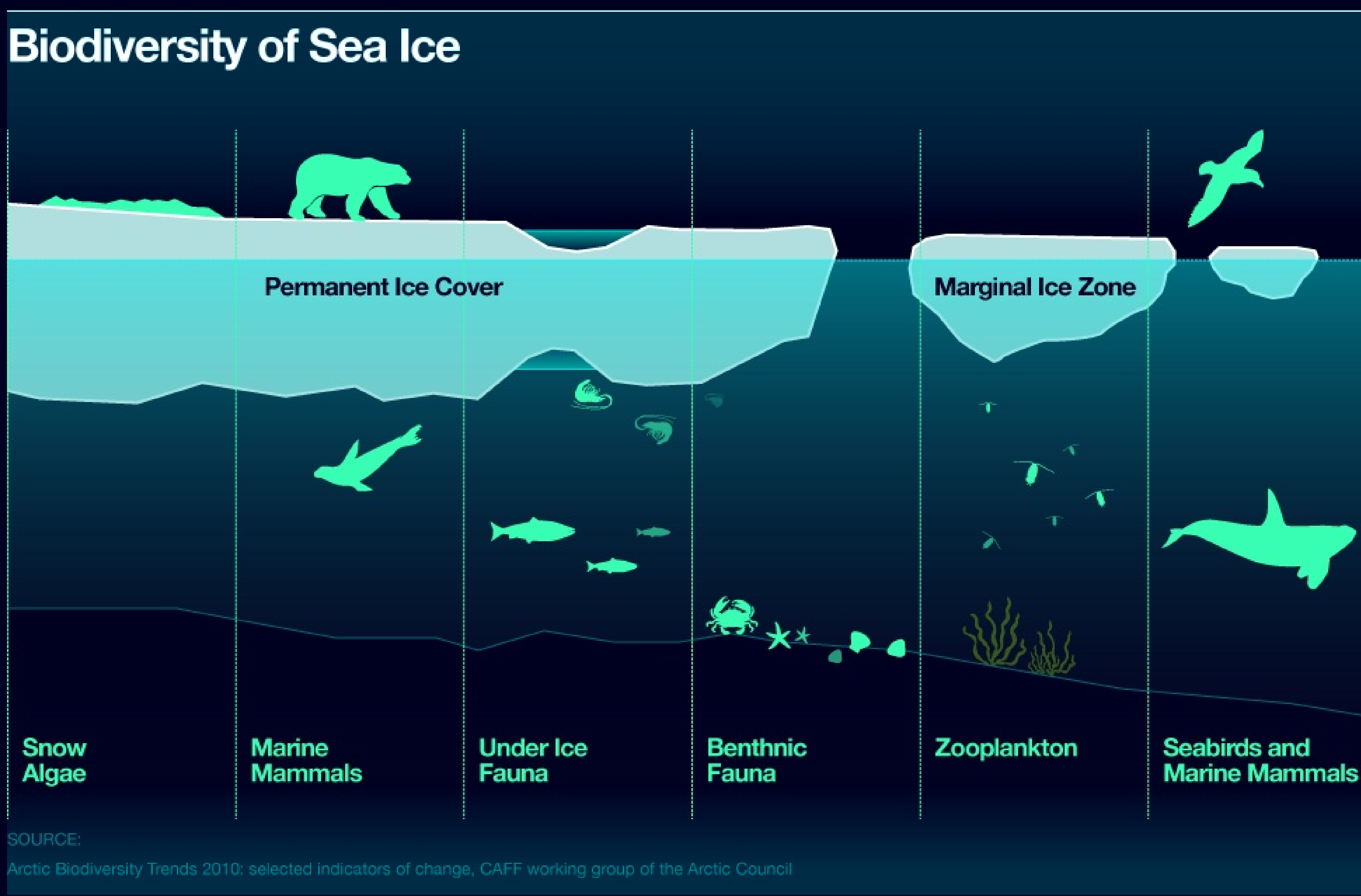
Sea ice extent is used as a Status measure for two goals, Coastal Protection (in locations where relevant) and Biodiversity (Subgoal: Habitats).

Prior to 2015, the reference point for sea ice was the average extent of sea ice from 1979 to the current year of data. Beginning in 2015 the reference point is the average extent of sea ice in the years from 1979-2000.

[See Raw Data](#)

WHAT ARE THE IMPACTS?

FROM PLANKTON TO POLAR BEARS, SEA ICE SUPPORTS ARCTIC HABITATS



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ECOLOGICAL IMPACT

Sea ice creates a barrier between the ocean and the atmosphere, helping to cool the atmosphere by up to 30% (Bradtmiller and Ali).

Sea ice protects the ocean from extreme arctic cold, keeping water under the ice warmer than it would otherwise be.

Microscopic algae grow at the sea-ice interface, providing the base of a productive under-ice food web and accelerating the spring bloom of plankton when the ice melts and releases its algal coating into the water column.

A wide variety of Arctic and Antarctic species rely on sea ice as an essential habitat.

HUMAN HEALTH IMPACT

Sea ice acts as a protective barrier against the impact of waves on arctic coastlines.

A lack of sea ice can lead to extensive shoreline erosion, resulting in the need to relocate coastal communities.

ECONOMIC IMPACT

Despite its key importance to Arctic biodiversity and coastal protection, extensive melting of sea ice caused by climate change is creating enormous economic opportunities for northern nations by creating new shipping routes between the Atlantic and Pacific Oceans and by offering the opportunity for oil, gas and mineral exploration in newly ice-free regions.

GET MORE INFORMATION

NATIONAL SNOW & ICE DATA CENTER (NSIDC)

Sea Ice Index: provides extensive information on the nature and formation of sea ice.

[Learn More](#)

REFERENCES

National Snow & Ice Data Center. [All About Sea Ice](#)

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Thompson, A. and ClimateCentral. 2015. Arctic sea ice dwindles toward record winter low.

Arctic sea ice continues to thin and recede. Scientific American online March 11, 2015.

<http://www.scientificamerican.com/article/arctic-sea-ice-dwindles-toward-record-winter-low/>