

# **An Arctic that's warmer, greener and with less ice becomes the 'new normal'**

**Lauren Morello, Environment & Energy Publishing, 12-2-11**

The Arctic has transformed over the last five years into a region that's warmer and greener, with larger patches of open water as sea ice recedes.

It's the "new normal," say scientists who put together a new "Arctic report card" for the National Oceanic and Atmospheric Administration.

They described a series of dramatic shifts in the polar region that they said accelerated after record-setting sea ice loss during the summer of 2007, when the Arctic's ice cover shrank 40 percent below its 30-year average.

"The Arctic is clearly experiencing the impacts of a prolonged and intensified warming trend," said the report's co-editor, Jackie Richter-Menge, a sea ice expert at the Army Corps of Engineers' Cold Regions Research and Engineering Laboratory in Hanover, N.H.

The region's average surface air temperature was 2.5 degrees Fahrenheit higher in 2011 than it was during the period between 1981 and 2010, the report found.

That helped drive last summer's near-record thaw of Arctic sea ice, second only to the dramatic melt observed in 2007.

The five lowest summer sea ice minimums have occurred over the past five years, researchers noted. The steep, ongoing decline in Arctic sea ice has helped make the region's ocean water warmer, fresher and more acidic.

It has also decreased the amount of the oldest, thickest Arctic sea ice, leaving polar waters dominated by thinner ice that forms in the fall and melts in the summer. That thinner ice is more vulnerable to rising temperatures, sunny days and ocean circulation patterns that can shove blocks of ice toward the warmer waters of the Atlantic Ocean.

And when the ice melts, it opens wide patches of dark Arctic Ocean waters that absorb more heat than the reflective ice it replaces. That accelerates Arctic warming.

## **Warmer waters with changed chemistry and new organisms**

It also increases the amount of carbon dioxide absorbed by the ocean, changing its chemistry by making water more acidic. And it increases the amount of light reaching Arctic surface waters, spurring the growth of phytoplankton, tiny organisms that form the base of the Arctic ocean food chain.

"We have a new normal," said Don Perovich, a sea ice expert who works at the Cold Regions Research and Engineering Laboratory. "Whether it is a tipping point and it will never recover, who can say? But we have a new normal in the sea ice cover -- a normal that has less ice, thinner ice, younger ice. A normal where more light will be transmitted through the ice into the upper ocean."

Similar changes are occurring on parts of the Arctic land surface that are covered by ice -- including the

massive Greenland ice sheet. Warming is changing the structure of snow crystals on some parts of the ice sheet, making the surface less reflective.

Marco Tedesco, a scientist at the City College of New York, compared the situation to a train heading down a hill.

Warming air temperatures are the gas that keeps the train running, he said. But as ice becomes less reflective, it helps speed up that warming -- the same way a train will accelerate down a hillside, even if the amount of fuel reaching the engine holds steady.

### **Some species win, others don't**

Meanwhile, the loss of sea ice is making life harder for some marine animals, including polar bears and walrus, that rely on sea ice to hunt, breed and rear their young.

"Walrus and polar bears are the losers right now," said Sue Moore, a marine ecosystem expert with NOAA's fisheries division. "Some of them have had to go from using those platforms for hunting to scavenging on beaches."

But the warming Arctic appears to have benefits for some marine species that feed on phytoplankton, including gray whales. Though technically considered a temperate species, the whales are spending more time in Arctic waters each summer because there is more plankton and a longer period without sea ice.

Rising temperatures are also changing the habitat of Arctic land species, including those that make their home in the region's increasingly green tundras, where warming has helped shrubs spread into areas once dominated by mosses and lichens.

Whether the region's wild caribou and reindeer herds will suffer or benefit from the tundra's transformation isn't clear, said Mike Gill, a scientist with Environment Canada.