

The Nome Nugget

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The Bering Sea's a changing

By Anne Millbrooke

What's happening in the Bering Sea? A lot, according to Science magazine.

"A change from arctic to subarctic conditions is under way in the northern Bering Sea," reported Jacqueline M. Grebmeier, Lee W. Cooper, and their colleagues in "A Major Ecosystem Shift in the Northern Bering Sea," published in Science this month.

The northern Bering Sea is warming. Both the air and water temperatures are rising. The seasonal ice cover is declining, and marine populations are migrating. The changes may be irreversible.

In the arctic conditions that have prevailed for thousands of years, the northern Bering Sea has supported crabs, sand flea-like amphipods, and other crustaceans, also clams and other mollusks, and worms, all of which live in sediments at the bottom of the sea. Scientists call this layer of life the benthos, meaning underlying the sea, and scientists measure the weight, or biomass, of this community to assess its health and productivity.

Near-freezing bottom temperatures and the high nutrient content of the arctic seas, including the northern Bering Sea and the Chukchi Sea, allow the benthic biomass to accumulate a high density.

The benthic biomass becomes prey. Bottom-feeding seabirds, like the spectacled eider, feed on the high benthic biomass. So do bottom-feeding marine mammals, like the bearded seal, walrus, and gray whale.

In contrast, pelagic — or oceanic — conditions prevail more in subarctic conditions. Less carbon biomass accumulates on the



Photo courtesy of NSF SCIENTIFIC RESEARCH — Jacqueline Grebmeier collects benthic sediment during a cruise of the icebreaker Healy.



seafloor because zooplankton and microbes in the water column consume the falling carbon, preventing organic carbon from reaching the sediments. Pelagic fish eat the zooplankton, and bottom-dwelling fish and predatory benthic invertebrates eat animals dwelling in the benthos, thus reducing the benthic biomass.

Changes in benthic biomass and marine biology in general coincide with changes in climate.

Even the subsurface cold pool south of St. Lawrence Island is contracting in size and rising in temperature. The pool gets cold from winter's ice pack melting and the cold melt becoming trapped in the pool. With less winter ice, there is less cold water in the pool and a corresponding increase in seawater temperature.

The changes happening in the northern Bering Sea now are similar to changes observed in the southeastern Bering Sea after 1977; the southeastern waters often remain ice free now, and the northern waters increasingly have broken, thin ice rather than solid packs or floes.

Conditions are shifting from arctic to subarctic, from benthic to pelagic. As subarctic conditions move northward in the Bering Sea, bivalve populations are declining and marine mammals are being displaced. The gray whales that once foraged on the benthic biomass in the Chirikov Basin beside the northern part of St. Lawrence Island now forage more widely north of the Bering Strait.

Native hunters at Barrow report an increase in the numbers of gray whales there. The Barrow whalers traditionally hunt bowhead whales, one of the "right" whales for the whaling fleets of yore. The bowhead grazes on plankton, like krill, near the water surface; the plankton also attracts phalaropes, the "bowhead bird." Grays dive to dine.

In a related paper to appear in the journal *Aquatic Mammals*, researchers report that walrus mothers leave their pups when the seasonal ice retreats. The earlier the ice retreats, the earlier the mothers leave the pups. In arctic conditions the walrus mothers and pups remain together and use the ice as a summer resting platform.

Also, pelagic fish populations are increasing in northern waters. As the water warms up, pink salmon have increased in the northern Bering Sea and are now colonizing rivers that flow into Arctic waters north of the Bering Strait. Pollock are also moving north.

"Such shifts clearly affect both subsistence harvests and commercial fisheries," according to the authors of the Science article. In an interview Grebmeier and Cooper stressed that the safety of subsistence hunters has become a concern, as has the welfare of residents along the coast who depend upon subsistence hunting and fishing.

Unlike pack ice, thin ice does not support hunters going after walrus or polar bears, much less hold a large walrus or bear. Also, the hunting season is shortened when ice retreats early. Less ice also means reduced feeding areas for the walrus and polar bear.

The biological and physical changes may also bring more commercial fishing boats to northern ports like Nome.

For the past dozen years Grebmeier and Cooper, both of the University of Tennessee, have conducted experiments while on research vessels in the Bering Sea. They wrote the Science article with co-authors who work for the National Oceanic and Atmospheric Administration, the Canadian Institute of Ocean Sciences, University of California - Los Angeles, and University of Alaska Fairbanks.



Photo courtesy of NSF
PERILOUS— Broken ice does not support the marine wildlife or subsistence hunters in the way that pack ice does.

TOP

Superintendent's salary, radon take center stage at Nome School Board meeting

By Janet Ahmasuk