

Monitoring Change in the Bering Sea (F0410)

Long-term Observations on the Bering Sea Shelf: Biophysical Moorings at Sites 2 and 4 as sentinels for ecosystem change

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What is happening in the Bering Sea? In the Bering Sea, changes in water chemistry are affecting plankton. As an important food source for juvenile commercial fish, plankton provides the link between the structure of the atmosphere and marine life as they pass up the food chain to affect the fish, bird, and marine mammal populations. There are many variables in the Bering Sea that can affect plankton and other life such as ocean temperature, salinity, currents, and nutrients. Some of the most dramatic changes in the physical and biological environments of the southeastern Bering Sea occurred recently. These changes are expected to alter habitat, plankton abundance, and the mix of marine mammal, bird, fish, and invertebrate species found there.



Recovering a mooring. The large orange instrument contains an ADCP which measures currents. The yellow balls keep it upright.

The Project: To measure ecosystem change, moorings consisting of a series of various data recorders measuring the physical and biological characteristics of the ocean are being maintained at two sites in the Bering Sea. Researchers monitor ocean temperature, salinity, currents, fluorescence, nitrates, and the amount and types of zooplankton found at varying depths. These are the mechanisms of climate change related to decreasing populations of plankton and fish. Research cruises to check the moorings are being used opportunistically to collect additional data on the changing Bering Sea ecosystem.

Preliminary Results: Long-term measurements taken at Sites 2 and 4 are helping scientists understand and predict ocean dynamics, especially the impacts of climate change on the Bering Sea. Data from the moorings and the research cruises have provided the basis for a number of advancements in our understanding of how the Bering Sea shelf functions, and have supported over a dozen publications and many more presentations. The research builds upon previous work and data collection completed with funding from the Coastal Ocean Program's, Southeast Bering Sea Carrying Capacity, International Arctic Research Center, Cooperative Institute for Arctic Research, the Pollock Conservancy, and the North Pacific Research Board.

From the work there appear to be three distinct domains in the Bering Sea southeastern shelf. These domains differ by their water column structure, currents, and the life-forms residing in them. The lack of ice over the southeastern shelf during recent winter resulted in increased water temperatures in the water column. These warmer conditions can trigger changes in the Bering Sea ecosystem. A preliminary indicator of such a change was the occurrence of a coccolithophrid plankton bloom over the Bering Sea shelf during the summers of 1997-2001, and its reappearance in September 2003. There have been some recent indications that the abundance of juvenile flatfish correlate with the warm and cold cycles of the water column over the middle shelf as well, although this requires more investigation.

The North Pacific Research Board seeks to build a clear understanding of the North Pacific, Bering Sea, and Arctic Ocean ecosystems to enable effective fisheries management and the sustainable use of marine resources. www.nprb.org