

The Bering Sea: Current Status and Recent Trends

by Jeffrey Napp

Current status of the Bering Sea ecosystem

The eastern Bering Sea remained cold in the winter of 2011/2012 and the spring of 2012. It was the sixth year in a sequence of cold years that began in 2007 and reflects the presence of a moderate La Niña (for the second cold season in a row), along with a mostly positive Arctic Oscillation (AO). The air pressure pattern in winter was higher than average over eastern Siberia and the northeastern Pacific Ocean and lower than average over northwestern Canada. This atmospheric pattern produced average wind anomalies of 1–2 m/s from the west to the northwest over the Bering Sea shelf, and air temperatures were from 2–4°C colder than average. Two periods of extremely cold air extended over the Bering Sea to the interior of Alaska: mid-December to early January and mid-January to early February. During spring, strongly positive air pressure anomalies occurred south of the western Aleutians along with negative air pressure anomalies over the Yukon Territory. This configuration, which is characteristic of previous La Niñas, was accompanied by average wind anomalies of 2–3 m/s and cold air temperatures.

An important consequence of the winter and spring atmospheric patterns was another heavy-ice year. Sea ice extent for the eastern Bering Sea was the highest observed since 1980. In the western Bering Sea, the areal extent of sea ice was at or above the average of recent years (1979 to present). Strong northerly winds in late spring opened large polynyas in the northern Bering Sea shelf and delayed the retreat of the ice in the south. St. Paul Island was surrounded by ice for a record number of days (more than 100). The ice remained in Bristol Bay until early May, making it difficult for non-ice strengthened hulled ships to reach NOAA mooring M2 (56.87°N, 164.03°W) for its semi-annual maintenance. By mid-June, the southern ice edge was still around 60°N (Fig. 1), but there was a large lead of open water extending from north of St. Matthew Island to St. Lawrence Island. The region north of Bering Strait, however, had low concentrations of sea ice, and there was an area just offshore of Alaska’s northern slope that was open.

Sea surface temperatures (SSTs) over the entire eastern Bering Sea were colder than average by up to more than 2°C (Fig. 2). A time series of the first EOF of SST for the Bering Sea reveals the largest negative values since the time series began in 1980 (Fig. 3). Thus, a well-developed cold pool over the southeastern Bering Sea shelf is expected this summer.

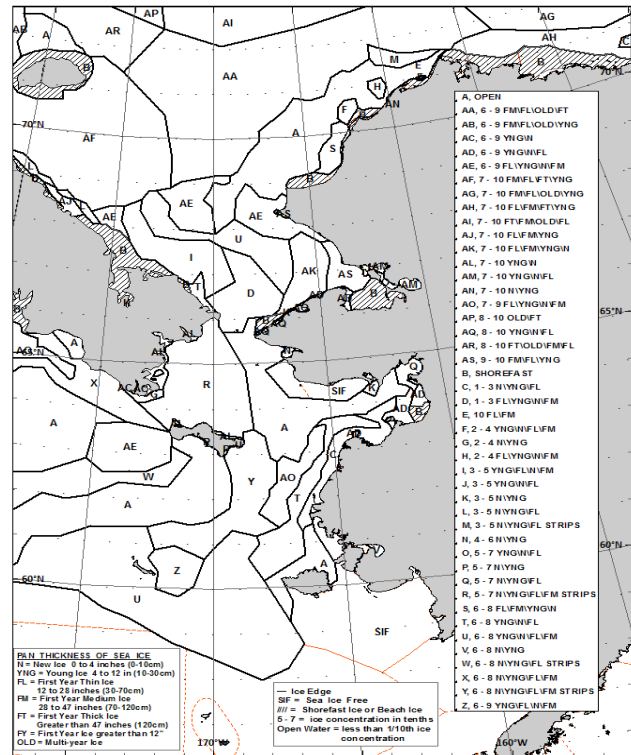


Fig. 1 NOAA National Weather Service sea ice analysis for June 13, 2012.

2012 Bering Sea field season

A very full field season for the Bering Sea is planned for the spring and summer. NOAA’s Alaska Fisheries Science Center had a spring oceanography/plankton survey in May, and there was a cooperative aerial survey of ice-associated seals in the Bering and Okhotsk Seas by NOAA and multiple institutions in the Russian Federation, including the Marine Mammal Commission and the Scientific Research Institute “Giprorbyflot” of the Fisheries Agency of Russia. This survey used advanced imaging systems and statistics to provide the first comprehensive estimates of ice associated seals for the region. It yielded 36,000 km of effort trackline data, with 885,000 high resolution images and 3.6×10^6 thermal images on the U.S. side of the dateline (Fig. 4). NOAA’s Alaska Fisheries Science Center will also have a summer shelf bottom trawl survey, a summer shelf midwater trawl survey, a summer Aleutian Island bottom trawl survey, and a late summer ecosystem survey (oceanography, plankton, surface trawl, and acoustic midwater trawl). Hokkaido University’s T/S *Oshoro Maru* will operate in the Aleutian Islands and eastern Bering Sea shelf in June.

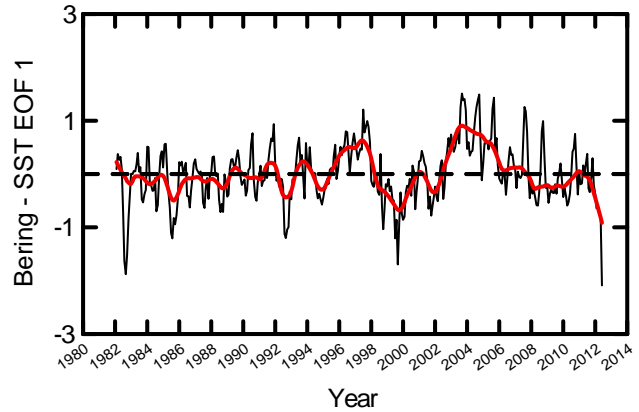
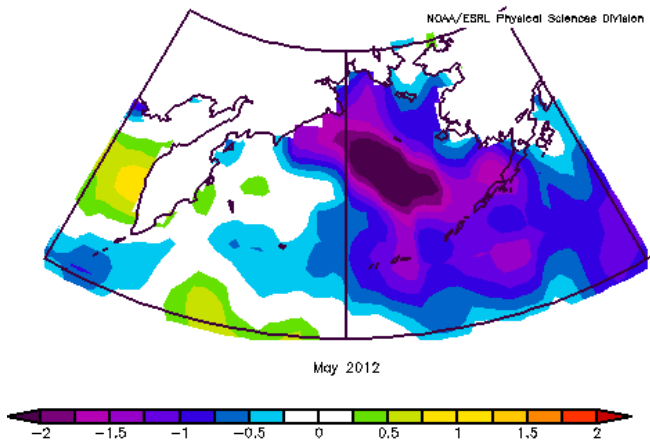


Fig. 2 (left) NOAA Sea Surface Temperature anomalies (deviations from 1981–2010 climatology) for May 2012.

Fig. 3 (right) Time series of Bering Sea SST EOF 1. Red line is a loess smoother trend. Analysis and figure courtesy of S. McKinnell (PICES).

There are also multiple cruises scheduled for the Chukchi Sea and Arctic Ocean this year. The AOOS web page (http://data.aos.org/maps/arctic_assets/) is one place to find recent and planned cruises to the Arctic Ocean. Expect multiple ships (both science and industry) to be working in that area during the ice-free period this summer. This includes ships from the U.S. (e.g. USCG Ice Breaker *Healy*, charter vessels *F/V Bristol Explorer*, *F/V Aquila*), Japan (*R/V Mirai*), Russian Federation (*R/V Professor Khromov*), China and Korea. This is a full field year for the Russian-American Long-Term Census of the Arctic (RUSALCA) that will emphasize sampling in the western Chukchi Sea (Fig. 5).

In addition to RUSALCA and many oil industry-sponsored research programs, NOAA, with support from the U.S. Bureau of Ocean Energy Management (BOEM) will conduct an ecosystem survey comprised of oceanography, plankton, surface and acoustic midwater trawls, bottom trawls, and seabird distributions on the U.S. side of the Chukchi Sea during August (Fig. 6). There is also a new U.S. multi-disciplinary investigation being conducted in the eastern Chukchi Sea over Hannah Shoal with support from the BOEM (<http://www.boem.gov/BOEM-Newsroom/Press-Releases/2011/press09202011.aspx>).

Upcoming science meetings and special journal issue

Meetings in 2012 and 2013 that may host sessions or talks of interest to scientists working in the Bering Sea include:

- PICES Annual Meeting, October 12–21, 2012, Hiroshima, Japan;
- ICES/PICES International Symposium on “*Forage fish interactions*”, November 12–14, 2012, Nantes, France;
- Alaska Marine Science Symposium, January 21–25, 2013, Anchorage, USA;
- Lowell Wakefield Symposium on “*Responses of Arctic marine ecosystems to climate change*”, March 26–29, 2013, Anchorage, USA.

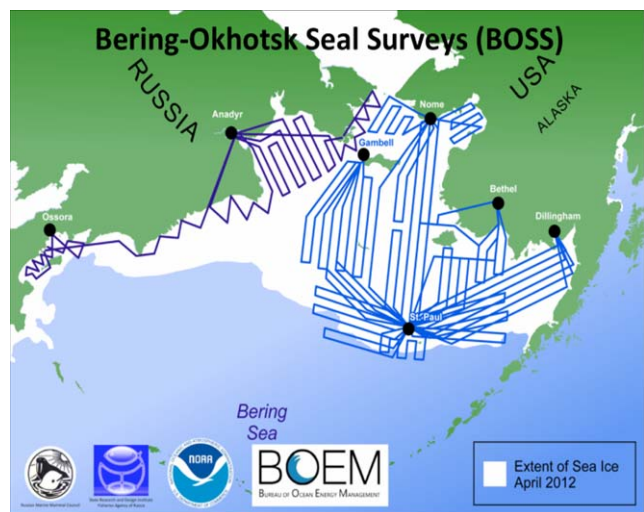


Fig. 4 Proposed track lines for the international Bering-Okhotsk Seal Surveys (BOSS). Figure courtesy of P. Boveng (NOAA’s Alaska Fisheries Science Center).

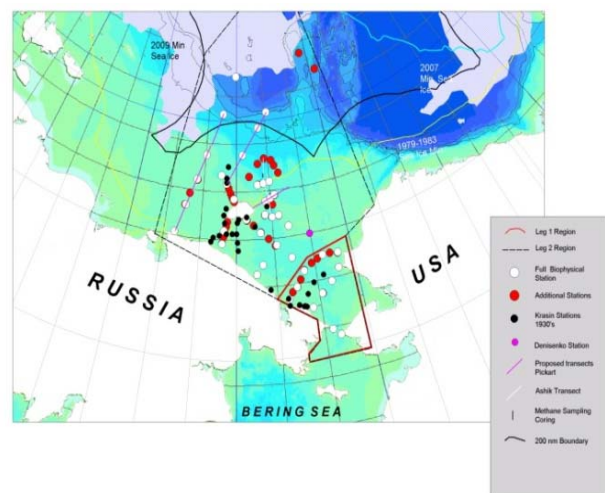


Fig. 5 Proposed station locations for the 2012 RUSALCA ecosystem study of Bering Strait and the western Chukchi Sea. Figure courtesy of M. Busby.



Fig. 6 Draft station plan for the NOAA 2012 ecosystem survey of the eastern Chukchi Sea.

A collection of 23 original scientific papers on the Bering Sea was published in a special issue of *Deep-Sea Research II* (Vol. 65–70; June 15, 2012) to highlight results of research contributed by investigators from the U.S. National Science Foundation-sponsored Bering Sea Ecosystem Study (BEST) and the U.S. North Pacific Research Board-sponsored Bering Sea Integrated Ecosystem Program (BSIERP). This is the first major publication focused on

the Bering Sea since 2002, and it acknowledges the important contributions of Dr. Clarence Pautzke (Fig. 7), who retired as the Executive Director of the North Pacific Research Board in 2011, to research in the North Pacific Ocean and in particular the eastern Bering Sea.

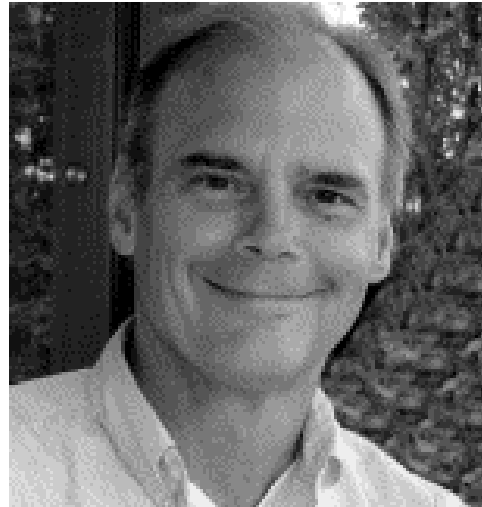


Fig. 7 Dr. Clarence Pautzke, retired Executive Director of the North Pacific Research Board. Photo from DSR II, 2012, Vol. 65–70

Additional research articles from the Bering Sea Program, and the Ecosystem Studies of the Subarctic Seas (ESSAS) Open Science Meeting in May 2011 are currently under peer review for a second special issue. This second issue includes research into the human dimensions of climate change and resource utilization around the eastern Bering Sea. The Bering Sea Program has plans for two additional special issues (total of four). The deadline for submission of manuscripts to the third special issue will be November/December of 2012.

Acknowledgements: Many thanks to the following Piceans who helped create this report: Drs. Nicholas Bond, Skip McKinnell, Phyllis Stabeno, and Mr. Morgan Busby.

I want to thank all of those who have contributed time and news to this column over the last several years. The willingness among scientists within PICES to share data and expertise across international and language borders is one of the organization’s greatest strengths. I have greatly enjoyed assembling the community’s information for this report and I wish the next lead author of this Bering Sea column, Dr. Lisa Eisner, the best of luck and much fun in continuing this tradition.



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