

## The Bering Sea: Current Status and Recent Events

by Jeffrey Napp

### Current status of the Bering Sea ecosystem

As reported in the previous issue of PICES Press (July 2009, Vol. 17, No. 2, pp. 30–31), the eastern Bering Sea was in its fourth straight year of cool or cold conditions in 2009. The pool of cold water over the eastern shelf during summer extended all the way to the Alaska Peninsula (Fig. 1). A video loop of annual bottom water temperatures for the southeastern shelf can be viewed at <http://www.afsc.noaa.gov/RACE/groundfish/images/eb/btemps.gif>.

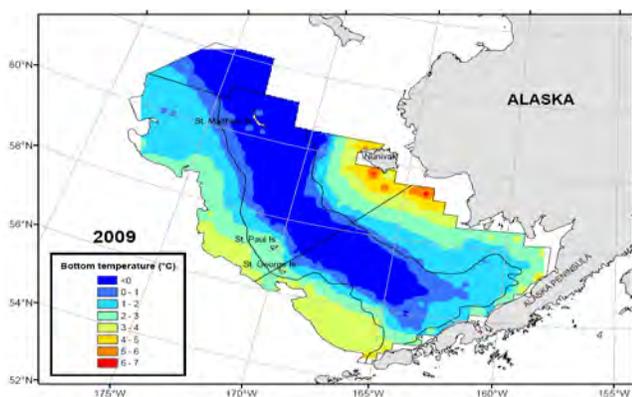


Fig. 1 Bottom water temperature on the eastern Bering Sea shelf sampled during the 2009 NOAA-Alaska Fisheries Science Center (AFSC) summer bottom trawl survey. The cold pool is defined as the water with temperature  $\leq 2$  °C. Figure courtesy of R. Lauth (NOAA-AFSC).

Late summer/early fall cruises of NOAA’s Ecosystems and Fisheries Oceanography Coordinated Investigations (EcoFOCI) and Bering-Aleutian Salmon International Surveys (BASIS) encountered surface coccolithophorid blooms in the eastern Bering Sea. During the BASIS cruise, the aquamarine waters were seen in the area between 56.7–59.4°N and 165.2–170.7°W from September 11–27. Age-0 walleye pollock relative abundance from surface trawls (0–15 m) was the lowest BASIS has measured for the last seven years; capelin abundance was higher than other years, and juvenile salmon CPUE was low over the southeastern shelf.

The large cold pool in 2009 was the result of early and extensive ice penetration into the southeastern portion of the shelf. While winter 2009 water temperatures were comparable to 2007 and 2008, the maximum depth-averaged summer temperature at the M2 location was almost 2°C colder during 2009 than any other year in the time series, except for 1995 (Fig. 2, top). The trend from 2006 through October of 2009 was for increasingly colder temperatures (increasing negative anomalies) from the mean (Fig. 2, bottom). Comparison of the eastern Bering Sea to other

PICES regions (using synopses from the soon to be published PICES North Pacific Ecosystem Status Report) indicates that this region is one of the few areas that has been colder than average during the last several years.

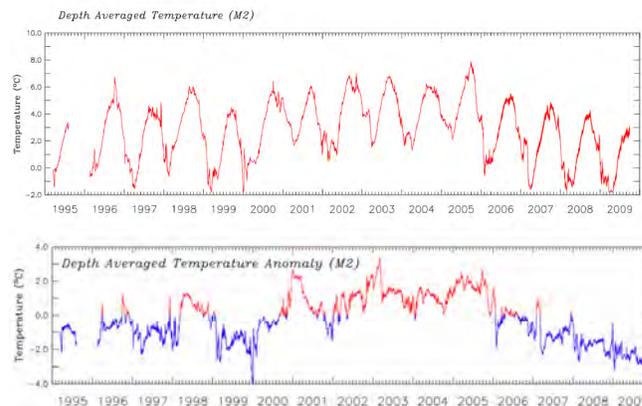


Fig. 2 Depth-averaged water column temperatures (top) and depth-averaged water column temperature anomalies (bottom) measured at NOAA mooring M2 in the southeastern Bering Sea. Figure courtesy of P. Stabeno (NOAA-PMEL, EcoFOCI).

Fall 2009 water temperatures in the eastern Bering Sea were much colder than usual, however, at the time of this writing the marginal ice edge was still well north of the Pribilof Islands. January solid ice cover of 10/10<sup>ths</sup> began just south of St. Matthew Island. This past fall (October) also saw a historical low in the ice extent for the Arctic (P. Stabeno, pers. comm.). The Arctic waters had high heat content from the previous summer, and ice formation was delayed. This may have also delayed the formation of ice in the northern Bering Sea, by warming the air and winds that blow over the Arctic on their way to the Bering Sea. Sea ice of lesser coverage was pushed south into inner Bristol Bay. In the western Bering Sea, 10/10<sup>ths</sup> ice covered the Gulf of Anadyr south to about Beringovski, and along the continental shelf off Korjakskoje Nagorje.

Some of the atmospheric conditions and indices that existed during the cool to cold period of 2006–2009 are changing. The Multivariate ENSO Index (MEI) is now positive, although the current moderate El Niño is predicted to weaken to more neutral conditions during the first half of 2010 (<http://meteora.ucsd.edu/~pierce/elnino/elnino.html>). This can be contrasted with the La Niña conditions that existed at the equator during the cool to cold period. The Pacific Decadal Oscillation (PDO) Index was moderately negative from January through July and became positive in August, with another reversal in November. It is currently weakly positive. The Arctic Oscillation (AO) Index became strongly negative in December of 2009, and remained

negative at the time of this writing. This coincided with intrusions of frigid Arctic air into the temperate and subtropical regions of North America and Europe which affected winter holiday travel and food crops. Winter values for the AO Index have not been of this sign and magnitude since the late 1970s (January 1977 = -3.767 and February 1978 = -3.014).

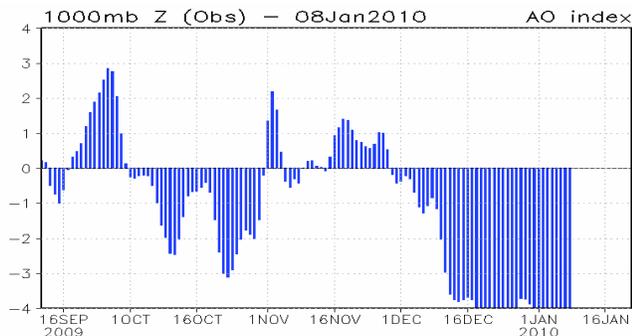


Fig. 4 Daily Arctic Oscillation Index ([http://gcmd.nasa.gov/records/GCMD\\_NOAA\\_NWS\\_CPC\\_AO.html](http://gcmd.nasa.gov/records/GCMD_NOAA_NWS_CPC_AO.html)).

### 2010 Bering Sea field season

This will be the last field year for the current BEST/BSIERP partnership (<http://bsierp.nprb.org>). Due to scheduled maintenance for the USCGC *Healey*, the BEST/BSIERP spring cruise will be later than in the past two years and will be accomplished from the R/V *Thomas G. Thompson*. As in previous years, there will be an early cruise to the ice (USCGC *Polar Sea*, March) and a summer cruise (R/V *Thompson*).

The U.S. intends to expand its annual summer bottom trawl survey into the Northern Bering Sea Research Area this summer ([http://www.fakr.noaa.gov/NPFMC/current\\_issues/ecosystem/NBSRA\\_files/NBSRA\\_outline509.pdf](http://www.fakr.noaa.gov/NPFMC/current_issues/ecosystem/NBSRA_files/NBSRA_outline509.pdf)). NOAA's Groundfish Assessment Program at the Alaska Fisheries Science Center plans to sample a grid of stations in the northern Bering Sea from approximately St. Matthew Island to the Bering Strait. This area is currently closed to bottom trawling by the North Pacific Fishery Management Council (NPFMC). The survey goals are to: (1) determine baseline (non-fished) conditions, measure the expanded distributions and abundances of species that fall outside the traditional sampling grid of the standard annual survey; and (3) fulfill a research plan requirement from NMFMC. The research plan demands a recurring and systematic standardized bottom travel survey of that region before it

can be determined if the area should be opened to commercial bottom trawling.

### Recent developments for the Arctic

Last October, an international symposium on Arctic fisheries was held in Anchorage, Alaska (<http://www.nprb.org/iafs2009>). More than 150 participants from 9 countries spent 3 days listening and contributing to discussions covering the scientific, political, socioeconomic, and cultural issues associated with living marine resources in the Arctic.

The U.S. Minerals Management Service (MMS) is funding multiple projects in the U.S. portion of the Chukchi Sea this summer. The MMS is the U.S. federal agency responsible for the lease of oil and gas rights in territorial waters. A field work coordination meeting is being held at the 2010 Alaska Marine Science Symposium in Anchorage.

### Upcoming scientific meetings

There are multiple scientific symposia and workshops occurring in 2010 that will feature research results from the Bering Sea. Among these are:

- Alaska Marine Science Symposium, January 18–21, Anchorage, Alaska, U.S.A.;
- Ocean Science Meeting, February 22–26, Portland, Oregon, U.S.A.;
- State of the Arctic Conference, March 16–19, Miami, Florida, U.S.A.;
- PICES/ICES/FAO Symposium on “Climate Change Effects on Fish and Fisheries”, April 26–29, Sendai, Japan;
- ESSAS (Ecosystem Studies of Sub-Arctic Seas) Annual Science Meeting, August 30–September 2, Reykjavik, Ireland.

ESSAS, now the Regional Program of IMBER (Integrated Marine Biochemistry and Ecosystem Research), is in the process of planning its second Open Science Meeting scheduled for the late spring of 2011 in the Seattle area. It is expected that the date and venue will be chosen by mid-February. Details of the scientific program will be available shortly thereafter.

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*Dr. Jeffrey (Jeff) Napp ([jeff.napp@noaa.gov](mailto:jeff.napp@noaa.gov)) is a biological/fisheries oceanographer at the Alaska Fisheries Science Center of NOAA-Fisheries. He is Head of the Recruitment Processes Program at the Center and co-leader (with Dr. Phyllis Stabeno) of NOAA's Ecosystems and Fisheries Oceanography Coordinated Investigations (EcoFOCI). His research is focused on physical and biological processes at lower trophic levels that affect recruitment variability in fish populations. He is a Principle Investigator on an NPRB-sponsored Bering Sea Integrated Ecosystem Research Plan (BSIERP) project. In PICES, Jeff is a member of the Technical Committee on Monitoring (MONITOR) and Advisory Panel on the Continuous Plankton Recorder Survey in the North Pacific.*