

Bering Sea Integrated Ecosystem Research Project B52: Semiannual Progress Report

Project #: B52

Title: Biophysical Moorings

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2008-2010 \$732,259

Report Period:

1 October 2008 – 31 March 2009

Report Date:

1 April 2009

Lead Author of Report:

Dr. Phyllis J. Stabeno

Proposed timeline and milestones within report period:

2009 Tasks, Assignments, Timeline

<i>What</i>	<i>Who/Ship</i>	<i>Dates</i>	<i>Other information</i>
Prep equip., design and build moorings, develop cruise plans.	Stabeno, Napp, Whitledge, Mordy (SNWM)	November 2008 - present	
Recover/deploy moorings M2, M4, M5, M8	SNWM, NOAA Ship <i>Miller Freeman</i>	October 2008–	Also conduct CTD/bongos along southern hydrography line through M2
Process and disseminate mooring data,	SNWM	October 2008 – Feb 2009	
Send plankton samples to Poland to be counted	Napp	June 2008 – present	The actual time for processing varies
Attempt to deploy moorings at M2	Stabeno, <i>Oscar Dyson</i>	March 2009	Failed because of ice/weather
Submit data to data manager	Stabeno	March 2009	Time series from moorings

Project Summary: This project is a continuation of a long-term partnership between NOAA and NPRB. Moorings have been maintained on the southeastern Bering Sea shelf at four sites: M2 (56.9°N, 164.1°W) since 1995, M4 (57.9°N, 168.9°W) since 1996, M5 (59.9°N, 171.7°W) and M8 (62.2°N 174.7°W) since 2004 (Fig. 1). This project, along with research by the NOAA program North Pacific Climate Research and Ecosystem Productivity (NPCREP), will continue these measurements for the next two years (2009-2010). These moorings, and ancillary observations along the 70-m isobath, are core to the long-term observations on the Bering Sea shelf. All four moorings are deployed on the 70-m isobath. Key findings about the regional ecosystem (the Oscillating Control Hypothesis [OCH], timing of spring bloom, and stability in the nutrient supply) have resulted from data collected by these moorings. Data from M2 has quantified the warming that occurred over the southern shelf during 2001-2005 and the marked cooling in 2007-2008. This project continues the time series of temperature, salinity, fluorescence, currents, zooplankton abundance (TAPS-8 at M2 and possibly M4), nitrate, and oxygen at four mooring sites on the Bering Sea shelf. Additionally, during late spring and summer, a surface mooring (two if ice permits) will be deployed to measure meteorological variables (air temperature, humidity, barometric pressure, wind velocity and solar radiation – PAR). The surface moorings permit real-time reporting of selected data. Data from these moorings are also critical to model verification. Products include mixed layer depth, heat content, temperature, position of the transition between southern pelagic-dominated shelf and northern benthic-dominated shelf, advection, nutrient supply and timing of the spring phytoplankton bloom.

This project supports all five BSIERP hypotheses (see <http://bsierp.nprb.org/focal/index.html>).

Progress Summary: All milestones were met, in full or in part. In September 2008, moorings were recovered at three sites and redeployed at all four mooring sites. The large mooring at M4 was missing and presumed trawled by a fishing vessel. A 24-hour search was undertaken, but the mooring was not found. We will search for it again in April/May 2009. In October 2009, a fishing vessel accidentally snagged the ADCP mooring at M2. It was returned to us in December. We planned to redeploy it in March, but because of bad weather we were unable to reach the mooring site. Moorings are presently being constructed for deployment in May.

Zooplankton samples from the previous spring were shipped to Poland in July and the data returned in December 2008. The next steps are to QC the data and upload them into the database. The summer samples were received by Poland on 28 December 2008 and are in the queue for processing and data entry. We expect the data to be returned to the AFSC this spring.

Lessons learned and project adjustments:

In 2008, four moorings (two at M4 and two at M2) were disturbed, we suspect, by fishing boats. Two moorings (one at each site) were found and recovered. A vessel signaling to the

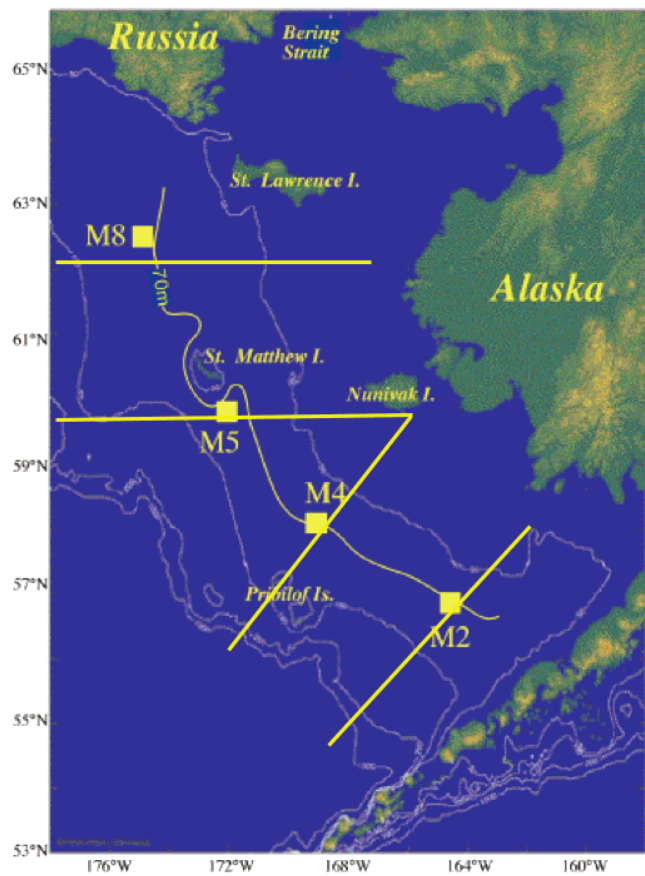


Figure 1. Bathymetry of the eastern Bering Sea showing the location of four biophysical moorings (M2, M4, M5 and M8), the 70-m isobath and the four cross-shelf lines that have been adopted as standard survey tracks.

Bering Sea Integrated Ecosystem Research Project B52: Semiannual Progress Report

releases and listening for replies must make extensive searches of the area to locate the missing equipment. Because we expect that fishing pressure will remain a problem during the next year, we plan to deploy “pop-up” tags on some of the moorings. These tags will automatically release several days after the planned recovery and transmit their position, providing us with a good estimate on the location of the mooring.

Integration activity: In October, Stabeno attended the BEST/BSIERP PI meeting and presented four posters discussing results from this project together with results from other BSIERP/BEST projects. Investigators from this project (Stabeno and Napp) participate in the monthly PI phone conference. Stabeno is a member of the Science Advisory Board and talks each week with investigators from a number of programs primarily about field operations and modeling concerns. Investigators from this program have had several discussions with the modeling projects (ROMS and NPZ) about progress. Target for delivery of zooplankton data is this summer (1 August 2009). Except for the nutrient time series, the mooring data were delivered to the BSIERP data manager on 31 March 2009.

Education and Outreach: None during the last 6 months.

Next year’s Work Plan:

BSIERP B52, Biophysical Moorings, Dr. Phyllis J. Stabeno, phyllis.stabeno@noaa.gov, 206-526-6453

2009 Tasks, Assignments, Timeline

<i>What</i>	<i>Who</i>	<i>Start (2009)</i>	<i>Other key dates/information</i>
Data delivery (rcv’d Sept 2008) to data manager	Stabeno, Napp, Whitledge, Mordy (SNWM)	Mar. 2009: phys/chem	Partially complete, nutrient data to be delivered when ready
Send plankton samples to Poland to be counted	Napp	Jun 1, 2009 – Jun 1, 2010	The actual time for processing varies.
Recover/deploy moorings M2 and M4 (ice permitting)	SNWM, <i>Oscar Dyson</i> or fishing vessel,	Apr-May 2009	Will also conduct some hydrographic stations
Process and disseminate CTD/mooring data Deliver CTD/mooring data to data manager	SNWM	Apr-Oct, 2009 Nov 2009: phys/chem	
Deploy moorings at M5 and M8	Stabeno, Whitledge, June cruise on ship of opportunity	Jun/Jul 2009	
Process and disseminate mooring data Data delivery to data manager	SNWM	May – Dec, 2009 Mar 2010: phys/chem	
Recover/redeploy all moorings M2, M4, M5 and M8	SNWM, <i>Oscar Dyson</i> or <i>Miller Freeman</i> and/or <i>Thompson</i>	Sep 2009	Will also conduct some hydrographic/bongo stations

Manuscripts and Presentations

Related Manuscripts

- Stabeno, P.J., Napp, J.M., Mordy, C., and Whitledge, T.E. The influence of seasonal sea ice on the eastern Bering Sea shelf ecosystem: 2005. *Progress in Oceanography*, in revision.
- Stabeno, P.J., and Overland, J.E., 2008. Sea ice extent: A decoupling between summer ice extent in the Arctic Ocean and winter ice extent in the Bering Sea. *Geophys. Res. Letters*, in revision.
- Other - NPRB 602 & 701 Synopses.

Presentations

- Cokelet, E., Mordy, C., Stabeno, P., Kachel, N., and Proctor, P., 2009. Evolution of the Bering Sea shelf's mixed layer and photic zone: Ice to summer. Alaska Marine Science Symposium, Anchorage, AK, January, poster.
- Cokelet, E.D., Mordy, C., Stabeno, P.J., Kachel, N.B., Proctor, P.D., and Righi, D., 2008. A Comparison of Oceanographic Sections Across the Bering Sea Shelf: Spring and Summer 2008. BEST/BSIERP PI Meeting, Girdwood, AK, October, poster.
- Coyle, K.O., Pinchuk, A.I., Eisner, L.B., Napp, J.M., and Mueter, F., 2009. Zooplankton species composition on the southeastern Bering Sea shelf during summer: the potential role of temperature water column stability in structuring the zooplankton community and influencing the survival of pollock. Alaska Marine Science Symposium, Anchorage, AK, January.
- Kachel, N.B., Cokelet, E.D., Mordy, C.W., Napp, J.M., and Stabeno, P.J., 2009. Biophysical observations along the 70-m isobath in the Bering Sea in 2008. Alaska Marine Science Symposium, Anchorage, AK, January, poster.
- Kachel, N.B., Sullivan, M., Strausz, D., Kachel, D., Dewitt, C., and Stabeno, P.J., 2008. Hydrographic Cruises in the Bering Sea in 2008. BEST/BSIERP PI Meeting, Girdwood, AK, October, poster.
- Mordy, C., Proctor, P., Whitledge, T.E., Stabeno, P.J., Menzia, F., Wisegarver, D., Devol, A., and Shull, D., 2009. Seasonal changes of nutrients on the Bering Sea shelf: Implications on primary production and the nitrogen cycle. Alaska Marine Science Symposium, Anchorage, AK, January, poster.
- Napp, J.M., Stabeno, P.J., Hunt, G.L. Jr., and Holliday, D.V., 2009. Recent trends in eastern Bering Sea zooplankton: data and confessions. Alaska Marine Science Symposium, Anchorage, AK, January.
- Parada, C., Orensanz, L., Hinckley, S., Ernst, B., Armstrong, D., Megrey, B., Napp, J.M., and Hermann, A.J., 2009. New information about connectivity: Relationships between larval release and potential settlement areas for snow crab in the Bering Sea. Alaska Marine Science Symposium, Anchorage, AK, January.
- Stabeno, P.J., 2009. Variability on the Eastern Bering Sea. EcoFOCI Seminar, Seattle, WA, February 25.
- Stabeno, P.J., Kachel, N., Floering, W., Mordy, C., and Napp, J., 2008. BEST/BSIERP PI Meeting, Girdwood, AK, October, poster.
- Stabeno, P.J., Kachel, N.B., Floering, W., Mordy, C., Napp, J.M., and Whitledge, T.E., 2008. Status of the Bering Sea in 2008: Cold! BEST/BSIERP PI Meeting, Girdwood, AK, October, poster.
- Stabeno, P.J., Napp, J.M., and Overland, J.E., 2009. The Bering Sea in 2008: A decoupling of sea-ice extent between the Arctic and Bering Sea. Alaska Marine Science Symposium, Anchorage, AK, January.