

Project #: B55

Title: Summer Microzooplankton in the Bering Sea

Principal Investigator(s) and Recipient Organization(s):

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Contract Period and Amount of Funding:

1 October 2007-September 30, 2009 (first installment); \$197,307 (first installment)

Report Period: September 30, 2008-April 1, 2009

Report Date: March 5, 2009

Lead Author of Report: Diane K. Stoecker

Proposed timeline and milestones within report period:

1. Preliminary analysis of data from microzooplankton grazing experiments conducted on Healy 0803, July 3-31, 2008. Done.
2. Microscopic analysis of microzooplankton samples collected on Healy 0803, July 3-31 2008. Ongoing.
3. Analysis of data on microzooplankton abundance and biomass. Ongoing.
4. Preparation of poster "Summer Micro zooplankton Grazing on Phytoplankton in the Bering Sea, HLY803, July 3-31, 2008" by Stoecker & Blattner. Done.
5. Stoecker attends BSIERP-BEST Fall PI Meeting at Girdwood, Alaska, 14-16 October, presents poster. Done.
6. Microzooplankton Grazing data from Healy 0803, July 3-31 2008 submitted to BSEIRP modelers- Done.
7. "Headlines" on significant findings from project from 2008 summer cruise submitted to M. Sigler for presentation at BEST-BSIERP PI Meeting, January 20, 2009. Done.
8. Conversion factors for estimating microzooplankton biomass discussed by email with PIs Lessard and Sherr and with Strom (previous work on Bering Sea microzooplankton). We decided on factors to be used. We also decided on a standardized fixation protocols (5% acid Lugol's solution) and agreed to collect samples on Bering Sea cruises to compare shrinkage of microzooplankton cells with different fixative concentrations. This will facilitate comparison of microzooplankton data from past and future cruises. Done.
9. Exchanged data from collaboration with Goes, who was on Healy 0803, on effects of dilution on phytoplankton physiology in dilution grazing experiments. Similar measurements are to be made by a student on an Arabian Sea cruise. This will allow comparison of dilution effects on phytoplankton physiology between two very different systems. This is important because effects on phytoplankton growth may influence estimation of microzooplankton grazing in dilution experiments. Ongoing.
10. Prepare semi-annual progress report. Done.

Project Summary:

This project addresses the BSIERP hypothesis that “Climate-induced changes in physical forcing will modify the availability and partitioning of food for all trophic levels through bottom-up processes”. MZ are responsible for most of the grazing on phytoplankton in the sea and are an important link in the food chain between phytoplankton and zooplankton, which are food for zooplanktivorous fish which support top predators. The project contributes to the goals of BSIERP by providing summer data on standing stocks of MZ and their grazing activities. A key goal is to determine how the MZ link in Bering Sea food webs is influenced by climate-induced changes in physical forcing.

Progress Summary:

We met the timeline and milestones within the report period. Specifically, we analyzed data from 21 dilution grazing experiments. We have calculated net phytoplankton growth (NGR), intrinsic phytoplankton growth rate (μ) and the mortality rate of phytoplankton due to MZ grazing (g) in treatments with and without added nutrients as well as estimated the fraction of phytoplankton growth grazed per day (g/μ). We are in the process of further analyzing these data to elucidate the relationship of these parameters to total and size fractionated chlorophyll (an indicator of phytoplankton biomass), physical and chemical parameters, water column structure, phytoplankton/MZ community type and spatial variability/domain.

To date, we have enumerated, sized and estimated the abundance and biomass of microzooplankton from the 21 dilution experiments (21 mixed layer samples from process stations) as well as chlorophyll maximum layer(s) (if present) at these stations (13 additional samples). Mixed layer and chlorophyll maximum layer(s) (if present) samples have also been analyzed from stations MN-6, MN-9, SI-12, SL-13, N-55, NP-1 through NP-15, N-55, and 70m-13, 70m-17, and 70m-27. Microzooplankton samples were taken from t0 and t 24 whole seawater treatment bottles (with and without added nutrients) in dilution experiments #12, #13, #14 and #16 to determine the survival/growth coefficients of microzooplankton in these treatments; duplicate samples from experiment #16 have been analyzed, triplicate samples from experiments # 12 and #13 are currently being processed.

Lessons learned and project adjustments:

We are modifying microzooplankton fixation procedure to standardize them with other BEST-BSIERP PIs, Lessard and Sherr. We have agreed on 5% acid Lugol's for preservation of microzooplankton for enumeration and sizing. We have also planned with these PIs a comparison of cell shrinkage in microzooplankton samples fixed with 2%, 5% and 10% acid Lugol's. This will help in comparing microzooplankton biomass estimates between investigators, seasons and years.

Integration activity: Diane Stoecker attended the Bering Sea Ecosystem Partnership principal investigator meeting on October 14-16, 2008. Grazing rate data from our July 2008 cruise was submitted to BSIERP in late October 2008. Samples containing interesting dinoflagellates have been provided to the “Assembling the Tree of Life (ATOL) project for Dinoflagellates”. This will help elucidate and document biodiversity in the Bering Sea. Lugol's fixed samples containing an interesting chain forming a cyanobacterium from cold pool samples have been sent to taxonomic experts; however, because of the limited number of specimens and the preservation method, it may not be possible to get them identified.

Education and Outreach: Diane Stoecker used material from the 2008 cruise in teaching a graduate course in Biological Oceanography at University of Maryland.

Next year's Work plan: On a separate page, we have appended our workplan for the coming year.

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2009-2010 Tasks, Assignments, Timeline

<i>What</i>	<i>Who</i>	<i>When</i>	<i>Other key dates</i>
Prepare for Summer 2009 cruise, order supplies and ship to Dutch Harbor	Blattner	April-May 2009	
Analyze 2008 MZ samples and data analyses	Stoecker, Blattner	April-June 2009	
BEST/BSIERP 2009 summer cruise on RV Knorr; ship MZ samples to HPL, UMCES	Stoecker, Blattner	June-July 2009	June 14-July 13 cruise
Analyze data from 2009 dilution experiments; submit data to data manager	Stoecker, Blattner	July-October 2009	
Attend annual PI meeting	Stoecker	October 2009	October 12-16 PI meeting
Analyze MZ samples from 2009 summer cruise	Blattner	July 2009-June 2010	
Prepare spreadsheets on MZ abundance and biomass from 2009 cruise for data manager	Stoecker, Blattner	July 2009-June 2010	
Prepare for Summer 2010 cruise, order supplies and ship	Blattner	April-May	