

## **Annual Report Summary Format**

**Period Covered by the Report:** January 2001-March 2002

**Date of Report:** April 1, 2002

**Title:** Effects of anthropogenic eutrophication on the magnitude and trophic fate of microphytobenthic production in estuaries

**Investigators:** Just Cebrian (DISL) and Jonathan Pennock (UA)

**Institution:** Dauphin Island Sea Lab

**Research Category:** SGER

**Project Period:** on paper (07/2000-06/2001); real period: 01/2001-present (in progress, see below)

**Objective(s) of the Research Project:** The goals of the project are two-fold. First, describe the importance of grazing by macro-herbivores (i.e. excluded by mesh  $> 1\text{mm}^2$ ) and resuspension and subsequent transportation on the water column as routes followed by microphytobenthic production. This is important to understand the role of microphytobenthic populations as food resources for resident and exogenous, through transportation by waves and currents, consumers. Second, the project will also evaluate how sediment fertilization, one of the most important consequences of anthropogenic eutrophication of coastal systems, affects those routes of microphytobenthic production. This second goal will contribute to our knowledge of how increasing human-induced nutrient delivery into coastal systems alters the ecological role of microphytobenthic communities.

**Progress Summary/Accomplishments:** Our work is still in progress, in spite of the initially planned study duration (07/2000-06/2001). Three are the main reasons: First, the student working on the project, Adrienne Dunsmuir, could not arrive in DISL till September 2000. She is from Canada, and she had to make a lot of personal and professional arrangements before she was ready to come. In addition, the validation of her Canadian transcripts and other credentials further delayed her acceptance into the Marine Sciences program and onset of the project.

Second, we have been introducing a series of changes in our initial experimental design, which address a series of problems we had not anticipated. Namely, we were forced to increase substantially the number of enclosures to account for the markedly patchy distribution of microphytobenthos. Sampling procedures, number of replicates, and time duration of the experiments have also been modified to better cope with the real field conditions encountered in preliminary runs.

Finally, the work that we first proposed has been considerably expanded. Namely, besides everything that was proposed in the initial project, we are now carrying out two new activities. First, we are running a series of experiments to evaluate the effect of anthropogenic eutrophication, mimicked with sediment fertilization and water-column shading, on microphytobenthic production and metabolism. Second, we are working on the validation of a spectrophotometric method to assess the metabolism of microphytobenthic communities. This method will offer several advantages over existing techniques.

We believe that, in spite of the considerable delay in relation to the initial plan proposed, we are making considerable progress and the project will overall benefit from all the changes made. We will achieve more goals, do more work, and present a more complete picture of the interaction between anthropogenic eutrophication and microphytobenthos dynamics. The

waiting time till the start of the definite experiments ,and all the preliminary runs done so far, will definitely pay off.

We now have a final work plan. All the problems brought up by preliminary experiments have been worked out. We will start our first definite field experiment this month, and run them seasonally till summer 2003 (see below). The results of all our preliminary experiments, besides solidifying our final plan, have gone a long way since Adrienne has presented them in several scientific meetings (see below).

**Publications/Presentations:** Three oral presentations in professional meetings:

Dunsmuir, A. L. and J. Cebrian. Measuring microphytobenthic production and consumption using a spectrophotometric technique. 16<sup>th</sup> Biennial Conference of the Estuarine Research Federation, November 2001, St. Pete (Florida).

Dunsmuir, A. L. and J. Cebrian. Measuring microphytobenthic production and consumption using a spectrophotometric technique. 4<sup>th</sup> Annual Graduate Student Symposium, January 2002, Ocean Springs, (Mississippi) (awarded with best presentation of work in progress).

Dunsmuir, A. L. and J. Cebrian. Measuring microphytobenthic production and consumption using a spectrophotometric technique. 31<sup>st</sup> Annual Marine Benthic Ecology Meeting, March 2002, Orlando (Florida).

**Future Activities:** As stated above, we have devote all last year to run preliminary experiments and set up a final sampling plan and techniques. We have also implemented the initial project with two more components. We now feel confident we will be carrying out all activities with success. We will be starting our first sampling session in April 2002, and run all experiments seasonally till summer 2003. Adrienne will be defending her thesis in spring 2004 and by then our results will be wrapped up as scientific papers.

**Supplemental Keywords:** microphytobenthos, herbivory, export/import, eutrophication

**Relevant Web Sites:** not developed yet, but it is planned within the next two years (as part of a general web page for my lab)

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