NOAA COP ANNUAL PROGRESS REPORT

Project Title: Changing salinity effects on spiny lobster and hard-bottom habitat

Grantee: Dr. Mark J. Butler
Department of Biological Sciences
Old Dominion University
Norfolk, VA 23529-0266
Telephone: (757) 683-3609
Fax: (757) 683-5283
Email: mbutler@odu.edu

Award Period: From: August 1, 2000 To: July 31, 2002

Period Covered by this Report: From: May 1, 2001 To: April 31, 2002

A. Summary of Progress

1. Work Accomplishments:

a. Summary of Progress:

Proposed changes in water management within the Everglades are likely to profoundly alter the spatio-temporal patterns of salinity within Florida Bay, with unknown consequences for hard-bottom communities. Although hard-bottom habitat is limited primarily to southwestern Florida Bay, these habitats and the organisms they harbor are important for understanding ecological linkages between the bay and the adjacent Florida Keys marine ecosystem.

In our original proposal, we proposed a series of laboratory salinity tolerance experiments on lobsters and sponges, field surveys of hard-bottom habitat to compliment existing field distribution data, and computer simulation modeling of lobster recruitment and hard-bottom structure to predict the population-level consequences of salinity change on lobster recruitment. Specifically, we are assessing the lethal and sublethal effects of different salinity-temperature regimes on prominent hard-bottom species, specifically Caribbean spiny lobster (*Panulirus argus*), five sponge species (*Speciospongia vesparia, Ircinia campana, Ircinia sp., Hippospongia lachne)*, and two species of octocoral (*Pterogorgia anceps, Pseudopterogorgia acerosa)*.

Because of the funding change in year 2 of the grant (approximately half of the funds awarded were subsequently provided), we are unable to perform some of the originally proposed tasks, specifically: the field surveys and many of the proposed alterations to our existing simulation model. However, we completed the remaining laboratory salinity tolerance studies on lobsters, sponges, and octocorals, and will soon complete (by the final report due date) an initial set of modeling simulations examining salinity change effects on lobsters. The following is a summary of our accomplishments in year 2.

Our laboratory studies indicate that early benthic juvenile spiny lobsters are intolerant of salinity change and experience high mortality, especially at high summer

temperatures. In contrast, the survival and growth of larger juvenile lobsters was unaffected by salinity, although their movement rates initially increase then decline with altered salinity. Our laboratory studies of the effect of salinity change on lobster movement reveal that changes in movement depend on an interaction between salinity and time of exposure. At extreme salinities (15 psu & 45 psu), lobsters nearly double their movement during the first night of exposure as compared to movement rates at the control salinity (35 psu). However, movement at extreme salinities after the first 24 hours of exposure then declines to ambient movement or below. This is presumably a result of increased metabolic demands due to salinity stress over time. At less extreme hyposalinity levels (25 psu), lobsters increase their daily movements and maintain those high levels of movement for at least 5 days.

The five species of sponge that we tested varied in their tolerance to low salinity, although none survived the 15 ppt treatment at winter temperatures and none survived any low salinity during high summer temperatures. The least tolerant species was the commercial sponge (*Hippospongia lachne*) and the most tolerant was the finger sponge (*Ircinia sp.*). Both species of octocoral that we tested experienced 100% mortality at salinities below 35 ppt at all temperatures.

b. Summary of Work to be Performed in Next Year (if changed from original):

This project is nearing its completion, so most of what remains to be completed this summer are the scaled-back modeling simulations, data analysis, and the write up of the data for the final report and for publication.

2. **Applications:**

a. Publications, presentations, workshops:

This project is just now nearing its scheduled end so we have not yet produced any publications. However, we have given two presentations at scientific meetings since last year, those were:

Butler, Mark J. IV, Scott Donahue, and Tom Dolan. 2002. Everglades restoration and the effects of changing salinity on hard-bottom communities in Florida Bay. 31st Annual Benthic Ecology Meeting, Orlando, FL.

Donahue, Scott and Mark J. Butler IV. 2002. Sponge dynamics in nearshore hard-bottom communities of the Florida Keys. 31st Annual Benthic Ecology Meeting, Orlando, FL.

b. Applications to management or research: None yet

c. Data or information products: None yet

d. Partnerships: None