Coastal Ocean Monitoring Program

NOAA Award # NA96RP0259
Semi-Annual Progress Report, 1 March 2001 to 31 May 2001

Submitted by:

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INTRODUCTION

The Coastal Ocean Monitoring Program, entitled the Southeast Marine Monitoring and Prediction Center in appropriations language, was established on September 1, 1999. As described in the original proposal, the purpose of the program is to assess the effects of natural and anthropogenic influences on coastal processes in the South Atlantic Bight. The program is based at the University of North Carolina at Wilmington's Center for Marine Science, located on the Intracoastal Waterway (ICW) opposite Masonboro Island (Figure 1a). This progress report summarizes accomplishments during the last three months, March-May 2001, of grant award # NA96RP0259.

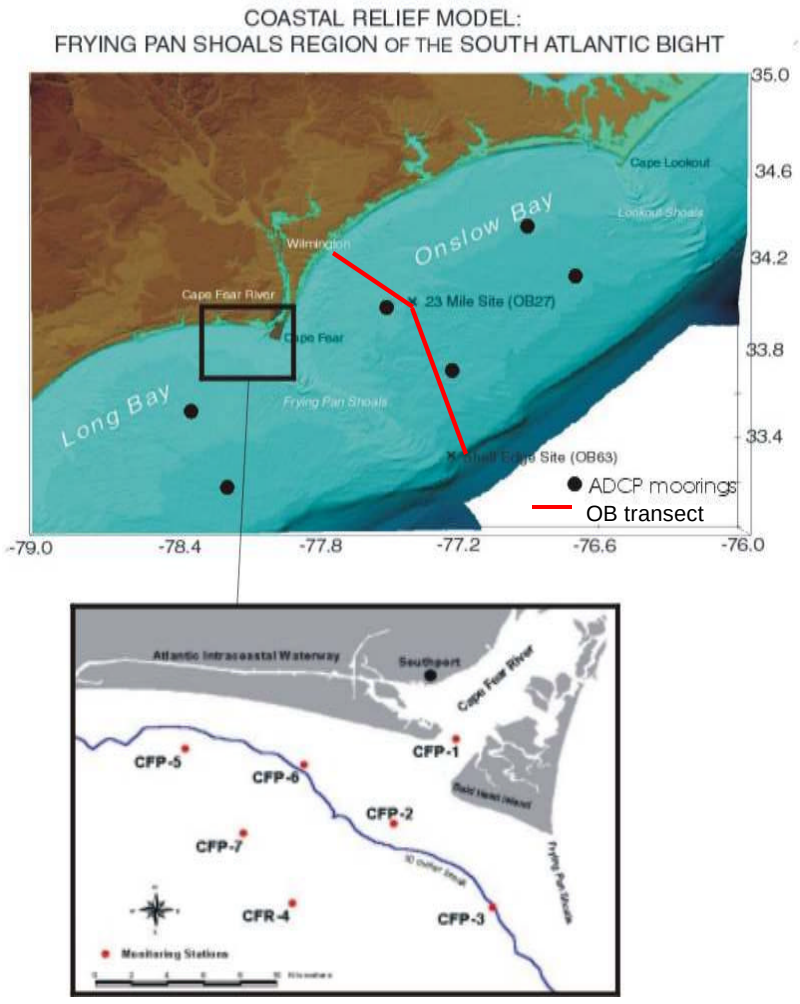


Figure 1. Chart of COMP study area showing Onslow Bay transect (red line), permanent stations at OB27 and OB63, NCSU ADCP moorings (dots, to be deployed in 2002), and Cape Fear River plume sampling stations (inset).

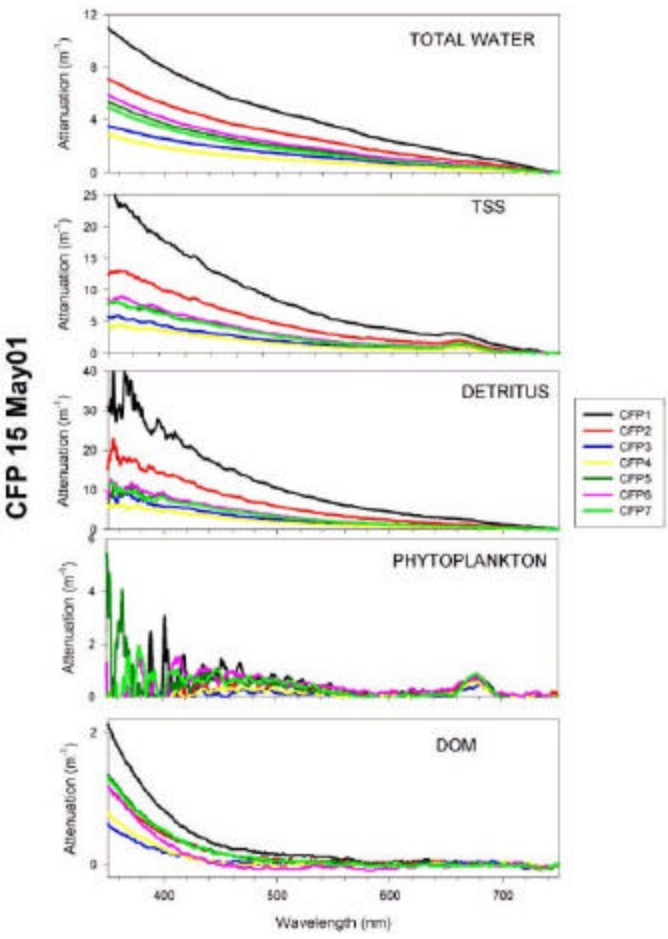
OBJECTIVES

The primary scientific objectives during this period were to:

- understand and model the dynamics of cross shelf transport of materials (including nutrients, sediments, and biota)
- define the relationship between physical properties (circulation, weather, storms) and coastal environmental health
- determine the influences of oceanographic forces on the recruitment of commercially important fisheries
- assess the impact of riverine input on coastal water quality and productivity

In order to accomplish these objectives, the following tasks were proposed that apply to this three month period:

- conduct monthly sampling cruises to long-term stations across the continental shelf off Wilmington, NC (Figure 1a)
- conduct monthly sampling cruises to long-term sampling stations in the Cape Fear River plume (Figure 1b)
- maintain a permanent, long-term mooring and seafloor instrumentation on a mid-shelf "live bottom" reef and on the outer shelf near the west wall of the Gulf Stream
- integrate observations from the at-sea sampling, in situ instrumentation, and satellite imagery



RESULTS

Due to poor weather, no Onslow Bay cruises were accomplished during this period. March operations were also cancelled in the Cape Fear River plume (see www.uncwil.edu/cmsr/comp for cruise logs and monthly data tables and graphs).

Figure 2. Partitioning of light attenuation data from the Cape Fear River Plume, May 15, 2001, shows dominant impact of particulates and gradation from river mouth station 1 to offshore stations (3,4, and 7—see Figure 1).

The data from the optical characterization study component (Figure 2 and http://www.uncwil.edu/cmsr/comp/bioopticalbiooptical index.htm) provide an optical database for shelf and river plume waters that will be used to 1) calibrate and develop algorithms for remotely sensed data, 2) event-response detection, and 3) establishing response targets for management actions. CDOM

(Chromophoric or Colored Dissolved Organic Matter) is a major contributor to ocean color, and perhaps higher in the Cape Fear River than any other river system that drains directly into the coastal ocean on the U.S. Atlantic coast. Data from the May 2001 plume sampling on light attenuation partitioned by various CFRP water components show that particulate matter are primary light blockers (Figure 2).

Profiles of physical water quality parameters (water temperature, salinity/conductivity, dissolved oxygen, pH, and turbidity) were again sampled using a YSI Model 6920 multi-parameter water quality instrument. Table 1 shows mean results from the 2000. Samples were also collected on-site for nutrient species concentrations. Total nitrogen, nitrate, total phosphorus, and orthophosphate have been stored frozen and will be analyzed pending resolution of the problems with the Center for Marine Science Nutrient Laboratory. Ammonium,, silicate, and chlorophyll *a* data from 2000 are also provided in Table 2.

Table 1. Selected physical parameters (mean and standard deviation) measured during CY 2000 monthly samplings (n = 7 cruises) at seven Cape Fear River plume stations.

Station	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
CFP1	27.1±7.7	13±8	7.8±1.2
CFP2	31.2±4.1	10±5	7.6±1.3
CFP3	34.3±1.4	7±7	7.7±1.1
CFP4	33.6±2.1	4±5	8.0±1.3
CFP5	33.3±2.1	5±7	8.1±1.3
CFP6	32.7±1.6	6±6	7.7±0.8
CFP7	32.8±2.8	4±4	7.6±0.9

Table 2. Selected nutrient and biological parameters (mean and standard deviation) measured during CY2000 samplings (n = 7 cruises) at seven CFRP stations.

Station	Ammonium (µg/L)	Chlorophyll *a* (µg/L)	Silicate (µg/L)
CFP1	23±24	8.0±8.6	534.5±514.2
CFP2	18±17	5.0±3.7	280.9±292.7
CFP3	8±8	3.0±3.7	114.6±79.2
CFP4	10±11	3.0±2.9	184.3±149.2
CFP5	9±9	2.5±1.4	136.6±130.1
CFP6	13±15	2.9±1.5	231.7±124.2
CFP7	10±12	2.3±1.2	163.9±109.4

Average salinity was lowest in the estuary proper (CFP1) and just outside of the estuary (CFP2). It was slightly higher at the control station CFP3, and Stations CFP4 and CFP5, oceanward and often outside of the direct plume. Lowest salinities occurred in March, followed by September. Turbidity was highest in the estuary and just outside of its mouth, and slightly elevated at the control site CFP3, located in shoals to the east of the plume. Turbidity was highest in March, followed by September. The sites that are farthest oceanward of the plume's direct influence, (CFP4 and CFP5) appeared to yield the highest levels of surface dissolved oxygen. Temporally, dissolved oxygen showed an inverse

relationship with water temperature, being highest in February (9.5 – 10.6 mg/L) and lowest in August (6.3 – 7.7 mg/L).

During the winter, the OB63 mooring was did not respond to the acoustic release. A lost equipment bulletin has been posted internationally to no avail. The mooring will not be replaced in the same location. A recovery attempt made during this report period, using a remotely operated vehicle supplied by NOAA's National Undersea Research Center at UNCW, revealed that the wire and instruments broke free from the bottom weight. Monitoring continued at the OB27 shelf station. Winter data is being analyzed to gauge the impact of other winter storms on sediment transport and reef health.

A study to examine the distribution and abundance of selected larval invertebrate taxa, in this case the blue crab *Callinectes sapidus*, is on-going at ten stations on the shelf and plume sampling surveys. These larvae will be sorted from the zooplankton monitoring samples monthly during times of expected peak abundance (April-November) and bimonthly for the remainder of the year. The processing of these samples is ongoing. Evaluation of settlement within the Cape Fear River proper indicates that 2000 may have had an exceptionally high larval pool. Will this translate into high fisheries yields in 2001 and beyond? This larval supply question has particular importance when looking at the interaction between oceanic and river systems.

Offshore fish larval sampling continued on the Onslow Bay transect. Family distributions were found to be different in Gulf Stream (GS) intrusions vs. shelf water (SW) masses. Ichthyoplankton concentrations and abundances for three gear types (bongo, neuston, and Methot frame trawl nets; Figure 3) exhibited no significant differences. Family diversity showed significantly higher values in GS intrusion than in SW for reef fish larvae and all larval fishes combined. Family Richness was significantly higher in GS intrusion than in SW masses for all larval fish, but no significant differences were found for reef fish larvae only. These results are preliminary and with more sampling, we hope to demonstrate that the GS is a significant source of reef fish recruits to southern Onslow Bay.

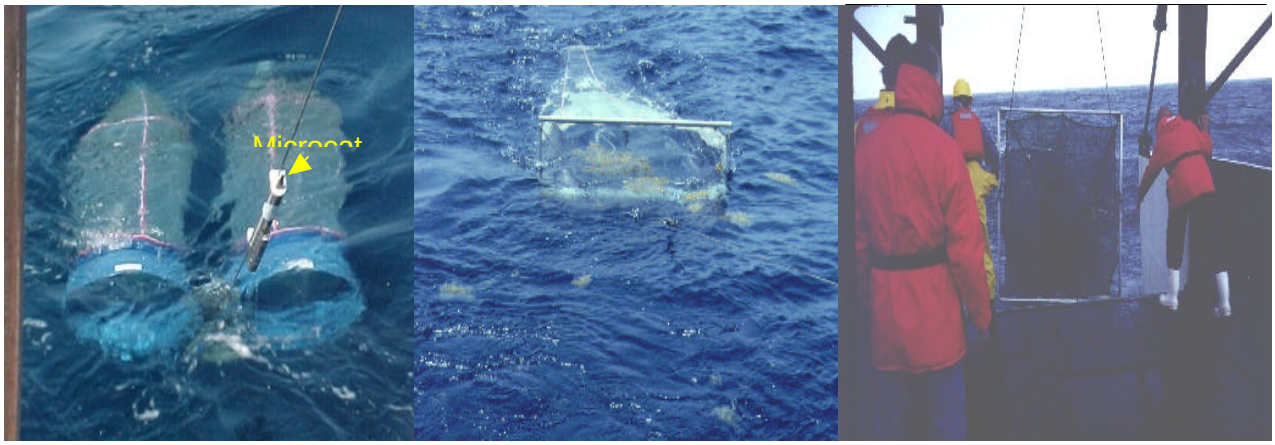


Figure 3. Gear used to sample offshore larvae included bongo (left), neuston (middle) and the Methot frame trawl (right) nets.