

2 August 2002

#### CRUISE RESULTS

Fisheries Research Vessel Albatross IV

Cruise No. AL 02-07

Part 1.

Bongo-Video Plankton Recorder Comparison Survey

Part 2.

Joint NOAA/Living Marine Resources Cooperative Service center Cruise

#### CRUISE PERIOD AND AREA

The cruise period was from 11 to 21 June 2002. In Part 1 of this cruise, from 11 to 15 June, the research vessel Albatross IV sampled plankton along transects in the Great South Channel, the mouth of the Hudson River to the Hudson Canyon, and the mouth of the Chesapeake Bay areas using 3 Video Plankton Recorder (VPR) systems provided and operated by Drs. Scott Gallager and Cabell Davis from the Woods Hole Oceanographic Institute (WHOI) and 61 cm diameter bongo nets. In addition to sampling these 3 areas, an along-shelf sampling run was made from the New York Bight to the mouth of the Chesapeake Bay, using the larger of the 2 towed-body VPR's. In Part 2 of the cruise, from 15 to 21 June, the Albatross IV sampled the southern mid-Atlantic Bight Shelf between Oregon Inlet, North Carolina and Chesapeake Bay, Virginia, and the Coastal mid-Atlantic Bight near Barnegat Inlet, New Jersey for bluefish larvae using a Tucker trawl.

#### OBJECTIVES

The primary objective of Part I of the cruise was to compare the sampling properties of a MARMAP 61-cm Bongo Sampler with those of two towed Video Plankton Recorder systems. In addition to this comparison, samples taken from one of the 61-cm bongo nets were analyzed using an on-board video imaging system for later comparison with data derived from conventional sorting of the second sample after the cruise.

The primary objective of Part II of the cruise was to document the abundance and distribution of bluefish larvae (*Pomatomus saltatrix*) in southern mid-Atlantic Bight Waters using a Tucker trawl equipped with 64 and 333 micron mesh nets. In addition to these samples, larval bluefish prey and associated hydrographic data were also collected.

## METHODS

The first part of the survey consisted of 25 stations arrayed in three transects. The first transect, across the Great South Channel, consisted of 9 stations, 6 nautical miles apart which were sampled from east to west. The second transect consisted of 6 stations from the mouth of the Hudson River to the Hudson Canyon area that were 10 miles apart. These stations were sampled from northwest to southeast. The third transect was at the mouth of the Chesapeake Bay and had 10 stations, 6 miles apart that were sampled from west to east. Placement of these transects was guided by observations of SeaWiFS images that were sent to the vessel by Jay O'Reilly from the NMFS Narragansett Laboratory. All stations were sampled by a combination of a 2-camera Video Plankton Recorder (VPR) mounted in a metal sled and a 61 cm Bongo Sampler equipped with two 333-micron nylon mesh nets which was mounted 1.5 meters above the VPR on the towing wire (Figure 4). The bongo sampler was attached to the towing wire with a dual-grip termination (Chinese finger). A digital flowmeter was suspended within the mouth of each sampler to determine the amount of water filtered by each net. This plankton sampling array was deployed over the port stern quarter of the vessel using the ship's powered boom and a Woods Hole Oceanographic Institute (WHOI)-supplied winch. A V-fin depressor was bolted to the upper part of the VPR sled and supplied the depressing force for the entire array. Other instrumentation onboard the VPR sled included a CTD unit, a fluorometer, a depth sensor, an optical back-scatter sensor and a down-welling sensor. All data from the sensors was streamed in real-time through the armored towing cable to a computer aboard the vessel. Video imagery was recorded and analyzed by image recognition software to identify some of the zooplankton.

Key parameters which were measured included water column temperature and salinity, water column chlorophyll-a fluorescence, optical back-scatter and down-welling light levels.

On each transect sampling was done by the vessel stopping to make a modified Ecosystems Monitoring double oblique tow with the bongo-VPR array to within 10 meters of the bottom at a ship speed of 1.5 knots. After each bongo-VPR tow was completed, the plankton samples were washed from the bongo nets, and the 6B3Z net sample was preserved in a 5% solution of formalin and seawater as per standard Ecosystem Monitoring protocols. The sample from the 6B3I net was run through an on-board image analysis system developed by Scott Gallagher and preserved in the same manner as the 6B3Z sample after this process was completed. After all stations at each transect had been sampled, the vessel turned around and went back along the transect in the opposite direction, towing a large VPR at speeds of 9-11 knots. The large VPR was also towed along the continental shelf between the New York Bight and Chesapeake Bay transects at the full ship speed of 11 knots. The large VPR was deployed and towed from the stern starboard quarter of the vessel using the same ship's powered boom used for deploying the

bongo-VPR array, but with a different WHOI winch (Figure 5). The large VPR was 'flown' through the water column, using a tow profile that undulated the towed body from within 2 meters of the surface down to within 10 meters of the bottom. It was equipped with 1 high resolution video camera, a CTD, a fluorometer, an optical back-scatter sensor, an altimeter, and a down-welling light sensor. Data from the sensors was streamed in real time to an onboard computer via a faired optical towing cable. Video imagery was recorded and image recognition software performed identifications of some of the zooplankton that were captured on film.

Continuous monitoring of the seawater temperature, salinity, and chlorophyll-a level, at a depth of 2 meters was done along all of the cruise track by means of a thermosalinograph, and a flow-through fluorometer.

The thermosalinograph and flow-through fluorometer were connected to the Scientific Computing System installed in the laboratory area of the vessel by Atlantic Marine Center personnel. This system recorded output from the thermosalinograph, and the fluorometer every ten seconds, and gave the data records a time-date stamp from the Global Positioning System (GPS) unit.

Calibration of the thermosalinograph and fluorometer from the surface flow-through system was undertaken on both the 6-12 and 12-6 watches using a modification of the protocol outlined in the Ecosystem Monitoring Program Operations Manual. In this modification, each chlorophyll sample was read repeatedly over time in an effort to determine the optimal extraction time in the dark cooler.

In Part II of the cruise, larval bluefish, their zooplankton prey and associated physical oceanographic data were collected along four transects on the Southern mid-Atlantic Bight Shelf between Oregon Inlet, North Carolina and the Chesapeake Bay, Virginia using a Tucker trawl and a CTD unit. Additional samples for comparison were collected in nearshore waters off Barnegat Inlet, New Jersey. Samples were preserved in either 5% seawater buffered formalin, or in 100% ethanol (changed after 24 hours).

This year the program for Part 2 of this cruise was organized by Dr. Eric May from the University of Maryland Eastern Shore. Most cruise participants were undergraduate (8 of 11), and 50% women. Only one of the students had been to sea prior to this experience.

## RESULTS

A summary of routine survey activities and estimated volumes of Calanus finmarchicus observed in the samples is presented in Table 1. The areal coverage achieved during Part 1 of the cruise is shown in Figure 1, while the coverage of Part 2 is depicted in Figure 2. The

Albatross IV sailed at 0600 hours EDT on Tuesday, June 11 and proceeded to Nantucket Channel where a test station was done using the bongo-VPR sampling array. After ascertaining that the sampling equipment was in good working order, the vessel proceeded on to the Great South Channel where the first transect was completed as described in the methods section. While midway along this first transect, at the 4<sup>th</sup> bongo-VPR tow, a very large concentration of *Calanus finmarchicus*, nearly 3 liters, was caught in a 20 minute haul with the bongo nets. Right whales were sighted in the vicinity as this tow was being conducted. After successfully completing this first transect early on June 12, the Albatross IV sailed to the New York Bight for a second transect from the mouth of the Hudson River out to the Hudson Canyon.

While en route to the second transect, a timed chlorophyll extraction experiment was set up. Students from University of Maryland Eastern Shore (UMES) and Elizabeth City State University (ECSU), Aja Campbell, Rashad Judson and Candice Shaifer, were trained to perform the chlorophyll extractions and read and enter the values into an Excel spreadsheet to determine the optimal extraction time (Figure 3). From this preliminary experiment it appears that samples need to be in acetone for at least 12 hours, and preferably 24 hours, which is close to the present protocol of 12 to 24 hours of extraction. More sampling is needed however to resolve inconsistencies in the optimal amount of time that appeared between some of the samples taken.

Prior to the second transect the Albatross IV rendezvoused with a small craft from the NMFS Woods Hole Lab, to receive bearings to repair the malfunctioning air-conditioning system aboard the vessel. The second transect was started early on June 13 and completed later that same day. After completing this second transect, the large VPR system was deployed for an along-shelf transect from the New York area down to Norfolk starting late in the day on June 13. The scientific staff took turns assisting the bridge in maintaining a watch for fixed gear in the water as the vessel towed the large VPR at 10 - 11 knots. No problems were encountered except for a software glitch which affected the attitude of the towed body causing it to develop a slowly increasing list while it was being towed. This was temporarily corrected by bringing the towed body to the surface and re-booting the computer controlling the undulation pattern of the unit through the water column. Undulations were stopped as the instrument neared the shallow water of the transect area at the mouth of the Chesapeake Bay to prevent collision with bottom obstructions. Upon arrival at the Chesapeake Bay transect area, the large VPR was towed from the mouth of the Chesapeake Bay for a distance of 60 nautical miles, out to the shelf break and then retrieved. The Albatross IV then steamed back along the transect, completing ten bongo-VPR tows 6 miles apart as it returned to the mouth of the Chesapeake Bay.

The vessel docked at the Atlantic Marine Center facility on Saturday, June 15 at 0800 EDT, where personnel from the first part of the cruise disembarked and personnel from the second part boarded.

The Albatross IV sailed the same day and commenced sampling for bluefish larvae using the Tucker trawl equipped with two nets and a mechanical opening and closing system. Tows were made in a double oblique manner, down to within 5 meters of the bottom or a maximum depth of 50 meters, using a 64 micron mesh net from the surface to the bottom, and a 333 micron mesh net from the bottom up to the surface. Fifty seven CTD stations were completed along four transects between Oregon Inlet and the Chesapeake Bay. Tucker trawl tows were made at stations from the Slope sea to the 15 meter isobath. Additional samples for comparison were collected in nearshore waters at seven stations off Barnegat Inlet, NJ. Samples were preserved in either 5% seawater buffered formalin, or in 100% ethanol (changed after 24 hours). A total of 66 CTD casts (Table 2) and 60 Tucker trawl samples were collected (Figure 2), meeting all of the objectives for Leg 2 of this cruise. Water samples were also collected from 2 depths (surface and bottom) at 8 inshore and offshore stations for analysis of microorganisms. The flow-through system calibration sampling and chlorophyll extraction project that was initiated on the first leg of the cruise was continued, with additional chlorophyll-a samples being collected by two of the undergraduate students. All gear, Tucker Trawl, winches and CTD operated without any problems. As usual the captain and crew of the Albatross IV worked to ensure that the cruise participants were comfortable and that the science plan was accomplished without any problems.

#### DISPOSITION OF SAMPLES AND DATA

The 6B3Z zooplankton samples and associated station and net tow data collected on Leg 1 of the cruise were delivered to the Ecosystems Monitoring Group of the NEFSC, Narragansett, RI. The 6B3I samples, and all VPR data were delivered to the Woods Hole Oceanographic Institute, in care of Drs. Scott Gallager and Cabell Davis.

The Tucker trawl samples from Leg 2 of the cruise were delivered to Morgan State University in care of Drs. Christian Reiss and Livingston Marshall for identification of all fish larvae to species. Bluefish larvae will be enumerated and measured. Larvae preserved in ethanol will be sent to the Center for Quantitative Fisheries Ecology at Old Dominion University for further examination by Dr. Christian Reiss. Microzooplankton samples collected on Leg 2 from the surface and bottom water casts will be sorted and species identified and measured to the nearest 0.01 mm under magnification. Gut contents of bluefish larvae will be determined and compared to the microzooplankton field.

#### SCIENTIFIC PERSONNEL

##### National Marine Fisheries Service, NEFSC, Narragansett, RI

Jerome Prezioso, <sup>1</sup>	Chief Scientist
Carolyn Griswold, <sup>1</sup>	Fisheries Biologist

National Marine Fisheries Service, NEFSC, Woods Hole, MA

Dr. Michael Fogarty,<sup>1</sup>            Statistician

Woods Hole Oceanographic Institution, Woods Hole, MA

Dr. Scott Gallagher,<sup>1</sup>            Oceanographer  
Dr. Cabell Davis,<sup>1</sup>                Oceanographer  
Fred Thwaite,<sup>1</sup>                    Engineer  
Nick Witzell,<sup>1</sup>                     Engineer

United States Coast Guard Academy, New London, CT

Evie Young,<sup>1</sup>                      Intern

Old Dominion University

Dr. Christian Reiss<sup>2</sup>            Chief Scientist

Morgan State University

Dr. Livingston Marshall,<sup>2</sup>    Watch Leader  
Samalla Lewis,<sup>2</sup>                 Graduate Student  
Yvonne Ezeala,<sup>2</sup>                 Undergraduate Student  
Reginald Graves,<sup>2</sup>               Graduate Student

Elizabeth City State University

Dr. Francisco SanJuan,<sup>2</sup>        Scientist  
Genee Smith,<sup>2</sup>                    Undergraduate Student  
Candice Shaifer,<sup>2</sup>               Undergraduate Student

Hampton University

Nicholas Lewis,<sup>2</sup>                Undergraduate Student

University of Maryland, Eastern Shore

Aja Campbell,<sup>2</sup>                   Undergraduate Student  
Rashad Judson,<sup>2</sup>                 Undergraduate Student

<sup>1</sup>/Personnel on Leg 1, 11 - 15 June 2002

<sup>2</sup>/Personnel on Leg 2, 15 - 21 June 2002

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Table 1. STATION OPERATION REPORT FOR CRUISE AL0207 (Part 1)

Cast	Sta	Date (GMT)	Time (GMT)	Lat (N)	Long (W)	Depth (M)	Operation (b-vpr= bongo+video plankton recorder sled)
001	001	06 11 02	1850	4120.6	6923.7	043	b-vpr
002	002	06 11 02	1947	4120.6	6915.7	097	b-vpr
003	003	06 11 02	2044	4120.6	6907.7	151	b-vpr
004	004	06 11 02	2158	4120.4	6859.6	147	b-vpr
005	005	06 11 02	2302	4120.6	6851.9	128	b-vpr
006	006	06 11 02	2354	4121.0	6843.9	097	b-vpr
007	007	06 12 02	0107	4120.9	6836.4	076	b-vpr
008	008	06 12 02	0200	4120.8	6828.2	072	b-vpr
009	009	06 12 02	0307	4120.7	6820.1	059	b-vpr
010	010	06 13 02	0600	4005.1	7317.3	038	b-vpr
011	011	06 13 02	0707	3958.0	7308.7	048	b-vpr
012	012	06 13 02	0815	3951.2	7300.3	069	b-vpr
013	013	06 13 02	0929	3943.8	7251.3	072	b-vpr
014	014	06 13 02	1040	3936.6	7242.5	070	b-vpr
015	015	06 13 02	1200	3928.5	7233.4	103	b-vpr
016	016	06 14 02	2311	3644.1	7441.5	100	b-vpr
017	017	06 14 02	2358	3645.5	7449.2	050	b-vpr

018	018	06	15	02	0057	3646.8	7456.7	032	b-vpr
019	019	06	15	02	0128	3648.6	7503.9	037	b-vpr
020	020	06	15	02	0210	3650.5	7511.1	027	b-vpr
021	021	06	15	02	0254	3652.4	7518.5	032	b-vpr
022	022	06	15	02	0341	3654.0	7525.9	031	b-vpr
023	023	06	15	02	0426	3655.7	7533.0	020	b-vpr
024	024	06	15	02	0515	3657.5	7540.4	015	b-vpr
025	025	06	15	02	0557	3659.2	7547.6	015	b-vpr

Table 2. CTD sampling stations during cruise AL0207 - Leg 2.

Sta	Date	Time	Day	Mon	Yr	Latitude	Longitude	Lat-decimal	Long-decimal	filename	Max.Depth	Ctd-depth
1	06/16/02	7:13	16	6	02	3548.13	7448.06	35.80217	-74.80	AL207001	500	400
2	06/16/02	8:42	16	6	02	3548.24	7450.33	35.804	-74.8388	AL207001	500	400
3	06/16/02	9:26	16	6	02	3548.13	7452.65	35.802	-74.8775	AL207003	91	80
4	06/16/02	9:54	16	6	02	3548.12	7455.16	35.802	-74.9193	AL207004	70	60
5	06/16/02	10:28	16	6	02	3548.19	7457.42	35.803	-74.957	AL207005	54	44
6	06/16/02	11:09	16	6	02	3548.17	7503.85	35.8028	-75.064	AL207006	37	34
7	06/16/02	12:11	16	6	02	3548.24	7509.76	35.804	-75.1626	AL207007	36.7	33
8	06/16/02	13:20	16	6	02	3548.41	7516.02	35.8028	-75.267	AL207008	31.1	25
9	06/16/02	14:33	16	6	02	3548.41	7522.28	35.8028	-75.3713	AL207009	18.3	15
10	06/16/02	15:25	16	6	02	3548.42	7527.88	35.807	-75.4646	AL202010	16	14
11	06/16/02	16:02	16	6	02	3548.62	7531.12	35.8103	-75.5186	AL202011	14	12
12	06/16/02	17:29	16	6	02	3556.47	7523.79	35.941	-75.3965	AL207012	19.9	16
13	06/16/02	20:06	16	6	02	3615.41	7545.08	36.2586	-75.7513	AL207013	14	11
14	06/16/02	21:25	16	6	02	3615.85	7539.06	36.2641	-75.651	AL207014	22	18
15	06/16/02	22:20	16	6	02	3616.13	7533.04	36.2688	-75.5506	AL207015	26	22
16	06/16/02	23:22	16	6	02	3616.54	7526.74	36.2756	-75.445	AL207016	31	26
17	06/16/02	0:35	16	6	02	3616.71	7520.54	36.2785	-75.3423	AL207017	33	28
18	06/16/02	1:18	16	6	02	3616.91	7514.48	36.2818	-75.2413	AL207018	30	25
19	06/16/02	2:11	16	6	02	3617.19	7508.55	36.2865	-75.1425	AL201019	34	29
20	06/16/02	3:26	16	6	02	3617.77	7502.17	36.286	-75.03616	AL201020	36	30
21	06/17/02	4:14	17	6	02	3617.83	7459.02	36.2971	-74.9836	AL207021	41	35
22	06/17/02	4:45	17	6	02	3617.96	7456.10	36.2993	-74.935	AL207022	40	35
23	06/17/02	5:28	17	6	02	3617.08	7452.87	36.2846	-74.8811	AL207023	65	60
24	06/17/02	5:50	17	6	02	3618.39	7449.76	36.3065	-74.8293	AL207024	87	85
25	06/17/02	6:40	17	6	02	3618.44	7446.77	36.3073	-74.7795	AL207025	218	215



Bongo-VPR sled Casts	(Leg 1)	25
Bongo Samples	(Leg 1)	50
Large VPR Tows	(Leg 1)	4
Chlorophyll Samples	(Leg 1 + 2)	8
Tucker Trawl Samples	(Leg 2)	60
Water Samples	(Leg 2)	16
CTD Casts	(Leg 2)	66

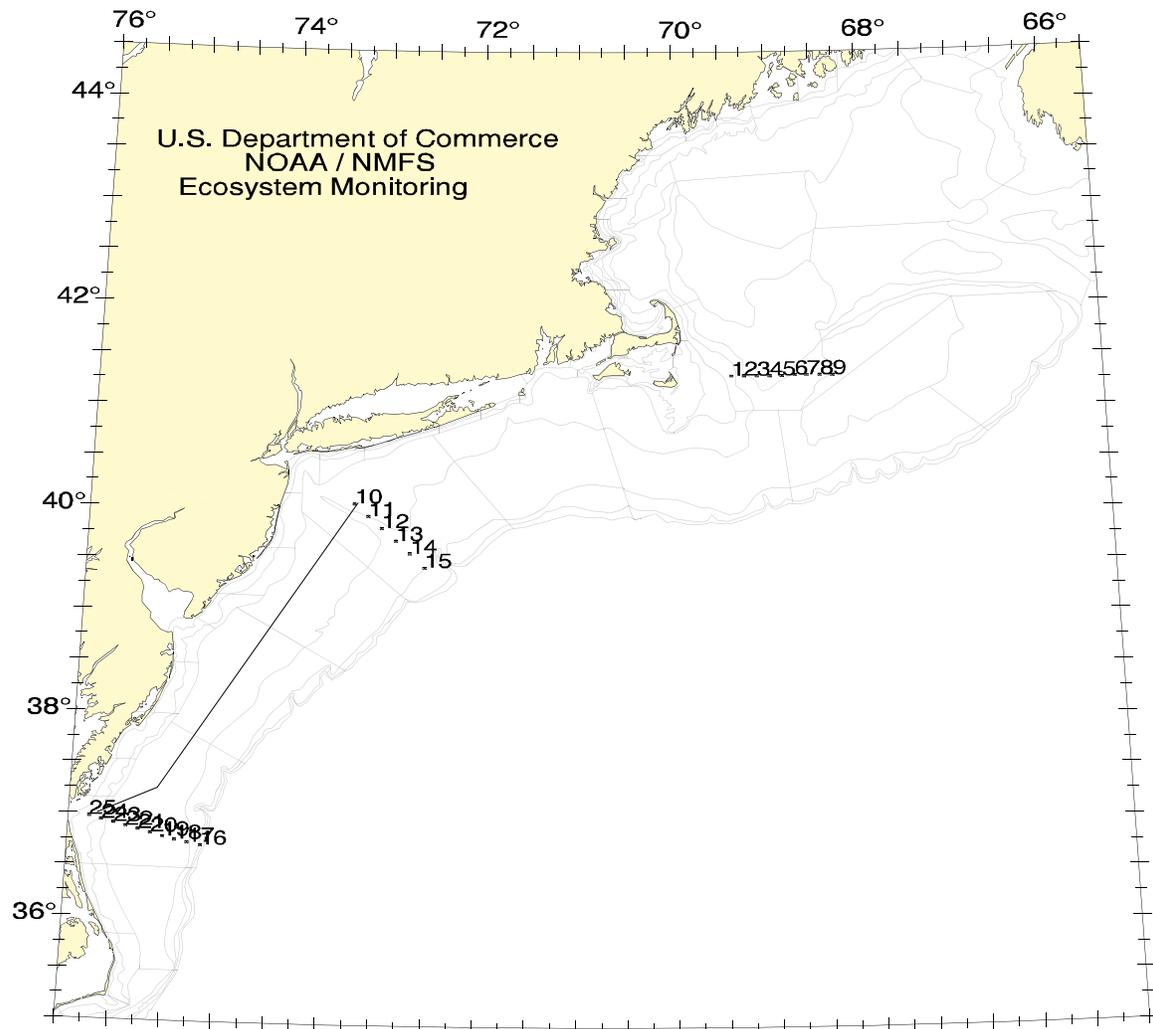


Figure 1. Station locations numbered consecutively and along-shelf transect of Large VPR for Leg I of AL0207: Bongo-VPR Comparison Cruise, 11 - 15 June 2002.

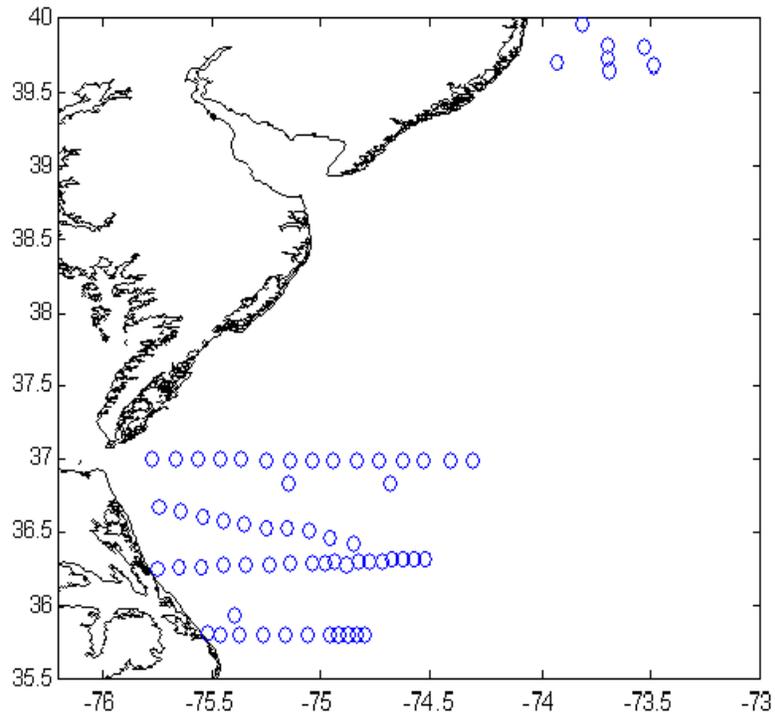


Figure 2. Station locations for Part 2 of AL0207:  
Joint NOAA/Living Marine Resources Cooperative  
Service Center Leg, 15 - 21 June 2002.



Figure 3. Excel plots of raw chlorophyll a readings (prior to subtraction of acetone blank) vs extraction time in 90% acetone.



Figure 4. Bongo and VPR Sled being deployed during AL0207 Part 1:  
Bongo-VPR Comparison Leg, 11 - 15 June 2002.



Figure 5.  
Large VPR being retrieved during AL0207 Part 1:  
Bongo-VPR Comparison Leg, 11 - 15 June 2002.

Appendix 1. Thank you letters from two students.

June 19, 2002

Dear Dr. Michael Sissenwine,

I have recently participated in a marine research cruise aboard the Albatross IV. I am very happy to inform you that the research cruise was very productive and that the Albatross and its' crew are an especially important and critical tool in the conduct of marine research. The second leg of the cruise of which I participated was conducted from June 16-June 21, 2002 and consisted of science and geology professors, graduate students, and undergraduate students from Old Dominion University, Morgan State University, and Elizabeth City State University. The purpose of the cruise was to conduct research that will provide important and useful data on the feeding ecology of bluefish. An analysis of the data collected on this cruise will provide data on bluefish that is extremely important to fisheries and in turn many of our local economies. The study consisted of approximately 4 predetermined transects along the coasts of Virginia and North Carolina. A transect along the coast of New Jersey was also added as a means of producing comparative regional studies on bluefish feeding ecology. Each of the predetermined transects consisted of stations with predetermined latitudes and longitudes, totaling approximately 65 stations. At each station the science crew worked together to collect data on water conditions that consisted of deploying a CTD (Conductivity, Temperature, and Depth) meter, as well as collecting planktonic samples using a tucker trawl. Along with providing data on bluefish that is extremely important to fisheries and local economies, the cruise provided both graduate and undergraduate students with an opportunity to learn new skills or enhance old skills in oceanographic sampling techniques.

This cruise is not only critical because it provides useful information on marine life but because it provided me with an opportunity to enhance my academic, professional, experimental, and personal skills. The cruise was lead by researchers and professors with expertise in separate areas such as environmental science, marine science, and geology. Under the direction of these experts, I learned about the practical aspects of marine biological sampling and data analysis that will help me further my academic, experimental, and professional career. The students who participated in the 2002 Albatross Bluefish Cruise were also able to enhance their personal and communication skills by interacting with various individuals aboard the Albatross. Both the boat crew and science crew provided students with important insights on science, marine life, and other aspects of life that are necessary for a successful future.

In all, this cruise plays a critical role in the education of students, the future production of highly qualified scientists, furthering our understanding of bluefish feeding ecology, and the maintenance of many of our local fisheries and economies.

Thank You For The Wonderful Opportunity,

Samala B. Lewis  
Graduate Student, Morgan State University  
June 19, 2002

Dear Dr. Michael Sissenwine:

My name is Candice Shaifer, a senior at the University of Maryland Eastern Shore (UMES) majoring in biology. Marine science was of no interest to me due to my fear of the ocean, rough waves and interactions with the aquatic organisms. Now, as the cruise is coming to an end, I can say that my time spent as volunteer scientist on the NOAA Ship Albatross IV for two weeks was very beneficial in many ways. I have overcome my fears, experienced life at sea, learned how research is conducted at sea, became knowledgeable about marine life, networked with experienced scientists and, enjoyed myself while working.

On the first leg, the Video Plankton Recorder-bongo tow, I worked with two other students from UMES, Chief Scientist Jerry Prezioso and Drs. Scott Gallagher and Cabell Davis from Woods Hole Oceanographic Institute. I enjoyed the experience I had working with the bongo tows and identifying the interesting organisms that were caught in the nets. At this time I gained more knowledge about copepods, terapods, phytoplankton, zooplankton and various species of jellyfish. Using the Video Plankton Recorder in addition to the bongos, allowed me to view the plankton on the lab computer while the VPR was in the water. This amazed me because I thought the only way to view plankton was through a microscope. The chlorophyll extraction project informed me on how to extract chlorophyll from plankton using acetone, calculate the amount of chlorophyll present in the sample and determine the optimal number of hours for maximal extraction.

On the second leg, I worked with Dr. Christian Reiss, Dr. Livingston Marshall, two graduate students, and five undergraduates on spring-spawned bluefish larvae. I gained experience casting the Conductivity Temperature Depth equipment (CTD) into the water, obtaining water samples at various depths, and interpreting the data collected by the CTD. At each station a 1m<sup>2</sup> Tucker Trawl tow was conducted using two nets. The larger net collected the bluefish larvae while the smaller net collected their food. After the collection the samples were preserved labeled bottles in either formalin or ethanol.

In conclusion, I would like you to know that the NOAA Ship Albatross IV crew and the science team from leg 1&2 were great individuals to work with. Their friendly personalities and willingness to help made the long trip out to sea a little better each day.

Sincerely,

Candice Shaifer