

*Oceanography Branch Cruise Report
Late Spring Ecosystem Monitoring
Survey - AL0605*

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DATE: 21 July 2006

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CRUISE RESULTS
NOAA Fisheries Research Vessel ALBATROSS IV
Cruise No. AL 06-05
Late Spring Ecosystem Monitoring Survey

CRUISE PERIOD AND AREA

The cruise period was 23 May to 8 June 2005. The NOAA fisheries research vessel ALBATROSS IV sampled 126 stratified random ecosystem monitoring stations located in the mid-Atlantic Bight, southern New England, Georges Bank and Gulf of Maine, plus four hydrographic (CTD only) fixed stations in the Wilkinson, Jordan and Georges basins and the Northeast Channel in the Gulf of Maine, (Figure 1) for the Late Spring Ecosystem Monitoring Survey.

OBJECTIVES

The primary objective of the cruise was to assess changing biological and physical properties which influence the sustainable productivity of the living marine resources of the mid-Atlantic Bight, southern New England, Gulf of Maine and Georges Bank portions of the northeast continental shelf ecosystem. Key parameters measured included water column temperature, salinity, and chlorophyll-*a* fluorescence, and ichthyoplankton and zooplankton composition, abundance and distribution.

Secondary objectives of this cruise involved the following sampling:

- Hydrographic CTD casts in deep basin areas and the Northeast Channel of the Gulf of Maine to provide hydrographic data detailing the incursion of Labrador Current water into the Gulf of Maine.
- Collection of zooplankton samples for the Census of Marine Zooplankton (formerly the Zooplankton Genome study),
- Sampling at the site of a proposed LNG terminal to gather baseline biological and hydrographic data,
- Collection of red tide organism samples from Georges Bank and the Gulf of Maine,
- Collection of phytoplankton samples from the ship's flow-through seawater system for nitrogen stable isotope ratio analysis,
- Collection of phytoplankton samples from the ship's flow-through seawater system for nitrogen stable isotope ratio analysis.
- Examination of plankton samples for concentrations of Calanus finmarchicus to correlate with Right whale sightings.

- Collection of plankton samples for DNA analysis within Closed Area 1 and correlation with presence of whales in that area.
- Testing of a Video Plankton Recorder (VPR) system in the Gulf of Maine.

METHODS

The survey consisted of 127 stations at which the vessel stopped to lower instruments over the side (Figure 1). One hundred twenty randomly stratified stations were planned for the cruise, with 30 in the Mid-Atlantic Bight, 30 in Southern New England, 30 on Georges Bank, and 30 in the Gulf of Maine. Five additional stations were planned at non-random fixed locations in the Gulf of Maine area to sample the Wilkinson, Georges and Jordan basins, the Northeast Channel and a proposed Liquefied Natural Gas (LNG) terminal site east of Boston Harbor. All of the non-random, fixed sites were over 200 m in depth except for the LNG site. These deep sites had a 200 m Bongo tow followed by a CTD cast to within 5 m of the bottom to document characteristics of deep basin water transported in by the Labrador Current. Two additional sites were sampled in the western Gulf of Maine to improve coverage of the area. A total of one hundred twenty seven stations were sampled on the cruise. Near-surface along-track chlorophyll-*a* fluorescence, water temperature and salinity were measured from a hull intake 2.1 m below the surface while underway with the vessel's flow-through seawater sampling system. Zooplankton genetics (zoogen) samples were collected at five randomly designated stations in each of the four regions, except for Georges Bank, where six samples were collected.

Double oblique tows using the 61-cm Bongo sampler and a Seabird CTD with a fluorometer were made at 127 stations. The tows were made to approximately 5 m above the bottom, or to a maximum depth of 200 m. All plankton tows were conducted at a ship speed of 1.5 knots. Plankton sampling gear consisted of a 61-cm diameter aluminum Bongo frame with two 335-micron nylon mesh nets. At the randomly designated zoogen stations a 20-cm diameter PVC Bongo frame fitted with paired 165-micron nylon mesh nets was put on the towing wire one half m above the Seabird CTD with a wire stop. A 45-kilogram lead ball was attached by an 80-cm length of 3/8-inch diameter chain below the aluminum Bongo frame to depress the sampler. A digital flowmeter was suspended within the mouth of each sampler to determine the amount of water filtered by each net. The flowmeters were calibrated at the beginning of the cruise by towing them over a known distance at bongo towing speeds (Table 2). No flowmeters were used in the 20-cm Bongos. Three additional 20-cm Bongo samples were taken from within Closed Area 1 for Woods Hole Oceanographic researcher Nadine Lysiak. These samples were frozen and saved for DNA sequencing ashore. This data is to be correlated with the presence/absence of Right Whales within Closed Area 1. The plankton sampling gear was deployed over the port side of the vessel by means of a power boom. Upon retrieval, the Bongo frame was placed in the checker, a wooden table used to hold the fish catch from trawl surveys. The checker allowed for easier wash down of the sampling nets, and, if the weather was bad, the Bongo frame could be carried forward so the nets could be washed down under the protection of the sheltered work area near the entrance to the wet lab. When zoogen samples were collected with the 20-cm Bongo frames, both sampling arrays could be washed down simultaneously after retrieval by placing the large frame in the checker and the small frame in the protected work area. The 61-cm Bongo plankton samples were preserved in a 5 % solution of formalin in seawater. The zooplankton genetics samples were preserved in 95 % ethanol, which was changed once 24 hours after the initial preservation. Tow depth was monitored in real time with a Seabird CTD

profiler. The Seabird CTD profiler was hardwired to the conductive towing cable, providing simultaneous depth, temperature, salinity and chlorophyll-*a* fluorescence data for each plankton tow. A CTD cast was made in Wilkinson, Jordan, and Georges basins and near the anorthern wall of the Northeast Channel.

After the cruise, stations with large amounts of Calanus finmarchicus were measured for settled volumes (Table 1.) and the data forwarded to Tim Cole, of the NEFSC Protected Species Branch, Large Whale Group.

Continuous monitoring of the seawater salinity, temperature and chlorophyll-*a* level, was done at a depth of 2.1 m along the entire cruise track by means of a thermosalinograph, and a flow-through fluorometer. The Scientific Computer System (SCS) recorded the output from both the thermosalinograph, and the fluorometer at 10 second intervals. The data records were given a time-date stamp by the GPS unit.

Samples for Seabird CTD salinity data and fluorometer chlorophyll-*a* calibration were obtained on the 12-6 watch using a 1.7 liter Niskin bottle taking a water sample from 30 or more meters depth at an isohaline portion of the water column. Water samples collected from the flow-through system on Georges Bank and the Gulf of Maine were tested for the presence of red tide organisms on the second part of the cruise. Water from the surface flow through system was filtered through a 13 micron mesh sieve. Half of the filtered material was frozen and half was incubated in filtered seawater kept at approximately 4⁰C. Calibration of the CTD salinities and chlorophyll from the surface flow-through system was undertaken on the 6-12 watch. Sample analysis for these calibrations followed the protocol outlined in the Ecosystem Monitoring Program Operations Manual.

Nitrogen isotope samples for the US EPA Atlantic Ecology Laboratory were taken at 18 sites along the cruise track. Five were from the Mid-Atlantic Bight, 4 were from Southern New England, 4 were from Georges Bank and 5 were from the Gulf of Maine. These samples were collected from the discharge water of the near-surface flow-through system. Samples of 800 to 1000 milliliters of seawater were pre-filtered through a 300 micron mesh nitex gauze to remove most zooplankton, then filtered through a Whatman glass-fiber filter (GFF) and flash frozen for analysis ashore.

Testing of a new Video Plankton Recorder (VPR) was planned for the second half of the cruise (Figure 2). Deployment location would depend upon the weather, and was scheduled to be as a transect between stations.

RESULTS

A summary of routine survey activities is presented in Table 1. Areal coverage for the cruise is shown in Figure 1. The ALBATROSS IV was scheduled to sail on Tuesday, 30 May but a routine test of the CTD cable made prior to departure showed that replacement was necessary. The CTD cable was changed and replaced with approximately 700 m of new cable the following day, and the vessel sailed at 1900 hours on Wednesday, 31 May 2006. On the way to the first station of the cruise, calibration of four flowmeters was done from the vessel while it was underway at a speed of 1.5 knots (similar to a Bongo tow). Positions of the start and end of these calibration runs were recorded, so calibrations could be worked out

from the number of revolutions recorded over a known distance. A series of runs were made as follows: 3 two-minute tows with nets on the frames, 3 five-minute tows with nets on the frames, then 3 two-minute tows without nets on the Bongo frames and 3 five-minute tows without nets on the frames. These calibration runs were finished at 0030 on June 1 and were made under calm sea conditions. Table 2 provides a summary of the calibration results from these runs. Sampling was then undertaken in the Southern New England area and the vessel proceeded south towards the Mid-Atlantic Bight offshore stations. By 3 June the ALBATROSS IV reached the southernmost station and started working its way back north sampling the inshore stations. Weather continued to be calm, allowing for excellent progress. By 5 June all sampling in the Mid-Atlantic Bight was completed and work continued on the remaining Southern New England stations. Sampling of the Southern New England stations was completed early on 7 June and the ALBATROSS IV returned to Woods Hole and docked at 0700 that same day. Personnel were exchanged and the vessel returned to sea 5 hours later at noon, heading east to commence sampling on Georges Bank. Unlike the first half of the cruise, the weather had now deteriorated, slowing progress and making work difficult. Video plankton recorder (VPR) testing was deferred until later in the cruise when conditions improved. During the marginal weather conditions, sampling was done with 61 cm Bongos for ecosystem monitoring. Three additional zoogen samples for researcher Nadine Lysiak were collected in Closed Area I using 20 cm Bongos mounted one half m above the 61 cm Bongos. Sampling on Georges Bank was completed by 11 July, after which the ALBATROSS IV began sampling the Gulf of Maine region. When conditions improved, two VPR transects were made in the western portion of the Gulf of Maine, between stations 107 and 108, and stations 121 to 122. Samples were also collected to document the presence of red tide organism *Pseudo-nitzschia spp.* on Georges Bank and the Gulf of Maine for WHOI researcher David Kulis. In addition to the 30 random stations planned for the Gulf of Maine, seven stations at non-random fixed positions were sampled. Three of these were in the Wilkinson, Jordan and Georges basins, and one was in the Northeast Channel. A fifth one was at the site of a proposed offshore Liquefied Natural Gas terminal east of Boston Harbor. Two other stations were added at the end of the cruise to improve areal coverage of the western Gulf of Maine. Sampling in the Gulf of Maine was conducted generally in a counterclockwise direction and was completed by 14 June 2006. The ALBATROSS IV returned to Woods Hole via the Cape Cod Canal and docked at the NMFS pier at 0800 on 15 June 2006 concluding the Late Spring Ecosystem Monitoring Cruise AL0605.

DISPOSITION OF SAMPLES AND DATA

All ecosystem monitoring samples and data were delivered to the Ecosystem Monitoring Group of the NEFSC, Narragansett, RI, for quality control processing and further analysis. The Census of Marine Zooplankton samples were taken from the vessel by Nancy Copley of the Woods Hole Oceanographic Institute. The CTD data were delivered to the Oceanography Branch of the NEFSC, Woods Hole, MA. Copies of the CTD logs were retained by the Ecosystems Monitoring Group in Narragansett. Researchers Nadine Lysiak and David Kulis retrieved their samples from the vessel. Calanus volume information was forwarded to Tim Cole after the cruise report was completed.

SCIENTIFIC PERSONNEL

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Table 1. STATION OPERATION REPORT FOR CRUISE AL0605

CAST	STA.	Date(GMT)			TIME(GMT)		LAT	LONG	DEPTH	OPERATION
		mm	dd	yy	hr	min				
1	1	6	1	2006	5	42	4121.2	7125.2	32	W
2	1	6	1	2006	5	50	4121.3	7125.4	32	B, N1
3	2	6	1	2006	8	27	4056.7	7109.1	51	B
4	3	6	1	2006	9	58	4044	7116.4	57	B
5	4	6	1	2006	11	20	4036.3	7130.1	66	B
6	5	6	1	2006	15	55	4011.2	7225.7	66	W
7	5	6	1	2006	16	8	4011.3	7225.8	66	B, CO/432cc
8	6	6	1	2006	17	4	4004	7226.4	62	B, CO/289cc
9	7	6	1	2006	18	3	3959.4	7219.1	76	B, CO/308cc
10	8	6	1	2006	19	39	3951.7	7202.3	97	B, CO/401cc
11	9	6	1	2006	20	29	3949.2	7156.5	140	B, CO/531cc
12	10	6	2	2006	3	6	3924.1	7319.9	52	B
13	11	6	2	2006	6	25	3859.2	7249.7	142	W
14	11	6	2	2006	6	33	3859.2	7249.8	135	B,N2
15	12	6	2	2006	7	14	3856.6	7254.4	109	B
16	13	6	2	2006	9	36	3853.3	7323.7	59	B, CO/413cc
17	14	6	2	2006	10	51	3901	7334.3	51	B,Z1, CO/215cc
18	15	6	2	2006	11	29	3856.6	7336	47	B, CO/271cc
19	16	6	2	2006	12	56	3846.7	7346.4	46	B
20	17	6	2	2006	14	7	3839.2	7355.8	48	B
21	18	6	2	2006	16	32	3824.6	7334.4	350	W
22	18	6	2	2006	16	40	3824.5	7334.7	350	B
23	19	6	2	2006	20	9	3811.1	7411.9	55	B,N3, CO/289cc
24	20	6	2	2006	23	8	3744	7423.5	66	B,Z2, CO/314cc
25	21	6	3	2006	3	23	3704.2	7442	89	B,N4

Table 1. (continued) STATION OPERATION REPORT FOR CRUISE AL0605

CAST	STA.	Date(GMT)			TIME(GMT)		LAT LONG		DEPTH m	OPERATION
		mm	dd	yy	hr	min				
26	22	6	3	2006	7	31	3624.3	7452.6	46	W
27	22	6	3	2006	7	41	3624.3	7452.6	46	B
28	23	6	3	2006	11	15	3549.9	7458.9	51	B,Z3
29	24	6	3	2006	14	54	3519.4	7526.2	16	B
30	25	6	3	2006	18	4	3553.1	7520.9	22	W
31	25	6	3	2006	18	12	3553.3	7520.9	22	B
32	26	6	3	2006	19	7	3558.3	7515.4	31	B
33	27	6	3	2006	22	5	3630.9	7518.8	24	B
34	28	6	3	2006	23	12	3638.1	7511.4	29	B
35	29	6	4	2006	0	50	3653	7505	35	B
36	30	6	4	2006	4	4	3701.2	7546.3	14	B,N5
37	31	6	4	2006	6	0	3711.3	7527.2	25	W
38	31	6	4	2006	6	4	3711.4	7527.3	24	B, CO/302cc
39	32	6	4	2006	7	38	3725.9	7528.7	23	B
40	33	6	4	2006	10	59	3741.3	7449	44	B,Z4, CO/159cc
41	34	6	4	2006	13	29	3803.1	7431.3	44	B
42	35	6	4	2006	15	10	3817.9	7425	41	B, CO/289cc
43	36	6	4	2006	17	32	3828.2	7452.2	21	W
44	36	6	4	2006	17	39	3828.1	7452.2	21	B
45	37	6	4	2006	18	34	3833.5	7458.7	14	B,N6
46	38	6	5	2006	1	25	3929	7357.1	25	B,Z5, CO/271cc
47	39	6	5	2006	2	48	3940.8	7402.1	17	B
48	40	6	5	2006	5	40	3959	7335	31	W
49	40	6	5	2006	5	44	3958.6	7335	31	B, CO/277cc
50	41	6	5	2006	7	25	4013.7	7338.9	31	B,N7

Table 1. (continued) STATION OPERATION REPORT FOR CRUISE AL0605

CAST	STA.	Date(GMT)			TIME(GMT)		LAT LONG		DEPTH	OPERATION
		mm	dd	yy	hr	min				
										B=BongoW=waterZ=zoogenRT=red
tide										N=nitrogen NL=Nadine Lysiak sample CO=Calanus observed/vol V=CTD only
51	42	6	5	2006	9	45	4028.3	7314.6	28	B
52	43	6	5	2006	13	34	4048.1	7231.4	18	B
53	44	6	5	2006	14	56	4039.1	7221.4	42	B,Z6
54	45	6	5	2006	16	1	4029.3	7220.4	51	W
55	45	6	5	2006	16	11	4029.3	7220.4	51	B
56	46	6	5	2006	17	17	4035.7	7211.2	50	B
57	47	6	5	2006	23	2	4016.5	7059.7	111	B,Z7,N8,CO/283cc
58	48	6	6	2006	1	12	4038.5	7047.5	65	B,Z8
59	49	6	6	2006	2	1	4043.3	7043.1	61	B
60	50	6	6	2006	3	37	4039.1	7023.3	55	B
61	51	6	6	2006	5	39	4021	7023.1	86	W
62	51	6	6	2006	5	44	4021	7023	86	B
63	52	6	6	2006	7	57	3958.9	7024.4	317	B
64	52	6	6	2006	8	32	3957.8	7024.6	346	V
65	53	6	6	2006	11	50	4006	6947.4	106	B,Z9
66	54	6	6	2006	13	31	4020.5	6945	74	B,Z10
67	55	6	6	2006	16	34	4023.6	6907.2	83	W
68	55	6	6	2006	16	44	4023.5	6907.5	83	B
69	56	6	6	2006	20	1	4052.9	6929.1	39	B
70	57	6	6	2006	20	39	4052.9	6929.1	39	B
71	58	6	6	2006	23	54	4053.4	7001	22	B
72	59	6	7	2006	2	26	4058.9	7034.7	46	B
73	60	6	7	2006	4	19	4110.5	7021.1	28	B
74	61	6	8	2006	4	24	4138	6929	99	B
75	61	6	8	2006	4	46	4137.5	6927.9	96	W
76	62	6	8	2006	6	36	4128.9	6907.4	150	B,NL1, CO/184cc, RT1

Table 1. (continued) STATION OPERATION REPORT FOR CRUISE AL0605

tide	CAST	STA.	Date(GMT)			TIME(GMT)		LAT LONG		DEPTH	OPERATION
			mm	dd	yy	hr	min			m	
	77	63	6	8	2006	10	22	4106.6	6836.3	59	B, NL2
	78	64	6	8	2006	11	37	4059.4	6835.2	52	B, NL3
	79	65	6	8	2006	13	22	4101.3	6815.6	51	B, Z11
	80	66	6	8	2006	14	40	4110.8	6807.1	42	B
	81	66	6	8	2006	14	56	4110.5	6807.2	38	W
	82	67	6	8	2006	16	6	4101.3	6804.9	46	B
	83	68	6	8	2006	17	26	4051.6	6803.2	62	B
	84	69	6	8	2006	18	14	4050.9	6810.2	58	B
	85	70	6	8	2006	18	41	4049.1	6812.3	52	B
	86	71	6	8	2006	19	6	4046.9	6812.9	55	B
	87	72	6	8	2006	20	26	4046.3	6759	71	B
	88	73	6	8	2006	21	35	4039	6803	86	B, Z12, CO/500cc, RT1
	89	74	6	9	2006	0	43	4014.2	6822.7	166	B
	90	75	6	9	2006	6	45	4034.1	6707.7	184	B
	91	76	6	9	2006	8	27	4045.8	6716.6	95	B, CO/685cc
	92	76	6	9	2006	8	49	4046.4	6716.2	95	W
	93	77	6	9	2006	11	49	4119.1	6721.1	48	B, N9, RT2
	94	78	6	9	2006	14	37	4116	6643.1	77	B, Z13
	95	79	6	9	2006	16	23	4113.6	6619.2	108	B
	96	80	6	9	2006	17	43	4118.1	6630.8	92	B
	97	81	6	9	2006	18	41	4123.3	6634.7	85	B, Z14, RT3
	98	82	6	9	2006	21	19	4141.1	6646	66	B
	99	83	6	9	2006	22	57	4134	6631.3	84	B, Z15, RT4
	100	84	6	10	2006	0	15	4136.8	6617.3	86	B, RT5
	101	85	6	10	2006	2	17	4156	6608.8	92	B, N10, RT6

Table 1. (continued) STATION OPERATION REPORT FOR CRUISE AL0605

CAST	STA.	Date(GMT)			TIME(GMT)		LAT LONG		DEPTH m	OPERATION
		mm	dd	yy	hr	min				
102	86	6	10	2006	4	4	4158.4	6545.1	243	B, RT7
103	86	6	10	2006	4	31	4157.7	6544.8	239	W
104	87	6	10	2006	6	38	4213.5	6533.1	114	B
105	88	6	10	2006	7	48	4213.3	6545.7	223	B
106	88	6	10	2006	8	13	4212.7	6545.1	227	V
107	89	6	10	2006	11	20	4236.2	6558.9	84	B
108	90	6	10	2006	13	48	4241.4	6634.5	168	B
109	91	6	10	2006	16	25	4225	6659.4	359	B
110	91	6	10	2006	16	51	4224.3	6700.1	360	V
111	92	6	10	2006	17	17	4224.2	6660	359	B,N11
112	92	6	10	2006	17	44	4223.3	6700.3	340	W
113	93	6	10	2006	20	13	4236.3	6722.7	265	B, CO/283cc
114	93	6	10	2006	20	44	4236.6	6723.8	264	V
115	94	6	10	2006	23	46	4209.6	6727	206	B, CO/196cc, RT8
116	95	6	11	2006	1	41	4159.2	6718.4	45	B
117	96	6	11	2006	3	9	4200.9	6700.6	72	B,N12
118	97	6	11	2006	4	48	4146.2	6658.1	63	B
119	97	6	11	2006	4	58	4145.9	6658	62	W
120	98	6	11	2006	7	45	4146.3	6730.2	36	B,Z16
121	99	6	11	2006	11	37	4143.9	6815.4	59	B,N13
122	100	6	11	2006	14	2	4206.5	6805.6	215	B, CO/747cc
123	100	6	11	2006	14	42	4207	6805.9	214	W
124	101	6	11	2006	16	10	4215.8	6818.6	205	B,Z17, CO/271cc
125	102	6	11	2006	17	32	4211.6	6830.4	154	B, CO/314cc
126	103	6	11	2006	18	49	4213.3	6844.7	200	B, CO/295cc, RT9
127	104	6	11	2006	21	36	4230.5	6908.3	196	B, CO/723cc
128	105	6	12	2006	0	2	4229.8	6939.4	241	B,Z18, CO/314cc
129	105	6	12	2006	0	28	4229.9	6940.1	254	W
130	106	6	12	2006	1	40	4238.2	6945.4	241	B, CO/252cc

Table 1. (continued) STATION OPERATION REPORT FOR CRUISE AL0605

CAST	STA.	Date(GMT)			TIME(GMT)		LAT LONG		DEPTH	OPERATION
		mm	dd	yy	hr	min				
131	106	6	12	2006	2	5	4238.6	6945.9	241	V
132	107	6	12	2006	4	15	4243.2	6918.6	185	B, CO/264cc
133	108	6	12	2006	10	33	4243.8	6839.9	187	B, CO/196cc
134	108	6	12	2006	11	0	4244.5	6840.8	192	W
135	109	6	12	2006	13	14	4253.8	6813.4	193	B,Z19, CO/190cc, RT10
136	110	6	12	2006	16	21	4308.7	6737.2	188	B,N14, CO/283cc
137	111	6	12	2006	18	31	4308.5	6711.7	187	B, CO/209cc, RT11
138	112	6	12	2006	22	12	4341.4	6657.3	138	B,Z20, CO/265cc, RT12
139	113	6	13	2006	1	6	4348.7	6626.5	71	B,N15
140	114	6	13	2006	4	18	4424.1	6618.5	112	B, RT13
141	114	6	13	2006	4	34	4423.9	6619	116	W
142	115	6	13	2006	8	50	4359	6712.8	161	B, CO/333cc, RT14
143	116	6	13	2006	13	4	4324.5	6742	245	B,N16, CO/209cc, RT15
144	116	6	13	2006	13	38	4324.5	6743	251	V
145	117	6	13	2006	15	36	4338.4	6800.7	198	B
146	117	6	13	2006	16	1	4338.4	6801.8	199	W
147	118	6	13	2006	17	10	4333.7	6814.1	181	B,Z21, CO/221cc, RT16
148	119	6	13	2006	20	5	4358.9	6833.2	85	B
149	120	6	13	2006	22	35	4350.9	6906.2	55	B
150	121	6	14	2006	2	3	4328.5	6947.4	132	B,N17, CO/184cc
151	122	6	14	2006	9	56	4251.1	6960	195	B, CO/190cc
152	122	6	14	2006	10	20	4251.6	7000.5	186	W
153	123	6	14	2006	13	30	4242.2	7039.7	26	B
154	124	6	14	2006	15	35	4226.2	7030.4	55	B,N18
155	125	6	14	2006	16	11	4224.8	7034.4	88	B
156	126	6	14	2006	19	20	4214.9	6958.4	102	B
157	127	6	14	2006	21	28	4219.8	6935.4	242	W
158	127	6	14	2006	21	53	4219.4	6935.4	242	B, CO/277cc

B=Bongo W=water Z=zoogen RT=red tide
 N=nitrogen NL=Nadine Lysiak sample
 CO=Calanus observed/vol V=CTD only

TOTALS: Bongo Casts = 127
 Bongo 6B3Z Samples = 124
 Bongo 6B3I Samples = 125
 Water Samples = 25
 Vertical Casts = 3
 CTD Casts = 158
 Zoogen samples = 21
 Calanus observations = 53
 Nitrogen samples = 18
 Nadine Lysiak samples = 3
 Red Tide samples = 16

Table 2. Flowmeter Calibrations Carried Out on AL0605 Ecosystem Monitoring Cruise.

		Flowmeter	Start	End	Revs	Meters	M/Rev	avg M/Rev (cal factor)
		#						
w/nets	Run 1	2697	22028	22485	457	122.6	0.2683	0.2706
2 min tow		13609	26692	27140	448	122.6	0.2737	0.2770
	Run 2	2697	22485	22934	449	123.7	0.2755	
		13609	27140	27578	438	123.7	0.2824	
	Run 3	2697	22934	23406	472	126.5	0.2680	
		13609	27578	28038	460	126.5	0.2750	
5 min tow	Run 1	2697	23406	24573	1167	321	0.2751	0.2739
		13609	28038	29175	1137	321	0.2823	0.2815
	Run 2	2697	24573	25744	1171	311	0.2656	
		13609	29175	30312	1137	311	0.2735	
	Run 3	2697	26073	27162	1089	306	0.2810	
		13609	30640	31700	1060	306	0.2887	
w/o nets	Run 1	2697	27162	27805	643	164.4	0.2557	0.2519
2 min tow		13609	31699	32347	648	164.4	0.2537	0.2498
	Run 2	2697	27805	28538	733	178.1	0.2430	
		13609	32347	33082	735	178.1	0.2423	
	Run 3	2697	28538	29246	708	181.9	0.2569	
		13609	33082	33800	718	181.9	0.2533	
5 min tow	Run 1	2697	29246	30967	1721	432	0.2510	0.2457
		13609	33800	35528	1728	432	0.2500	0.2441
	Run 2	2697	30967	32448	1481	374	0.2525	
		13609	35528	37026	1498	374	0.2497	
	Run 3	2697	32448	33758	1310	306	0.2336	
		13609	37026	38341	1315	306	0.2327	
w/nets	Run 1	13634	9693	10252	559	161.4	0.2887	0.2856
2 min tow		18685	89766	90311	545	161.4	0.2961	0.2935
	Run 2	13634	10252	10763	511	138.2	0.2705	
		18685	90311	90808	497	138.2	0.2781	
	Run 3	13634	10763	11250	487	144.9	0.2975	
		18685	90808	91281	473	144.9	0.3063	
5 min tow	Run 1	13634	11250	12470	1220	336	0.2754	0.2726
		18685	91281	92477	1196	336	0.2809	0.2791
	Run 2	13634	12470	13648	1178	326	0.2767	
		18685	92477	93629	1152	326	0.2830	
	Run 3	13634	13648	14931	1283	341	0.2658	
		18685	93629	94877	1248	341	0.2732	
w/o nets	Run 1	13634	4285	4810	525	140.3	0.2672	0.2581
2 min tow		18685	84348	84876	528	140.3	0.2657	0.2568
	Run 2	13634	4810	5356	546	132.6	0.2429	
		18685	84876	85424	548	132.6	0.2420	
	Run 3	13634	5356	5887	531	140.3	0.2642	
		18685	85424	85958	534	140.3	0.2627	
5 min tow	Run 1	13634	5887	7029	1142	297	0.2601	0.2574
		18685	85958	87110	1152	297	0.2578	0.2562
	Run 2	13634	7029	8129	1100	286	0.2600	

	18685	87110	88216	1106	286	0.2586
Run 3	13634	8129	9323	1194	301	0.2521
	18685	88216	89409	1193	301	0.2523

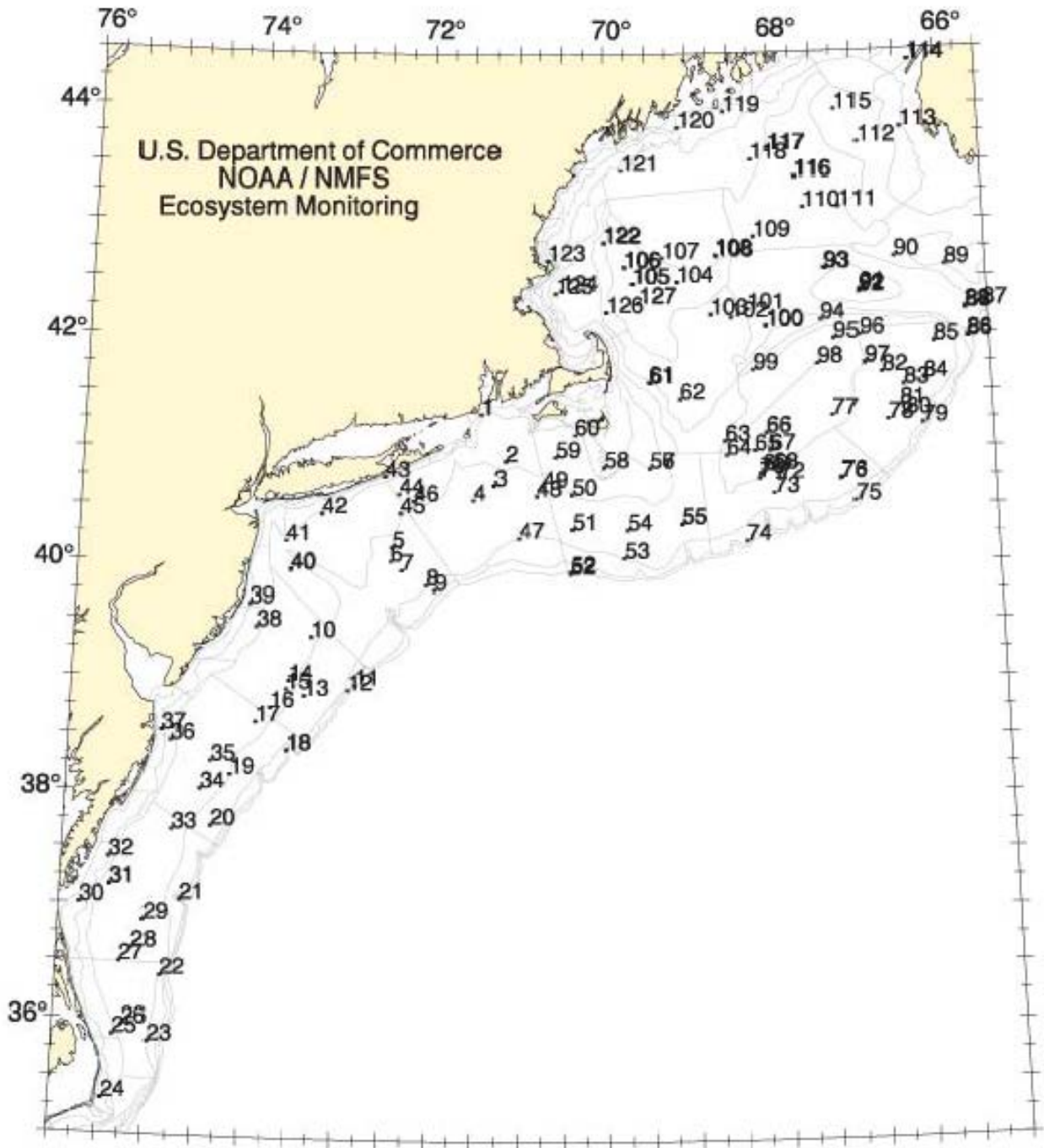


Figure 1. Station locations numbered consecutively for Late Spring Ecosystem Monitoring Cruise AL0605, 31 May - 15 June 2006.



Figure 2. Video Plankton Recorder used aboard AL0605 Ecosystem Monitoring

Cruise.