

Atlantic Coast Environmental Indicators Consortium

ACE-INC 0302 Cruise Report 21-24 July 2003

This report provides a summary of the research activities completed on the R/V Aquarius. Additional sampling was conducted from the 25' Parker and is briefly noted.

Research Vessel
R/V Aquarius

Area of Operations
21-22 July Patuxent River
23-24 July Choptank River

Scientific Crew
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D. Kimmel, M. Mallonee, and A. Spear

Guests
Scott McLean (Satlantic Incorporated representative)

Goals and Objectives:

The ACE INC program goal is to develop integrative indicators of trophic structure and function that reflect changes in nutrient loading resulting from a changing landscape. Biota are proposed to be integrators of changing conditions in the Bay. Physical variability, both temporal and spatial, especially dissolved oxygen, is proposed to modulate trophic responses to nutrient over-enrichment. Phytoplankton, zooplankton, and fish responses are being analyzed to develop integrated indicators of Bay 'health.' We proposed that the structure of biotic communities will differ in the Patuxent and Choptank Rivers as a response to their differing trophic status. The Patuxent is 'recovering' from nutrient over-enrichment while the Choptank continues to receive high nutrient loading from agricultural inputs.

Cruise Activities:

RV Aquarius

The Patuxent and Choptank Rivers were sampled at five fixed stations on each river (**Figure 1**). Each river was sampled over a two-day period. **Table 1** is a log of the activities conducted at each station. Once on station, a CTD cast was made prior to any other activities. TAPS (acoustic profiler) was configured to the CTD array and collected zooplankton size and abundance data on each cast.

Pump and grab samples were obtained for chlorophyll, seston, particulate absorption, dissolved inorganic nutrients, total CO₂, HPLC pigments (size fractionated) and particle size analysis (fixed samples). Primary production was measured using ¹⁴C methodology. In-water bio-optical profiles were obtained using both Satlantic MicroPro (vertical) and Hyper-TSRB (surface) instruments.

Zooplankton was collected in bottom and surface pump samples, vertical lifts of a 0.5 diameter 64µm mesh plankton net, and acoustical sampling by TAPS. The plankton net was lowered to the bottom and lifted to the surface.

A 1m² Tucker trawl tow with 280-µm mesh was used to sample ichthyoplankton. Each tow provided a 2-min bottom and 2-min top sample that together sampled the entire water column. Ctenophores (*Mnemiopsis leidy*) were very abundant on both rivers, perhaps more abundant on the Choptank. No sea nettles (*Chrysaora quinquecirrha*) were collected by the Tucker trawls. Ichthyoplankton numbers appeared low based on simple sample observation. Bay anchovy post-larvae were collected in low numbers.

One 10-min mid-water trawl (MWT) tow was conducted at each station to collect juvenile and adult fish. At the three lower Patuxent River stations, the MWT tows were made in slightly shallower water outside the main channel in an attempt to sample in waters that were more oxygenated below the pycnocline. The catches were processed to obtain data on species composition, sizes, and abundances. YOY alosids, white perch, striped bass and bay anchovy dominated catches in the upper river stations. Bay anchovy dominated lower river catches. Ctenophores (*Mnemiopsis*) were abundant at the three most down river stations. Demersal fish catches were very low in each river.

RV 25' Parker

In conjunction with activities on the R/V Aquarius, surveys were conducted from Horn Point Laboratory's 25' Parker. Activities included, CTD casts and ACROBAT tows. For questions related to the Parker activities, please contact Tom Wazniak (see below).

CTD Summary:

The salt front was located near Magruder's landing and the Dover Bridge on the Patuxent and Choptank Rivers, respectively. Bottom salinities were highest in the Patuxent River (**Figure 2**). Stratification was also more pronounced in the Patuxent River. Surface water temperatures were similar between rivers and ranged from 26.3 to 28.2⁰C in the Patuxent River and from 26.8-28.1⁰C in the Choptank River. On average, bottom temperatures were lower in the Patuxent River than in the Choptank (**Figure 3**). In both rivers, turbidity (as measured by light attenuation) was highest at the UR station where bottom salinities were

between 0.2 and 0.3 psu (**Figure 4**). Turbidities decreased significantly downstream of station UR. Stratification was most pronounced on the Patuxent River, where bottom dissolved oxygen levels were low compared to the Choptank (**Figure 5**). Three of five stations on the Patuxent had bottom dissolved oxygen readings below 3.0 mg/l. The Choptank River had higher readings (>4.0 mg/l) at all stations except the mid-river station (3.98 mg/l).

Weather Summary:

Measurements from CBOS Choptank River Buoy

Weather was fair for the two days on the Patuxent River. Air temperatures averaged approximately 27.0°C and winds were moderate out of the southwest (mean 7 mph). On the Choptank River the weather changed slightly as a result of a mild front that passed on the evening of 22 July. Mean daily air temperatures fell to 24.0 °C and by 24 July winds blew from a northwestern direction (mean = 4.0 mph).

Problems:

1. CTD fluorometer not working properly.

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Shoal Sampling and Activities Performed on 25' Parker

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CTD Data

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ACE 0302 Consecutive Station Log

RV Aquarius

21 -24 July 2003

STA	CTD	STA 2	LOCATION	TIME	DAY	DEPTH	LAT	LONG	CTD	TAPS	TT	MWT	ZOOPS	VL	C14	MP	TSRB	CF	MZ
1	1	PAX_UR	Magruder's Landing	820	21	5	38.6409	-76.6923	X	X	X		X	X	X	X	X	X	X
2	2	PAX_UMR	Chalk Pt.	1008	21	4	38.5323	-76.6692	X	X	X		X	X		X	X	X	X
3	3	PAX_MR	Battle Cr.	1137	21	10	38.4280	-76.6123	X	X	X		X	X	X	X	X	X	X
4	4	PAX_LMR	St. Leonard Cr.	1305	21	9	38.3756	-76.5059	X	X	X		X	X		X	X	X	X
5	5	PAX_LR	Pax River mouth	1425	21	15	38.3078	-76.4384	X	X	X		X	X	X	X	X	X	X
6	6	PAX_UR	Magruder's Landing	759	22	6	38.6373	-76.6928	X	X		X							
7	7	PAX_UMR	Chalk Pt.	1028	22	4	38.5356	-76.6717	X	X		X							
8	8	PAX_MR	Battle Cr.	1154	22	8	38.4283	-76.6125	X	X		X							
9	9	PAX_LMR	St. Leonard Cr.	1305	22	8	38.3747	-76.5053	X	X		X							
10	10	PAX_LR	Pax River mouth	1411	22	11	38.3050	-76.4314	X	X		X							
11	11	CHOP_UR	Dover Bridge	744	23	12.5	38.7514	-75.9994	X	X	X		X	X	X	X	X	X	X
12	12	CHOP_UMR	Blinkhorn Creek	919	23	8	38.6597	-75.9564	X	X	X		X	X		X	X	X	X
13	13	CHOP_MR	Chancellor's Point	1035	23	11	38.5782	-76.0213	X	X	X		X	X	X	X	X	X	X
14	14	CHOP_LMR	Castle Haven Point	1155	23	8	38.6377	-76.1594	X	X	X		X	X		X	X	X	X
15	15	CHOP_LR	Choptank River mouth	1332	23	9	38.6471	-76.3284	X	X	X		X	X	X	X	X	X	X
16	16	CHOP_UR	Dover Bridge	739	24	6	38.7517	-75.9990	X	X		X							
17	17	CHOP_UMR	Blinkhorn Creek	849	24	6	38.6616	-75.9574	X	X		X							
18	18	CHOP_MR	Chancellor's Point	942	24	5.5	38.5841	-76.0207	X	X		X							
19	19	CHOP_LMR	Castle Haven Point	1048	24	6	38.6411	-76.1666	X	X		X							
20	20	CHOP_LR	Choptank River mouth	1143	24	10	38.6560	-76.3091	X	X		X							
Total									20	20	10	10	10	10	6	10	10	10	10

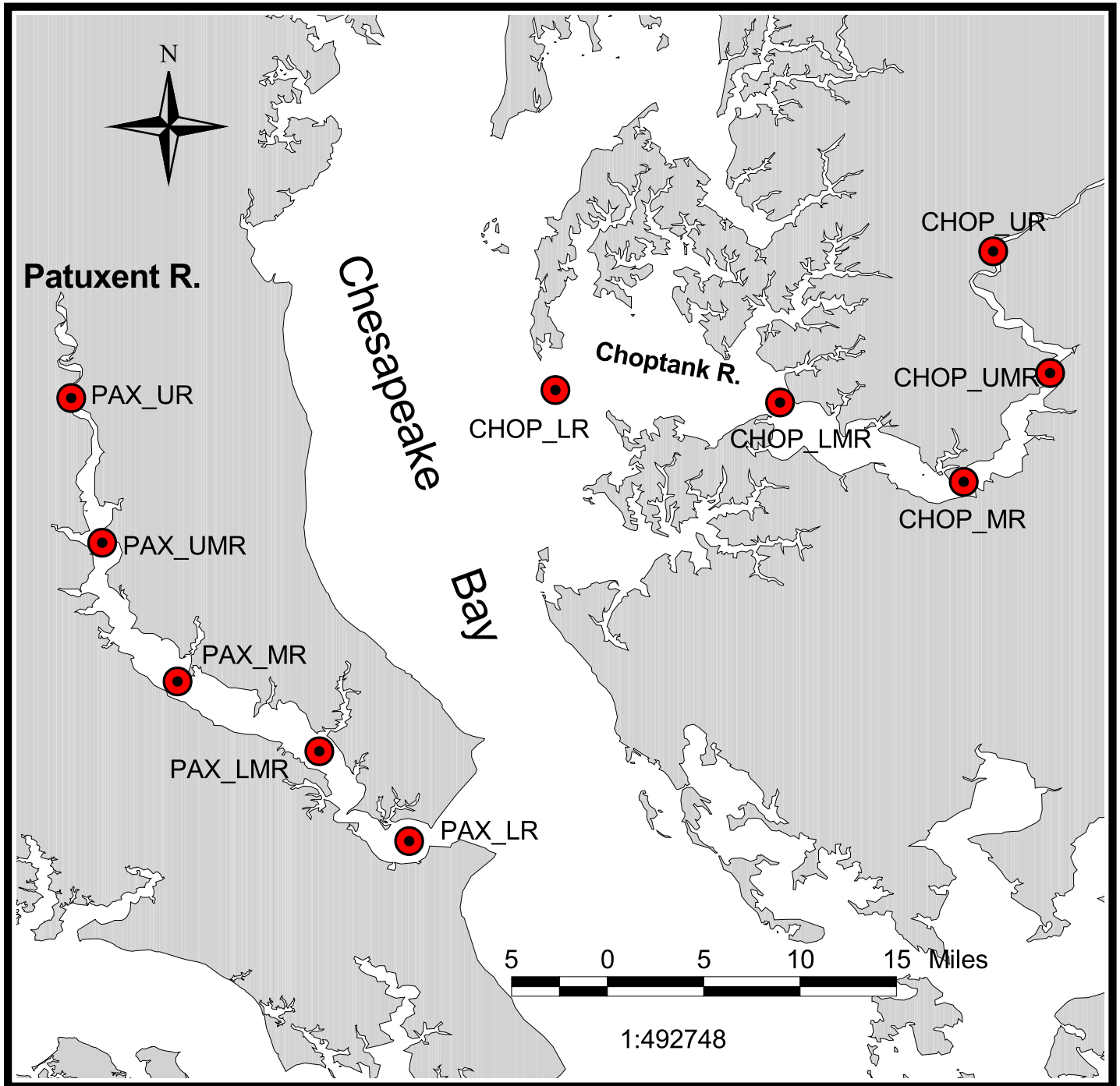
Field Codes:

STA - consecutive station number; **CTD** - CTD station number; **STA2** - secondary station identifier; **LOCATION** - geographic station location; **TIME** - arrival time; **DAY** - day of the month (July); **DEPTH** - station depth in meters; **LAT** - latitude; **LONG** - longitude.

Activity Codes:

CTD - Conductivity, Temperature and Depth datalogger; **TAPS** - Tracor Acoustic Profiler System; **TT** - tucker trawl; **MWT** - Mid-water Trawl; **ZOOPS** - Zooplankton Pump Samples; **VL** - Zooplankton Vertical Lift (35um); **C14** - Carbon uptake incubations (primary production); **MP** - MicroPro vertical profiler; **TSRB** - Towed Surface Radiometry Buoy; **CF** - Cold Filtration (Chlorophyll); **MZ** - microzooplankton (for Stoeker)

Figure 1: Study area ACE-INC cruise 0302. Choptank and Patuxent Rivers, Maryland.



Bottom Salinity ACE INC 0302

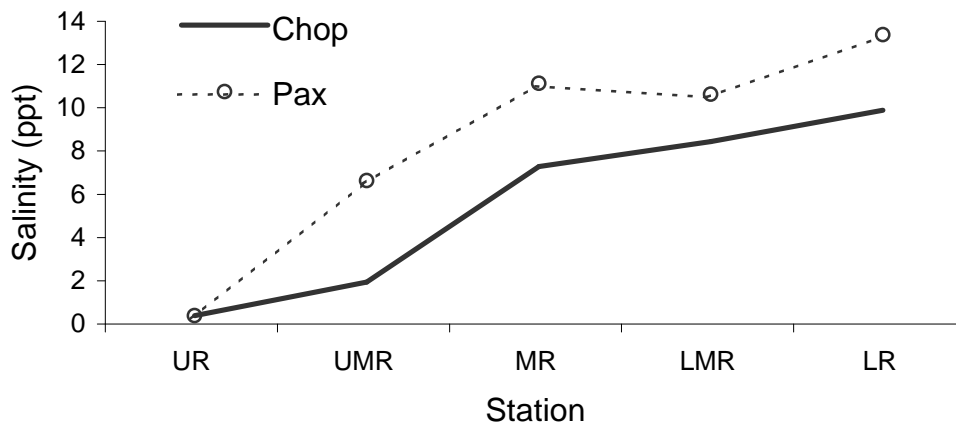


Figure 2: Mean bottom salinity (psu) over a two day period on the Patuxent (dashed line) and Choptank (solid line) River stations. Stations sampled as part of the ACE-INC 0302 cruise in July 2003.

Bottom Temperature ACE INC 0302

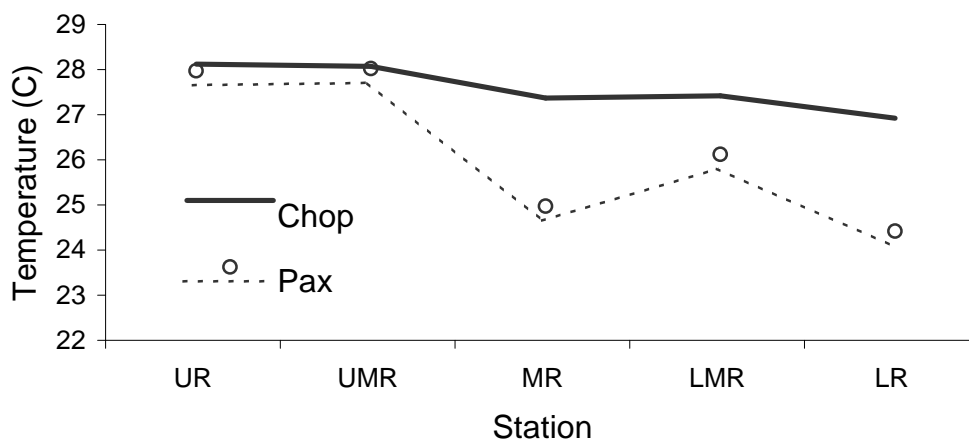


Figure 3: Mean bottom temperature (C) over a two day period on the Patuxent (dashed line) and Choptank (solid line) River stations. Stations sampled as part of the ACE-INC 0302 cruise in July 2003.

Bottom Turbidity ACE INC 0302

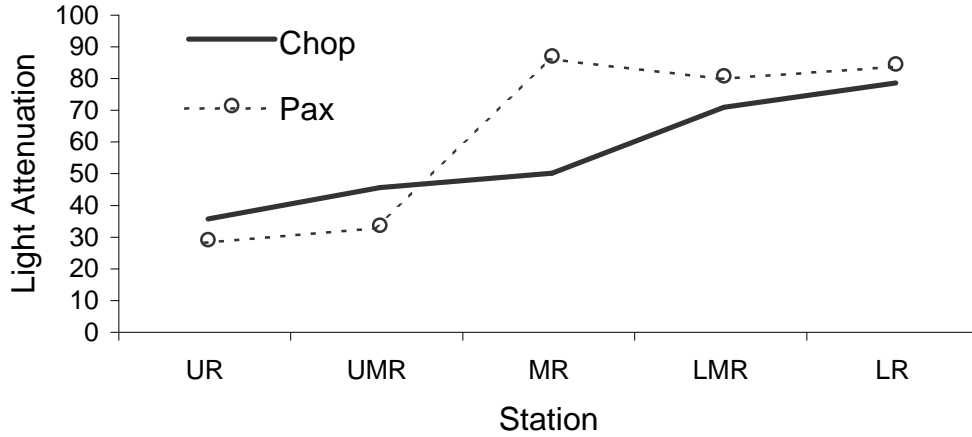


Figure 4: Mean bottom turbidity over a two day period on the Patuxent (dashed line) and Choptank (solid line) River stations. Stations sampled as part of the ACE-INC 0302 cruise in July 2003.

Bottom Dissolved Oxygen ACE INC 0302

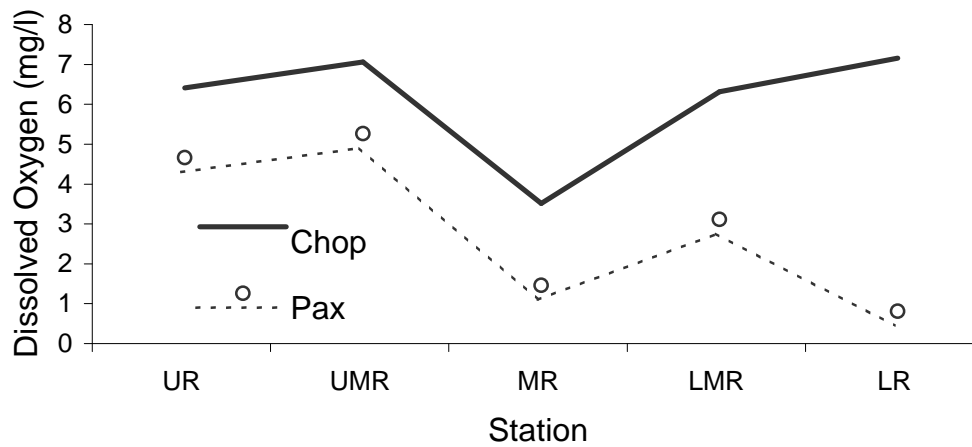


Figure 5: Mean bottom dissolved oxygen (mg/l) over a two day period on the Patuxent (dashed line) and Choptank (solid line) River stations. Stations sampled as part of the ACE-INC 0302 cruise in July 2003.