

WATER QUALITY SURVEY
OF THE
PATUXENT RIVER

1969
DATA REPORT
Number 17

Annapolis Field Office
Region III
Environmental Protection Agency

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OF THE
PATUXENT RIVER

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I INTRODUCTION

A. Purpose and Scope

During the year of 1969 the Annapolis Field Office, Region III, Environmental Protection Agency continued surveys of the estuary portion of the Patuxent River. The purpose of the surveys was to continue upgrading data from previous years and model verification.

B. General Remarks

The Patuxent estuary was sampled six times during the year. Monthly sample runs were made during the summer months of June through August.

C. Sampling Procedures

Samples for chemical analysis were obtained by dipping a plastic bucket into the river water with a minimum of agitation. The water sample was then transferred to a plastic one-quart cubitainer. Dissolved oxygen (DO) samples were obtained by siphoning from the bucket through plastic tubing extended to the bottom of a conventional 300 ml DO bottle. The bottle was overfilled twice without excessive agitation, and the DO fixed immediately. All samples were stored on ice. Analysis was started immediately on return to the Annapolis Field Office, generally within two hours of sampling.

D. Measured Parameters and Analytical Methods

1. Water temperature was determined using a mercury thermometer inserted into the sample container immediately upon collection.
2. Water temperature was read from a Beckman Salinometer.
3. Conductivity was read from a calibrated Beckman Salinometer.
4. Salinity was determined with a calibrated Beckman Salinometer.

5. Total Phosphorus

Reference: Menzel, D.W. and Corwin, N., 1965. The Measurement of Total Phosphorus in Seawater Based on the Liberation of Organically Bound Fractions by Persulfate Oxidation. *Limnology and Oceanography*, 10: 280-282.

Murphy, J. and Riley, J.P., 1962. A Modified Single Solution Method for the Determination of Phosphate in Natural Waters. *Analytica Chimica Acta*, 27: 31-36.

Total Phosphorus was determined after persulfate oxidation of the sample in an autoclave at 15 psi for 30 minutes. The resultant ortho-phosphate was then determined colorimetrically as the molybdenum-blue complex with the optical density measured at 882 m μ .

6. Inorganic Phosphorus

Reference: Murphy, J. and Riley, J.P., 1962. A Modified

Single Solution Method for the Determination of Phosphate in Natural Waters. *Analytica Chimica Acta*, 27: 31-36.

Inorganic Phosphorus was determined by automation of the above procedure using the Technicon "AutoAnalyzer." The molybdenum-blue complex formed was determined colorimetrically with the optical density measured at 885 m μ .

7. Total Kjeldahl Nitrogen

Reference: Standard Methods for the Examination of Water and Wastewater, 12 ed., 1965.

Total Kjeldahl Nitrogen includes ammonia and organic nitrogen and was determined by the standard micro-kjeldahl procedure. The sample was digested in the presence of strong acid to convert the organic nitrogen to ammonia. The ammonia was then distilled, collected in boric acid solution, nesslerized and determined colorimetrically.

8. Nitrate and Nitrite

Reference: A Practical Handbook of Seawater Analysis, J.D.H. Strickland and T.R. Parsons, Bulletin 167, Fisheries Research Board of Canada, Ottawa, Canada. 1968.

Nitrate plus nitrite nitrogen was determined by automation of the above procedure using the Technicon "Auto-Analyzer." This procedure utilizes cadmium reduction of nitrate to nitrite and subsequent diazotization with sulfanilamide

and N-(1-naphthyl)-ethylenediamine dihydrochloride with the optical density measured at 540 m μ . The results were reported as nitrogen.

9. Ammonia

Reference: Southeast Water Laboratory, FWQA, Methodology for the colorimetric determination of ammonia by the phenol-hypochlorite reaction.

FWPCA Methods for Chemical Analysis of Water and Wastes, November 1969.

Ammonia nitrogen was determined by automation of the phenol-hypochlorite procedure as described in the Southeast Water Laboratory Methodology and later adopted as the official FWPCA procedure. The intensity of the indophenol blue color, formed by the reaction of ammonia with alkaline phenol-hypochlorite, was increased using sodium nitroprusside as an intensifying agent. The optical density was measured at 630 m μ and calculated as NH₃-N.

10. Chlorophyll a

Reference: A Practical Handbook of Seawater Analysis, J.D.H. Strickland and T.R. Parsons, Bulletin 167, Fisheries Research Board of Canada, Ottawa, Canada. 1968.

Chlorophyll a was determined by extraction of millipore filtered samples in 90% acetone and read spectrophotometrically.

11. Turbidity was determined with a Hach photoelectric nephelometer, calibrated in Jackson Turbidity Units.

12. Dissolved Oxygen

Reference: Standard Methods for the Examination of Water and Wastewater, 12 ed., 1965.

Dissolved Oxygen was determined by the azide modification of the basic Winkler method with the titration done potentiometrically with a Fisher automatic "titralyzer."

II STATION LOCATIONS

<u>Station</u>	<u>Location</u>
E 1	Route 50 Bridge
E 2	Queen Anne's Bridge
E 3	Bell's Junk Yard
E 4	Trailer Court
E 5	Wayson's Corner, Route 4 Bridge
E 5A	Western Branch
E 6	Mouth of Western Branch
E 6A	Middle of Jug Bay
E 7	Mouth of Lyon's Creek
E 8	Nottingham
E 9	Lower Marlboro, opposite wharf
E 10	High Power Lines
E 11	Halfway between Trueman Point and Deep Landing
E 12	500 yards east of PEPCO Canal
E 13	Chalk Point
E 14	Benedict Bridge Channel
E 15	Sheridan Point, Buoy 21

III SURVEY RESULTS
1969
PATUXENT ESTUARY
ANNAPOLIS FIELD OFFICE

Sample Number	Date Sample Taken	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Conductivity μmhos	Salinity ‰	Gage Height Feet	Total P PO ₄ mg/l	Inorganic P PO ₄ mg/l	TKN mg/l N	NO ₂ +NO ₃ mg/l NO ₃ -N	NH ₃ mg/l N	Chloro-phyll <u>a</u> μg/l	Turbidity JTU	DO mg/l
<u>Station E 1 - U.S. Route 50 Bridge</u>															
69020301	2-03	0945	4.5				4.50	2.286		1.883	1.224	1.160	2.25	17.5	10.37
060901	6-09	0945	20		1.1	3.70	3.632			2.843	1.905	1.033	6.75	72	4.15
070201	7-02	0915	22.9		0		5.206		4.735	1.744	3.496	.780	11.25		2.62
082501	8-25	1045	20			3.39	2.530			1.413	1.75	.77	6.00		5.75
102701	10-27	0925	10				4.85		>3.0		1.75	1.95	ND		7.07
121801	12-18	0910	1				3.08		2.71	.957	1.07	2.27	7.50		11.32
<u>Station E 2 - Queen Anne's Bridge</u>															
69020302	2-03	1010	5				1.429			1.463	.997	.835	1.50	29	10.51
060902	6-09	1145	21		.8		3.027			1.529	2.543	.948	4.50	25	4.50
070202	7-02	0850	23		0		3.619		3.260	.943	3.248	.360	9.75		4.22
082502	8-25	1025	19.5				2.130			1.250	1.64	.73	3.75		6.13
102702	10-27	1055	9.5				4.74		>3.0		> 1.80	1.74	ND		LA
121802	12-18	1035	1				2.70		2.28	1.10	1.04	1.45	3.75		11.58
<u>Station E 3 - Bell's Junk Yard</u>															
69020303	2-03	1040	4.5				1.771			1.790	.906	.923	5.25	36	10.27
060903	6-09	1120	20.5		0		2.368			1.674	2.270	.585	7.50	24	4.88
070203	7-02	0830	27		0		2.984		2.533	.551	2.744	.116	11.25		4.99
082503	8-25	1010	20				2.032			1.069	1.65	.64	3.00		6.09
102703	10-27	1115	9				4.31		>3.0		> 1.80	1.38	ND		7.94
121803	12-18	1050	1				2.42		2.00	1.98	.969	1.46	6.00		11.61

LA Laboratory accident
ND Not detectable

Sample Number	Date Sample Taken	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Conductivity μmhos	Salinity ‰	Gage Height Feet	Total P PO ₄ mg/l	Inorganic P PO ₄ mg/l	TKN mg/l N	NO ₂ +NO ₃ mg/l NO ₃ -N	NH ₃ mg/l N	Chlorophyll a μg/l	Turbidity JTU	DO mg/l
<u>Station E 4 - Trailer Court</u>															
69020304	2-03	1055	4.5					.892		1.265	1.302	.648	9.75	14	8.85
060904	6-09	1110	21			0		2.638		1.773	2.230	.693	9.75	27	4.42
070204	7-02	0600	27			0		1.725	1.299	1.273	2.212	.252	7.50		3.87
082504	8-25	1000	20.5					1.395		1.456	1.22	.39	3.75		5.50
102704	10-27	1135	11					2.82	2.12		1.75	.63	ND		8.41
121804	12-18	1110	1					2.09	1.64	1.91	1.01	1.17	3.75		11.32
<u>Station E 5 - Route 4 Bridge, Wayson's Corner</u>															
69020305	2-03	1140	5					1.543		1.222	1.052	1.025	3.00	25	9.61
060905	6-09	1045	21.5			0		1.751		1.291	1.954	.660	5.25	21	3.97
070205	7-02	0730	26	14		0		1.196	.866	.858	2.720	.230	5.25		3.20
082505	8-25	0945	21					1.514		1.238	1.26	.40	8.25		5.21
102705	10-27	1015	9.5					3.73	2.73		1.66	.87	3.75		7.94
121805	12-18	1015	1					1.92	1.26	1.66	1.18	1.96	3.75		11.03
<u>Station E 5A - Western Branch</u>															
69020306	2-03	1255	2.4	33				.290		1.049	.548	.145	2.25	12	10.61
060906	6-09	1105	22			0		.844		.756	1.006	.423	6.00	19	3.61
070206	7-02	0745	22	13		0		.693	.188	1.170	2.212	.030	10.50		6.33
082506	8-25	1000	21					.581		.400	.20	.13	3.75		4.48
102706	10-27	1035	9.5					.858	.400		.49	.17	ND		8.70
121806	12-18	1035	1.5					1.53	1.11	1.17	.932	.873	3.00		11.24
<u>Station E 6 - Mouth of Western Branch</u>															
69020307	2-03	1245	2.5	27				.994		1.049	.937	.733	4.50	15	9.74
060907	6-09	1110	22.5			.6		.688		LA	.727	.343	14.25	17.5	3.38
070207	7-02	0750	28	18		0		.488	.125	.790	.006	.010	16.50		6.60
082507	8-25	1005	22					1.006		.806	.87	.35	8.25		4.45
102707	10-27	1045	10					2.20	1.33		1.34	.42	.75		7.11
121807	12-18	1040	1					1.49	.915	2.11	.885	.820	6.75		11.20
<u>Station E 6A - Middle of Jug Bay</u>															
69020308	2-03	1235	2.4	25				.887		.926	.898	.833	2.25	14.5	9.34
060908	6-09	1121	24			.7		.548		.802	.371	.190	44.25	27.5	5.34
070208	7-02	0805	28	20		0		.431	.095	.886	ND	.005	41.25		6.79
082508	8-25	1020	23.5					.795		.781	.46	.23	6.75		3.93
102708	10-27	1058	11					1.03	.408		.85	.28	24.25		10.09
121808	12-18	1050	1					1.03	.625	1.03	.871	.559	5.25		11.55

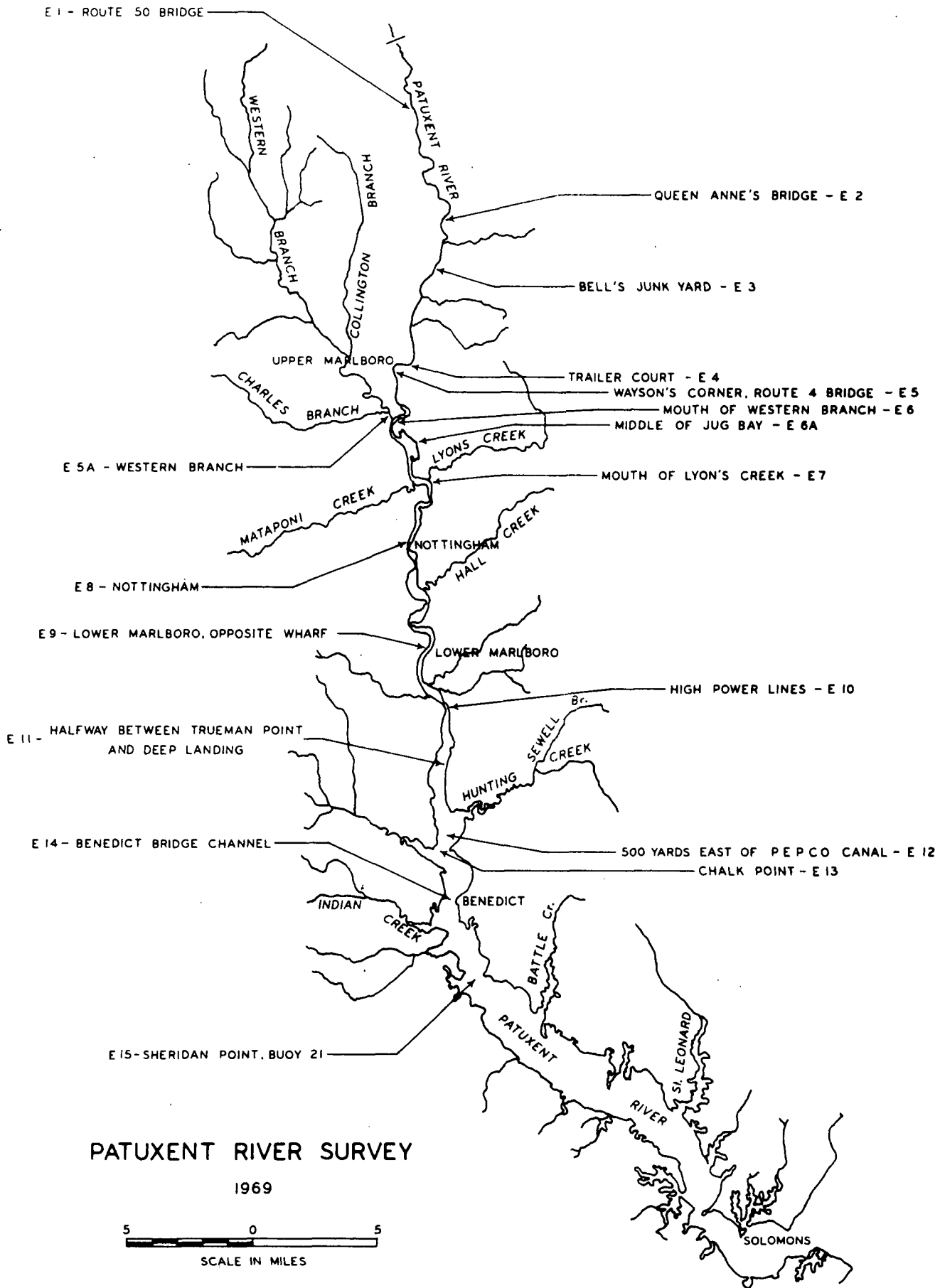
LA Laboratory accident
ND Not detectable

Sample Number	Date Sample Taken	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Conductivity µmhos	Salinity ‰	Gage Height Feet	Total P PO ₄ mg/l	Inorganic P PO ₄ mg/l	TKN mg/l N	NO ₂ +NO ₃ mg/l NO ₃ -N	NH ₃ mg/l N	Chlorophyll a µg/l	Turbidity JTU	DO mg/l
<u>Station E 7 - Mouth of Lyon's Creek</u>															
69020309	2-03	1215	2.3	18				.920		1.068	.888	.663	6.75	23	9.66
060909	6-09	1128	24			1.5		.918		.640	.340	.310	54.00	34	5.86
070209	7-02	0810	28	20		0		.426	.072	.830	ND	.008	51.75		6.34
082509	8-25	1035	23.5					.586		.756	.35	.21	8.25		3.96
102709	10-27	1105	11					.775	.152		.39	.29	22.50		11.13
121809	12-18	1100	1.5					1.07	.660	.797	.864	.476	16.50		10.98
<u>Station E 8 - Nottingham</u>															
69020310	2-03	1140	2	12				.815		.864	.781	.545	6.75	35	10.36
060910	6-09	1145	24			13.9		.398		.849	.163	.218	41.25	18	6.64
070210	7-02	0830	28	18		2.5		.438	.116	.608	ND	.026	61.50		5.66
082510	8-25	1050	25					.624		.800	.36	.23	15.75		4.63
102710	10-27	1120	12					.539	.145		.12	.08	9.00		9.65
121810	12-18	1115	1.5					1.28	.625	.946	.802	.476	30.00		10.89
<u>Station E 9 - Lower Marlboro, opposite wharf</u>															
69020311	2-03	1125	2	14	.6			.405		.883	.698	.495	5.25	25	10.25
060911	6-09	1205	24.5					.292		.750	.055	.173	33.00	16.5	6.21
070211	7-02	0850	28	18		4.9		.447	.115	.699	ND	ND	52.50		6.23
082511	8-25	1115	27					.612		.925	.40	.18	20.25		5.19
102711	10-27	1140	13					.309	.120		.03	.05	9.00		8.59
121811	12-18	1135	2					.459	.261	.601	.751	.489	15.00		10.61
<u>Station E 10 - High Power Lines</u>															
69020312	2-03	1115	2.2	14	2.9			1.0	.226	.654	.581	.533	3.75	17	10.09
060912	6-09	1220	25					8.6	.282	.558	.016	.158	29.25	12	6.76
070212	7-02	0915	28	22				6.7	.370	.727	ND	ND	133.50		7.37
082512	8-25	1135	27.5						.560	1.200	.33	.21	13.50		5.47
102712	10-27	1300	13.5						.251		.03	.06	.75		8.46
121812	12-18	1155	2						.377	.68	.724	.474	LA		10.85
<u>Station E 11 - Halfway between Trueman Point and Deep Landing</u>															
69020313	2-03	1110	2.6	19	4.1			2.0	.211	.512	.511	.443	ND	12.5	10.00
060913	6-09	1230	25.5					9.8	.248	.413	ND	.053	27.75	12	6.76
070213	7-02	0925	29	30				8.8	.371	.574	ND	ND	47.75		6.89
082513	8-25	1145	28						.304	.650	.21	.26	15.00		6.14
102713	10-27	1210	14						.279	.078	.04	.04	3.75		8.57
121813	12-18	1210	2						.277	.150	LA	.452	11.25		10.93

LA Laboratory accident
ND Not detectable

Sample Number	Date Sample Taken	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Conductivity µmhos	Salinity ‰	Gage Height Feet	Total P PO ₄ mg/l	Inorganic P PO ₄ mg/l	TKN mg/l N	NO ₂ +NO ₃ mg/l NO ₃ -N	NH ₃ mg/l N	Chlorophyll a µg/l	Turbidity JTU	DO mg/l
<u>Station E 12 - 500 yards east of PEPCO Canal</u>															
69020314	2-03	1105	3.5	24	6.0	3.6		.198		.691	.453	.135	ND	13	9.69
060914	6-09	1245	25.5			11.6		.258		.401	ND	.415	16.50	8.4	6.76
070214	7-02	0930	29	24		11.3		.392	.171	.568	ND	.005	51.00		6.17
082514	8-25	1155	28.5					.405		1.244	.10	.10	6.75		7.60
102714	10-27	1230	14					.278	.102		.005	.03	.75		8.76
121814	12-18	1215	2					.254	.128	.368	.293	.170	19.50		11.19
<u>Station E 13 - Chalk Point</u>															
69020315	2-03	1055	3.7	28	9.4	6.9		.201		.593	.375	.118	4.50	10	9.69
060915	6-09	1250				12.5		.224		.413	ND	.278	15.75	6.4	6.63
070215	7-02	0940	29	42		11.7		.415	.162	.614	ND	.008	32.25		6.38
082515	8-25	1205	28.5					.545		.800	.02	.04	12.00		9.51
102715	10-27	1240	14					.278	.127		.005	.04	.75		8.91
121815	12-18	1225	2					.221	.121	.797	.336	.211	2.25		11.25
<u>Station E 14 - Benedict Bridge channel</u>															
69020316	2-03	1045	3.5	36	10.6	8.1		.139		.444	.382	.073	9.00	8	9.85
060916	6-09	1305	24			12.8		.229		.186	ND	.343	17.25	7	6.63
070216	7-02	0950	28.5	46		12.1		.332	.150	.449	ND	.005	30.00		6.21
082516	8-25	1220	28					.389		.456	.02	.14	12.00		7.06
102716	10-27	1250	14					.251	.137		.005	.03	3.75		8.99
121816	12-18	1235	2					.223	.068	.724	.181	.108	22.50		11.55
<u>Station E 15 - Sheridan Point, Bucy 21</u>															
69020317	2-03	1030	2.1	75	11.5	9.3		.121		.716	.265	.043	8.25	4.5	10.13
060917	6-09	1320				13.8		.187		.401	ND	.423	14.25	3.2	6.44
070217	7-02	1015	28	46		13.7		.540	.231	1.131	ND	.063	63.75		8.74
082517	8-25	1230	28					.417		.500	.03	.05	21.00		7.58
102717	10-27	1305	14					.241	.127		ND	.03	3.75		9.14

ND Not detectable



PATUXENT RIVER SURVEY

1969

