Hydrography of South Carolina Estuaries, with Emphasis on the North and South Santee and Charleston Harbor-Cooper River Estuaries

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HYDROGRAPHY OF SOUTH CAROLINA ESTUARIES, WITH EMPHASIS ON THE NORTH AND SOUTH SANTEE AND CHARLESTON HARBOR-COOPER RIVER ESTUARIES[1]

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DEDICATION

We dedicate this paper to Edward Keister Burch, commercial fisherman, former colleague on our South Carolina Estuarine Survey Program, and friend - lost in rough seas with fishing companions, October 1980, aboard his swordfishing vessel Breck's Joy.

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INTRODUCTION

The South Carolina Wildlife and Marine Resources Department, Marine Resources Division, began a statewide research program of South Carolina estuaries in February 1973, entitled "An Environmental Base Line Study of South Carolina Estuaries" (Estuarine Survey). This project was a joint effort of the Marine Resources Research Institute (MRRI) and the Office of Conservation, Management and Marketing (OCMM). The primary objectives of the program were to determine the basic biological, chemical, and physical characteristics of the major South Carolina estuarine systems, the seasonal changes in these characteristics, and their interactions over a long-term period. The data, thus gathered, would serve as a basis for evaluating and detecting environmental modifications, whether natural, industrial, or municipal. The collection of these base line data is of great significance, especially when dealing with relatively unpolluted estuaries. With continuing development and an ever-increasing coastal population, it is particularly important to be able to assess the effects of such growth on the estuaries.

This work is quite timely with respect to major environmental modifications to the study area in that Santee-Cooper rediversion is scheduled to occur about 1983. Both the Santee and Cooper Rivers will return to conditions approximating those prior to the 1941 Santee River diversion. This study will provide a means of evaluating the extent of ensuing changes to the hydrography of the study area, whether beneficial or detrimental. A similar argument holds for the proposed State Ports Authority (SPA) expansion to the Wando River, an estuary emptying into Charleston Harbor (Figure 1). The SPA expansion will increase the potential for pollution of the upper reaches of Charleston Harbor, making it imperative to document present hydrographic conditions in order to elucidate future conditions.

This report presents the results of the second two year program segment of the Estuarine Survey, the first two year segment having been concerned primarily with the Edisto and Cooper Rivers (Mathews and Shealy, 1978).

STUDY AREA

Cooper River

The Cooper River, prior to Santee River diversion, had a drainage basin of 1865 km^2 (720mi^2) and an average discharge of about 5.7 m^3/sec (200 ft 3/sec) (Nelson, 1974). Many plantations occur along the upper reaches of the river with numerous rice fields, many of which are incompletely diked to provide river circulation within the fields. In contrast to the relatively unpolluted upper reaches, the lower half of the Cooper River is heavily industrialized, starting at Bushy Park on the Back River Reservoir and continuing to the Charleston peninsula (Figure 1). The river now extends from the mouth of Charleston Harbor to the Pinopolis Dam on Lake Moultrie, a distance of about 97 km (52 mi).

Prior to Santee diversion, Charleston Harbor was a well-mixed estuary with depths of 15 m (49 ft) or more, making it an excellent natural harbor. After Santee River diversion and the creation of the Santee-Cooper Lakes, approximately 85% of the Santee River flow was diverted via the Tail Race Canal to the West Branch of the Cooper River and ultimately Charleston Harbor. This increased flow of about 425 m^3/sec (15,000 ft^3/sec) resulted in distinct stratification and subsequent clay deposition in Charleston Harbor. Today the problem is of such magnitude as to prompt rediversion of about 80% of the present Cooper River flow back to the old Santee riverbed, reducing the average Cooper flow to about 85.0 m^3/sec (3000 ft^3/sec).

Santee River

Previous to the 1941 diversion project, the Santee River drainage basin was fourth largest on the Atlantic Coast south of the St. Lawrence River. The Santee had a drainage basin of 38,100 km^2 (14,700 mi^2) (U. S. Geological Survey, 1978) with headwaters extending into western North Carolina, while the river now reaches only to Lake Marion, about 163 km (87 mi) from the mouth. Downstream from Lake Marion, the Santee River is still undeveloped except for occasional plantations. Few man-made structures other than the Atlantic Intracoastal Waterway (AIWW), power lines, and three highway crossings are to be found. Modifications have been made along the lower reaches of the river, where logging and

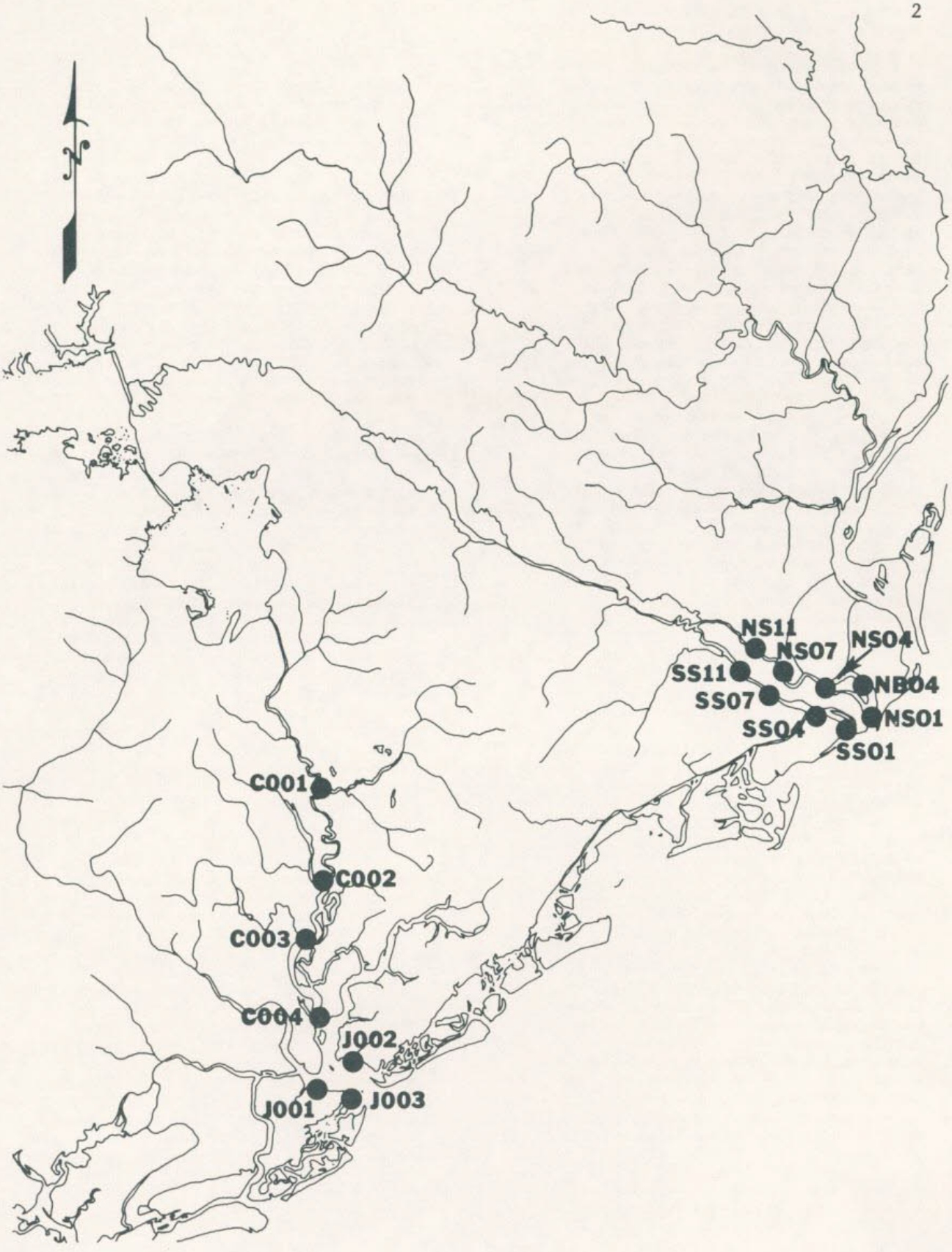

Figure 1. Sampling stations occupied monthly during this study.

farming operations have persisted since Colonial times.

After diversion the Santee River average stream flow was only 14.2 - 17.0 m^3/sec (500-600 ft^3/sec) (U. S. Geological Survey, 1978). The maximum flow of 4390 m^3/sec (155,000 ft^3/sec) was recorded on September 23, 1945, while values near zero were recorded during repair work on the electric generating turbines at Wilson Dam on Lake Marion during February 1947 (U. S. Geological Survey, 1978). In addition to much-reduced flow, the flow regime has been altered at the point of bifurcation of the North and South Santee Rivers, about 30.6 km (19 mi) upstream, to direct more of the river flow into the North Santee River (Nelson, 1976).

METHODS

Sampling Design

Hydrographic samples for this report were collected from fifteen stations representing three estuarine river systems from February 1973 through December 1977 (Table 1). Stations were categorized by sampling interval, i.e. stations sampled monthly were designated Intensive Phase stations included six in the Charleston Harbor-Cooper River estuary, five in the North Santee River and four in the South Santee River. The Extensive Phase stations were represented by two stations in Charleston Harbor-Cooper River, one in the North Santee, and one in the South Santee. All three estuarine systems also were represented by one twenty-five hour station occupied each quarter.

Stations were selected in order to provide information on hydrographic conditions in several locations within these three estuaries (Table 2). (Station locations are given in river miles (R.M.) in nautical miles followed by the metric equivalent in Table 2 and throughout this report.) Sampling the salinity gradient provided us with a complete data base for assessing any ecological effects which future alterations might have on the hydrological quality of these rivers. Hydrological conditions found within these estuaries could eventually be a key factor in deciding future issues concerning the management of coastal areas dependent upon them.

We chose to sample the Charleston Harbor-Cooper River system for the entire period for several reasons. Because of its location this river exhibits a fluctuating salinity regime, being typically a mixohaline environment. Three major zones of salinity found within this estuary are the following: high salinity (≤30 °/oo) in Charleston Harbor, intermediate (0.5-20 °/oo) from the river mouth inland, and limnetic (≤0.5 °/oo) above the freshwater line. Additionally, this river system flows through the intensely industrialized and heavily-populated area of North Charleston.

The Santee River was sampled at this time primarily because of future plans for rediversion. The salinity distributions in the three estuaries are similar, although the Cooper River (due to diversion), has a much higher discharge rate than the Santee River. Stations were chosen along both estuaries in an effort to provide a comparison of both rivers and their tributaries. The lower Santee is relatively unpolluted and undeveloped, although plans are being made for use of much of the land as spoil areas for the rediversion project.

Field and Laboratory Procedures

All hydrographic data were derived from water samples collected aboard the RV Anita from February 1973 through December 1977. Samples were obtained using six-liter Van Dorn bottle casts at two depths, 1 m below the surface and 0.3 m above the bottom. All water samples were returned to the laboratory for analyses, excluding measurements of temperature and pH, which were measured in the field with a stem thermometer and a Corning model 10 pH meter. Samples for nutrient analysis were frozen on dry ice immediately after collection. Analyses were made to determine dissolved oxygen, salinity, turbidity, nitrite, nitrate, silicate, orthophosphate, and solids (total, suspended, and settleable). In addition, secchi disc readings were taken to determine light penetration. Samples for dissolved oxygen and turbidity analyses were fixed in the field.

Dissolved oxygen was determined by a modified Winkler-Carpenter titration (Strickland and Parsons, 1972). We determined salinity with a Beckman RS7B induction salinometer, turbidity with a Hach model 2100 A turbidimeter, total suspended solids by the American Public Health Association (APHA) Standard Method 224 C (APHA, 1971), settleable solids by Standard Method 224 F (APHA, 1971) and nutrients with a Technicon Auto Analyzer II.

For comparison of results temporally and spatially, all monthly and quarterly samples were collected at the flood stage of the tide during daylight hours. Twenty-five hour station samples were collected at all stages of the tide to provide insight into the effects of the tidal cycle on estuarine hydrography.

Table 1. Schedule of Estuarine Survey cruises in the Charleston Harbor-Cooper River and North and South Santee Rivers from February 1973 through December 1977.

Date		Cruise
1973	February	Charleston Harbor-Cooper River (Intensive Phase)
	March	Charleston Harbor-Cooper River (Intensive Phase)
	April	Charleston Harbor-Cooper River (Intensive and Extensive Phases)
	May	Charleston Harbor-Cooper River (Intensive Phase and 25-hr. Stations)
	June	Charleston Harbor-Cooper River (Intensive Phase)
	July	Charleston Harbor-Cooper River (Intensive and Extensive Phases)
	August	Charleston Harbor-Cooper River (Intensive Phase and 25-hr. Stations)
	September	Charleston Harbor-Cooper River (Intensive Phase)
	October	Charleston Harbor-Cooper River (Intensive and Extensive Phases)
	November	Charleston Harbor-Cooper River (Intensive Phase and 25-hr. Stations)
	December	Charleston Harbor-Cooper River (Intensive Phase)
1974	January	Charleston Harbor-Cooper River (Intensive and Extensive Phases)
	February	Charleston Harbor-Cooper River (Intensive Phase and 25-hr. Stations)
	March	Charleston Harbor-Cooper River (Intensive Phase)
	April	Charleston Harbor-Cooper River (Intensive and Extensive Phases)
	May	Charleston Harbor-Cooper River (Intensive Phase and 25-hr. Stations)
	June	Charleston Harbor-Cooper River (Intensive Phase)
	July	Charleston Harbor-Cooper River (Intensive Phase and 25-hr. Stations)
	August	Charleston Harbor-Cooper River (Intensive and Extensive Phases)
	September	Charleston Harbor-Cooper River (Intensive Phase)
	October	Charleston Harbor-Cooper River (Intensive and Extensive Phases)
	November	Charleston Harbor-Cooper River (Intensive Phase and 25-hr. Stations)
	December	Charleston Harbor-Cooper River (Intensive Phase)

Table 1. (Continued).

Date		Cruise
1975	January	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive and Extensive Phases)
	February	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase and 25-hr. Stations)
	March	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase)
	April	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive and Extensive Phases)
	May	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase and 25-hr. Stations)
	June	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase)
	July	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase and 25-hr. Stations)
	August	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive and Extensive Phases)
	September	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase)
	October	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive and Extensive Phases)
	November	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase and 25-hr. Stations)
	December	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase)
1976	January	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive and Extensive Phases)
	February	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase and 25-hr. Stations)
	March	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase)
	April	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive and Extensive Phases)

Table 1. (Continued).

Date		Cruise
1976	May	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase and 25-hr. Stations)
	June	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase)
	July	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase and 25-hr. Stations)
	August	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive and Extensive Phases)
	September	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase)
	October	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase)
	November	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase and 25-hr. Stations)
	December	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive Phase)
1977	January	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive and Extensive Phases)
	February	Charleston Harbor-Cooper River (Intensive Phase and 25-hr. Stations)
	March	Charleston Harbor-Cooper River (Intensive Phase)
	April	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive and Extensive Phases)
	May	Charleston Harbor-Cooper River (Intensive Phase and 25-hr. Stations)
	June	Charleston Harbor-Cooper River (Intensive Phase)
	July	Charleston Harbor-Cooper River (Intensive Phase and 25-hr. Stations)
	August	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive and Extensive Phases)
	September	Charleston Harbor-Cooper River (Intensive Phase)
	October	Charleston Harbor-Cooper River, North and South Santee Rivers (Intensive and Extensive Phases)

Table 1. (Continued).

Date		Cruise
1977	November	Charleston Harbor-Cooper River (Intensive Phase and 25-hr. Stations)
	December	Charleston Harbor-Cooper River (Intensive Phase)

Table 2. Locations, river miles, mean depths, tidal ranges, and bottom types for 15 Estuarine Survey stations, Intensive Phase, occupied monthly in the North and South Santee River estuaries during the two annual cycles from January, 1975 through December, 1976 and in the Charleston Harbor-Cooper River estuary, South Carolina during the three annual cycles from January, 1975 - December, 1977

Estuary	Station	River Miles/km	Latitude	Longitude	Mean Depth (m)	Tidal Range (m)		Bottom Type
						Mean	Spring	
Cooper River	CO01 - The Tee	28/52.4	33°04.0'N	79°55.5'W	6.8	1.3	1.5	clay
	CO02 - Big Island	17/31.8	32°58.2'N	79°55.5'W	5.0	1.5	1.8	sand
	CO03 - North Charleston	12/22.4	32°53.8'N	79°57.6'W	5.5	1.6	1.9	sand, shell, mud
	CO04 - Mouth of Cooper	8/15.0	32°51.1'N	79°56.0'W	6.9	1.6	1.9	shell, sand, mud
	JO01 - Charleston Harbor (Ft. Johnson)	3/5.6	32°45.4'N	79°55.1'W	5.5	1.6	1.8	mud
	JO03 - Charleston Harbor (Cummings Point)	1/1.9	32°44.9'N	79°51.6'W	12.5	1.6	1.9	sand, shell, mud
North Santee	NS01 - North Santee Inlet	1/1.8	33°08.2'N	79°14.8'W	3.0	1.4	1.6	sand, mud, shell
	NS04 - Crow Island	4/7.5	33°10.2'N	79°17.5'W	3.0	1.2	1.4	sand and mud
	NS07 - Santee Swamp	7/13.1	33°10.6'N	79°20.7'W	5.7	1.3	1.5	sand and mud
	NS11 - 1 mi. up from Highway 17 Bridge	11/20.6	33°13.0'N	79°24.2'W	6.3	1.3	1.5	sand
	NB04 - North Santee Bay	4/7.5	33°10.3'N	79°14.6'W	2.1	1.4	1.6	sand, mud, shell
South Santee	SS01 - South Santee Inlet	1/1.9	33°07.9'N	79°16.4'W	3.1	1.3	1.5	shell, sand, mud
	SS04 - Murphy Island	4/7.5	33°08.8'N	79°19.2'W	3.2	1.3	1.5	sand, mud, shell
	SS07 - 1 mi. up from Santee Coastal Reserve	7/13.1	33°09.8'N	79°22.3'W	3.0	1.3	1.5	mud and sand
	SS11 - Hampton Island	11/20.6	33°12.3'N	79°25.4'W	2.2	1.3	1.5	sand

RESULTS

Although the data from this study resulted from three collection intervals: intensive (monthly), extensive (quarterly), the 25-hour (quarterly), the main body of results is composed of data from intensive collections. Consequently most of this report is based on the monthly results, with the quarterly data serving in a supplementary capacity. Appendix 1 contains the intensive phase data from February 1975-December 1977 in the Cooper River and from January 1975-December 1976 in the North and South Santee Rivers. Annual means of the intensive data are in Tables 3-5, with the ranges in Tables 6-10.

To illustrate long-term trends, salinity data collected during the intensive phase have been plotted in conjunction with precipitation and river discharge versus time (Figures 2-13). These salinity plots include stations C002-J003 for the Cooper River, boatslip salinity values from the Marine Resources Center on Charleston Harbor, and all of the Santee River stations. Station C001 was not plotted since the salinity was ≤0.5 °/oo for the entire 5-year sampling period and, hence, did not show noticeable fluctuations. Salinity data from 1973-1977 were plotted for the Cooper River and boatslip, while 1975-1976 data were plotted for the Santee, except for stations NS11 and SS11, which were essentially fresh (≤0.5 °/oo) during the study period. Mean salinity values for the study period, i.e. 1973-1977 for the Cooper River and 1975-1976 for the Santee River, were also plotted against river mile to determine the permanent freshwater line (Figures 14-16).

Oxygen saturation (%) was also plotted for all Cooper River intensive phase stations versus time for 1975-1977 (Figures 17-22). Mean oxygen saturation (%) was plotted versus station for all Charleston Harbor-Cooper and Santee River intensive stations (Figures 22-23).

Extensive phase data are presented in Appendix 2. These stations were located in each of the estuaries covered by this report (Fig. 1).

Station data collected during the twenty-five hour study are displayed in Appendix 3. These hydrographic data were taken around the clock on station while anchored. Secchi disc readings, of course, were not taken at night, but the other parameters were measured. Water and air temperatures were measured every hour, with full hydrographic sampling being conducted every four hours. Also depending on the requirements of the biological field sampling being conducted concurrently aboard the research vessel at that time, e.g. trawling, samples were occasionally collected at varying intervals. Data are from the 1973-1977 period, but not all inclusively for each station.

DISCUSSION

Several points should be kept in mind by the reader. The Cooper River data are included for the entire sampling period of 1973-1977, not just for the Santee sampling period. Also some weather extremes occurred during the 1975-1977 sampling period (weather extremes in the 1973-1974 data were discussed in Mathews and Shealy, 1978). Since cruise samples were taken monthly and quarterly, not daily, only the more significant, long-term events have been recorded. As a result, it should be emphasized that the means in Tables 3-5 are means of our data, not necessarily the absolute means for the sampling period.

SALINITY

General Trends. Salinity in the Charleston Harbor-Cooper River and Santee River systems ranged from ≤0.5 °/oo to ≤30 °/oo. Annual trends were persistent at each station, but relationships with rainfall were difficult to detect. It appears that drought conditions have a widespread effect, whereas rainfall can be significant in a small area. Rainfall near the coast may not always cause a large decrease in salinity in the lower reaches of a river, while moderate rainfall in the watershed may cause a distinct decrease in salinity near the coast. In the Santee and Cooper systems this is further complicated by a series of lakes, i.e. Lakes Murray, Marion, and Moultrie, which largely control the flow to the coast. Heavy rainfall in the watershed may only fill the lakes without substantially increasing river discharge, particularly after an extended drought. The converse is true during a rainy season, when even a moderate amount of rainfall upstream may force large amounts of fresh water out of the lakes, resulting in low salinity downstream.

At times, it appears that some salinity fluctuations do not obviously correspond to either rainfall or lake discharge. Examples will be discussed below.

Despite the fact that 85% of the Santee River flow has been diverted into the Cooper River, the salinity regimes in the three rivers are similar, i.e. comparing the North and South Santee Rivers to the Cooper River starting at the head of Charleston Harbor (Figures 14-16). Also

Table 3. Annual means for air temperature and major physical and chemical water characteristics monitored monthly, surface and bottom, at 15 stations in the North and South Santee and Charleston Harbor-Cooper River estuaries, South Carolina during the first of two annual cycles of study from January through December, 1975.*

1975 (Annual Means) Estuary	Air Temperature (°C) $\bar{X}$	Water Temperature (°C)		Salinity (°/oo)		Dissolved Oxygen (mg/l)		Nitrate (µg/l)		Nitrite (µg/l)		Silicate (µg/l)	
		$\bar{X}$ Surface	$\bar{X}$ Bottom	$\bar{X}$ Surface	$\bar{X}$ Bottom	$\bar{X}$ Surface	$\bar{X}$ Bottom	$\bar{X}$ Surface	$\bar{X}$ Bottom	$\bar{X}$ Surface	$\bar{X}$ Bottom	$\bar{X}$ Surface	$\bar{X}$ Bottom
Cooper River:													
CO01-The Tee	22.0	20.3	20.2	0.2	0.1	8.0	8.2	128.8	162.6	2.4	2.1	635.8	468.0
CO02-Big Island	20.9	20.4	20.2	0.2	0.2	8.2	8.2	108.3	195.0	2.3	2.5	950.1	866.5
CO03-N. Charleston	18.9	20.4	20.2	2.1	3.2	7.9	7.6	114.7	96.1	2.8	2.8	876.7	1011.1
CO04-Mouth of Cooper	19.4	20.4	20.2	3.9	10.5	7.6	6.9	82.8	145.7	2.7	3.4	829.4	786.2
JO01-Charleston Harbor (Ft. Johnson)	22.2	20.5	20.4	10.9	18.6	7.2	6.8	127.8	60.4	3.1	3.3	775.1	923.6
JO03-Charleston Harbor (Cummings Pt.)	20.3	20.5	20.3	14.5	27.2	7.2	6.9	53.8	30.7	3.6	3.2	923.5	643.4
North Santee River:													
NB04-North Santee Bay	19.1	20.4	20.4	15.7	16.8	7.0	6.7	61.5	62.3	3.2	3.0	1438.2	1125.9
NS01-N. Santee Inlet	20.2	20.8	20.6	22.0	23.7	6.9	6.7	63.4	42.0	3.6	2.9	545.4	494.9
NS04-Crow Island	21.2	20.4	20.4	5.5	5.9	7.3	7.4	89.6	92.9	3.7	3.8	1505.5	1408.9
NS07-Santee Swamp	20.6	20.3	20.3	1.9	1.9	7.5	7.6	121.6	140.6	3.4	3.4	771.4	652.7
NS11-1 mile up from Hwy. 17 Bridge	18.6	20.2	20.2	0.2	0.2	7.5	7.5	133.6	127.2	3.3	2.8	687.2	1319.2
South Santee River:													
SS01-S. Santee Inlet	20.4	20.6	20.4	20.6	22.4	6.9	7.2	53.9	52.4	3.1	3.7	642.8	600.6
SS04-Murphy Island	19.8	20.2	20.0	8.6	11.1	7.4	7.2	75.6	60.5	3.3	3.2	842.4	733.5
SS07-1 mile up from Santee Coastal Reserve	18.7	20.1	20.0	3.6	4.0	7.3	7.1	55.5	65.8	4.0	2.8	569.0	699.0
SS11-Hampton Island	19.6	20.2	20.2	0.4	2.4	7.3	7.5	123.1	110.1	2.6	2.6	623.5	626.8

*In addition to the data presented herein, two earlier annual cycles of parallel Estuarine Survey data (1973 and 1974) for the Charleston-Cooper River estuary were reported previously by Mathews and Shealy, (1978) and are available as a separate publication.

Table 3. (Continued).

1975 (Annual Means) Estuary	Phosphate (µg/l) $\bar{X}$ Surface	Phosphate (µg/l) $\bar{X}$ Bottom	pH $\bar{X}$ Surface	pH $\bar{X}$ Bottom	Turbidity (FTU) $\bar{X}$ Surface	Turbidity (FTU) $\bar{X}$ Bottom	Total Solids (mg/l) $\bar{X}$ Surface	Total Solids (mg/l) $\bar{X}$ Bottom	Settleable Solids (mg/l) $\bar{X}$ Surface	Settleable Solids (mg/l) $\bar{X}$ Bottom	Secchi Disc (m) $\bar{X}$ Surface	Secchi Disc (m) $\bar{X}$ Bottom
Cooper River:												
CO01-The Tee	26.7	29.1	6.9	6.9	9.3	9.3	6.4	5.9	1.2	1.1	1.5	1.5
CO02-Big Island	34.5	32.2	7.0	7.0	9.6	10.2	7.5	10.7	1.3	3.8	1.4	1.4
CO03-N. Charleston	62.3	36.8	7.0	7.0	9.3	15.2	13.7	37.8	2.4	14.2	1.2	1.2
CO04-Mouth of Cooper	48.0	49.4	7.0	7.1	8.9	20.8	21.5	66.8	8.4	27.2	1.2	1.2
JO01-Charleston Harbor (Ft. Johnson)	39.1	56.5	7.1	7.2	10.5	13.3	28.8	65.2	4.4	12.8	1.2	1.2
JO03-Charleston Harbor (Cummings Pt.)	54.2	85.3	7.2	7.5	7.0	40.4	41.3	178.1	12.6	82.1	1.4	1.4
North Santee River:												
NB04-North Santee Bay	64.1	94.6	7.0	6.9	30.1	51.2	91.7	153.5	33.1	54.2	0.4	0.4
NS01-N. Santee Inlet	48.3	87.1	7.2	7.2	21.6	41.6	89.1	137.8	24.6	43.9	0.5	0.5
NS04-Crow Island	35.5	59.8	7.0	6.9	24.8	31.2	37.8	56.2	9.1	13.7	0.6	0.6
NS07-Santee Swamp	36.5	43.8	6.9	6.9	27.5	39.2	48.8	70.0	21.4	38.2	0.4	0.4
NS11-1 mile up from Hwy. 17 Bridge	41.9	43.0	6.9	6.9	27.8	31.4	31.8	40.8	14.3	21.6	0.5	0.5
South Santee River:												
SS01-S. Santee Inlet	68.0	93.4	7.2	7.2	31.8	37.5	99.7	133.8	27.2	46.7	0.5	0.5
SS04-Murphy Island	53.6	55.4	6.9	7.1	25.8	32.8	50.7	79.4	10.8	27.7	0.6	0.6
SS07-1 mile up from Santee Coastal Reserve	42.2	58.5	6.8	6.8	29.2	36.4	43.1	59.3	14.8	22.1	0.5	0.5
SS11-Hampton Island	34.0	36.9	7.0	6.9	23.5	30.1	29.8	51.5	11.7	23.4	0.5	0.5

Table 4. Annual means for air temperature and major physical and chemical water characteristics monitored monthly, surface and bottom, at 15 stations in the North and South Santee and Charleston Harbor-Cooper River estuaries, South Carolina during the second of two annual cycles of study from January through December, 1976.*

1976 (Annual Means) Estuary	Air Temperature (°C) $\bar{X}$	Water Temperature (°C)		Salinity (°/oo)		Dissolved Oxygen (mg/l)		Nitrate (µg/l)		Nitrite (µg/l)		Silicate (µg/l)	
		$\bar{X}$ Surface	$\bar{X}$ Bottom	$\bar{X}$ Surface	$\bar{X}$ Bottom	$\bar{X}$ Surface	$\bar{X}$ Bottom	$\bar{X}$ Surface	$\bar{X}$ Bottom	$\bar{X}$ Surface	$\bar{X}$ Bottom	$\bar{X}$ Surface	$\bar{X}$ Bottom
Cooper River:													
CO01-The Tee	20.8	19.0	19.1	0.2	0.1	8.8	8.6	98.2	105.6	2.5	2.0	473.6	536.8
CO02-Big Island	18.8	19.3	19.4	0.6	0.9	8.7	8.6	90.3	102.0	4.1	2.8	412.7	426.0
CO03-N. Charleston	18.0	19.6	19.6	3.4	4.7	8.4	8.1	80.7	86.6	2.2	4.3	465.4	564.4
CO04-Mouth of Cooper	15.9	19.4	19.7	6.7	14.1	8.0	7.4	74.0	57.6	4.4	4.8	531.0	504.5
JO01-Charleston Harbor (Ft. Johnson)	20.1	19.9	20.2	13.0	19.0	7.8	7.6	50.2	41.4	4.6	4.7	577.8	514.0
JO03-Charleston Harbor (Cummings Pt.)	18.2	19.6	19.0	17.8	28.4	7.7	7.3	48.8	24.8	9.5	4.4	554.4	377.0
North Santee River:													
NB04-North Santee Bay	19.2	19.1	18.8	21.3	21.7	7.8	7.4	42.4	34.7	3.2	3.9	696.1	682.1
NS01-N. Santee Inlet	17.8	19.0	18.8	22.8	24.2	7.7	7.6	41.2	38.6	4.0	3.4	598.3	816.6
NS04-Crow Island	19.7	19.1	19.0	11.0	11.8	7.7	7.6	74.1	68.2	4.9	4.0	683.2	738.2
NS07-Santee Swamp	19.7	19.3	19.2	1.5	1.7	7.8	7.6	111.8	121.9	6.4	6.1	461.7	473.9
NS11-1 mile up from Hwy. 17 Bridge	20.8	19.4	19.4	0.2	0.2	8.1	8.1	112.4	114.8	3.7	3.4	489.4	531.0
South Santee River:													
SS01-S. Santee Inlet	20.3	18.9	19.2	21.5	22.0	7.9	7.8	30.9	33.1	2.7	3.0	580.5	608.6
SS04-Murphy Island	21.8	18.8	18.8	10.3	16.1	7.9	7.5	58.0	47.9	3.4	3.4	675.0	653.9
SS07-1 mile up from Santee Coastal Reserve	20.9	19.1	18.8	4.0	5.7	8.4	7.6	46.6	35.2	2.7	2.2	464.3	457.3
SS11-Hampton Island	21.2	18.6	18.6	0.4	0.4	8.0	8.1	80.0	63.7	2.8	2.4	514.1	330.8

*In addition to the data presented herein, two earlier annual cycles of parallel Estuarine Survey data (1973 and 1974) for the Charleston Harbor-Cooper River estuary were reported previously by Mathews and Shealy (1978) and are available as a separate publication.

Table 4. (Continued).

1976 (Annual Means) Estuary	Phosphate (µg/l) $\bar{X}$ Surface	Phosphate (µg/l) $\bar{X}$ Bottom	pH $\bar{X}$ Surface	pH $\bar{X}$ Bottom	Turbidity (FTU) $\bar{X}$ Surface	Turbidity (FTU) $\bar{X}$ Bottom	Total Solids (mg/l) $\bar{X}$ Surface	Total Solids (mg/l) $\bar{X}$ Bottom	Settleable Solids (mg/l) $\bar{X}$ Surface	Settleable Solids (mg/l) $\bar{X}$ Bottom	Secchi Disc (m) $\bar{X}$ Surface	Secchi Disc (m) $\bar{X}$ Bottom
Cooper River:												
C001-The Tee	18.9	12.1	7.5	7.4	7.0	6.9	9.1	8.9	2.4	2.0	1.9	1.9
C002-Big Island	12.3	21.0	7.4	7.5	7.3	8.2	9.0	13.4	3.1	3.1	1.5	1.5
C003-N. Charleston	24.7	14.8	7.4	7.3	7.0	7.6	15.0	28.0	4.0	5.5	1.4	1.4
C004-Mouth of Cooper	19.9	18.1	7.3	7.4	6.2	12.4	14.7	68.9	3.4	27.6	1.3	1.3
J001-Charleston Harbor (Ft. Johnson)	24.5	21.0	7.1	7.2	5.8	14.0	38.2	84.7	13.7	19.8	1.3	1.3
J003-Charleston Harbor (Cummings Pt.)	24.7	35.1	7.6	7.8	5.9	34.6	61.8	139.0	18.1	49.8	1.3	1.3
North Santee River:												
NB04-North Santee Bay	37.7	30.2	7.2	7.5	22.2	32.2	94.8	158.6	23.7	60.8	0.5	0.5
NS01-N. Santee Inlet	41.7	38.7	7.4	7.4	20.2	37.2	93.5	133.6	25.8	52.5	0.6	0.6
NS04-Crow Island	20.9	24.3	7.2	7.4	21.0	25.3	56.8	76.3	13.1	22.3	0.6	0.6
NS07-Santee Swamp	44.9	36.7	7.3	7.3	39.2	56.5	60.1	115.7	25.0	63.6	0.4	0.4
NS11-1 mile up from Hwy. 17 Bridge	34.7	26.5	7.4	7.4	26.6	36.1	37.0	60.7	18.4	36.1	0.6	0.6
South Santee River:												
SS01-S. Santee Inlet	21.2	32.9	7.3	7.4	18.6	19.6	84.8	90.7	23.8	25.3	0.6	0.7
SS04-Murphy Island	36.2	24.6	7.2	7.4	17.3	21.9	54.5	74.4	15.5	18.4	0.6	0.6
SS07-1 mile up from Santee Coastal Reserve	24.9	30.9	7.2	7.2	27.4	46.2	54.4	95.3	17.3	35.7	0.4	0.4
SS11-Hampton Island	31.4	13.9	7.2	7.2	31.2	35.8	44.4	60.6	23.0	36.9	0.4	0.4

Table 5. Annual ranges (lows and highs) for air temperature and major physical and chemical characteristics monitored monthly, surface and bottom, at six stations in the Charleston Harbor-Cooper River estuary, South Carolina during a third annual cycle of study from January through December, 1977.*

1977 (Surface) Estuary	Air Temperature (°C)		Water Temperature (°C)		Salinity (°/oo)		Dissolved Oxygen (mg/l)		Nitrate (µg/l)		Nitrite (µg/l)		Silicate (µg/l)		Phosphate (µg/l)		pH		Turbidity (FTU)		Total Solids (mg/l)		Settleable Solids (mg/l)		Secchi Disc (m)	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Cooper River:																										
C001-The Tee	1.0	35.0	4.0	33.0	0.1	1.0	5.9	13.1	10.1	270.2	0.0	3.2	21.1	1405.0	9.0	29.5	6.5	7.9	3.2	23.0	3.6	20.4	0.4	7.2	0.4	2.5
C002-Big Island	0.0	35.0	4.0	32.0	0.2	2.7	0.7	12.9	9.7	260.3	0.3	9.1	84.3	1405.0	2.5	57.0	6.9	8.5	3.1	23.0	4.8	26.4	0.0	8.4	0.5	2.5
C003-N. Charleston	0.0	33.0	4.1	31.0	1.7	7.7	4.8	12.4	35.4	193.3	1.0	6.2	119.4	1348.8	7.5	87.5	6.7	7.8	3.0	17.0	6.0	24.8	0.0	7.6	0.5	1.5
C004-Mouth of Cooper	0.0	33.0	5.1	30.1	2.6	13.0	5.2	12.1	11.8	123.5	0.8	7.1	231.8	1405.0	10.0	50.0	6.7	7.9	2.6	15.0	8.4	49.2	1.2	31.2	0.5	2.1
J001-Charleston Harbor (Ft. Johnson)	4.0	33.0	5.6	30.8	10.9	19.6	4.5	11.8	20.8	124.3	0.7	7.6	309.1	1419.0	10.0	60.0	6.8	7.8	2.5	10.0	23.2	39.6	0.0	6.8	0.5	1.8
J003-Charleston Harbor (Cummings Pt.)	6.0	33.0	6.0	30.4	14.7	24.0	4.7	10.9	18.9	85.5	0.3	24.9	112.4	1405.0	0.0	89.0	6.6	7.9	3.5	135.0	35.6	62.8	0.0	25.2	0.5	1.5

1977 (Bottom) Estuary	Air Temperature (°C)		Water Temperature (°C)		Salinity (°/oo)		Dissolved Oxygen (mg/l)		Nitrate (µg/l)		Nitrite (µg/l)		Silicate (µg/l)		Phosphate (µg/l)		pH		Turbidity (FTU)		Total Solids (mg/l)		Settleable Solids (mg/l)		Secchi Disc (m)	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Cooper River:																										
C001-The Tee	1.0	35.0	4.0	30.3	0.0	0.4	5.9	12.9	9.5	281.0	0.0	2.7	35.1	1405.0	0.0	32.0	6.6	7.9	2.7	25.0	4.8	22.0	1.2	8.0	0.4	2.5
C002-Big Island	0.0	35.0	4.2	31.0	0.3	6.1	5.4	12.9	10.7	256.5	0.4	13.3	112.4	1405.0	1.5	28.0	6.9	8.1	2.8	23.0	5.6	41.2	0.0	11.2	0.5	2.5
C003-N. Charleston	0.0	33.0	4.6	30.0	0.8	11.7	4.6	12.1	4.3	178.9	0.3	2.1	77.3	1405.0	3.0	105.5	6.8	7.7	3.1	33.0	5.6	67.6	0.0	30.8	0.5	1.5
C004-Mouth of Cooper	0.0	33.0	4.8	29.8	5.7	22.3	4.6	11.9	9.1	131.1	0.6	13.6	217.8	1405.0	8.0	52.5	6.6	7.9	6.2	28.0	20.4	156.0	0.4	57.6	0.5	2.1
J001-Charleston Harbor (Ft. Johnson)	4.0	33.0	5.8	34.0	12.6	25.3	4.3	11.8	15.8	124.6	0.0	11.1	154.6	1004.6	13.5	75.0	6.6	7.8	4.4	58.0	29.2	251.2	0.4	126.4	0.5	1.8
J003-Charleston Harbor (Cummings Pt.)	6.0	33.0	6.4	29.8	23.2	33.3	4.9	10.3	2.5	451.6	0.1	32.8	126.4	765.7	8.0	118.5	7.0	7.8	3.8	120.0	64.8	350.0	0.8	821.2	0.5	1.5

*An addition to the data presented herein, two earlier annual cycles of parallel Estuarine Survey data (1973 and 1974) for the Charleston Harbor-Cooper River estuary were reported previously by Mathews and Shealy (1978) and are available as a separate publication.

Table 6. Annual ranges (lows and highs) for air temperature and major physical and chemical characteristics of surface waters monitored monthly at 15 stations in the North and South Santee and Charleston Harbor-Cooper River estuaries, South Carolina during the first of two annual cycles of study from January through December, 1975.*

1975 (Surface) Estuary	Air Temperature (°C)		Water Temperature (°C)		Salinity (°/oo)		Dissolved Oxygen (mg/l)		Nitrate (µg/l)		Nitrite (µg/l)		Silicate (µg/l)		Phosphate (µg/l)		pH		Turbidity (FTU)		Total Solids (mg/l)		Settleable Solids (mg/l)		Secchi Disc (m)	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Cooper River:																										
C001-The Tee	9.0	32.0	10.3	28.6	0.1	0.3	5.3	10.5	24.5	292.8	0.1	4.8	196.7	1440.0	0.0	56.0	5.8	7.6	2.9	34.0	1.6	14.8	0.0	3.6	0.4	2.4
C002-Big Island	6.0	32.0	10.3	29.2	0.1	0.4	5.4	10.7	24.9	274.8	0.0	5.2	84.3	3084.0	12.0	55.0	6.2	7.7	3.6	32.0	2.0	10.8	0.0	2.8	0.5	2.4
C003-N. Charleston	5.0	32.0	10.3	29.5	0.9	3.8	5.1	10.3	42.0	264.6	1.0	7.0	252.7	2293.0	0.0	192.0	6.4	7.6	2.6	26.0	10.0	18.8	0.0	6.4	0.5	2.1
C004-Mouth of Cooper	4.0	33.0	11.6	29.4	1.8	7.2	4.6	10.4	28.8	260.0	0.0	6.2	337.2	2069.0	0.0	174.0	6.2	7.6	3.3	26.0	10.4	54.4	0.4	41.2	0.5	2.0
J001-Charleston Harbor (Ft. Johnson)	6.0	32.0	10.7	28.9	8.8	13.5	4.6	9.6	10.1	697.9	0.2	7.3	351.3	1131.0	3.0	86.5	6.7	7.5	3.1	52.0	17.6	45.2	0.0	15.6	0.7	1.8
J003-Charleston Harbor (Cummings Pt.)	3.0	30.0	12.2	28.6	10.5	17.9	4.9	9.4	23.2	145.2	0.4	10.8	491.8	1426.0	0.0	204.0	6.5	7.9	3.6	12.0	22.0	61.6	0.4	24.8	0.8	2.1
North Santee River:																										
NB04-North Santee Bay	2.0	32.0	10.8	29.4	0.5	34.0	4.1	9.5	3.5	170.4	0.3	7.3	252.9	9525.9	19.2	130.0	6.5	7.8	12.0	70.0	20.0	192.8	5.2	111.6	0.2	0.7
NS01-N. Santee Inlet	6.0	32.0	11.0	29.6	0.2	32.8	5.1	9.0	16.0	176.2	1.0	8.7	168.6	1011.6	11.5	94.5	6.2	7.8	7.8	54.0	12.4	218.0	4.4	64.8	0.3	0.8
NS04-Crow Island	7.0	32.0	9.6	29.2	0.1	19.1	5.4	9.8	6.1	181.7	1.3	8.8	161.6	9976.0	7.8	60.0	5.9	7.5	9.9	48.0	8.8	91.6	0.8	21.6	0.3	1.1
NS07-Santee Swamp	1.0	34.0	9.9	29.7	0.1	15.9	5.5	9.8	5.5	338.5	0.3	7.1	105.4	1264.5	6.6	90.0	6.3	7.8	11.0	42.0	20.8	100.0	7.6	56.4	0.3	0.7
NS11-1 mile up from Hwy. 17 Bridge	5.0	33.0	9.8	29.4	0.1	0.4	5.1	10.3	6.4	289.1	0.7	7.3	161.6	1355.8	0.0	73.5	6.4	7.3	7.0	57.0	7.2	85.6	0.8	35.2	0.3	1.0
South Santee River:																										
SS01-S. Santee Inlet	8.0	30.0	10.8	30.0	1.0	31.8	4.7	9.7	5.7	133.8	0.7	9.0	231.8	1018.6	25.2	144.5	6.1	7.8	7.2	89.0	17.2	292.0	2.0	109.6	0.1	0.9
SS04-Murphy Island	-2.0	32.0	9.3	30.4	0.2	23.7	5.3	10.3	7.8	171.5	1.0	4.8	147.5	2451.8	9.0	136.5	5.8	7.7	8.1	62.0	22.4	74.4	1.2	25.2	0.2	1.1
SS07-1 mile up from Santee Coastal Reserve	2.0	33.0	8.6	30.4	0.2	11.8	5.6	10.3	1.8	168.8	0.8	20.3	126.5	990.5	0.0	111.0	6.0	7.4	6.8	73.0	14.0	111.6	0.8	59.6	0.2	0.8
SS11-Hampton Island	6.0	31.0	9.7	29.8	0.0	1.7	5.2	10.2	43.9	217.4	1.0	6.0	175.6	1278.6	0.0	69.0	6.6	7.3	10.0	40.0	10.4	70.4	0.8	20.0	0.2	0.8

*In addition to the data presented herein, two earlier annual cycles of parallel Estuarine Survey data (1973 and 1974) for the Charleston Harbor-Cooper River estuary were reported previously by Mathews and Shealy (1978) and are available as a separate publication.

Table 7. Annual ranges (lows and highs) for air temperature and major physical and chemical characteristics of bottom waters monitored monthly at 15 stations in the North and South Santee and Charleston Harbor-Cooper River estuaries, South Carolina during the first of two annual cycles of study from January through December, 1975.*

1975 (Bottom) Estuary	Air Temperature (°C)		Water Temperature (°C)		Salinity (°/oo)		Dissolved Oxygen (mg/l)		Nitrate (µg/l)		Nitrite (µg/l)		Silicate (µg/l)		Phosphate (µg/l)		pH		Turbidity (FTU)		Total Solids (mg/l)		Settleable Solids (mg/l)		Secchi Disc (m)	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Cooper River:																										
C001-The Tee	9.0	32.0	10.3	28.7	0.1	0.3	5.1	10.8	24.5	696.9	0.0	5.0	112.4	1159.0	7.5	75.0	5.9	7.8	3.6	35.0	1.6	10.4	0.0	4.4	0.4	2.4
C002-Big Island	6.0	32.0	10.4	28.9	0.1	0.4	5.3	10.9	19.7	696.8	1.0	4.4	112.4	2732.7	9.0	84.0	6.2	7.6	3.1	31.0	8.0	14.4	0.4	6.4	0.5	2.4
C003-N. Charleston	5.0	32.0	10.5	29.4	1.1	6.7	4.5	10.2	36.5	254.8	0.6	7.8	323.2	2230.0	15.0	84.0	6.3	7.8	3.5	56.0	15.6	136.8	0.8	77.6	0.5	2.1
C004-Mouth of Cooper	4.0	33.0	11.6	29.2	3.4	19.9	4.4	9.9	21.5	696.8	0.5	8.0	414.5	1363.0	0.0	100.5	6.3	7.9	4.1	85.0	14.8	220.0	0.4	121.6	0.5	2.0
J001-Charleston Harbor (Ft. Johnson)	6.0	32.0	10.8	29.2	11.8	26.2	4.4	9.2	4.9	198.6	0.3	8.7	512.8	1419.1	12.5	102.0	6.8	7.6	5.1	64.0	36.4	81.2	2.4	21.2	0.7	1.8
J003-Charleston Harbor (Cummings Pt.)	3.0	30.0	12.3	29.0	22.2	32.6	4.7	8.8	6.1	45.2	0.2	11.6	351.2	1201.3	23.0	262.5	6.9	8.1	6.5	110.0	48.4	394.0	3.6	250.8	0.8	2.1
North Santee River:																										
NB04-North Santee Bay	2.0	32.0	10.6	29.1	0.5	34.0	4.1	9.2	8.4	135.7	0.4	8.7	168.6	6020.5	12.0	180.0	6.1	7.6	14.0	120.0	37.6	392.8	6.4	153.2	0.2	0.7
NS01-N. Santee Inlet	6.0	32.0	11.5	29.8	0.2	32.9	4.7	8.9	3.2	110.7	0.0	8.0	210.8	1383.9	13.0	195.5	6.3	8.0	14.0	84.0	54.8	204.4	4.0	119.2	0.3	0.8
NS04-Crow Island	7.0	32.0	9.7	29.2	0.1	19.8	5.4	9.8	14.0	261.4	1.0	9.0	161.6	8641.0	15.6	177.0	6.1	7.4	11.0	55.0	10.8	96.4	2.0	66.0	0.3	1.1
NS07-Santee Swamp	1.0	34.0	9.7	29.5	0.1	15.9	5.3	10.1	6.4	337.7	1.4	6.6	161.6	1278.6	6.6	79.5	6.4	7.6	13.0	91.0	11.6	168.4	0.4	123.6	0.3	0.7
NS11-1 mile up from Hwy. 17 Bridge	5.0	33.0	9.9	30.0	0.1	0.4	4.9	10.5	5.2	280.4	0.0	8.3	147.5	8360.0	0.0	103.0	6.4	7.4	8.0	74.0	11.6	112.8	2.4	65.2	0.3	1.0
South Santee River:																										
SS01-S. Santee Inlet	8.0	30.0	10.3	30.5	7.7	31.8	5.2	9.5	2.5	148.1	0.6	10.8	323.2	1194.2	12.0	169.5	6.7	7.6	16.0	91.0	41.2	326.0	6.0	152.4	0.1	0.9
SS04-Murphy Island	-2.0	32.0	9.3	30.0	0.2	26.0	5.2	10.3	11.3	150.7	1.2	6.4	119.5	1391.0	0.0	91.5	6.4	8.0	11.0	64.0	18.8	135.2	2.8	57.4	0.2	1.1
SS07-1 mile up from Santee Coastal Reserve	2.0	33.0	8.2	30.5	0.1	13.1	5.6	10.4	1.4	175.5	1.4	7.5	140.5	1370.0	0.5	157.5	5.9	7.2	11.0	82.0	13.2	122.0	5.2	58.0	0.2	0.8
SS11-Hampton Island	6.0	31.0	9.7	29.8	0.0	24.2	5.2	10.4	4.5	214.5	0.4	6.3	98.4	1138.1	0.0	88.5	5.9	7.6	14.0	54.0	12.0	178.0	2.8	118.0	0.2	0.8

*In addition to the data presented herein, two earlier annual cycles of parallel Estuarine Survey data (1973 and 1974) for the Charleston Harbor-Cooper River estuary were reported previously by Mathews and Shealy (1978) and are available as a separate publication.

Table 8. Annual ranges (lows and highs) for air temperature and major physical and chemical characteristics of surface waters monitored monthly at 15 stations in the North and South Santee and Charleston Harbor-Cooper River estuaries, South Carolina during the second of two annual cycles of study from January through December, 1976.*

1976 (Surface) Estuary	Air Temperature (°C)		Water Temperature (°C)		Salinity (°/oo)		Dissolved Oxygen (mg/l)		Nitrate (µg/l)		Nitrite (µg/l)		Silicate (µg/l)		Phosphate (µg/l)		pH		Turbidity (FTU)		Total Solids (mg/l)		Settleable Solids (mg/l)		Secchi Disc (m)	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Cooper River:																										
C001-The Tee	2.0	32.0	9.4	30.0	0.1	0.3	5.7	12.0	12.1	214.9	0.6	5.2	84.3	920.3	0.0	75.0	7.0	8.1	3.0	22.0	1.2	38.4	0.4	8.8	0.7	2.5
C002-Big Island	0.0	29.0	9.6	29.9	0.1	3.2	6.1	12.0	9.1	214.2	0.7	22.4	56.2	1405.0	0.0	34.5	6.8	7.9	2.4	22.0	4.8	14.4	0.4	6.8	0.7	2.0
C003-N. Charleston	-1.0	32.0	9.5	30.4	0.1	12.1	5.3	11.8	7.3	133.1	0.4	3.9	147.5	878.1	0.0	102.0	6.8	7.9	3.1	17.0	6.0	34.4	0.0	9.6	0.8	1.7
C004-Mouth of Cooper	-1.0	29.0	9.6	29.8	1.4	18.6	4.8	11.3	7.0	137.3	1.8	15.5	154.6	1194.2	0.0	58.0	6.9	7.4	2.7	13.0	9.2	22.4	1.2	5.2	0.6	1.6
J001-Charleston Harbor (Ft. Johnson)	-2.0	35.0	9.9	29.4	7.7	21.8	5.6	10.7	8.5	100.0	2.0	18.3	210.8	772.8	0.0	53.0	5.5	7.9	2.7	12.0	17.6	87.2	2.0	48.4	0.9	1.7
J003-Charleston Harbor (Cummings Pt.)	2.0	33.0	9.2	29.2	9.8	32.9	5.4	10.7	8.7	108.1	0.8	56.3	189.7	1271.5	0.0	39.0	6.8	8.1	3.6	9.1	13.2	154.0	2.4	62.8	0.8	1.7
North Santee River:																										
NB04-North Santee Bay	8.0	29.0	7.8	26.9	7.1	32.4	5.1	10.4	13.3	67.6	0.4	6.7	245.9	1405.0	4.5	229.0	5.9	7.8	6.4	70.0	43.2	213.2	2.0	77.2	0.3	0.8
NS01-N. Santee Inlet	2.0	29.0	9.2	26.9	7.8	32.6	5.3	10.1	5.5	94.3	0.8	9.7	217.8	1405.0	13.0	229.0	6.1	8.2	5.4	42.0	44.4	170.4	1.6	92.0	0.4	1.1
NS04-Crow Island	5.0	29.0	8.4	27.3	0.3	26.4	4.9	10.3	20.7	144.0	1.1	16.0	112.4	1405.0	3.0	58.0	6.4	8.2	10.5	42.0	20.4	132.0	3.2	44.0	0.4	0.8
NS07-Santee Swamp	3.0	28.0	9.2	29.2	0.1	6.6	5.3	10.4	25.7	202.7	1.5	13.7	182.6	1173.2	12.0	247.5	6.8	7.9	18.0	74.0	21.6	129.2	1.8	80.4	0.1	0.7
NS11-1 mile up from Hwy. 17 Bridge	4.0	31.0	9.8	29.2	0.1	0.4	5.4	10.1	53.5	176.1	1.1	8.7	154.6	786.8	0.0	164.0	6.9	8.4	18.0	55.0	9.2	100.4	3.6	68.8	0.2	1.0
South Santee River:																										
SS01-S. Santee Inlet	11.0	29.0	9.7	27.1	10.0	31.3	5.7	10.1	13.6	51.2	0.0	9.4	161.6	1046.7	0.0	100.5	6.5	7.9	5.2	39.0	44.0	147.6	2.8	56.0	0.4	0.9
SS04-Murphy Island	10.0	30.0	9.2	27.2	0.3	16.0	4.3	10.4	28.6	114.9	0.8	8.7	147.5	1018.6	0.0	238.0	6.5	7.9	7.5	44.0	35.2	92.0	1.6	42.8	0.3	0.8
SS07-1 mile up from Santee Coastal Reserve	4.0	28.0	9.2	28.0	0.4	9.6	5.3	12.0	9.7	83.3	0.6	7.0	91.3	843.0	0.0	75.0	6.7	7.9	8.4	67.0	30.8	99.6	2.0	50.8	0.3	0.7
SS11-Hampton Island	10.0	29.0	9.3	28.1	0.1	1.3	4.6	9.9	14.0	186.2	0.8	7.0	84.3	1250.4	0.0	227.5	6.8	7.6	17.0	53.0	11.6	86.0	4.4	54.0	0.2	0.6

*In addition to the data presented herein, two earlier annual cycles of parallel Estuarine Survey data (1973 and 1974) for the Charleston Harbor-Cooper River estuary were reported previously, by Mathews and Shealy (1978) and are available as a separate publication.

Table 9. Annual ranges (lows and highs) for air temperature and major physical and chemical characteristics of bottom waters monitored monthly at 15 stations in the North and South Santee and Charleston Harbor-Cooper River estuaries, South Carolina during the second of two annual cycles of study from January through December, 1976,*

1976 (Bottom) Estuary	Air Temperature (°C)		Water Temperature (°C)		Salinity (°/oo)		Dissolved Oxygen (mg/l)		Nitrate (µg/l)		Nitrite (µg/l)		Silicate (µg/l)		Phosphate (µg/l)		pH		Turbidity (FTU)		Total Solids (mg/l)		Settleable Solids (mg/l)		Secchi Disc (m)	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Cooper River:																										
C001-The Tee	2.0	32.0	9.3	30.1	0.0	0.4	5.8	11.9	11.3	221.8	0.4	3.5	140.5	857.0	0.0	43.5	7.0	8.0	2.7	21.0	2.4	36.4	0.0	4.0	0.7	2.5
C002-Big Island	0.0	29.0	9.2	29.8	0.1	7.5	6.0	11.8	8.8	207.5	0.3	7.0	63.2	1004.6	0.0	146.0	6.9	8.0	3.7	23.0	0.8	51.2	0.4	10.8	0.7	2.0
C003-N. Charleston	-1.0	32.0	9.6	29.6	0.1	15.2	5.3	11.4	11.3	148.1	0.4	15.7	133.5	1004.6	0.0	29.5	6.9	7.7	3.2	13.0	8.8	62.8	0.0	18.8	0.8	1.7
C004-Mouth of Cooper	-1.0	29.0	10.6	29.7	3.5	24.3	4.5	10.0	35.0	100.0	0.7	21.4	154.6	744.6	0.0	48.0	6.9	7.6	5.0	38.0	27.2	115.6	6.4	74.0	0.6	1.6
J001-Charleston Harbor (Ft. Johnson)	-2.0	35.0	10.5	29.5	7.5	27.7	4.6	9.9	24.5	56.4	2.0	18.2	84.3	1299.6	0.0	45.5	6.0	8.0	5.0	60.0	38.8	150.0	1.2	46.0	0.9	1.7
J003-Charleston Harbor (Cummings Pt.)	2.0	33.0	8.7	29.0	24.9	32.7	5.3	9.3	7.8	61.0	0.7	15.1	84.3	1187.2	0.0	99.0	6.9	8.3	5.3	74.0	66.5	233.2	12.0	121.2	0.8	1.7
North Santee River:																										
NB04-North Santee Bay	8.0	29.0	7.9	26.8	7.3	32.4	4.8	10.3	12.3	59.1	1.0	6.7	224.8	1299.6	13.5	49.5	6.5	8.0	4.4	70.0	90.4	291.6	15.6	167.6	0.3	0.8
NS01-N. Santee Inlet	2.0	29.0	9.0	26.8	10.8	32.6	5.3	9.9	3.5	90.6	0.0	9.8	112.4	3934.0	3.8	220.0	6.0	8.1	14.0	125.0	92.4	224.4	10.0	139.2	0.4	1.1
NS04-Crow Island	5.0	29.0	8.2	27.0	0.4	26.6	4.6	10.4	9.4	121.9	1.4	13.0	224.8	1405.0	0.0	59.5	6.6	8.2	14.0	52.0	26.4	218.0	2.4	76.0	0.4	0.8
NS07-Santee Swamp	3.0	28.0	8.9	28.9	0.1	6.7	5.0	10.2	38.4	206.3	1.1	15.1	112.4	983.5	6.0	214.5	6.3	8.3	19.0	145.0	15.6	406.4	5.6	282.4	0.1	0.7
NS11-1 mile up from Hwy. 17 Bridge	4.0	31.0	9.9	29.2	0.1	0.4	5.3	10.2	51.9	193.2	0.8	9.1	140.5	1095.9	3.0	85.5	6.9	7.9	18.0	77.0	10.0	148.4	4.4	105.6	0.2	1.0
South Santee River:																										
SS01-S. Santee Inlet	11.0	29.0	9.5	27.1	11.8	31.6	5.4	10.4	7.6	61.0	0.1	9.9	84.3	1236.4	0.0	235.5	6.8	8.0	7.0	43.0	35.2	148.4	1.2	57.6	0.4	0.9
SS04-Murphy Island	10.0	30.0	9.1	27.5	0.4	22.0	4.5	10.3	13.0	100.7	0.4	10.6	98.4	1215.3	0.0	84.0	6.7	7.7	6.7	47.0	34.8	118.8	0.0	63.6	0.3	0.8
SS07-1 mile up from Santee Coastal Reserve	4.0	28.0	9.2	27.7	0.3	11.5	4.8	11.0	5.9	66.9	0.4	5.9	168.6	632.2	0.0	132.0	6.4	7.7	25.0	92.0	47.2	189.2	1.2	88.0	0.3	0.7
SS11-Hampton Island	10.0	29.0	9.2	28.2	0.1	1.4	4.8	10.2	4.0	146.6	0.4	5.3	77.3	709.5	0.0	28.5	6.5	7.7	17.0	63.0	18.0	138.4	7.6	102.8	0.2	0.6

*In addition to the data presented herein, two earlier annual cycles of parallel Estuarine Survey data (1973 and 1974) for the Charleston Harbor-Cooper River estuary were reported previously by Mathews and Shealy (1978) and are available as a separate publication.

Table 10. Annual means for air temperature and major physical and chemical water characteristics monitored monthly, surface and bottom, at six stations in the Charleston Harbor-Cooper River estuary, South Carolina during a third annual cycle of study from January through December 1977.*

1977 (Annual Means) Estuary	Air Temperature (°C) $\bar{X}$	Water Temperature (°C) $\bar{X}$ Surface	Water Temperature (°C) $\bar{X}$ Bottom	Salinity (°/oo) $\bar{X}$ Surface	Salinity (°/oo) $\bar{X}$ Bottom	Dissolved Oxygen (mg/l) $\bar{X}$ Surface	Dissolved Oxygen (mg/l) $\bar{X}$ Bottom	Nitrate (µg/l) $\bar{X}$ Surface	Nitrate (µg/l) $\bar{X}$ Bottom	Nitrite (µg/l) $\bar{X}$ Surface	Nitrite (µg/l) $\bar{X}$ Bottom	Silicate (µg/l) $\bar{X}$ Surface	Silicate (µg/l) $\bar{X}$ Bottom
Cooper River:													
C001-The Tee	21.4	19.7	19.2	0.4	0.3	8.5	8.4	105.2	105.6	1.3	1.3	459.0	522.8
C002-Big Island	18.8	19.6	19.6	0.8	1.5	7.6	8.1	108.8	103.6	2.3	2.9	450.8	483.7
C003-N. Charleston	18.1	19.7	19.7	4.4	6.5	8.0	7.6	108.2	81.9	2.4	1.4	538.6	536.2
C004-Mouth of Cooper	20.7	19.6	19.9	6.9	13.5	7.8	7.3	79.8	69.6	2.6	3.7	579.0	549.1
J001-Charleston Harbor (Ft. Johnson)	19.3	19.8	20.1	15.0	21.1	7.4	7.1	59.7	49.4	2.8	3.6	594.2	519.3
J003-Charleston Harbor (Cummings Pt.)	20.2	19.6	19.4	20.0	28.5	7.4	7.2	51.4	70.7	4.8	6.2	564.3	357.7

1977 (Annual Means) Estuary	Phosphate (µg/l) $\bar{X}$ Surface	Phosphate (µg/l) $\bar{X}$ Bottom	pH $\bar{X}$ Surface	pH $\bar{X}$ Bottom	Turbidity (FTU) $\bar{X}$ Surface	Turbidity (FTU) $\bar{X}$ Bottom	Total Solids (mg/l) $\bar{X}$ Surface	Total Solids (mg/l) $\bar{X}$ Bottom	Settleable Solids (mg/l) $\bar{X}$ Surface	Settleable Solids (mg/l) $\bar{X}$ Bottom	Secchi Disc (m) $\bar{X}$ Surface	Secchi Disc (m) $\bar{X}$ Bottom
Cooper River:												
C001-The Tee	15.9	15.0	7.3	7.2	10.5	11.1	8.9	10.4	2.6	3.4	1.3	1.3
C002-Big Island	21.8	18.5	7.5	7.4	11.0	11.6	11.9	16.0	2.8	5.0	1.1	1.1
C003-N. Charleston	29.2	29.2	7.2	7.2	8.2	12.0	15.2	40.2	3.3	13.3	1.0	1.0
C004-Mouth of Cooper	28.3	25.4	7.2	7.2	7.9	13.0	25.1	61.7	7.6	13.5	1.1	1.1
J001-Charleston Harbor (Ft. Johnson)	31.9	32.0	7.3	7.4	5.7	16.5	34.3	88.4	1.5	25.6	1.2	1.2
J003-Charleston Harbor (Cummings Pt.)	30.8	34.2	7.3	7.5	18.4	44.2	47.1	173.1	6.4	144.2	1.0	1.0

*In addition to the data presented herein, two earlier annual cycles of paralled Estuarine Survey data (1973 and 1974) for the Charleston Harbor-Cooper River estuary were reported previously by Mathews and Shealy (1978) and are available as a separate publication.

there is surprisingly little difference in the salinity regimes in the North and South Santee distributaries, considering that most of the present flow is in the North Santee River (Cummings, 1970; Kjerve and Greer, 1978). The 1975-1976 Santee data indicate that both estuaries are essentially fresh (≤0.5 °/oo) by R.M. 11-12 (20.6-22.4 km) (Figures 15-16). The Cooper River freshwater line was located near R.M. 21-22 (39-41 km) (Figure 14).

Differences between surface and bottom mean salinities are greater in the lower reaches of the Cooper River and Charleston Harbor than in the same portions of the North and South Santee Rivers (Tables 3-5). This definitely indicates the stratified nature of Charleston Harbor and the zone near R.M. 9 (16.8 km) (station C004) on the Cooper River, where differences between mean surface and bottom salinities are up to 12.7 °/oo (Tables 3-5). Surface to bottom differences between mean salinities in both the North and South Santees are <2.0 °/oo, except at station SS04, where the difference is about 3.0-6.0 °/oo (Table 3-5). Figures 2-13 show monthly salinities, which distinctly illustrate the extent of stratification in each estuary.

Cooper River. Utilizing precipitation data for the watershed (Greenville-Spartanburg and Rock Hill) and Charleston in conjunction with the discharge from Lake Moultrie (Pinopolis Dam into the West Branch of the Cooper River), it is possible to elucidate most of the salinity fluctuations in our data. As would be expected, high rainfall in the watershed and concommitant discharge of water from Lake Moultrie normally caused a definite drop in Cooper River salinities at all stations. High local precipitation also produced low salinities at times, but generally was less important in affecting salinity than watershed precipitation. No rainfall for extended periods corresponded to increases in salinity. Only gross trends were seen however, and some salinity fluctuations observed during this study could not be explained. Tidal effects may have been important in altering salinity regimes, and causing salinities higher or lower than would be expected.

Data from the main Cooper River stations, i.e. J001, Ft. Johnson (boatslip), and J003, in some cases agreed well with the main Cooper River stations, but were more variable overall, probably due to tidal action. With the nominal discharge from Lake Moultrie being 326 m^3/sec (15,000 ft. ^{3}/sec), any value appreciably different from that would be likely to cause a noticeable salinity change. It appears that surface salinities are affected more than bottom salinities by fluctuations in discharge and/or runoff (compare Figures 4-6 with Fig. 2).

The following events were selected for discussion, since both surface and bottom salinities rose at all Cooper River stations (Figures 2-6). These elevated salinities followed very low surface and bottom salinities recorded during June and July, caused by record high local precipitation (Figure 25). The high salinities of Fall 1973 were a reflection of minimal summer rainfall and subsequent discharge from Lake Moultrie during October and November 1973 (Figures 25-26).

The next noticeable salinity change was recorded during the fall of 1974 at all stations (Figures 2-7) as a result of low precipitation and reduced discharge during October and November 1974 (Figures 25-26).

Since discharge from Lake Moultrie was >326 m^3/sec (>15,000 ft^3/sec) during 1975, a result of high rainfall throughout the year, the next major increase in surface and bottom salinities did not occur until May 1976 (Figures 2-7). Rainfall was low in April, as was discharge from Lake Moultrie in April and May 1976 (Figures 25-26).

The last observed salinity rise occurred in the late summer and fall of 1977 (Figures 2-7). Each station exhibited similar trends, but to varying degrees. This increase coincided with reduced rainfall in July 1977 in Greenville-Spartanburg and Rock Hill and low discharge from Lake Moultrie from May to October 1977 (Figures 25-26). This salinity increase occurred during a period of unusually hot weather, during which time evaporation also would have led to increased salinities.

Santee River. Salinity trends in the Santee River could generally be detected at each station. Some fluctuations were greater at one station than another, and others were not observed at all stations. The reasons for this are not clear, although large tidal variations may be the cause. Local rainfall data are not readily available since there are not weather stations located on the Santee River. Consequently, mainly watershed precipitation data will be used to elucidate salinity variations.

The first noticeable event observed at all stations was during April 1975 (Figures 8-13). It appears that relatively high rainfall and very high discharge from Lake Marion produced the exceptionally low salinities recorded in March and April 1975 (Figures 8-13). Salinity decreased at the upper Santee stations (NS07, SS07, NS04, and SS04) before the lower ones (NS01 and SS01) and generally in the North Santee prior to the South Santee.

The May 1975 increase in salinity was recorded at all stations except station NS07 (Figures 8-13). This is surprising because Lake Marion discharge was still rather high (Figure 26).

The July 1975 salinity increase was noted at all stations during a period of above average discharge (Figures 8-13). Both the May and July increases occurred during or after periods of reduced rainfall in the watershed. Since Lake Marion discharge was still high, this salinity increase is somewhat of an anomaly (Figures 25-26).

The next large inflection in salinity was during November and December 1975, when salinity rose sharply at all stations (Figures 8-13). Watershed rainfall and discharge were low during this period (Figures 25-26), as was local rainfall, e.g. Andrews had 3.07 cm (1.21 in.) of precipitation in November and 10.1 cm (3.96 in.) in December (U. S. Department of Commerce, NOAA, 1976).

The last major salinity change occurred in July 1976, when salinities dropped sharply at all stations (Figures 25-26), so the decrease in salinity must be due to local rainfall and/or reduced tidal influence. Precipitation data for July from Andrews, McClellanville, and Georgetown indicate average amounts of rainfall (U. S. Department of Commerce, NOAA, 1977a), so a lack of tidal incursion may be the cause of low salinity water at all of the stations.

DISSOLVED OXYGEN

In general, dissolved oxygen was high at all stations, whether surface or bottom. Concentrations ranged from a low of 4.4 mg/l to a high of 13.1 mg/l in the Cooper River for the 1975-1977 period (Tables 6-10). Thus, the Cooper River was well-oxygenated, as would be expected in an open estuarine system. During this sampling period another study was being conducted in Shem Creek, which drains into the northern part of Charleston Harbor. The results indicated that Shem Creek had summer dissolved oxygen concentrations as low as 3.2 mg/l (T. D. Mathews, unpublished data, 1977) in contrast to the 1977 Charleston Harbor minimum of 4.3 mg/l (Table 10).

Santee River dissolved oxygen concentrations were similar to those in the Cooper River. The North Santee had a minimum of 4.1 mg/l and a maximum of 10.5 mg/l, while the South Santee minimum and maximum oxygen concentrations were 4.3 and 12.0 mg/l (Tables 6-9). Monthly dissolved oxygen concentrations for both the Santee and Cooper Rivers are summarized in Appendix 1.

Oxygen saturation (%) was calculated from dissolved oxygen data, temperature, and salinity. These data can show signs of pollution, temperature extremes, and the general degree of oxygenation of a particular body of water. In the present study oxygen saturation has been plotted for the Cooper River from February 1975-December 1977 to complement the 1973-1974 data (Mathews and Shealy 1978). Several general observations can be made with respect to the data: surface waters are usually more saturated than bottom waters, saturation is at a minimum in the summer and a maximum in the winter, and the differences in saturation between estuaries are about the same as the differences within an estuary. Figures 17-22 illustrate that most of the bottom oxygen saturation values are $\leq$ surface values. This can also be seen in Figure 23, which shows annual means. Figures 17-22 illustrate seasonal variations. Figures 22-23 compare 1976 data for the North and South Santee Rivers (81-93%) with the Cooper River (81-91%).

Additionally, note the differences in the 1973-1974 and 1975-1976 data for the Cooper River. The drop in bottom oxygen saturation from C002 to C004 was on the order of 10-11% for 1973 and 1974 data (Mathews and Shealy, 1978), whereas the 1975-1976 data indicated a drop of 8-9% for bottom oxygen saturation (Figure 22). This might indicate less of an influence from the industrialized North Charleston area on the river, but due to the size of the decrease such a claim can only be considered conjectural. Mean oxygen saturation was also lowest overall for 1975 in the Cooper River (74-87%) (Figure 23), with 1974 having the highest values (81-95%) (Mathews and Shealy, 1978). These results should be compared to the much lower values found by the Federal Water Pollution Control Administration (1977).

Cooper River annual mean values were about the same at station C001 as at station J003 for 1973-1976. The North and South Santee Rivers had higher mean saturation values at their mouths than upstream (Figure 24). The same was true of the North and South Edisto Rivers, where the South Edisto, for instance, ranged from about 77% upstream to 92% at the mouth (Mathews and Shealy, 1978).

NUTRIENTS

Nutrient data were highly variable at all stations although some trends

appeared in the means. Nitrate usually decreased with increasing salinity, in surface and bottom waters of all three estuaries (Tables 3-5). This was not a smooth, even decline, however, for exceptions occurred in several instances. Nitrite, on the other hand, increased with increasing salinity in the Cooper River (surface and bottom) during 1975-1977 and in the South Santee (bottom) during 1975 to 1976, while there was no apparent relationship between nitrate and salinity in the North Santee (surface and bottom) during 1975 to 1976 (Tables 3-5). Increasing nitrite may be due to decreasing oxygen, since a high oxygen concentration would probably oxidize most of the nitrite to nitrate. Tables 3-5 illustrate decreasing dissolved oxygen concentration with increasing salinity. Unfortunately there is no obvious relationship between dissolved oxygen and nitrite except in the Cooper River.

Silicate varied more than nitrate or nitrite, with 1975 mean concentrations having no readily discernible pattern (Table 3). During 1976 surface silicate concentrations in the Cooper River generally increased with increasing salinity, as did North and South Santee silicate concentrations (Table 4). The Cooper River silicate concentrations in 1977 appeared to increase with increasing salinity (surface), while bottom values were variable (Table 5).

Orthophosphate concentrations, like the other nutrients, had few regular trends. Values from 1975 increased irregularly with increasing salinity (Table 3). The 1976 orthophosphate concentrations were irregular in each estuary with no obvious pattern (Table 4). The 1977 Cooper River data were more consistent with orthophosphate concentrations generally increasing downstream (Table 5).

SOLIDS AND TURBIDITY

Both total and settleable solids increased irregularly downstream, especially in the Cooper River (Tables 3-5). This trend was not as distinct in the North and South Santee Rivers, although it could be seen to some extent in total solids.

Turbidity should follow solids, but the data indicate an inverse relationship in some examples. Most of the 1975 turbidity data suggest a direct relationship between turbidity and solids, but 1976 data in the North and South Santee Rivers indicate that turbidity decreases downstream (Tables 3 and 4). Cooper River data for 1977, though irregular at the surface, increase downstream near the bottom (Table 5).

Extensive Phase Data

These data are included in Appendix 2, as a supplement to intensive (monthly) data. Station J001 in Charleston Harbor, for example, was occupied quarterly until it was shifted into the intensive phase. These quarterly data helped to fill in data gaps prior to intensive sampling. As long as extensive sampling occurred at any station, no intensive sampling was conducted at that particular station. The converse was also true.

Twenty-Five Hour Data

These data are displayed in Appendix 3. Diurnal variations can be readily detected at each of the stations, especially in the obvious parameters such as salinity, temperature, and dissolved oxygen. Typical ranges in Charleston Harbor (station J251) during July 1976, for example, were on the order of 9 °/oo surface and 22 °/oo bottom for salinity, 1.5°-2.0°C for surface and bottom temperature, and 1.0 mg/l for surface and bottom dissolved oxygen (Table 3a).

During the same period ranges in the South Santee River (station S254) were as follows: about 16.0 °/oo and 22.0 °/oo for surface and bottom salinity approximately 2.5°-3.0°C for surface and bottom water temperature, and about 1.5-2.0 mg/l for dissolved oxygen (Table 3b).

North Santee River (station N254) ranges for this sampling period were similar to those in the South Santee, i.e. about 16.5 °/oo and 23.0 °/oo for surface and bottom salinity, 2.0°C for surface and bottom temperature, and 1.0-1.5 mg/l for dissolved oxygen (Table 3c).

The other data varied far more than the above, with no clear diurnal trends existing in these data. An example of the data fluctuations can be seen in silicate, which ranged from 372.3-1032.7 µg/l during the May 1976 sampling period (Table 3b). Overall, the values varied in a seemingly random way.

SUMMARY AND CONCLUSIONS

The hydrography of the North and South Santee and Charleston Harbor-Cooper River estuaries is presented for 1975-1976 and 1973-1977 respectively. Major physical and chemical parameters are described and discussed with respect to overall trends and variations within and between estuaries. Many fluctuations in values could be explained with available data, while others seemingly varied randomly.

Several conclusions were drawn from our data, illustrating specific points. They are as follows:

1. It was noted that even salinity fluctuated occasionally in an unexpected fashion, unrelated to either rainfall or discharge. Such occurrences were assumed to be the result of tidal action.
2. Rainfall near the coast may not always cause a large decrease in salinity in the lower reaches of a river, while moderate rainfall in the watershed may cause a distinct lowering of the salinity near the coast.
3. There is surprisingly little difference between the North and South Santee distributaries, considering that most of the present flow is in the North Santee River.
4. There is also great similarity between the salinity regimes in the Santee system and the Cooper River above Charleston Harbor.
5. The encroachment of relatively high salinity water was clearly seen at Cooper River stations C002-C004 (R.M. 8-17/15-32 km) during late summer fall.
6. Stratification was clearly detected in Charleston Harbor and the lower reaches of the Cooper River by salinity measurements. Differences between mean surface and bottom salinities were up to 12.7 °/oo.
7. High dissolved oxygen concentrations were found at all stations, with values ranging from 4.1 to 13.1 mg/l. Oxygen saturation was generally higher in surface than bottom waters and was at a minimum in the summer and a maximum in the winter. The differences in oxygen saturation between estuaries were about the same as the differences within each estuary.
8. Both total and settleable solids increased irregularly downstream, especially in the Cooper River.

The complexity of the three estuarine systems in this study was illustrated not just in the differences, but in the similarities of these estuaries. If Charleston Harbor is excluded, the North and South Santee and Cooper Rivers had similar salinity distributions, but greatly different freshwater discharge. The freshwater line (≤0.5 °/oo) was located upstream of R.M. 11 (20-21 km) in the North and South Santee Rivers and near R.M. 21-22 (39-41 km) in the Cooper River. If, however, the distance is taken from C004 (R.M. 9/17 km), the Cooper River freshwater line is near R.M. 12-13 (22-24). This points out the need for careful examination of such systems prior to any major man-made alterations or modifications, since altering flow rates might not produce the desired effect.

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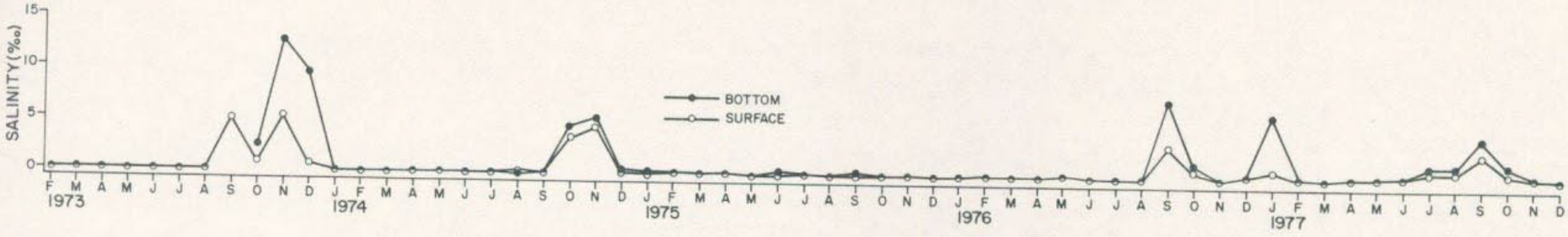

Figure 2. Surface and bottom salinity for Cooper River station Coo2, R.M. 17 (27.4 km) during the five continuous annual cycles from 1973 through 1977.

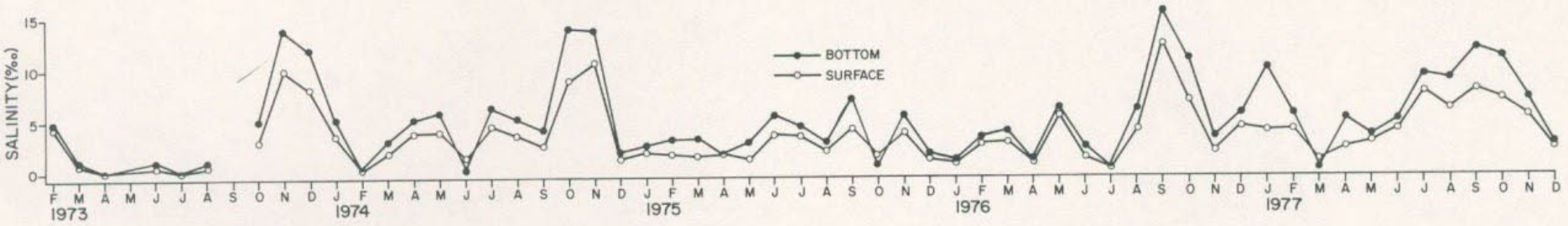

Figure 3. Surface and bottom salinity for Cooper River station C003, R.M. 12 (22.4 km) during the five continuous annual cycles from 1973 through 1977.

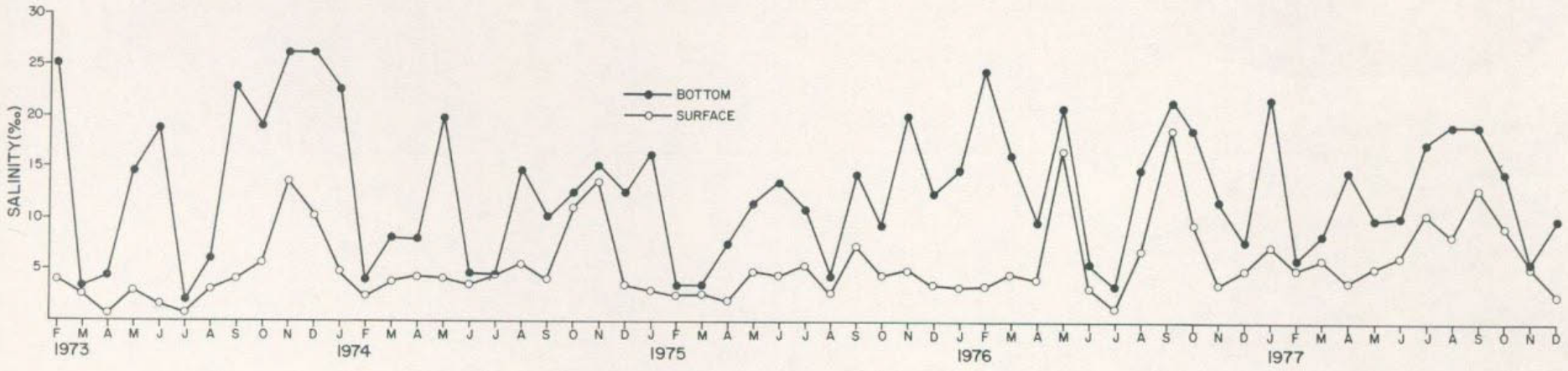

Figure 4. Surface and bottom salinity for Cooper River station C004, R.M. 8 (15.0 km) during the five continuous annual cycles from 1973 through 1977.

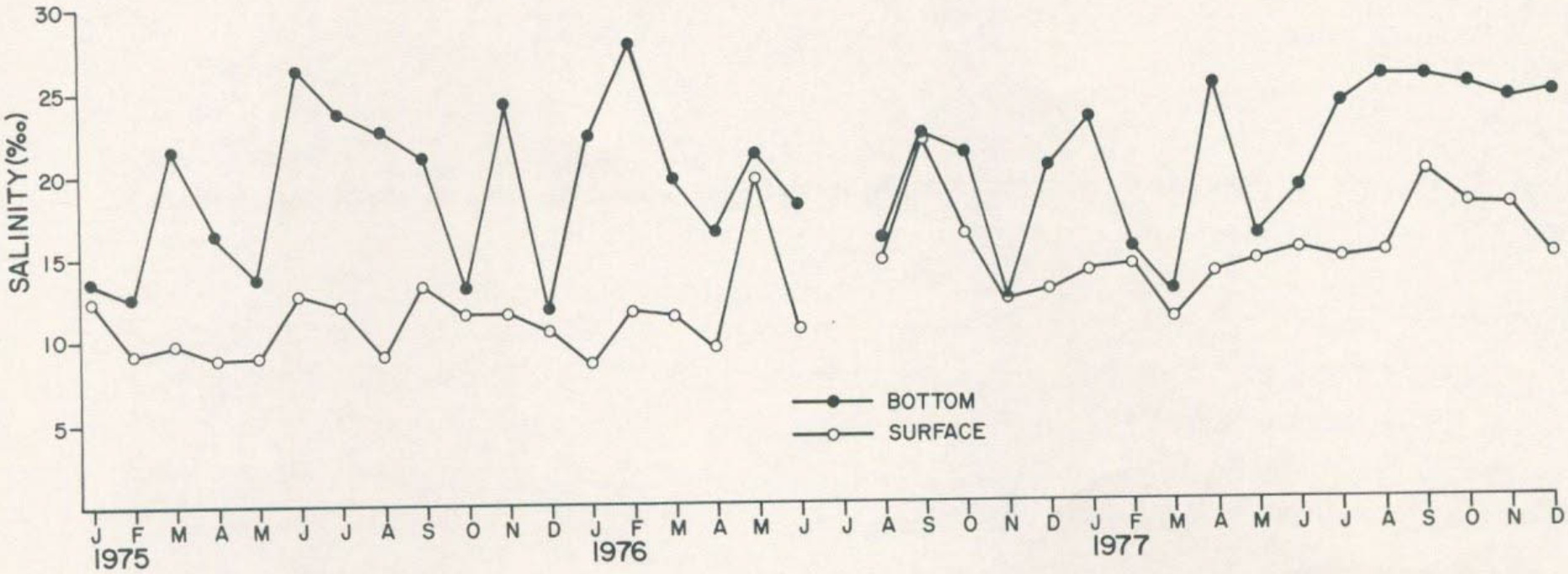

Figure 5. Surface and bottom salinity for Charleston Harbor station J001, R.M. 3 (5.6 km), during the three-year cycle from 1975 through 1977.

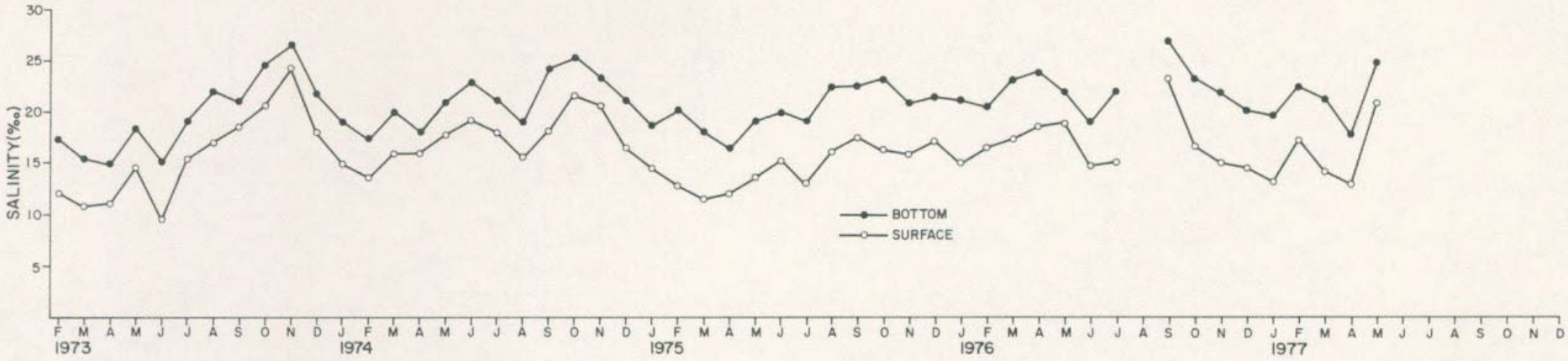

Figure 6. Surface and bottom salinity for Charleston Harbor (Ft. Johnson boatslip, R.M. 2 (3.7 km) during the five continuous annual cycles from 1973 through 1977.

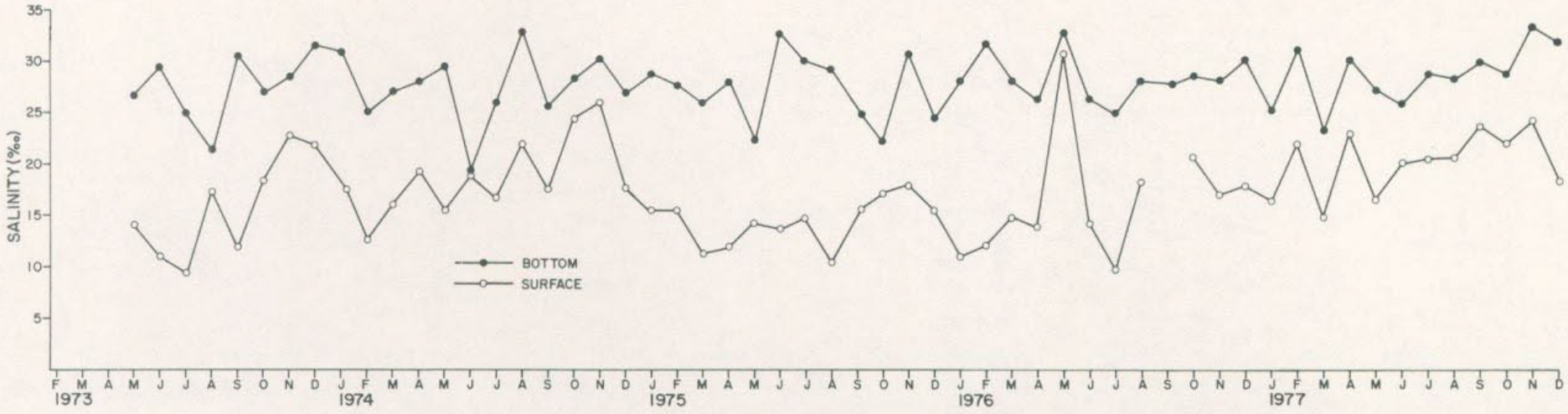

Figure 7. Surface and bottom salinity for Charleston Harbor station J003, R.M. 1 (1.9 km) during the five continuous annual cycles from 1973 through 1977.

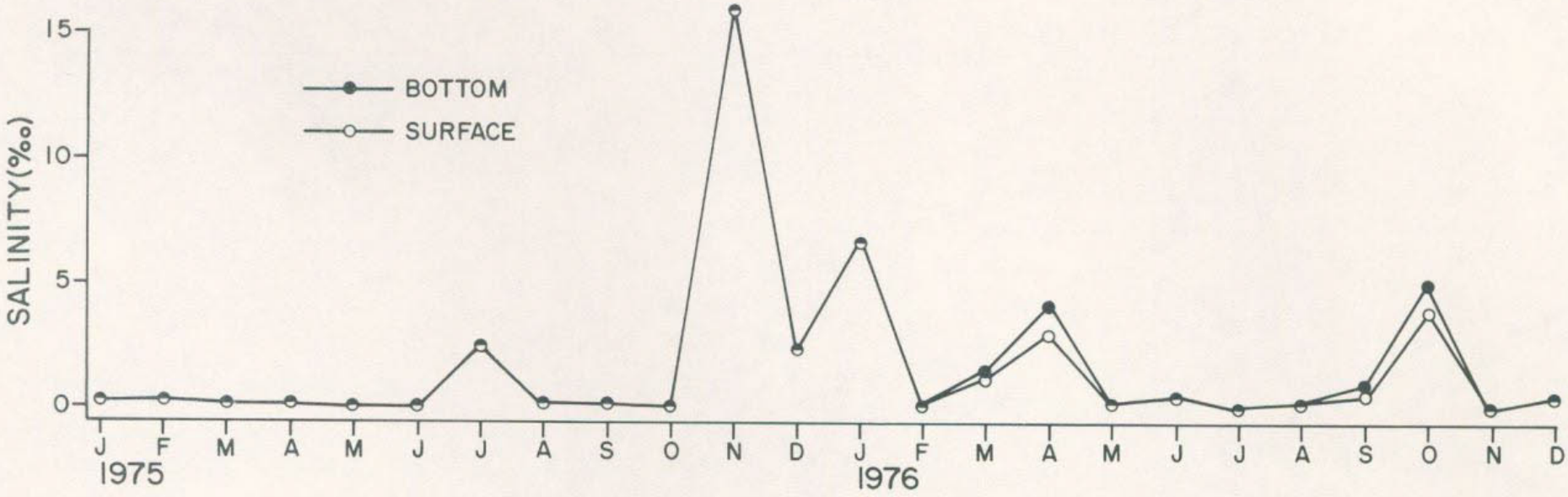

Figure 8. Surface and bottom salinity for North Santee River station NS07, R.M. 7 (13.1 km) during the two-year cycle from 1975 through 1976.

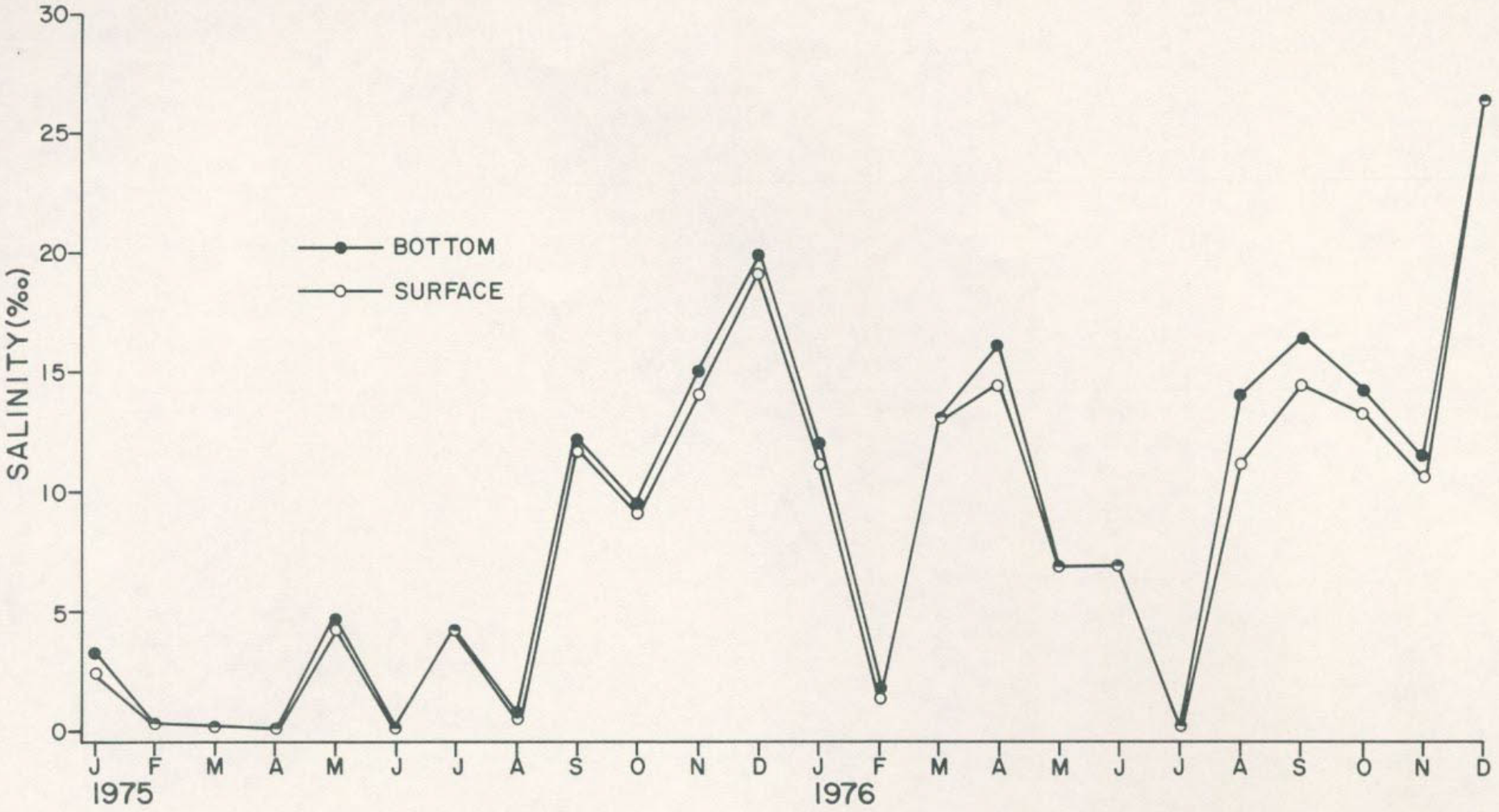

Figure 9. Surface and bottom salinity for North Santee River station NS04, R.M. 4 (7.5 km) during the two-year cycle from 1975 through 1976.

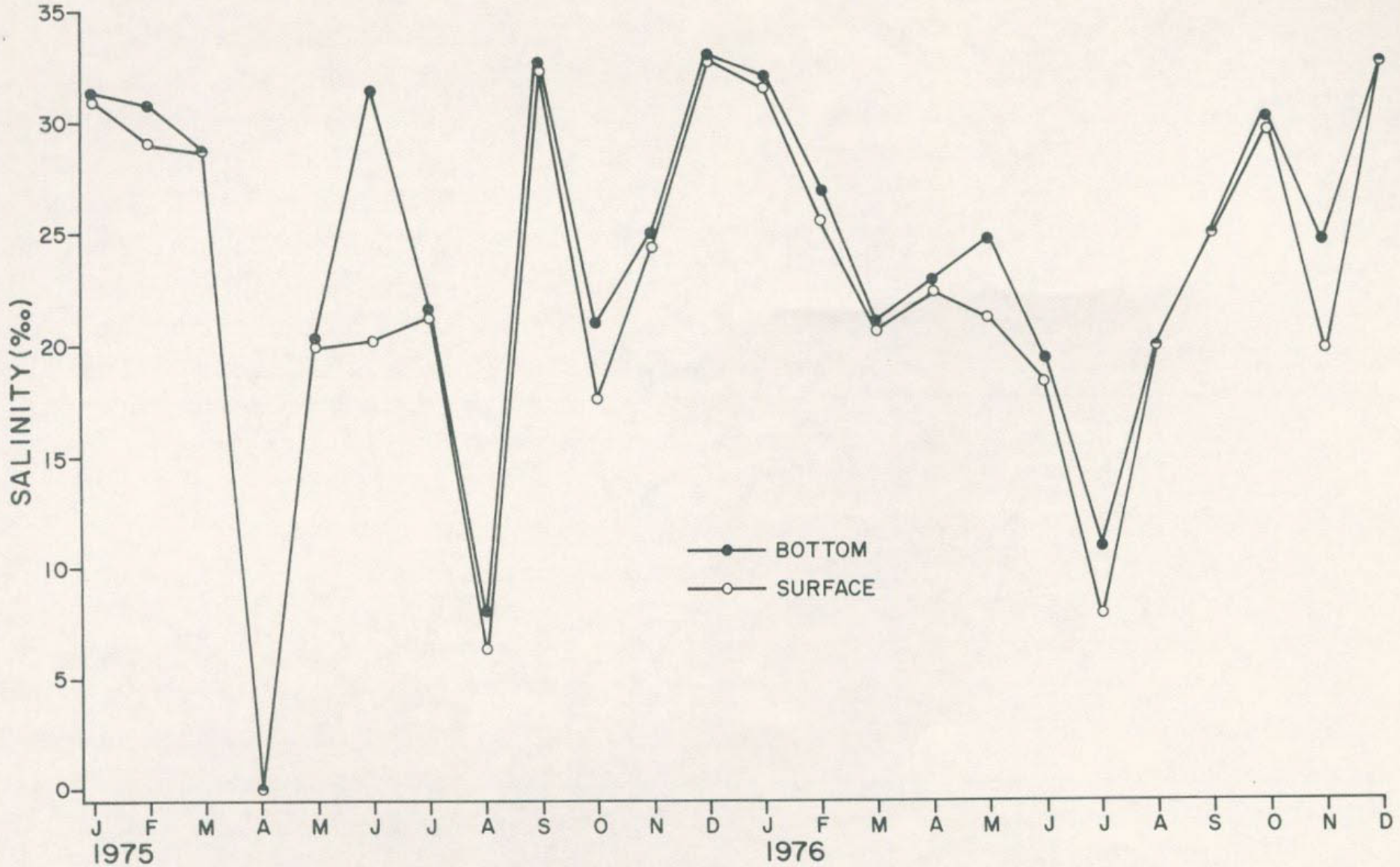

Figure 10. Surface and bottom salinity for North Santee River station NS01, R.M. 1 (1.9 km) (i.e. river mouth), during the two-year cycle from 1975 through 1976.

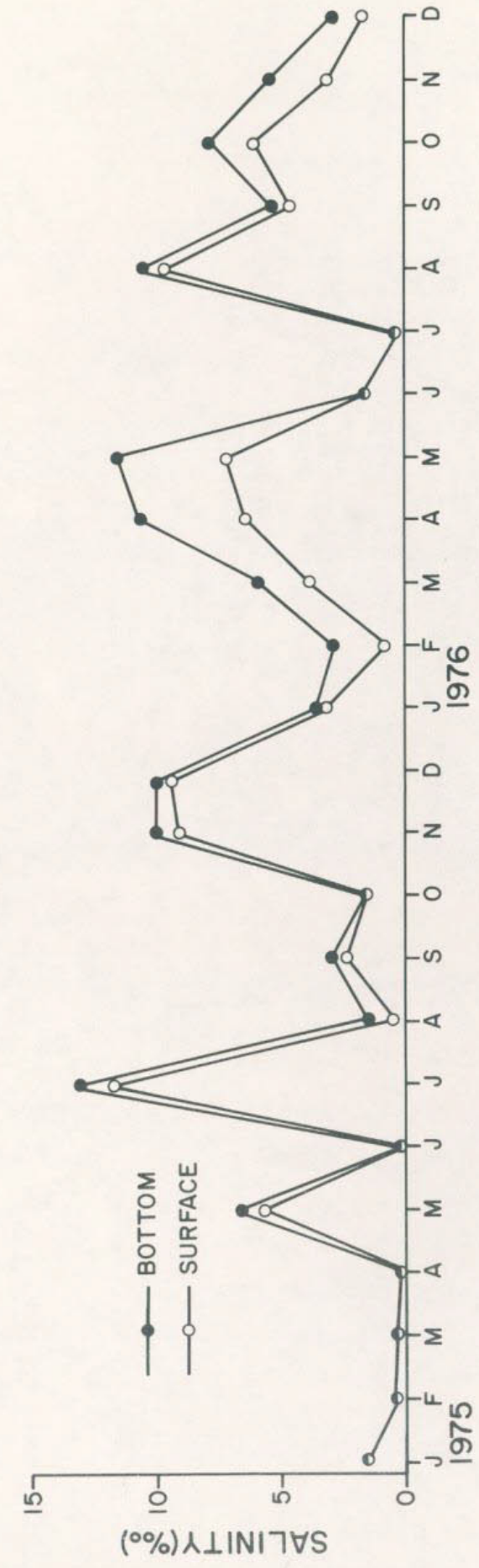

Figure 11. Surface and bottom salinity for South Santee River station SS07, R.M. 7 (13.1 km) during the two-year cycle from 1975 through 1976.

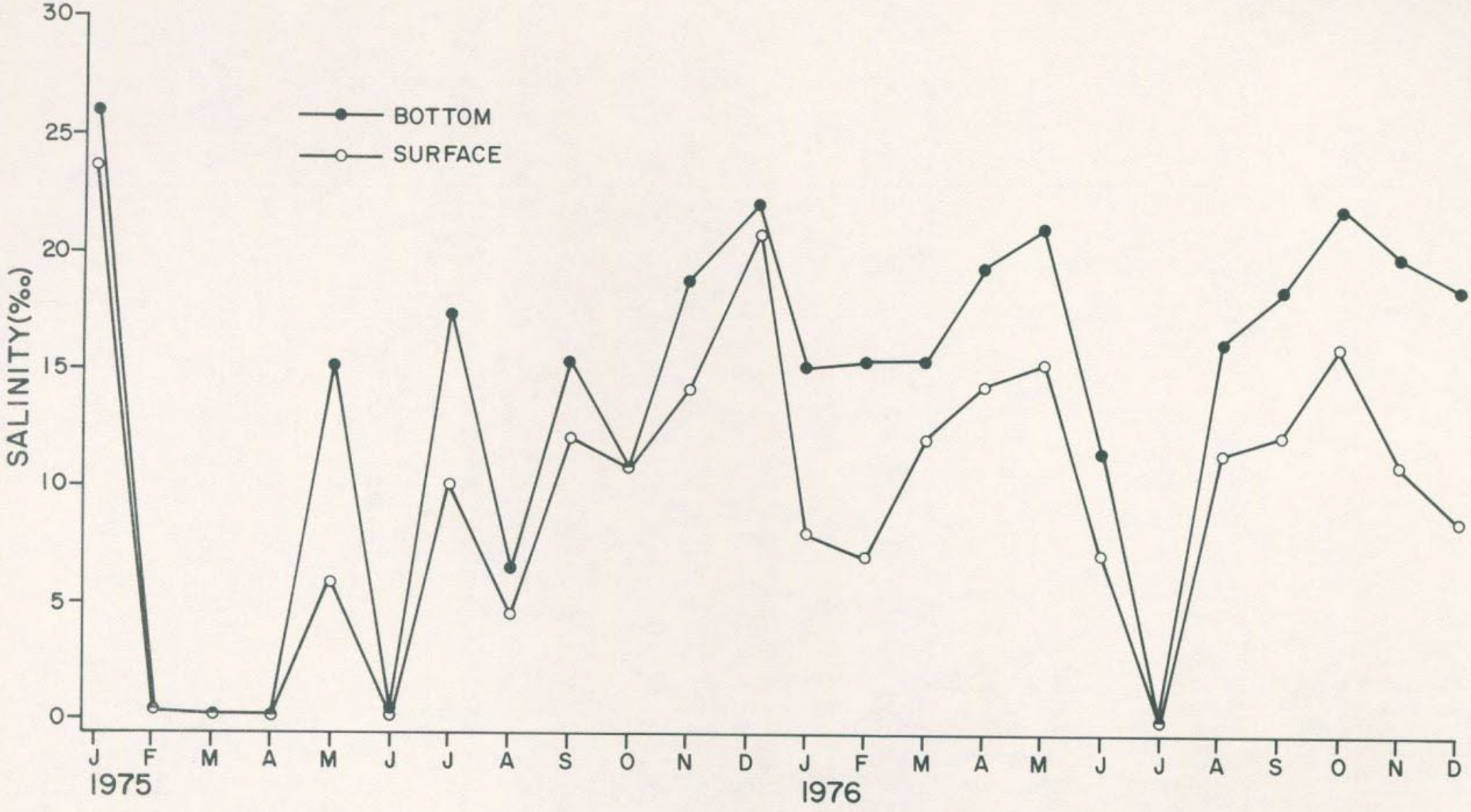

Figure 12. Surface and bottom salinity for South Santee River station SS04, R.M. 4 (7.5 km) during the two-year cycle from 1975 through 1976.

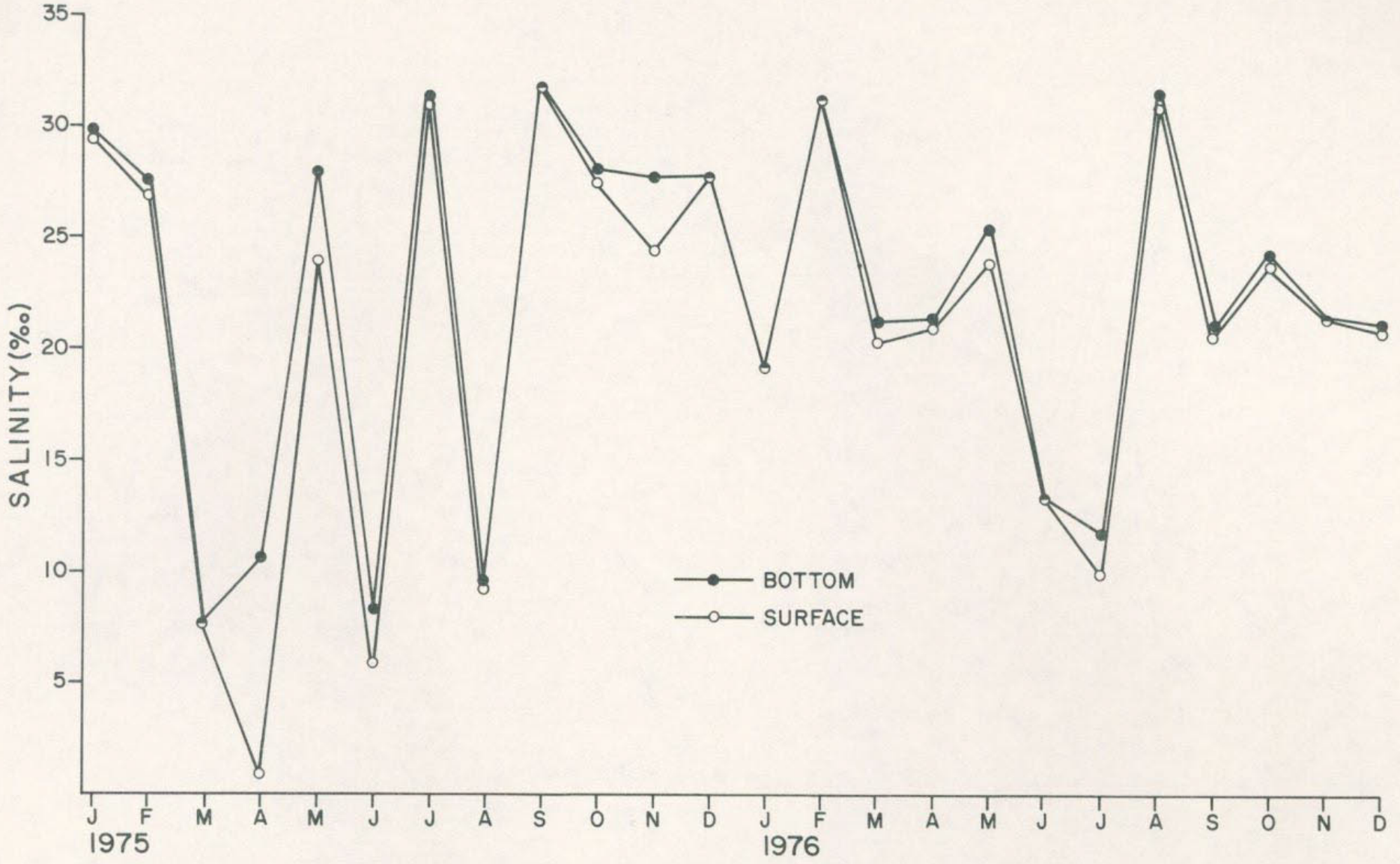

Figure 13. Surface and bottom salinity for South Santee River station SS01, R.M. 1 (1.9 km) (i.e. river mouth), during the two-year cycle from 1975 through 1976.

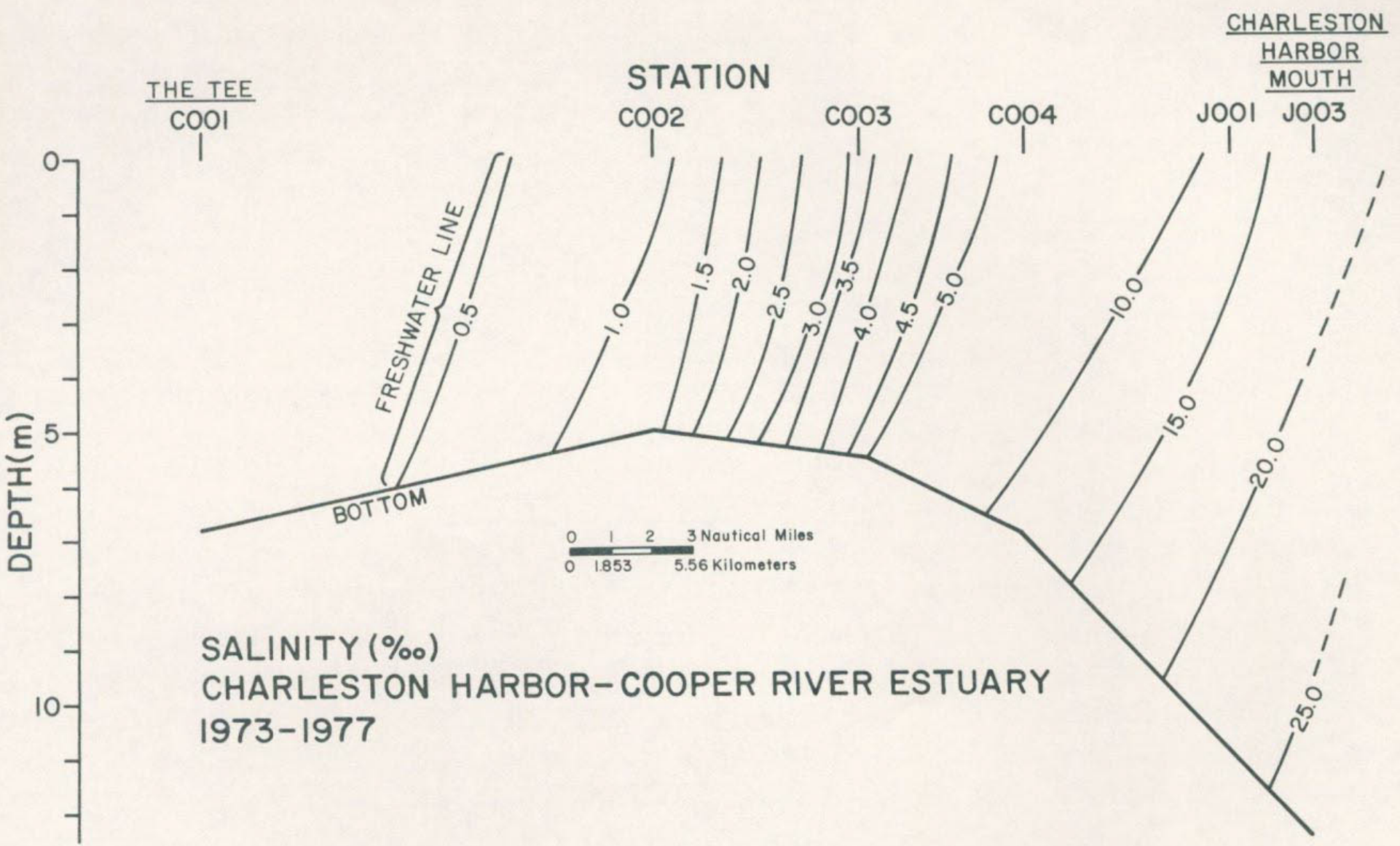

Figure 14. Isohalines for Cooper River and Charleston Harbor stations, based on mean surface and bottom salinities during the five-year period 1973 through 1977.

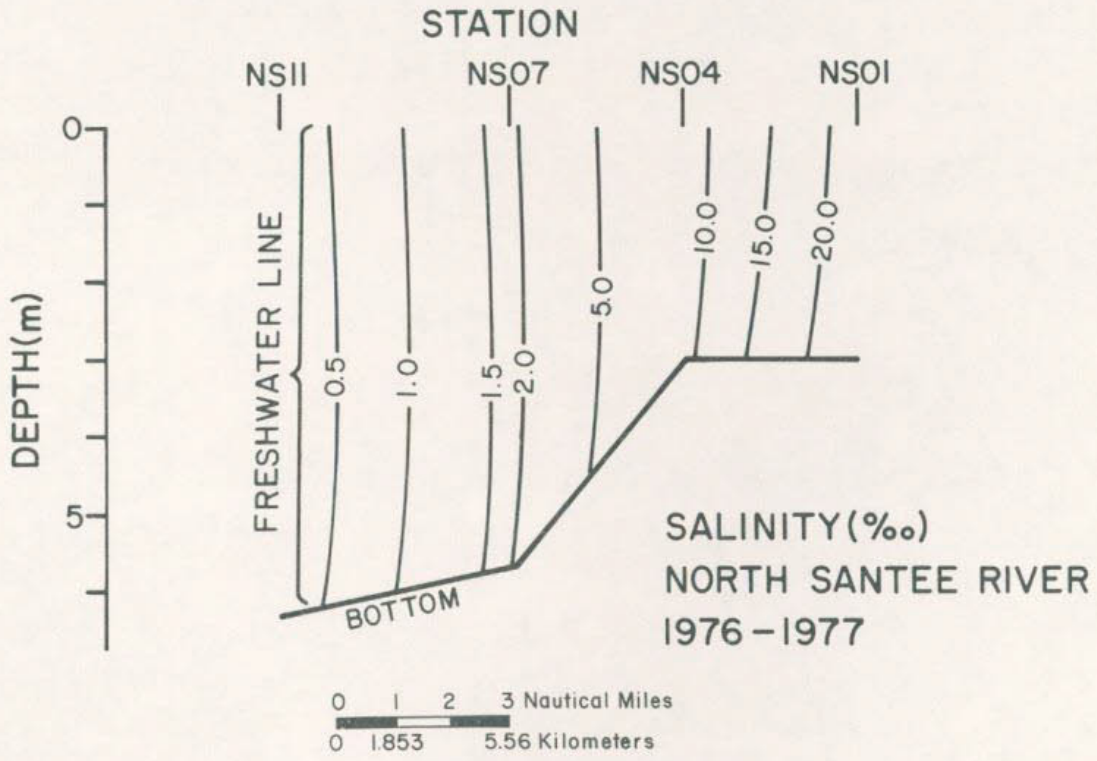

Figure 15. Isohalines for the North Santee River, based on mean surface and bottom salinities during the two-year period 1976 through 1977.

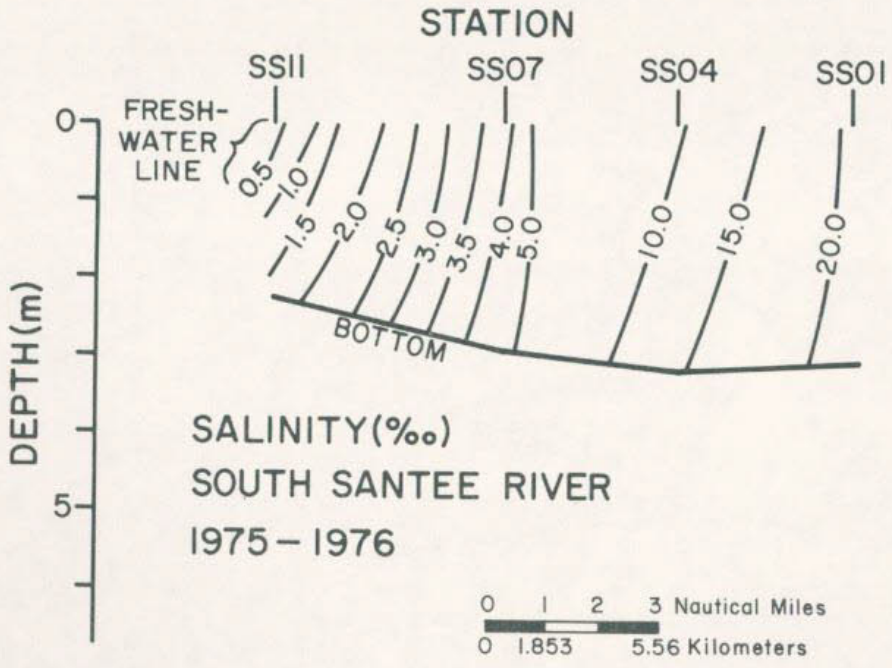

Figure 16. Isohalines for the South Santee River, based on mean surface and bottom salinities during the two-year period 1976 through 1977.

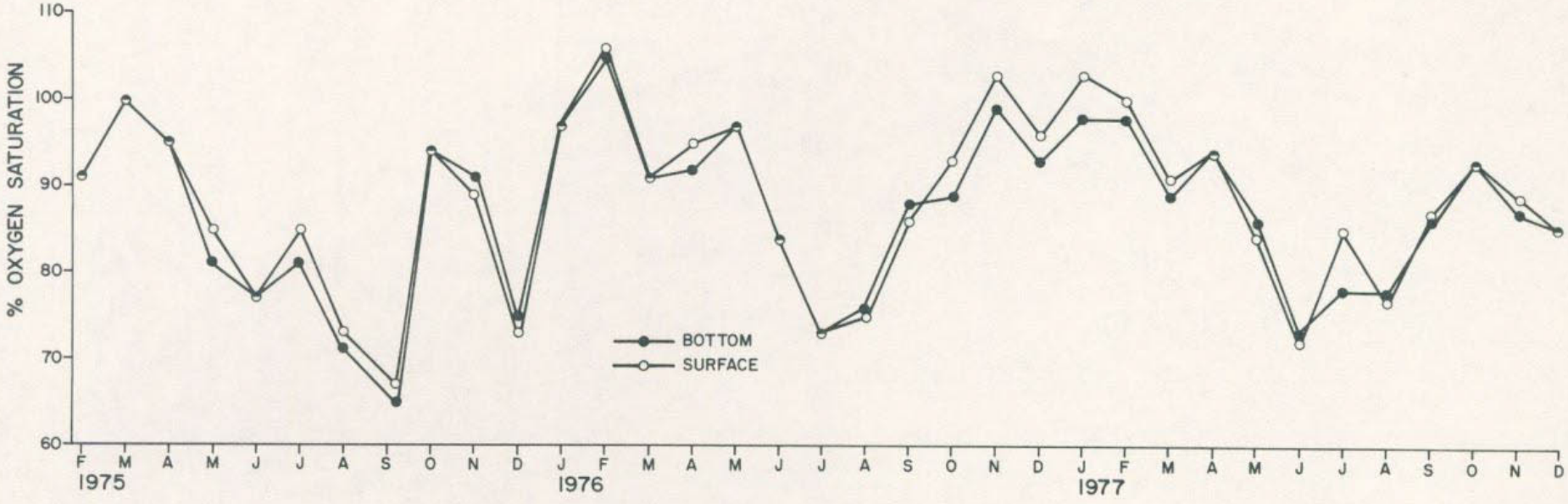

Figure 17. Surface and bottom oxygen saturation for Cooper River station C001, R.M. 28 (52.4 km), during the three-year cycle from 1975 through 1977.

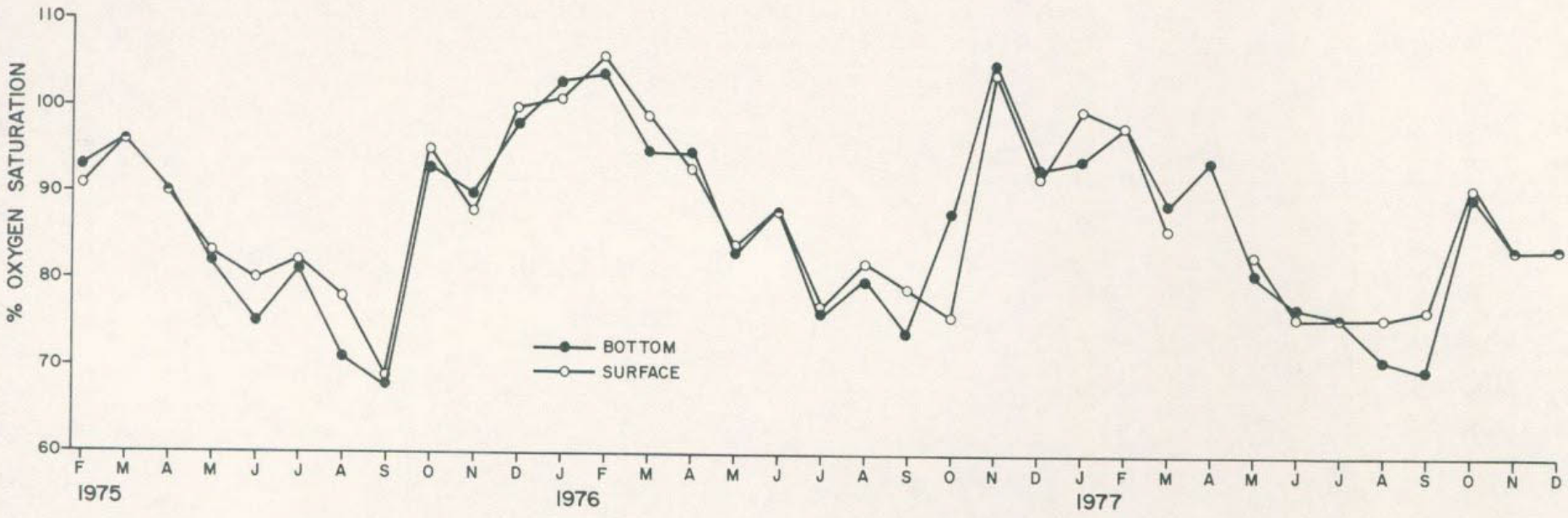

Figure 18. Surface and bottom oxygen saturation for Cooper River station C002, R.M. 17 (31.8 km), during the three-year cycle from 1975 through 1977.

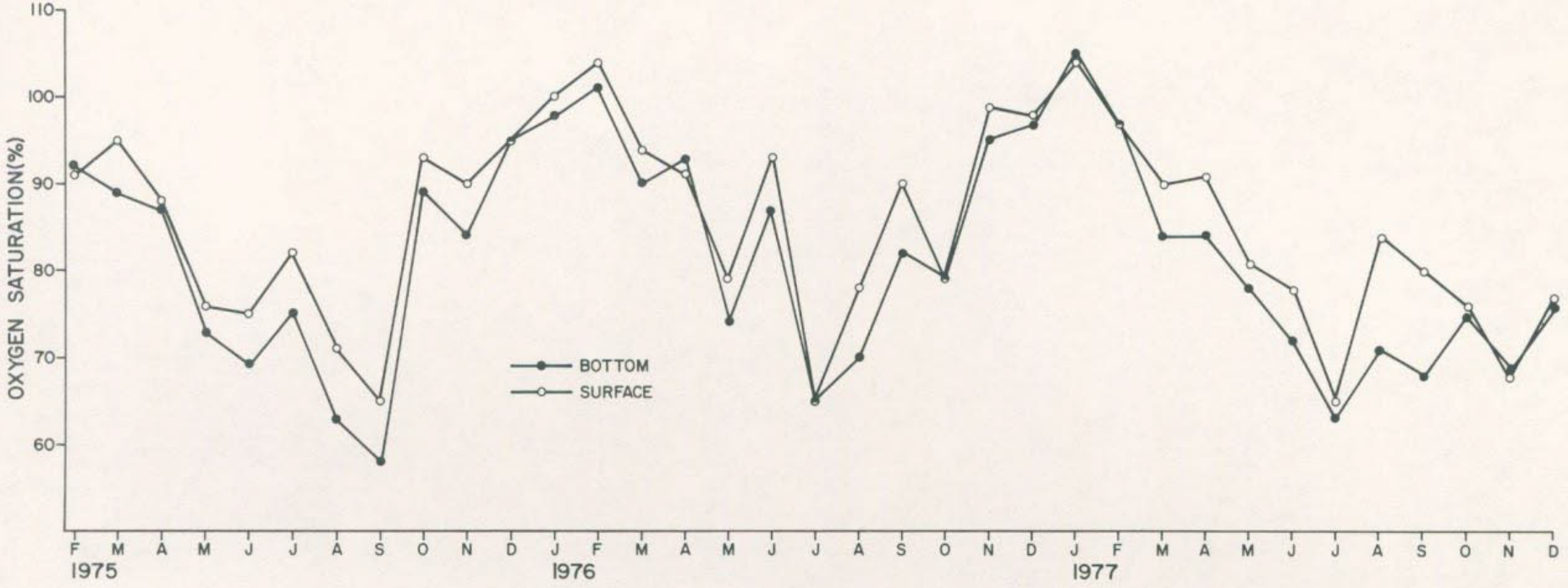

Figure 19. Surface and bottom oxygen saturation for Cooper River station C003, R.M. 12 (22.4 km), during the three-year cycle from 1975 through 1977.

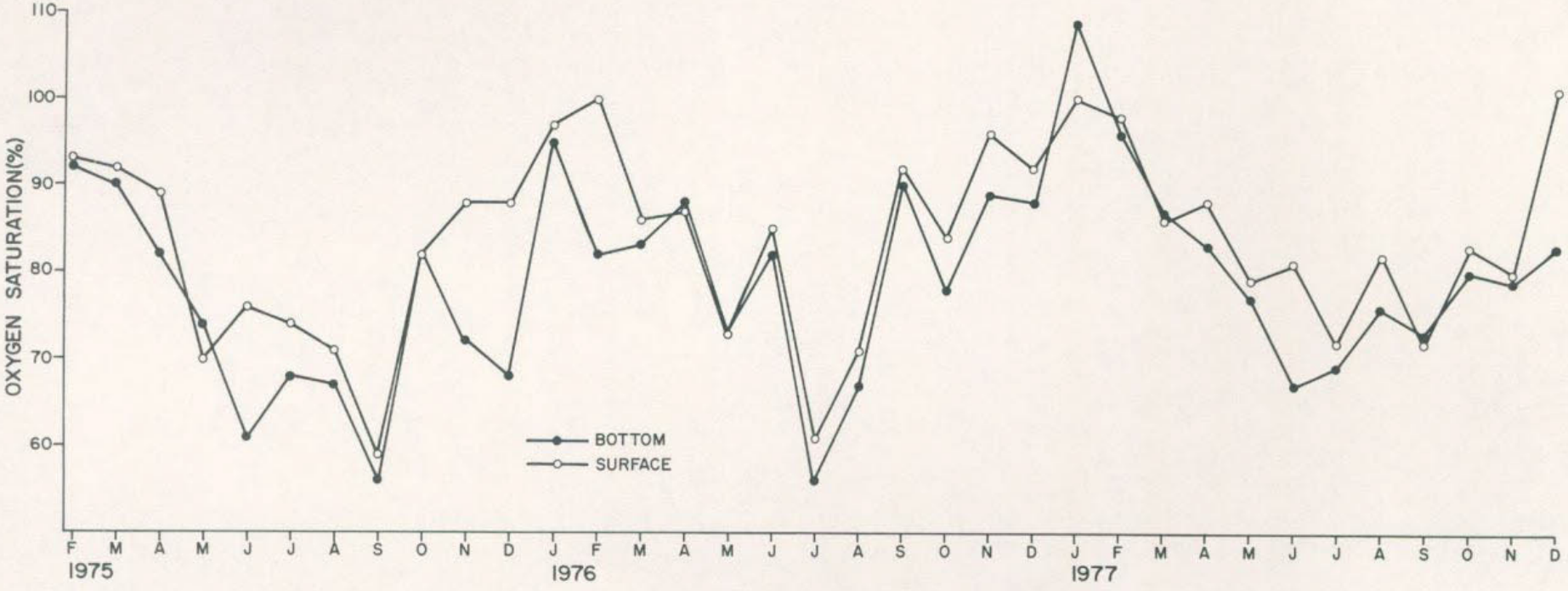

Figure 20. Surface and bottom oxygen saturation for Cooper River station C004, R.M. 8 (15.0 km), during the three-year cycle from 1975 through 1977.

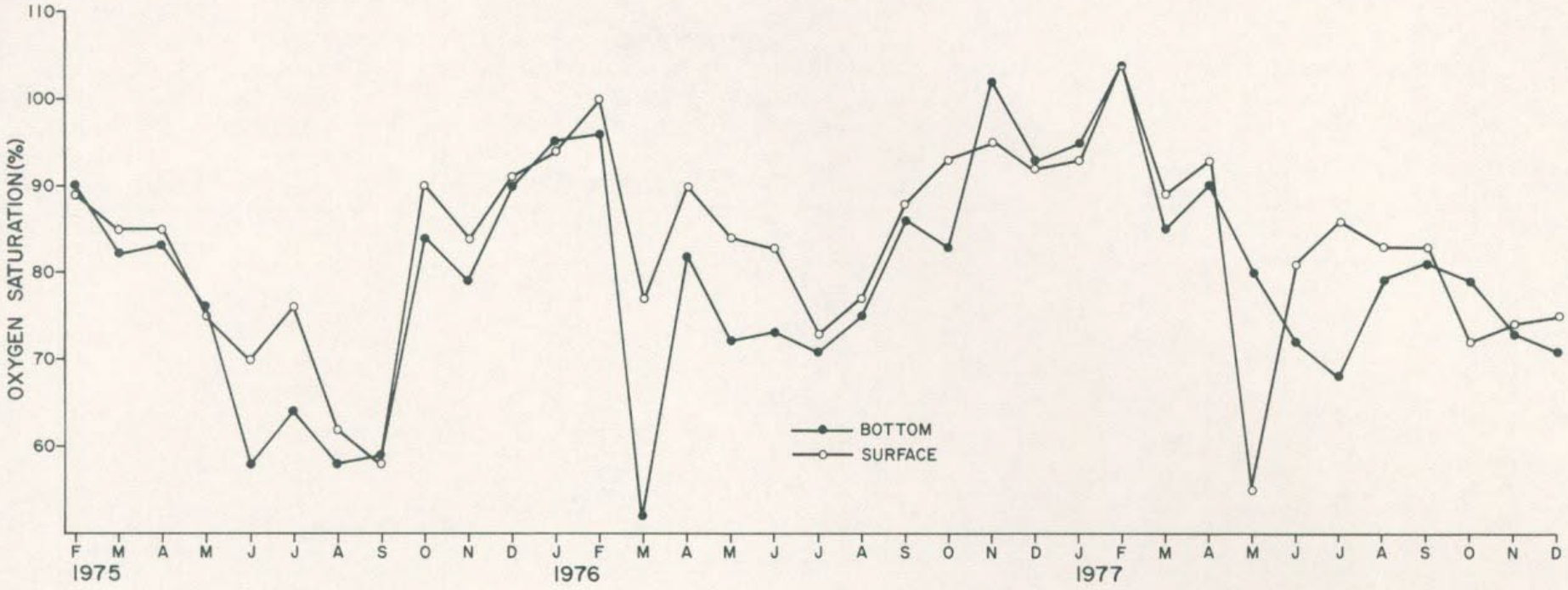

Figure 21. Surface and bottom oxygen saturation for Cooper River station J001, R.M. 3 (5.6 km), during the three-year cycle from 1975 through 1977.

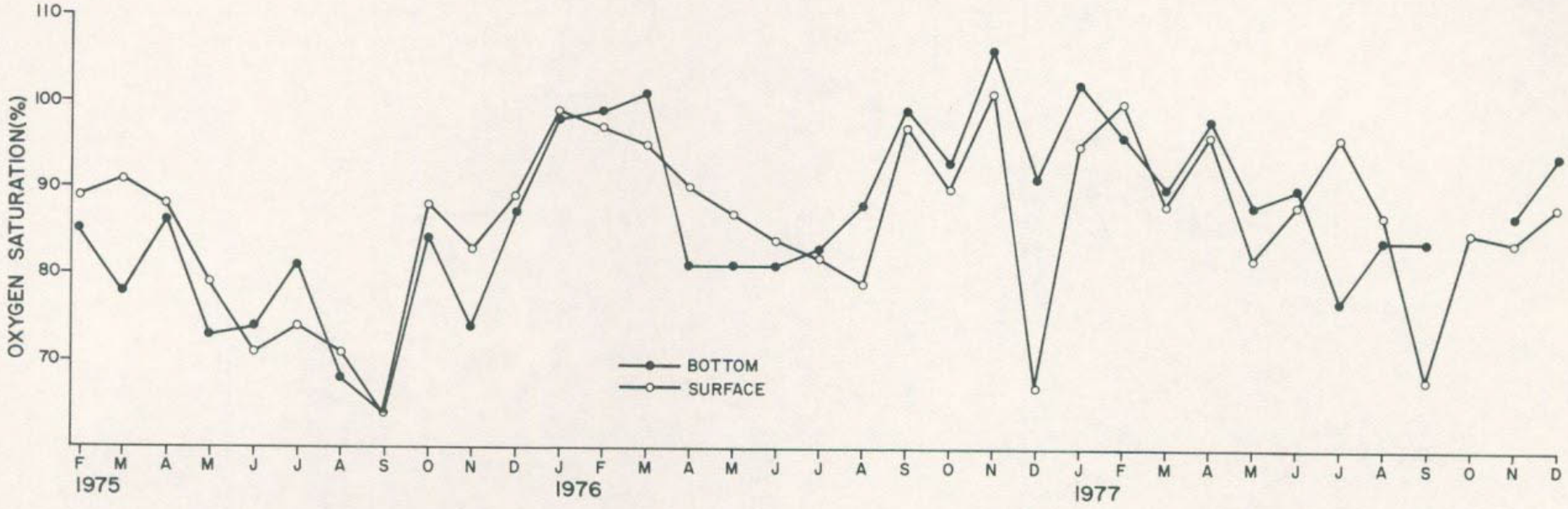

Figure 22. Surface and bottom oxygen saturation for Cooper River station J003, R.M. 1 (1.9 km), during the three-year cycle from 1975 through 1977.

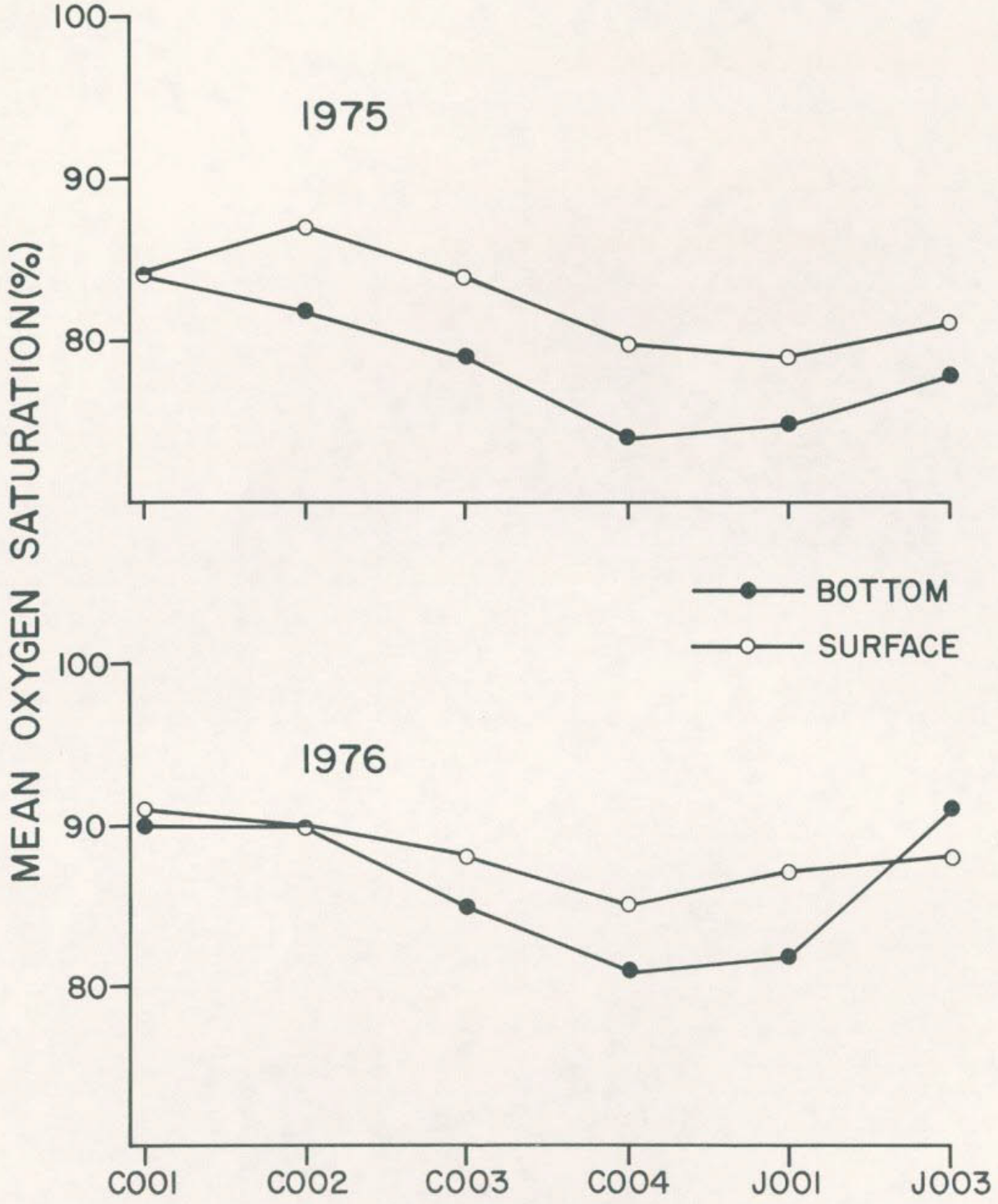

Figure 23. Surface and bottom mean oxygen saturation for the Charleston Harbor-Cooper River estuary during the two annual cycles 1975 and 1976.

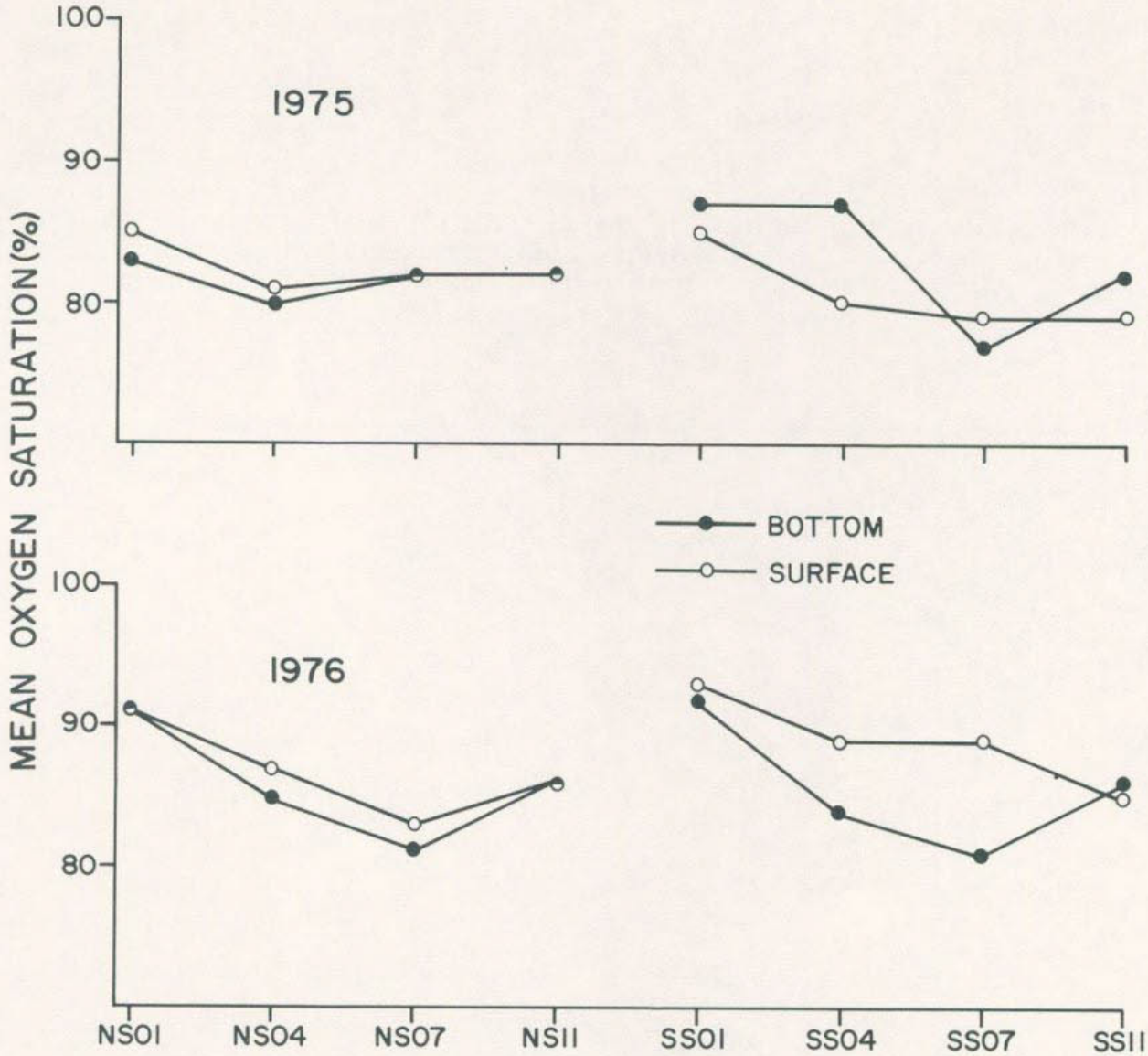

Figure 24. Surface and bottom mean oxygen saturation for North and South Santee River stations during the two annual cycles 1975 and 1976.

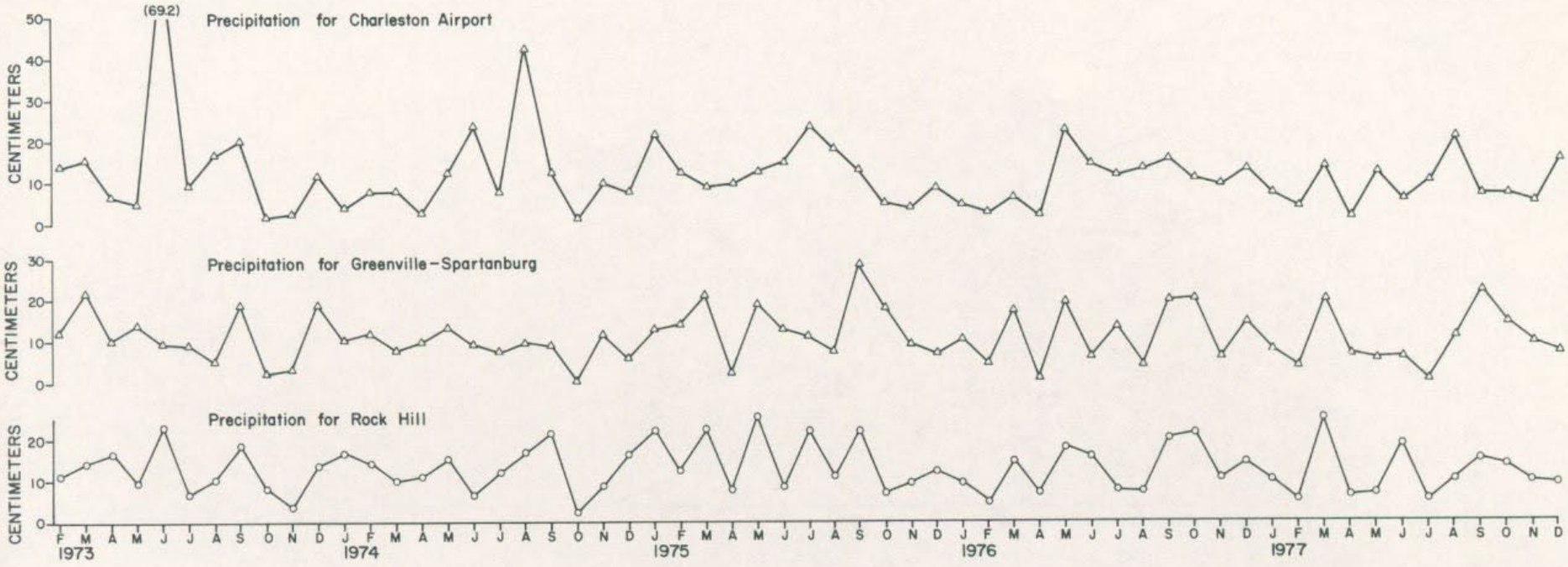

Figure 25. Monthly precipitation for Charleston, South Carolina (U. S. Department of Commerce, NOAA, 1977b, 1978), Greenville-Spartanburg, South Carolina (U. S. Department of Commerce, NOAA, 1977c, 1978), and Rock Hill, South Carolina (U. S. Department of Commerce, NOAA, 1974, 1975, 1976, 1977a, 1978).

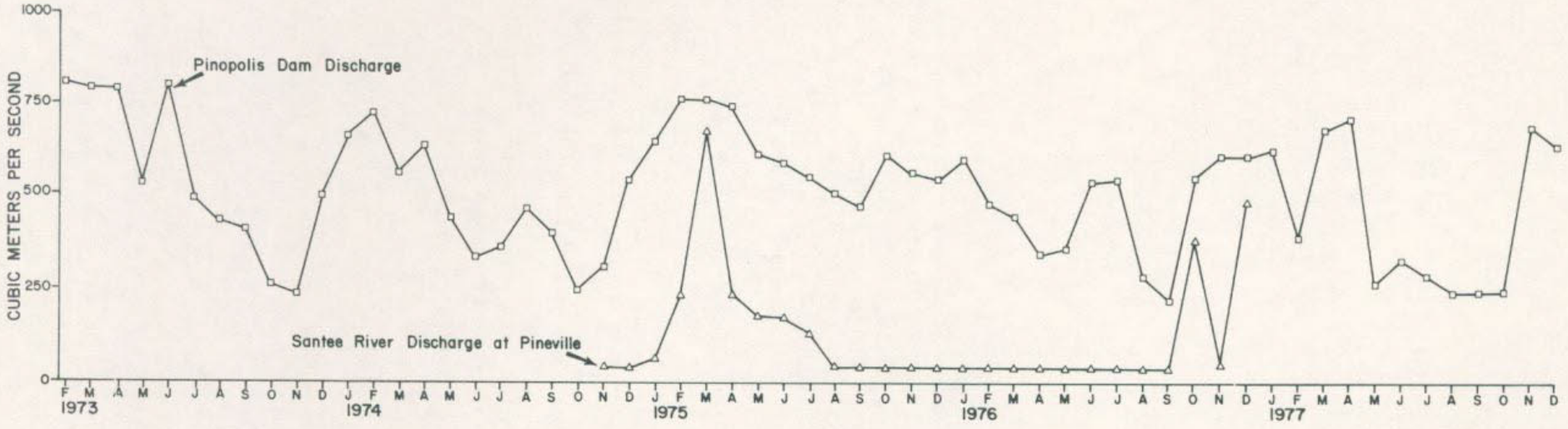

Figure 26. River discharge for the Cooper River (Pinopolis Dam) (R. Leisure, S. C. Public Service Authority, pers. commun.) and the Santee River (Pineville, S. C.) (U. S. Geological Survey, 1977, 1978) during the five-year cycle from 1973 through 1977.

APPENDIX 1

An appendix of physical and chemical values resulting from analyses of individual water samples, surface and bottom, collected monthly (Intensive Phase stations) over the three annual cycles from January 1975 through December 1977 at six locations throughout the Charleston Harbor-Cooper River estuary and over the two annual cycles from January 1975 through December 1976 at nine locations throughout the North and South Santee River estuaries, South Carolina.

Individual hydrographic values for several additional stations monitored quarterly (Extensive Phase stations) in these same estuaries are reported in Appendix 2.

Individual hydrographic values for several additional 25-hr stations occupied quarterly in the Charleston Harbor-Cooper River and North and South Santee River estuaries are reported in Appendix 3.

Table 1a. Physical and chemical characteristics of water samples collected monthly at Estuary Mile 1 (Station J003), Harbor mouth at Cummings Point, Charleston Harbor-Cooper River estuary, South Carolina, during the three annual cycles from January, 1975 through December, 1977. Samples were taken adjacent to Bell Buoy "23".

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	12.4	12.2	12.8	15.6	23.6	26.8	26.6	27.5	28.6	23.5	21.6	15.2
Bottom	12.8	12.3	13.4	16.5	21.5	24.2	26.8	27.3	29.0	22.9	21.8	14.8
Salinity (°/oo)												
Surface	15.5	15.5	11.3	12.0	14.2	13.7	14.7	10.5	15.6	17.1	17.9	15.6
Bottom	28.7	27.7	25.9	27.9	22.3	32.6	30.0	29.2	24.8	22.2	30.7	24.4
Dissolved Oxygen*												
Surface	9.4	9.2	9.2	8.4	6.3	5.5	5.7	5.3	4.9	7.1	7.0	8.6
Bottom	8.6	8.8	7.9	8.0	6.1	6.0	6.2	5.2	4.7	7.0	6.2	8.4
pH												
Surface	7.9	7.5	7.6	7.3	7.3	7.6	6.5	7.1	7.0	6.8	6.9	7.2
Bottom	7.9	8.1	7.7	7.6	7.3	7.9	7.1	7.9	7.0	6.9	7.3	7.8
Turbidity +	5.3	8.2	9.6	12.0	5.9	4.6	3.6	4.2	4.9	12.0	4.0	10.0
Surface	57.0	77.0	21.0	110.0	8.2	12.0	6.5	16.0	25.0	33.0	54.0	65.0
Bottom												
Secchi disk (m)	1.2	1.4	1.0	0.8	1.1	2.1	1.8	1.7	1.4	0.8	2.1	1.7
Solids												
Total Solids *												
Surface	-	-	22.0	26.0	-	41.2	-	-	55.6	61.6	-	-
Bottom	110.8	390.0	77.2	394.0	48.4	-	78.4	84.0	138.0	146.4	226.8	264.8
Settleable Solids*												
Surface	-	-	0.4	2.0	-	13.2	-	-	24.8	22.8	-	-
Bottom	54.8	250.8	8.4	211.2	3.6	-	30.8	14.0	52.4	60.4	80.4	136.4
Nutrients												
Nitrate **												
Surface	-	42.5	145.2	23.2	79.6	35.7	64.5	-	-	40.0	29.3	24.0
Bottom	6.1	40.1	41.8	23.7	45.2	-	34.5	-	-	40.9	13.4	-
Nitrite **												
Surface	-	3.0	0.4	6.6	3.4	1.1	1.0	-	-	10.8	2.2	3.6
Bottom	2.3	1.6	0.2	5.0	8.0	-	1.5	-	-	11.6	1.0	-
Silicate **												
Surface	1426.0	491.8	807.9	1234.4	709.5	871.1	920.3	948.4	695.5	1264.5	779.8	-
Bottom	723.6	477.7	533.9	540.9	646.3	351.2	407.4	793.8	632.2	1201.3	372.3	1039.7
Phosphate **												
Surface	0.0	31.0	42.0	204.0	25.5	64.5	55.5	70.5	36.0	40.5	49.5	31.5
Bottom	31.5	23.0	91.5	262.5	60.0	101.0	48.0	69.0	120.0	55.5	127.5	34.5

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1a. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	10.3	9.2	17.8	19.4	22.0	24.2	28.2	29.2	26.5	24.1	13.5	11.1
Bottom	11.1	10.8	15.8	15.4	21.3	24.3	27.3	29.0	26.2	24.7	14.0	8.7
Salinity (°/oo)												
Surface	11.1	12.2	14.8	13.8	30.7	14.2	9.8	18.2	32.9	20.7	17.0	17.8
Bottom	28.1	31.7	28.1	26.2	32.7	26.3	24.9	28.0	-	28.5	28.1	30.1
Dissolved Oxygen *												
Surface	10.6	10.7	8.6	8.0	6.1	6.8	5.4	5.5	6.7	6.9	9.6	7.0
Bottom	9.2	9.3	6.9	7.4	6.2	6.2	5.3	5.8	6.8	6.7	9.3	8.9
pH												
Surface	7.8	7.8	7.7	7.9	8.1	7.2	7.2	6.8	7.5	-	7.5	8.0
Bottom	7.8	8.0	8.0	8.0	7.9	7.5	7.7	6.9	7.6	-	7.8	8.3
Turbidity +												
Surface	8.5	5.6	4.1	3.6	7.8	3.8	6.0	5.7	5.5	5.7	5.4	9.1
Bottom	24.0	14.0	7.4	42.0	5.3	19.0	74.0	41.0	49.0	64.0	63.0	12.0
Secchi disk (m)	1.7	1.5	1.6	1.6	0.8	1.2	0.9	1.1	1.4	1.4	1.4	1.0
Solids												
Total Solids *												
Surface	13.2	-	-	-	154.0	32.4	-	-	53.2	-	-	56.4
Bottom	66.5	73.2	-	188.4	98.8	84.8	-	119.2	233.2	172.8	222.4	131.2
Settleable Solids *												
Surface	2.4	-	-	-	62.8	2.8	-	-	16.8	-	-	5.6
Bottom	15.2	21.2	-	88.0	12.0	12.8	-	28.8	121.2	58.0	95.2	46.0
Nutrients												
Nitrate **												
Surface	66.8	108.1	66.7	55.8	28.1	8.7	-	29.8	78.1	26.5	19.7	-
Bottom	25.9	14.2	20.4	17.5	7.8	-	34.7	15.5	26.2	24.6	61.0	-
Nitrite **												
Surface	0.8	2.5	2.9	3.4	4.5	2.1	-	5.6	56.3	14.8	2.0	-
Bottom	0.7	0.8	1.0	1.7	3.4	-	1.7	3.4	15.1	13.6	2.7	-
Silicate **												
Surface	1271.5	583.1	470.7	618.2	337.2	189.7	576.0	351.2	414.5	477.7	597.1	765.7
Bottom	695.5	295.0	189.7	435.6	84.3	112.4	323.2	344.2	238.8	407.4	1187.2	210.8
Phosphate **												
Surface	18.5	25.5	26.0	39.0	0.0	0.0	30.0	21.0	37.5	39.0	39.0	21.0
Bottom	67.0	14.5	19.0	30.0	0.0	0.0	99.0	34.5	82.0	54.0	13.5	7.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1a. (Continued).

Parameter	1977											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	7.5	6.0	12.6	17.0	23.1	26.7	30.4	28.6	28.4	18.2	20.4	17.0
Bottom	7.5	6.4	12.4	16.1	21.6	26.6	29.8	28.9	28.8	18.4	19.9	16.8
Salinity (°/oo)												
Surface	16.3	21.8	14.7	22.8	16.4	20.0	20.4	20.5	23.5	21.8	24.0	18.2
Bottom	25.2	31.0	23.2	30.0	27.1	25.8	28.6	28.2	29.7	28.6	33.3	31.7
Dissolved Oxygen *												
Surface	10.5	10.9	8.7	8.2	6.6	5.6	6.5	6.0	4.7	7.2	6.7	7.7
Bottom	10.3	9.8	8.4	8.2	6.7	5.6	4.9	5.8	5.8	-	6.6	7.5
Nitrate **												
Surface	-	79.1	85.5	40.3	45.4	27.8	-	-	-	41.9	18.9	72.5
Bottom	-	-	29.7	13.2	451.6	34.2	2.5	34.0	-	40.1	10.5	20.8
Nitrite **												
Surface	-	0.7	0.6	0.3	2.9	4.8	-	-	-	24.9	0.7	3.1
Bottom	-	-	0.1	0.1	2.4	6.0	1.3	32.8	-	12.7	0.3	0.6
Silicate **												
Surface	990.5	562.0	245.9	252.9	997.6	372.3	112.4	372.3	309.1	1405.0	498.8	653.3
Bottom	632.2	161.6	372.3	140.5	519.8	491.8	126.4	393.4	259.9	765.7	224.8	203.7
Phosphate **												
Surface	16.5	10.0	26.5	22.0	89.0	34.5	0.0	38.0	34.0	60.0	21.5	18.0
Bottom	22.5	8.0	27.0	13.5	118.5	25.0	9.0	83.0	21.0	47.0	25.5	10.5
pH												
Surface	7.6	7.6	7.2	6.6	6.9	7.4	7.9	7.8	7.0	7.2	7.6	7.3
Bottom	7.5	7.5	7.4	7.4	7.0	7.7	7.5	7.8	7.1	7.5	7.8	7.7
Turbidity +												
Surface	11.0	9.8	10.0	6.7	8.5	6.8	3.5	135.0	6.0	6.6	5.4	11.0
Bottom	44.0	14.0	63.0	4.0	26.0	53.0	7.2	3.8	120.0	71.0	52.0	72.0
Total Solids *												
Surface	42.4	44.8	45.2	-	53.6	44.4	35.6	-	62.8	60.8	42.0	39.6
Bottom	138.8	86.0	179.6	79.2	147.2	184.4	64.8	105.8	350.0	266.8	223.2	251.6
Settleable Solids *												
Surface	4.8	7.6	0.8	-	1.2	0.8	0.0	-	1.2	19.2	25.2	3.2
Bottom	39.2	26.8	69.6	0.8	36.0	102.4	4.8	821.2	164.4	136.4	184.8	143.6
Secchi disc (m)	1.0	1.5	0.6	1.0	0.8	1.1	1.3	1.3	1.4	0.5	1.0	1.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1b. Physical and chemical characteristics of water samples collected monthly at Estuary Mile 3 (Station J001), Ft. Johnson, Charleston Harbor-Cooper River estuary, South Carolina, during the three annual cycles from January, 1975 through December, 1977. Samples were taken in the 6-8 m depth contour on alignment with the James Island Yacht Club dock.

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	10.7	12.0	12.8	15.8	23.7	27.0	27.5	28.0	28.9	23.4	21.2	15.0
Bottom	10.8	12.6	13.0	16.2	22.6	25.5	27.3	28.3	29.2	23.2	21.5	14.7
Salinity (°/oo)												
Surface	13.5	9.2	9.7	8.8	9.0	12.6	12.0	9.0	13.2	11.4	11.5	10.4
Bottom	16.2	12.6	21.5	16.4	13.7	26.2	23.6	22.5	21.0	13.1	24.2	11.8
Dissolved Oxygen *												
Surface	9.6	9.2	8.6	8.5	6.4	5.4	5.7	4.9	4.6	7.5	7.2	8.8
Bottom	9.2	9.1	8.3	7.9	6.3	4.5	4.9	4.6	4.4	7.0	6.6	8.7
pH												
Surface	7.2	6.8	7.0	7.2	7.1	6.9	7.4	6.8	7.3	6.7	7.1	7.5
Bottom	7.3	7.2	7.5	7.1	6.9	7.5	7.5	6.8	7.1	6.8	7.1	7.6
Turbidity +												
Surface	4.6	11.0	10.0	14.0	52.0	5.7	3.1	3.6	5.9	7.0	4.2	4.7
Bottom	5.1	9.7	7.9	10.0	64.0	6.6	5.6	7.0	16.0	16.0	6.7	5.1
Secchi disk (m)	1.4	0.7	0.9	0.7	1.2	1.8	1.6	1.3	1.2	1.2	1.5	1.3
Solids												
Total Solids *												
Surface	36.8	23.6	21.6	35.2	17.6	28.0	-	-	22.8	45.2	-	-
Bottom	-	-	-	36.4	-	76.8	81.2	69.6	56.8	70.4	-	-
Settleable Solids *												
Surface	0.8	3.6	0.0	15.6	2.4	1.2	-	-	2.8	8.8	-	-
Bottom	-	-	-	11.6	-	2.4	5.2	15.2	21.2	21.2	-	-
Nutrients												
Nitrate **												
Surface	47.1	191.5	55.4	697.9	90.2	43.6	64.4	-	-	35.1	42.6	10.1
Bottom	64.5	145.4	53.9	198.6	4.9	13.1	58.4	-	-	31.5	20.0	13.5
Nitrite **												
Surface	1.6	3.5	0.2	2.1	2.9	2.8	4.2	-	-	7.3	3.2	2.9
Bottom	2.0	3.7	0.3	2.7	4.9	2.7	3.2	-	-	8.7	2.0	2.9
Silicate **												
Surface	843.0	1088.8	351.3	569.0	1131.0	906.2	737.6	-	751.7	-	597.1	-
Bottom	1016.7	990.5	751.7	1074.8	758.7	512.8	1194.2	562.0	779.8	1348.8	674.4	1419.1
Phosphate **												
Surface	3.0	-	33.0	86.5	10.5	80.0	37.0	30.0	40.5	22.5	73.5	13.5
Bottom	33.0	-	40.5	84.0	82.0	102.0	12.5	51.0	79.5	21.0	94.5	21.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1b. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	9.9	10.2	17.9	19.2	22.8	24.2	28.5	29.4	26.7	24.8	14.3	11.2
Bottom	10.5	11.2	17.1	19.4	22.8	24.2	28.5	29.5	26.7	24.8	15.0	12.5
Salinity (°/oo)												
Surface	8.6	11.6	11.3	9.5	19.5	10.4	7.7	14.5	21.8	16.1	12.1	12.8
Bottom	22.2	27.7	19.5	16.4	21.0	17.9	7.5	15.8	22.0	21.0	12.1	25.1
Dissolved Oxygen *												
Surface	10.6	10.7	7.0	8.0	6.6	6.7	5.7	5.6	6.4	7.4	9.4	9.7
Bottom	9.4	9.3	4.6	7.3	5.7	5.9	5.5	5.5	6.3	6.3	9.9	8.8
pH												
Surface	7.9	7.6	7.4	7.4	7.6	6.4	5.5	7.0	7.1	-	7.0	7.4
Bottom	8.0	7.2	7.6	7.6	7.4	6.8	6.0	7.1	7.3	-	7.0	7.7
Turbidity +												
Surface	4.8	5.4	3.7	3.7	2.7	3.4	8.0	3.8	12.0	4.6	9.0	8.5
Bottom	26.0	6.5	14.0	7.4	7.8	5.0	6.0	5.5	14.0	60.0	6.7	8.9
Secchi disk (m)	1.5	1.2	1.3	1.6	1.3	1.7	1.1	1.3	1.0	1.7	1.1	0.9
Solids												
Total Solids *												
Surface	17.6	34.0	-	-	-	33.2	30.0	-	-	-	27.2	87.2
Bottom	82.4	74.4	-	-	84.8	64.0	38.8	-	-	150.0	-	99.2
Settleable Solids *												
Surface	6.0	15.2	-	-	-	6.8	4.0	-	-	-	2.0	48.4
Bottom	31.2	32.8	-	-	1.2	15.6	8.0	-	-	46.0	-	4.0
Nutrients												
Nitrate **												
Surface	63.0	100.0	71.0	31.5	25.9	8.5	63.9	-	-	28.9	59.2	-
Bottom	44.6	25.5	48.0	24.5	55.8	-	51.2	36.1	-	30.4	56.4	-
Nitrite **												
Surface	3.8	3.2	2.5	2.5	2.1	2.0	4.3	-	-	18.3	3.1	-
Bottom	2.0	25.5	2.0	2.5	3.4	-	3.4	5.9	-	18.2	2.4	-
Silicate **												
Surface	758.7	772.8	365.3	667.4	274.0	210.8	744.6	449.6	681.4	660.4	716.6	632.2
Bottom	1299.6	421.5	442.6	358.3	639.3	84.3	400.4	295.0	540.9	456.6	779.8	449.6
Phosphate **												
Surface	13.0	28.5	53.0	27.0	27.0	0.0	20.0	18.0	32.0	34.5	30.0	10.5
Bottom	28.0	18.0	30.0	30.5	0.0	0.0	17.0	21.0	45.5	43.0	7.5	12.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1b. . (Continued).

Parameter	1977											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	8.4	5.6	13.0	17.8	22.5	26.9	30.8	29.0	28.5	18.6	20.1	16.4
Bottom	8.8	5.8	13.2	16.5	22.3	27.4	34.0	29.0	28.9	19.0	20.0	16.6
Salinity (°/oo)												
Surface	13.8	14.1	10.9	13.6	14.4	15.0	14.5	14.8	19.6	17.7	17.6	14.6
Bottom	23.1	15.2	12.6	25.0	15.9	18.7	23.7	25.3	25.2	24.8	19.0	24.4
Dissolved Oxygen *												
Surface	10.6	11.8	8.9	8.3	4.5	6.0	5.9	5.9	5.7	7.0	7.0	7.7
Bottom	9.5	11.8	8.4	7.6	6.5	5.2	4.3	5.3	5.4	7.2	6.8	7.0
Nitrate **												
Surface	-	124.3	110.0	63.4	27.0	53.5	20.8	-	-	-	27.3	51.2
Bottom	-	124.6	82.7	15.8	31.6	54.7	15.9	-	-	-	17.4	52.1
Nitrite **												
Surface	-	1.3	1.3	1.0	2.4	7.1	7.6	-	-	-	0.7	1.3
Bottom	-	1.0	0.6	0.0	3.8	9.7	11.1	-	-	-	0.4	2.5
Silicate **												
Surface	309.1	934.3	386.4	358.3	674.4	737.6	442.6	372.3	358.3	1419.0	702.5	435.6
Bottom	267.0	786.8	309.1	189.7	906.2	786.8	330.2	154.6	386.4	1004.6	435.6	674.4
Phosphate **												
Surface	16.5	25.5	46.5	24.0	40.0	18.0	10.0	52.5	40.5	39.0	60.0	10.5
Bottom	13.5	19.5	28.5	19.5	31.5	31.5	31.0	46.0	30.0	75.0	40.0	18.0
pH												
Surface	7.8	7.4	7.4	6.8	7.1	7.5	7.4	7.5	6.9	7.5	7.1	7.5
Bottom	7.5	7.5	7.5	6.6	7.0	7.4	7.7	7.8	6.8	7.7	7.3	7.7
Turbidity +												
Surface	6.9	8.1	10.0	7.0	6.3	5.4	2.5	2.8	5.5	5.3	3.6	5.0
Bottom	17.0	8.8	18.0	9.7	11.0	11.0	4.4	23.0	20.0	58.0	4.8	12.0
Total Solids *												
Surface	33.6	39.6	37.6	34.4	-	-	37.2	-	-	-	-	23.2
Bottom	91.6	54.0	77.2	75.2	40.8	54.8	75.6	-	154.4	251.2	29.2	68.0
Settleable Solids *												
Surface	6.8	0.0	0.4	0.8	-	-	0.4	-	-	-	-	0.8
Bottom	39.6	1.2	12.4	3.6	2.8	16.0	3.6	-	57.2	126.4	0.4	18.8
Secchi disc (m)	0.5	1.0	0.8	1.0	1.7	1.6	1.8	1.5	1.0	0.8	1.6	1.2

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1c. Physical and chemical characteristics of water samples collected monthly at Estuary Mile 8 (Station C004), near the mouth of the Cooper River, Charleston Harbor-Cooper River estuary, South Carolina, during the three annual cycles from January, 1975 through December, 1977. Samples were taken midriver above Drum Island on an alignment with the most seaward major dock of the U. S. Navy facilities.

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	12.5	12.2	11.6	15.8	22.6	28.0	27.1	28.6	29.4	22.6	21.2	13.8
Bottom	12.4	11.6	11.8	16.0	22.3	26.5	26.9	28.5	29.2	22.7	21.4	12.6
Salinity (°/oo)												
Surface	2.9	2.5	2.6	1.8	4.8	4.4	5.4	2.6	7.2	4.4	4.9	3.4
Bottom	16.1	3.4	3.4	7.4	11.3	13.5	10.8	4.2	14.2	9.3	19.9	12.4
Dissolved Oxygen *												
Surface	10.4	10.0	9.9	8.9	6.1	6.0	6.0	5.5	4.6	7.1	7.9	9.2
Bottom	8.9	9.9	9.7	8.2	6.2	4.7	5.2	5.2	4.4	6.8	6.2	7.2
pH												
Surface	7.4	7.2	7.0	6.7	6.8	6.9	6.2	6.8	7.2	6.6	7.5	7.6
Bottom	7.9	7.2	7.2	6.9	7.1	7.4	6.3	6.6	7.0	6.6	7.6	7.4
Turbidity +												
Surface	8.4	16.0	17.0	26.0	5.9	5.1	3.7	4.8	5.2	7.0	3.3	3.9
Bottom	85.0	18.0	22.0	21.0	29.0	5.8	5.0	4.1	21.0	15.0	5.8	18.0
Secchi disk (m)	0.8	0.8	0.7	0.5	1.1	1.8	1.4	1.5	1.5	1.0	2.0	1.1
Solids												
Total Solids *												
Surface	-	15.2	20.4	-	54.4	21.2	-	10.4	16.8	23.2	-	10.4
Bottom	220.0	27.6	-	38.4	87.2	24.8	-	14.8	64.0	54.4	60.8	76.0
Settleable Solids *												
Surface	-	2.4	3.2	-	41.2	10.8	-	2.0	0.4	6.0	-	0.8
Bottom	121.6	10.0	-	16.0	41.6	4.4	-	0.4	28.8	13.6	16.4	19.2
Nutrients												
Nitrate **												
Surface	29.7	226.3	260.0	68.2	77.1	34.6	54.3	61.7	-	29.5	40.2	25.8
Bottom	21.5	212.2	215.3	696.8	113.8	27.4	50.5	42.0	-	43.0	34.0	-
Nitrite **												
Surface	0.0	4.0	2.1	4.3	2.4	1.8	1.3	6.2	-	3.1	1.4	2.7
Bottom	0.5	3.4	1.3	3.2	4.2	2.0	1.7	8.0	-	7.0	2.8	-
Silicate **												
Surface	2069.0	-	337.2	428.5	484.7	1067.8	1839.7	695.5	920.3	-	421.5	-
Bottom	1363.0	1116.9	414.5	526.9	702.5	590.1	864.1	843.0	850.0	-	786.8	590.1
Phosphate **												
Surface	10.5	33.0	69.0	82.0	19.5	174.0	25.0	43.5	36.0	0.0	31.5	54.0
Bottom	44.0	24.0	55.0	76.5	92.5	55.0	43.5	28.5	100.5	0.0	42.0	31.5

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1c. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	10.0	9.6	16.4	18.6	22.6	24.2	27.5	29.8	26.5	23.8	13.2	11.2
Bottom	10.8	10.6	16.3	18.6	22.5	24.2	27.4	29.7	26.5	24.2	14.3	11.4
Salinity												
Surface	3.3	3.4	4.6	4.0	16.6	3.2	1.4	6.9	18.6	9.4	3.7	5.0
Bottom	14.6	4.3	16.2	9.6	24.8	5.6	3.5	14.7	21.3	18.7	11.7	7.8
Dissolved Oxygen *												
Surface	11.0	11.3	8.6	8.2	6.1	7.2	4.8	5.4	6.7	6.8	10.2	10.2
Bottom	10.0	9.1	7.9	7.8	5.8	7.0	4.5	4.9	6.6	6.3	9.3	9.8
pH												
Surface	7.4	7.4	7.3	7.0	7.4	7.3	7.4	6.9	7.3	-	7.4	7.3
Bottom	7.4	7.6	7.4	7.3	7.6	7.4	7.4	6.9	7.5	-	7.2	7.4
Turbidity +												
Surface	5.7	7.5	5.6	4.2	2.8	6.0	7.0	4.3	3.8	2.7	12.0	13.0
Bottom	12.0	13.0	19.0	7.3	6.5	5.0	38.0	7.0	8.9	11.0	9.0	12.0
Secchi disk (m)	1.4	1.2	1.5	1.4	1.5	1.4	0.6	1.3	1.4	1.6	0.9	1.0
Solids												
Total Solids *												
Surface	12.4	9.2	-	16.0	-	16.4	10.8	-	-	22.4	15.6	-
Bottom	67.6	72.0	78.8	46.8	104.0	29.2	115.6	78.8	79.2	58.4	27.2	-
Settleable Solids *												
Surface	4.8	2.4	-	2.4	-	3.6	1.2	-	-	5.2	4.0	-
Bottom	40.0	38.0	6.4	17.6	27.2	12.0	74.0	17.6	40.0	23.2	7.2	-
Nutrients												
Nitrate **												
Surface	-	126.1	70.5	106.7	30.9	7.0	-	-	-	30.9	82.2	130.3
Bottom	57.1	46.1	57.3	72.0	48.0	-	-	36.8	-	35.0	65.5	100.0
Nitrite **												
Surface	-	2.0	2.7	3.9	4.8	1.8	-	-	-	15.5	2.8	2.0
Bottom	0.7	1.4	2.5	3.6	7.0	-	-	3.8	-	21.4	2.4	0.8
Silicate **												
Surface	491.8	463.6	267.0	1194.2	386.4	15.5	421.5	302.1	878.1	351.2	498.8	962.4
Bottom	-	562.0	491.8	744.6	470.7	15.5	302.1	252.9	590.1	519.8	723.6	737.6
Phosphate **												
Surface	14.5	20.0	18.0	7.0	0.0	0.0	49.5	20.0	31.5	21.0	6.0	0.0
Bottom	20.0	16.5	48.0	7.3	0.0	0.0	-	24.0	12.0	31.5	7.5	1.5

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1c. (Continued)

Parameter	1977											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	7.8	5.1	12.5	17.2	23.3	27.1	30.1	29.2	28.9	18.6	19.9	16.0
Bottom	10.0	4.8	12.6	17.0	23.6	27.2	29.8	29.0	29.1	19.4	19.8	16.1
Salinity (°/oo)												
Surface	7.3	5.1	6.1	3.8	5.4	6.2	10.5	8.3	13.0	9.2	5.5	2.7
Bottom	21.6	6.1	8.4	14.6	10.0	10.4	22.3	19.1	19.0	14.5	5.7	10.1
Dissolved Oxygen *												
Surface	11.4	12.1	8.9	8.4	6.6	6.3	5.2	6.1	5.2	7.4	7.1	8.6
Bottom	10.8	11.9	8.9	7.5	6.2	5.1	4.6	5.6	5.1	6.8	7.0	7.9
Nitrate **												
Surface	86.7	121.0	123.5	94.4	-	49.9	11.8	-	-	-	43.3	107.8
Bottom	-	124.7	131.1	84.3	-	29.1	9.1	-	-	37.5	39.8	101.4
Nitrite **												
Surface	1.5	0.8	1.1	0.8	-	5.7	7.1	-	-	-	1.1	2.8
Bottom	-	0.6	1.5	1.1	-	4.1	4.9	-	-	13.6	0.8	3.2
Silicate **												
Surface	274.0	231.8	252.9	259.9	379.4	843.0	238.8	407.4	540.9	1236.4	1405.0	878.1
Bottom	400.4	224.8	330.2	407.4	533.9	400.4	217.8	428.5	562.0	821.9	1405.0	857.0
Phosphate **												
Surface	24.0	10.0	14.5	10.5	49.5	49.5	21.0	50.0	28.5	45.5	23.0	13.5
Bottom	15.0	8.0	21.0	15.5	23.0	23.0	18.0	52.5	48.0	37.5	31.5	12.0
pH												
Surface	7.4	7.3	7.5	6.7	7.0	7.3	7.3	6.8	7.0	7.9	7.2	7.2
Bottom	7.5	7.2	7.3	6.6	7.0	7.2	7.8	6.8	7.0	7.9	7.2	7.3
Turbidity +												
Surface	14.0	15.0	11.0	7.9	12.0	6.4	2.6	3.6	5.3	5.1	6.3	6.1
Bottom	8.3	21.0	9.7	13.0	28.0	8.8	6.9	12.0	22.0	13.0	6.8	6.2
Total Solids *												
Surface	-	49.2	26.4	17.2	28.4	13.6	-	18.8	46.8	-	16.8	8.4
Bottom	83.6	-	38.0	59.6	78.8	35.2	66.0	65.2	156.0	52.8	20.4	22.8
Settleable Solids *												
Surface	-	31.2	2.0	2.4	8.4	3.2	-	3.2	1.2	-	15.6	1.6
Bottom	2.0	-	0.8	13.6	38.0	8.8	0.4	16.4	57.6	0.4	6.0	4.4
Secchi disc (m)	0.5	0.8	0.8	0.8	0.7	1.4	2.1	1.3	1.1	1.5	1.0	1.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1d. Physical and chemical characteristics of water samples collected monthly at Estuary Mile 12 (Station C003), North Charleston, Charleston Harbor-Cooper River estuary, South Carolina, during the three annual cycles from January, 1975 through December, 1977. Samples were taken near Buoy R "58" off the West Virginia Pulp and Paper Company (WESTVACO) facilities.

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	12.1	10.3	12.5	16.2	22.4	27.6	27.5	29.5	28.9	22.8	20.7	14.7
Bottom	11.8	10.5	11.6	16.1	22.4	27.2	27.2	28.6	29.4	23.0	20.4	14.0
Salinity (°/oo)												
Surface	1.6	1.4	1.2	1.4	0.9	3.2	3.2	1.7	3.8	2.2	3.5	0.9
Bottom	2.3	2.8	2.9	1.5	2.6	5.2	4.4	2.6	6.7	1.1	5.1	1.6
Dissolved Oxygen *												
Surface	10.0	10.3	10.1	8.8	6.7	5.9	6.5	5.4	5.1	7.7	8.1	9.7
Bottom	9.9	10.2	9.6	8.7	6.4	5.6	6.1	4.9	4.5	7.1	7.7	9.9
pH												
Surface	7.3	7.4	7.2	6.9	6.9	7.0	6.4	6.9	6.5	6.9	7.6	7.5
Bottom	7.2	7.2	7.2	6.9	6.8	7.3	6.3	6.4	6.6	6.8	7.8	7.4
Turbidity +												
Surface	14.0	17.0	14.0	26.0	8.1	3.6	4.2	3.6	5.5	8.0	2.6	4.6
Bottom	21.0	18.0	14.0	27.0	11.0	4.1	4.1	3.5	9.6	56.0	3.7	11.0
Secchi disk (m)	0.7	0.8	0.9	0.5	1.1	1.7	1.6	1.5	1.2	0.9	2.1	1.1
Solids												
Total Solids *												
Surface	18.8	12.8	11.6	16.8	10.4	10.8	17.6	-	14.0	14.4	-	10.0
Bottom	26.0	27.6	-	21.6	17.6	-	-	-	26.8	136.8	15.6	30.0
Settleable Solids *												
Surface	6.4	0.0	2.8	2.8	0.4	1.2	4.4	-	1.6	0.0	-	4.4
Bottom	5.6	5.2	-	5.6	0.8	-	-	-	0.8	77.6	2.0	16.0
Nutrients												
Nitrate **												
Surface	-	233.2	264.6	241.2	119.0	47.8	54.0	43.4	-	47.6	54.0	42.0
Bottom	-	254.8	254.3	37.5	87.6	67.2	57.9	59.4	-	51.1	54.4	36.5
Nitrite **												
Surface	-	4.8	1.0	2.4	2.5	3.6	1.0	7.0	-	1.0	1.0	3.2
Bottom	-	4.2	0.8	3.1	2.4	1.1	1.3	7.8	-	4.2	0.6	2.7
Silicate **												
Surface	2293.0	-	252.7	323.2	625.2	-	-	906.2	309.1	1145.1	1159.1	-
Bottom	2230.0	-	351.3	323.2	1011.6	-	1222.4	786.8	850.0	-	1313.7	-
Phosphate **												
Surface	13.0	63.0	45.5	70.5	25.5	165.5	0.0	30.0	75.0	192.0	24.0	43.5
Bottom	24.0	38.0	33.0	49.5	33.0	16.5	25.5	25.5	84.0	55.5	42.0	15.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1d. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	9.8	9.5	16.5	18.7	23.6	24.3	27.3	30.4	26.4	23.7	13.2	11.3
Bottom	9.9	9.6	16.3	18.6	23.2	24.2	27.4	29.6	26.5	24.4	13.8	11.4
Salinity (°/oo)												
Surface	0.6	2.4	2.5	0.7	5.0	1.2	0.1	3.8	12.1	6.6	1.7	4.1
Bottom	0.7	3.0	3.7	0.9	5.9	2.2	0.1	5.7	15.2	10.7	3.1	5.3
Dissolved Oxygen *												
Surface	11.3	11.8	9.1	8.6	6.7	7.9	5.3	5.9	7.0	6.7	10.5	10.0
Bottom	11.1	11.4	9.0	8.7	6.4	7.4	5.3	5.3	6.3	6.4	9.9	9.7
pH												
Surface	7.3	6.8	7.4	7.3	7.5	7.9	7.5	7.8	7.2	-	7.2	7.3
Bottom	7.3	7.1	7.3	7.2	7.6	7.7	7.5	6.9	7.3	-	7.2	7.5
Turbidity +												
Surface	6.6	6.8	4.2	5.4	3.1	4.0	9.0	4.6	3.7	3.1	16.0	17.0
Bottom	8.2	7.0	4.8	5.4	3.2	4.0	8.0	6.0	9.7	8.9	13.0	13.0
Secchi disk (m)	1.6	1.4	1.6	1.3	1.5	1.6	0.9	1.4	1.7	1.7	0.8	0.8
Solids												
Total Solids *												
Surface	6.0	9.2	-	10.8	-	9.2	13.6	-	34.4	22.4	14.0	-
Bottom	8.8	-	-	-	47.6	12.8	16.4	27.2	62.8	32.8	15.2	-
Settleable Solids *												
Surface	1.6	1.2	-	2.4	-	0.0	6.4	-	8.4	9.6	2.8	-
Bottom	4.0	-	-	-	3.2	1.6	6.4	0.0	18.8	8.8	1.2	-
Nutrients												
Nitrate **												
Surface	75.2	133.1	59.1	107.2	44.1	7.3	-	57.4	-	-	118.3	124.2
Bottom	81.8	129.4	-	110.3	119.8	11.3	49.1	-	-	27.0	102.6	148.1
Nitrite **												
Surface	0.4	1.7	2.1	3.8	3.9	1.8	-	1.8	-	-	3.2	1.1
Bottom	0.4	1.8	-	3.8	5.2	1.7	4.8	-	-	15.7	3.4	1.7
Silicate **												
Surface	337.2	576.0	161.6	843.0	154.6	147.5	695.5	154.6	878.1	259.9	519.8	857.0
Bottom	477.7	779.8	238.8	723.6	435.6	133.5	555.2	540.9	625.2	274.0	983.5	1004.1
Phosphate **												
Surface	79.0	9.0	19.0	7.3	0.0	0.0	102.0	13.5	24.0	24.0	7.5	0.0
Bottom	18.0	8.0	22.5	7.2	10.5	0.0	29.5	28.0	9.0	21.0	16.5	0.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1d. (Continued).

Parameter	1977											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	7.5	4.1	12.5	17.3	23.5	27.2	30.2	31.0	29.0	18.6	19.3	16.0
Bottom	8.2	4.6	12.5	17.4	23.8	27.1	30.0	29.2	29.1	19.3	19.3	16.0
Salinity (°/oo)												
Surface	3.7	3.8	1.7	2.1	2.6	3.8	7.3	5.8	7.7	6.7	5.2	2.0
Bottom	9.8	5.3	0.8	4.9	3.3	4.7	9.1	8.6	11.7	10.8	6.9	2.4
Dissolved Oxygen *												
Surface	12.3	12.4	9.5	8.8	6.9	6.2	4.8	6.1	6.0	7.7	6.9	8.6
Bottom	11.8	12.1	9.0	8.0	6.5	5.7	4.6	5.2	5.0	7.3	6.9	8.5
Nitrate **												
Surface	-	185.0	193.3	123.5	50.0	57.2	-	-	-	-	35.4	112.7
Bottom	-	150.5	178.9	68.3	43.9	-	4.3	-	-	-	31.4	95.9
Nitrite **												
Surface	-	2.2	1.3	1.1	2.5	6.2	-	-	-	-	1.0	2.8
Bottom	-	2.1	1.3	0.3	1.3	-	2.0	-	-	-	0.8	2.1
Silicate **												
Surface	252.9	365.3	119.4	576.0	245.9	639.0	140.5	456.6	611.2	1348.8	1222.4	484.7
Bottom	288.0	295.1	147.5	231.8	140.5	800.8	77.3	358.3	653.3	1405.0	1271.5	765.7
Phosphate **												
Surface	7.5	16.5	28.5	26.5	26.0	27.0	21.0	87.5	21.0	36.0	43.0	10.5
Bottom	10.5	28.0	28.5	10.5	11.0	105.5	3.0	54.0	33.0	42.0	20.0	4.5
pH												
Surface	7.7	7.2	7.3	6.7	7.0	7.2	7.2	6.9	7.0	7.8	7.3	7.4
Bottom	7.4	7.6	7.3	6.8	7.0	7.3	7.5	6.8	6.9	7.7	7.2	7.5
Turbidity +												
Surface	13.0	14.0	17.0	7.4	14.0	6.4	3.7	3.0	4.4	5.7	3.8	6.3
Bottom	11.0	16.0	33.0	7.6	17.0	16.0	3.1	6.0	6.1	16.0	5.3	6.6
Total Solids *												
Surface	-	-	24.8	-	13.6	-	-	-	-	22.0	9.6	6.0
Bottom	-	-	67.6	-	25.6	30.0	-	22.2	64.8	66.0	-	5.6
Settleable Solids *												
Surface	-	-	6.4	-	0.8	++	-	-	-	7.6	1.6	-
Bottom	-	-	29.6	-	5.6	7.2	-	1.0	18.8	30.8	-	-
Secchi disc (m)	0.5	0.8	0.5	0.8	0.6	1.4	1.3	1.5	1.3	1.3	1.5	1.2

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1e. Physical and chemical characteristics of water samples collected monthly at Estuary Mile 17 (Station C002), Big Island, Charleston Harbor-Cooper River estuary, South Carolina, during the three annual cycles from January, 1975 through December, 1977. Samples were taken near Buoy R "28" just below Big Island.

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	12.1	10.3	12.3	16.2	22.5	28.0	27.5	28.8	29.2	22.8	20.7	13.8
Bottom	11.6	10.4	12.4	16.2	22.3	26.8	27.4	28.8	28.9	22.9	20.5	13.8
Salinity (°/oo)												
Surface	0.3	0.3	0.2	0.2	0.1	0.2	0.3	0.1	0.2	6.1	0.2	0.1
Bottom	0.3	0.3	0.2	0.2	0.1	0.4	0.3	0.1	0.3	0.1	0.2	0.1
Dissolved Oxygen *												
Surface	10.7	10.3	10.4	9.0	7.2	6.3	6.5	6.1	5.4	8.4	7.9	10.4
Bottom	10.9	10.5	10.4	9.0	7.2	6.1	6.6	5.5	5.3	8.1	8.1	10.2
pH												
Surface	7.3	7.0	7.4	6.7	7.0	6.9	6.2	6.4	6.9	6.5	7.4	7.7
Bottom	7.3	7.1	7.5	6.4	6.9	6.8	6.2	6.6	6.9	6.7	7.6	7.6
Turbidity +												
Surface	6.3	20.0	17.0	32.0	6.9	4.8	7.6	3.6	4.0	6.0	3.8	3.7
Bottom	6.3	19.0	18.0	31.0	7.0	4.3	6.7	6.3	6.9	10.0	3.6	3.1
Secchi disk (m)	1.3	1.1	0.8	0.5	1.4	1.9	1.2	1.6	1.7	1.4	2.4	1.4
Solids												
Total Solids *												
Surface	-	-	7.2	10.8	8.4	-	10.4	6.8	7.2	-	2.0	-
Bottom	10.0	8.0	-	14.4	10.0	-	-	11.6	8.8	12.4	-	-
Settleable Solids *												
Surface	-	-	0.0	1.6	0.4	-	2.8	1.6	2.8	-	0.0	-
Bottom	2.0	0.4	-	4.8	6.4	-	-	4.0	4.4	4.4	-	-
Nutrients												
Nitrate **												
Surface	-	274.8	240.4	44.1	164.3	78.4	86.2	-	24.9	27.0	-	34.3
Bottom	-	264.4	292.6	696.8	136.6	61.0	64.3	-	19.7	-	-	24.5
Nitrite **												
Surface	-	4.5	0.7	3.5	2.7	0.7	0.6	-	5.2	0.0	-	3.1
Bottom	-	4.4	1.0	3.2	2.4	1.3	1.5	-	3.4	-	-	2.8
Silicate **												
Surface	2230.0	1110.0	84.3	295.0	316.1	3084.0	913.2	267.0	407.4	-	793.8	-
Bottom	1071.0	885.2	112.4	252.9	983.5	2732.7	-	140.5	295.0	1355.8	836.0	-
Phosphate **												
Surface	15.5	20.0	43.5	55.0	43.5	12.0	39.0	30.0	43.5	42.0	52.5	18.0
Bottom	9.0	20.0	45.0	84.0	16.5	12.0	31.5	34.5	45.0	24.0	51.0	13.5

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1e. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp (°C)												
Surface	9.8	9.6	16.5	18.2	22.9	24.1	27.5	29.9	26.4	23.9	12.8	10.4
Bottom	9.7	9.2	16.3	18.1	23.4	24.1	27.5	29.8	26.4	23.8	13.5	10.6
Salinity (°/oo)												
Surface	0.1	0.2	0.3	0.1	0.8	0.3	0.1	0.2	3.2	0.8	0.2	0.4
Bottom	0.2	0.2	0.1	0.1	0.7	0.1	0.1	0.1	7.5	1.5	0.1	0.6
Dissolved Oxygen *												
Surface	11.4	12.0	9.6	8.8	7.3	7.7	6.1	6.2	6.5	7.8	11.0	10.4
Bottom	11.6	11.8	9.5	9.0	7.2	7.7	6.0	6.0	6.1	7.5	10.9	10.4
pH												
Surface	7.4	7.9	7.5	7.5	7.4	7.2	7.6	7.0	6.8	-	7.7	7.8
Bottom	7.3	8.0	7.6	7.4	7.7	7.5	7.6	7.3	6.9	-	7.7	7.3
Turbidity +												
Surface	5.4	10.8	3.8	3.4	2.4	6.0	5.0	5.9	2.7	3.4	22.0	17.0
Bottom	4.7	9.5	4.5	3.8	5.4	11.0	5.0	6.8	3.7	4.6	23.0	17.0
Secchi disk (m)	2.0	1.3	1.8	1.7	1.5	1.8	1.2	1.3	2.0	2.0	0.8	0.7
Solids												
Total Solids *												
Surface	-	6.0	10.8	14.4	-	7.6	7.2	10.0	10.0	4.8	6.8	12.4
Bottom	0.8	7.6	7.2	9.6	51.2	10.0	4.8	8.8	31.2	10.4	8.8	10.8
Settleable Solids *												
Surface	-	1.2	4.4	6.8	-	2.0	4.0	4.4	2.4	0.4	2.0	3.6
Bottom	0.4	3.6	0.8	6.0	10.8	5.6	1.6	2.4	2.0	0.8	2.0	1.2
Nutrients												
Nitrate **												
Surface	-	176.8	118.8	107.8	43.1	9.1	30.2	72.5	46.2	39.8	134.4	214.2
Bottom	-	178.8	142.8	107.8	37.8	8.8	-	69.3	-	51.2	113.0	207.5
Nitrite **												
Surface	-	2.8	3.4	3.2	2.4	1.4	3.4	0.7	22.4	2.2	1.8	1.4
Bottom	-	3.9	3.8	3.2	2.1	1.7	-	0.3	-	7.0	1.8	1.5
Silicate **												
Surface	302.1	583.1	259.9	259.9	56.2	112.4	302.1	147.5	576.0	126.4	1405.0	826.9
Bottom	463.6	-	463.6	526.9	63.2	119.4	421.5	77.3	477.7	309.1	1004.6	758.7
Phosphate **												
Surface	13.0	10.5	34.5	14.5	0.0	0.0	27.0	13.5	16.5	12.0	6.0	0.0
Bottom	7.0	25.5	146.0	13.5	0.0	0.0	-	10.5	6.0	19.5	2.5	0.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1e. (Continued).

Parameter	1977											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	7.3	4.0	12.3	17.6	23.5	26.5	32.0	29.2	29.4	19.1	19.1	15.6
Bottom	8.0	4.2	12.0	17.5	23.8	26.8	31.0	29.0	29.3	18.8	19.0	15.8
Salinity (°/oo)												
Surface	0.9	0.2	0.5	0.3	0.3	0.4	1.0	0.9	2.7	0.8	0.6	0.4
Bottom	6.1	0.4	0.3	0.3	0.5	0.5	1.6	1.6	4.2	1.7	0.6	0.4
Dissolved Oxygen *												
Surface	12.1	12.9	9.3	0.7	7.1	6.2	5.6	5.9	5.9	8.6	7.9	8.5
Bottom	11.1	12.9	9.6	9.0	6.9	6.2	5.7	5.5	5.4	8.4	7.9	8.4
Nitrate **												
Surface	142.5	240.4	260.3	136.8	-	56.6	-	35.0	-	43.7	31.9	131.3
Bottom	-	248.6	256.5	143.2	74.9	52.5	10.7	46.5	-	11.2	40.2	151.9
Nitrite **												
Surface	1.0	3.2	1.5	1.1	-	1.8	1.1	9.1	-	1.8	0.3	1.7
Bottom	-	2.0	1.5	1.0	1.4	2.8	1.5	13.3	-	3.2	0.4	2.1
Silicate **												
Surface	224.8	210.8	84.3	175.6	133.5	407.4	91.3	189.7	316.1	1405.0	1405.0	765.7
Bottom	196.7	217.8	112.4	259.9	147.5	730.6	168.6	231.8	338.8	1018.6	1405.0	976.5
Phosphate **												
Surface	12.0	13.5	15.5	26.5	57.0	24.5	6.0	43.5	21.0	22.5	17.0	2.5
Bottom	13.5	18.0	18.0	17.0	21.0	19.5	1.5	27.0	15.0	28.0	20.0	24.0
pH												
Surface	7.7	7.8	7.6	7.2	7.1	7.3	7.3	7.2	6.9	8.5	7.7	7.8
Bottom	7.5	7.7	7.6	6.9	7.1	7.1	7.4	7.4	7.0	8.1	7.7	7.7
Turbidity +												
Surface	17.0	23.0	19.0	13.0	18.0	8.8	3.1	3.2	4.6	5.9	5.7	11.6
Bottom	13.0	23.0	18.0	14.0	20.0	13.0	2.8	8.7	6.2	6.4	6.3	8.1
Total Solids *												
Surface	13.2	10.4	16.8	17.6	12.8	8.4	4.8	8.0	26.4	6.8	-	5.6
Bottom	-	12.0	21.2	24.8	13.2	9.6	11.6	16.8	41.2	12.8	7.2	5.6
Settleable Solids *												
Surface	1.2	0.0	2.8	8.4	5.2	4.0	2.0	2.0	2.0	1.2	-	2.0
Bottom	-	0.0	5.2	10.8	4.0	4.4	5.6	7.6	11.2	0.0	3.2	2.8
Secchi disc (m)	0.6	0.5	0.5	0.6	0.7	1.2	2.5	1.5	1.3	1.0	1.2	1.2

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1f. Physical and chemical characteristics of water samples collected monthly at Estuary Mile 28 (Station C001), "The Tee", Charleston Harbor-Cooper River estuary, South Carolina, during the three annual cycles from January, 1975 through December, 1977. Samples were taken in the vicinity of the uncharted fixed marker at "The Tee".

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	12.1	10.3	12.6	16.1	23.0	27.7	27.5	28.6	28.4	22.8	20.5	13.8
Bottom	11.5	10.3	12.6	16.0	22.3	27.5	27.4	28.6	28.7	23.0	20.4	14.2
Salinity (°/oo)												
Surface	0.3	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.2
Bottom	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Dissolved Oxygen *												
Surface	10.5	10.4	10.5	9.5	7.4	6.1	6.7	5.7	5.3	8.2	8.0	7.6
Bottom	10.8	10.4	10.6	9.5	7.1	6.1	6.6	5.5	5.1	8.2	8.4	9.7
pH												
Surface	7.6	7.3	6.8	6.8	6.7	6.8	5.8	6.4	7.2	6.6	7.5	7.6
Bottom	7.3	7.3	6.9	7.1	6.9	6.5	5.9	6.3	7.0	6.8	7.5	7.8
Turbidity +												
Surface	4.0	21.0	16.0	34.0	6.3	5.1	3.8	3.6	2.9	4.1	5.2	5.1
Bottom	4.0	20.0	17.0	35.0	6.3	5.6	3.9	3.8	3.6	3.8	4.3	3.8
Secchi disk (m)	1.8	0.9	0.7	0.4	1.5	1.6	1.5	1.8	2.4	2.2	-	1.8
Solids												
Total Solids *												
Surface	-	8.8	8.4	14.8	-	4.0	2.8	6.4	4.0	-	-	1.6
Bottom	4.8	-	8.8	10.4	4.4	4.4	-	7.2	4.0	-	7.6	1.6
Settleable Solids *												
Surface	-	0.4	0.8	3.6	-	0.0	0.4	1.6	1.2	-	-	1.6
Bottom	0.0	-	0.0	0.8	1.2	0.8	-	1.6	0.8	-	4.4	0.0
Nutrients												
Nitrate **												
Surface	-	281.6	292.8	223.6	129.3	71.5	67.3	42.8	24.5	-	81.5	73.2
Bottom	-	292.6	306.9	696.9	125.8	64.4	57.4	41.1	24.8	24.5	88.8	64.8
Nitrite **												
Surface	-	4.7	0.8	2.5	2.7	1.3	2.0	4.8	1.8	-	0.1	2.8
Bottom	-	4.2	0.7	3.2	2.7	1.1	1.4	5.0	1.5	0.0	0.4	3.4
Silicate **												
Surface	1440.0	-	196.7	540.9	414.5	709.5	-	449.6	639.3	-	695.5	-
Bottom	1159.0	-	210.8	365.3	309.1	449.6	-	484.7	112.4	-	653.3	-
Phosphate **												
Surface	5.5	-	25.5	56.0	19.5	36.0	28.5	33.0	22.5	0.0	31.5	31.5
Bottom	7.5	-	75.0	73.0	24.0	12.0	22.5	25.5	22.5	13.5	39.0	7.5

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1f. (Continued).

Parameter	1976											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	9.4	9.4	16.2	17.0	23.1	23.7	27.?	30.0	26.6	23.9	12.2	9.9
Bottom	9.3	9.3	16.2	17.0	23.0	23.5	27.5	30.1	26.6	23.8	13.2	10.2
Salinity (°/oo)												
Surface	0.1	0.1	0.2	0.2	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.3
Bottom	0.1	0.0	0.1	0.2	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.3
Dissolved Oxygen *												
Surface	11.2	12.0	9.1	9.2	8.4	7.1	5.9	5.7	7.0	7.9	11.1	10.9
Bottom	11.2	11.9	9.1	8.9	8.4	7.1	5.8	5.8	7.1	7.6	10.5	10.5
pH												
Surface	7.2	7.9	7.6	7.5	7.6	7.3	7.6	7.1	7.0	-	8.1	8.0
Bottom	7.2	-	7.6	7.4	7.4	7.4	7.5	7.1	7.0	-	8.0	7.9
Turbidity +												
Surface	9.0	9.4	3.8	3.9	3.0	3.0	3.0	3.7	3.2	3.2	22.0	17.0
Bottom	4.7	12.0	3.9	4.2	2.8	4.0	3.0	4.8	3.9	2.7	21.0	17.0
Secchi disk (m)	2.2	1.2	2.3	1.9	2.5	1.8	1.6	1.8	2.3	2.5	0.7	-
Solids												
Total Solids *												
Surface	1.2	-	5.6	12.4	38.4	6.4	4.0	4.0	3.6	2.4	6.8	15.6
Bottom	2.4	8.0	6.8	5.2	36.4	6.4	-	6.0	4.4	6.0	8.0	8.8
Settleable Solids *												
Surface	1.2	-	0.8	8.8	1.2	1.2	1.6	1.6	2.8	0.4	2.4	4.4
Bottom	1.2	4.0	3.6	3.2	0.0	1.2	-	3.6	0.0	2.0	2.4	0.8
Nutrients												
Nitrate **												
Surface	78.1	179.9	153.1	104.6	68.9	12.1	-	55.4	53.6	33.3	126.6	214.9
Bottom	-	183.4	153.7	111.7	34.4	11.3	-	-	51.1	58.4	124.2	221.8
Nitrite **												
Surface	1.0	3.1	4.1	3.2	3.2	1.5	-	0.6	5.2	2.1	2.5	1.4
Bottom	-	3.2	3.5	3.1	2.7	1.3	-	-	1.1	0.4	1.4	1.5
Silicate **												
Surface	639.3	814.9	238.8	836.0	224.8	91.3	920.3	203.7	463.6	84.3	548.0	618.2
Bottom	681.4	857.0	302.1	800.8	224.8	140.5	758.7	182.6	779.8	309.1	583.1	821.9
Phosphate **												
Surface	2.0	22.5	60.0	23.0	0.0	0.0	75.0	6.5	7.5	19.5	10.5	0.0
Bottom	3.5	5.0	43.5	18.0	0.0	0.0	29.5	30.5	6.0	9.0	0.0	0.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1f. (Continued).

Parameter	1977											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	8.4	4.0	11.8	17.7	23.3	26.5	33.0	29.0	29.1	18.6	19.2	15.4
Bottom	6.7	4.0	11.5	17.6	23.7	26.1	30.3	29.2	29.2	18.1	18.9	15.4
Salinity (°/oo)												
Surface	0.1	0.1	0.3	0.3	0.3	0.3	1.0	0.3	0.4	0.4	0.5	0.3
Bottom	0.0	0.1	0.2	0.4	0.3	0.4	0.4	0.3	0.4	0.3	0.4	0.3
Dissolved Oxygen *												
Surface	12.3	13.1	9.8	8.9	7.3	5.9	6.2	6.0	6.8	8.7	8.4	8.6
Bottom	12.3	12.9	9.8	8.9	7.3	6.0	5.9	6.1	6.7	8.8	8.2	8.6
Nitrate **												
Surface	151.1	259.1	270.2	129.9	-	62.2	10.1	31.8	18.5	28.7	40.3	154.8
Bottom	196.3	269.9	281.0	101.8	65.5	56.4	9.5	39.6	15.5	28.0	41.2	162.7
Nitrite **												
Surface	0.8	2.0	1.4	1.0	-	1.5	0.4	1.1	3.2	0.0	0.3	2.7
Bottom	0.7	2.4	1.4	1.1	1.0	1.4	0.3	2.0	2.7	0.0	0.4	1.8
Silicate **												
Surface	758.7	210.8	91.3	21.1	91.3	491.8	42.2	330.2	470.7	1405.0	1405.0	189.7
Bottom	379.4	288.0	98.4	267.0	154.6	611.2	35.1	386.4	562.0	1405.0	1405.0	681.4
Phosphate **												
Surface	10.5	19.5	13.5	13.5	19.5	9.5	14.0	29.5	12.0	21.0	19.0	9.0
Bottom	3.0	16.5	21.0	15.0	13.0	10.0	4.5	32.0	25.5	25.5	14.0	0.0
pH												
Surface	7.7	7.9	7.6	6.9	7.0	7.4	7.5	6.9	7.0	6.5	7.5	7.6
Bottom	7.7	7.9	7.6	6.8	7.0	7.3	7.4	6.6	6.9	6.8	7.7	7.2
Turbidity +												
Surface	18.0	23.0	17.0	14.0	15.0	8.0	4.0	3.3	4.5	4.9	3.2	11.0
Bottom	18.0	25.0	18.0	15.0	14.0	-	2.7	3.6	4.5	5.0	4.9	11.0
Total Solids *												
Surface	5.6	8.0	11.6	17.6	6.8	6.0	6.0	3.6	20.4	5.6	10.0	6.0
Bottom	7.6	10.0	10.8	20.0	7.2	7.6	-	4.8	22.0	4.8	-	9.2
Settleable Solids *												
Surface	2.0	0.4	2.0	7.2	1.2	2.0	2.0	0.4	2.8	2.0	5.2	3.6
Bottom	2.4	1.2	2.0	8.0	2.4	4.0	-	2.8	4.4	1.2	-	6.0
Secchi disc (m)	0.4	0.5	0.8	0.7	1.0	1.6	2.2	1.5	1.9	1.8	2.5	0.8

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1g. Physical and chemical characteristics of water samples collected monthly at River Mile 1 (Station NS01) North Santee River estuary, South Carolina, during the two annual cycles from January, 1975 through December, 1976. Samples were taken midchannel off the seaward tip of Cane Island.

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	12.4	11.0	11.9	15.4	24.0	26.6	28.8	29.6	29.4	24.8	20.3	14.8
Bottom	12.2	11.5	11.9	15.5	23.3	26.1	28.6	29.8	29.3	24.6	20.5	14.1
Salinity (°/oo)												
Surface	31.0	29.0	28.8	0.2	20.0	20.2	21.3	6.4	32.3	17.6	24.4	32.8
Bottom	31.2	30.8	29.0	0.2	20.4	31.4	22.2	8.1	32.7	20.9	25.0	32.9
Dissolved Oxygen *												
Surface	8.5	9.0	8.6	6.5	7.2	5.6	6.5	5.1	5.8	5.9	6.8	7.6
Bottom	8.9	8.7	8.8	6.5	6.9	5.6	6.3	4.7	5.8	5.7	6.5	5.8
pH												
Surface	7.8	7.5	7.8	6.2	6.9	7.5	7.3	7.0	7.0	6.9	6.9	7.7
Bottom	-	7.4	7.8	6.3	7.0	8.0	7.1	7.0	7.1	6.7	7.4	7.2
Turbidity +												
Surface	54.0	23.0	15.0	36.0	9.7	9.0	16.0	13.0	21.0	18.0	7.8	37.0
Bottom	57.0	38.0	23.0	36.0	14.0	39.0	84.0	27.0	45.0	67.0	30.0	39.0
Secchi disk (m)	0.3	0.5	0.6	0.4	0.7	0.8	0.3	0.4	0.4	0.7	0.8	0.4
Solids												
Total Solids *												
Surface	-	-	62.0	12.4	-	45.2	218.0	23.6	108.0	72.0	-	171.6
Bottom	164.0	159.2	78.0	-	73.2	204.4	-	54.8	148.4	201.2	109.6	185.6
Settleable Solids *												
Surface	-	-	16.0	6.0	-	8.0	64.8	4.4	12.8	22.4	-	62.8
Bottom	12.8	52.0	20.8	-	5.2	119.2	-	18.4	4.0	82.0	40.8	83.6
Nutrients												
Nitrate **												
Surface	16.0	68.8	30.5	102.3	73.8	84.7	-	-	20.4	176.2	37.0	24.6
Bottom	10.9	42.8	3.8	110.7	81.0	3.2	-	-	11.5	102.6	33.0	20.7
Nitrite **												
Surface	6.1	1.2	1.0	8.7	2.9	1.8	-	-	1.0	6.9	3.6	2.4
Bottom	5.2	0.6	0.4	8.0	2.7	0.0	-	-	1.5	6.6	3.4	1.0
Silicate **												
Surface	-	632.3	168.6	217.8	653.3	1011.6	576.0	696.3	407.4	-	864.1	449.6
Bottom	-	519.9	238.7	210.8	576.0	443.6	590.1	1383.9	281.0	-	688.4	267.0
Phosphate **												
Surface	7.8	27.0	87.0	27.0	36.0	94.5	56.0	64.5	79.5	54.0	19.5	11.5
Bottom	15.6	35.0	49.5	40.0	68.5	195.5	154.0	55.5	157.5	195.0	58.5	13.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1g. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	9.5	9.2	19.5	17.8	21.8	24.9	26.7	26.9	25.4	24.3	10.3	11.1
Bottom	9.4	9.0	19.5	17.8	20.7	25.1	26.3	26.8	25.2	24.0	11.2	11.2
Salinity (°/oo)												
Surface	31.5	25.6	20.6	22.3	21.1	18.4	7.8	19.8	25.0	29.5	19.7	32.6
Bottom	31.9	26.8	20.9	22.9	24.6	19.4	10.8	20.1	25.0	30.1	24.7	32.6
Dissolved Oxygen*												
Surface	9.7	9.7	7.9	7.6	6.9	6.8	5.9	5.3	5.7	7.2	10.1	9.6
Bottom	9.5	9.9	7.9	8.0	6.8	6.4	5.8	5.3	5.8	7.3	9.9	9.2
pH												
Surface	-	7.9	7.4	7.7	7.2	7.4	6.8	7.4	6.1	7.3	7.8	7.8
Bottom	-	7.8	7.5	7.9	7.9	7.4	7.1	6.3	6.0	7.6	8.0	7.8
Turbidity+												
Surface	36.0	42.0	20.0	7.3	5.4	11.0	19.0	16.0	21.0	17.0	15.0	33.0
Bottom	43.0	125.0	20.0	14.0	22.0	23.0	53.0	18.0	17.0	54.0	24.0	33.0
Secchi disk (m)	0.4	0.4	0.7	0.8	1.1	0.6	0.6	0.4	0.4	0.7	0.7	0.5
Solids												
Total Solids*												
Surface	126.0	131.6	-	-	61.6	47.6	44.4	-	95.2	102.0	62.4	170.4
Bottom	224.4	-	-	92.4	115.2	99.2	98.0	-	101.2	192.0	108.8	171.6
Settleable Solids*												
Surface	48.8	20.4	-	-	8.4	9.2	15.6	-	20.0	1.6	16.2	92.0
Bottom	139.2	-	-	50.8	40.4	40.8	38.0	-	10.0	37.2	29.2	87.2
Nutrients												
Nitrate**												
Surface	-	5.5	52.0	54.9	24.5	30.2	-	94.3	-	35.3	68.1	5.7
Bottom	24.2	4.4	57.1	44.5	23.9	14.6	-	90.6	50.8	46.5	65.1	3.5
Nitrite**												
Surface	-	0.8	3.5	3.9	4.5	4.1	-	9.7	-	6.7	1.5	1.7
Bottom	0.0	0.8	3.5	3.8	4.5	2.9	-	9.8	5.2	5.3	1.1	0.0
Silicate**												
Surface	407.4	337.2	569.0	435.6	484.7	829.0	604.2	737.6	702.5	449.6	1405.0	217.8
Bottom	238.8	327.2	540.0	393.4	484.7	639.3	463.6	772.8	744.6	456.6	1074.8	112.4
Phosphate**												
Surface	18.0	32.0	16.5	27.0	48.0	229.0	25.5	22.5	33.0	13.0	20.0	16.0
Bottom	28.0	51.5	31.5	17.0	15.0	220.0	13.0	22.5	34.5	18.0	15.0	12.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1h. Physical and chemical characteristics of water samples collected monthly at River Mile 4 (Station NS04), North Santee River estuary, South Carolina, during the two annual cycles from January, 1975 through December, 1976. Samples were taken midchannel immediately seaward of the Intracoastal Waterway off Marker Number 15.

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	13.8	9.6	11.8	15.2	23.6	26.7	28.2	29.2	29.2	24.7	19.3	14.1
Bottom	13.8	9.7	11.7	15.2	23.5	26.2	28.1	29.0	29.2	24.7	19.2	14.2
Salinity												
Surface	2.5	0.3	0.3	0.2	4.4	0.1	4.2	0.5	11.7	9.1	14.1	19.1
Bottom	3.3	0.3	0.3	0.2	4.7	0.1	4.2	0.7	12.3	9.5	15.0	19.8
Dissolved Oxygen*												
Surface	9.5	9.8	9.0	6.5	6.8	6.7	6.3	5.9	5.4	5.8	7.6	8.0
Bottom	9.6	9.8	9.0	6.9	7.1	6.7	6.5	6.1	5.4	5.7	7.4	8.1
pH												
Surface	7.3	6.6	7.2	5.9	7.4	6.9	7.0	6.7	7.1	7.0	6.9	7.5
Bottom	7.4	6.4	7.2	6.1	7.3	6.9	7.0	6.6	7.1	6.9	7.1	6.5
Turbidity+												
Surface	43.0	48.0	31.0	37.0	13.0	9.9	21.0	23.0	14.0	21.0	13.0	24.0
Bottom	55.0	49.0	37.0	38.0	13.0	11.0	24.0	44.0	16.0	38.0	23.0	27.0
Secchi disk (m)	0.3	0.3	0.6	0.4	0.6	1.1	0.6	0.4	0.6	0.6	0.6	0.5
Solids												
Total Solids*												
Surface	67.2	-	30.0	10.8	21.6	8.8	35.6	28.0	46.4	-	-	91.6
Bottom	96.4	79.6	30.4	10.8	22.0	10.8	33.6	88.4	71.6	83.6	60.4	77.2
Settleable Solids*												
Surface	3.6	-	2.0	0.8	8.8	2.0	11.6	18.4	13.2	-	-	21.6
Bottom	29.2	7.6	3.6	2.0	7.2	4.0	7.2	66.0	13.6	14.0	6.0	4.4
Nutrients												
Nitrate**												
Surface	66.6	107.1	181.7	95.9	121.1	158.9	6.1	-	23.9	133.1	36.0	55.5
Bottom	67.3	135.6	185.2	95.0	155.4	14.0	26.6	-	21.8	261.4	37.3	22.7
Nitrite**												
Surface	6.9	3.1	1.7	8.8	4.6	1.8	1.3	-	1.3	5.9	2.2	2.9
Bottom	6.2	2.0	2.0	9.0	5.3	1.8	1.0	-	2.4	7.1	2.9	1.8
Silicate**												
Surface	-	407.5	379.4	161.6	997.6	512.8	597.1	238.8	548.0	-	1236.4	-
Bottom	-	224.8	323.2	161.6	1299.6	1060.8	850.0	267.0	927.3	-	1067.8	674.4
Phosphate**												
Surface	7.8	00.0	48.0	42.0	23.0	52.5	33.0	21.0	24.0	51.0	21.0	43.0
Bottom	15.6	40.0	177.0	70.5	35.0	57.0	42.0	60.0	85.5	91.5	27.0	17.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1h. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	8.4	10.4	17.9	18.4	22.4	25.0	26.6	27.3	26.3	24.8	10.7	11.3
Bottom	8.2	10.4	17.2	18.2	22.4	24.3	27.0	27.0	26.1	24.8	11.7	11.2
Salinity (°/oo)												
Surface	11.2	1.5	13.1	14.5	8.0	7.0	0.3	11.2	14.5	13.3	10.7	26.4
Bottom	12.1	1.7	13.0	16.2	8.1	7.1	0.4	14.1	16.5	14.3	12.0	26.6
Dissolved Oxygen *												
Surface	10.3	10.1	8.7	8.0	7.7	6.6	4.9	4.9	5.6	6.0	10.0	9.3
Bottom	10.4	10.0	8.2	7.9	7.7	6.5	5.0	4.6	5.8	6.1	9.7	9.6
pH												
Surface	-	7.4	7.4	7.7	6.6	6.8	7.3	6.6	6.4	7.2	7.5	7.7
Bottom	-	7.5	7.5	7.5	7.7	7.0	7.6	7.0	6.6	7.3	7.6	7.7
Turbidity +												
Surface	12.0	42.0	28.0	14.0	14.0	20.0	32.0	16.0	11.0	10.5	13.0	39.0
Bottom	16.0	48.0	28.0	21.0	14.0	25.0	27.0	23.0	15.0	19.0	16.0	52.0
Secchi disk (m)	0.8	0.4	0.5	0.6	0.7	0.6	0.6	0.4	0.6	0.8	0.7	0.5
Solids												
Total Solids *												
Surface	30.4	68.8	60.8	53.2	-	54.0	20.4	55.6	54.0	-	38.4	132.0
Bottom	43.2	78.0	77.2	71.6	-	46.8	26.4	87.2	71.6	64.0	55.6	218.0
Settleable Solids *												
Surface	6.4	6.4	19.6	19.2	-	3.2	7.6	11.6	8.8	-	4.4	44.0
Bottom .	12.0	19.6	24.0	26.4	-	6.0	12.4	34.8	8.4	2.4	23.6	76.0
Nutrients												
Nitrate **												
Surface	-	130.5	56.1	59.4	31.4	20.7	-	144.0	57.4	65.0	102.2	-
Bottom	67.6	121.9	53.1	-	16.4	9.4	-	101.5	-	65.8	109.5	-
Nitrite **												
Surface	-	1.1	2.7	3.6	3.6	3.5	-	26.0	4.2	7.1	2.4	-
Bottom	1.4	1.7	2.5	-	1.8	2.8	-	13.0	-	6.6	2.1	-
Silicate **												
Surface	955.4	913.2	442.6	519.8	393.4	814.9	112.4	814.9	533.9	618.2	1405.0	674.4
Bottom	1102.9	1110.0	259.9	1264.5	224.8	351.2	456.6	519.8	786.8	653.3	1405.0	723.6
Phosphate **												
Surface	18.0	17.0	28.0	58.0	3.0	6.0	25.0	20.0	28.0	14.0	4.5	29.0
Bottom	28.0	24.0	18.0	59.5	0.0	39.0	13.0	20.0	36.0	18.0	15.0	21.5

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 11. Physical and chemical characteristics of water samples collected monthly at River Mile 7 (Station NS07), North Santee River estuary, South Carolina, during the two annual cycles from January, 1975 through December, 1976. Samples were taken 0.8 mile upriver from mouth of Sixmile Creek.

Parameter	1975 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	12.5	9.9	11.5	15.2	24.3	26.2	27.9	29.3	29.7	25.0	17.4	15.1
Bottom	12.6	9.7	11.4	15.2	24.4	26.2	27.7	29.5	29.5	25.2	17.5	14.9
Salinity (°/oo)												
Surface	0.3	0.3	0.2	2.4	0.1	0.2	2.2	0.3	0.3	0.2	15.9	2.4
Bottom	0.2	0.3	0.2	2.1	0.1	0.1	2.6	0.1	0.2	0.2	15.9	2.5
Dissolved Oxygen *												
Surface	9.5	9.8	9.5	6.4	7.5	6.3	6.1	5.5	6.9	6.4	7.5	9.0
Bottom	9.5	10.1	9.7	6.3	7.6	6.3	5.5	5.3	6.8	6.5	7.6	8.9
pH												
Surface	6.8	6.8	6.9	6.4	6.9	7.0	6.8	6.8	7.2	6.6	6.8	7.8
Bottom	6.8	7.1	6.6	6.4	7.0	6.8	6.8	6.8	7.2	6.5	6.8	7.6
Turbidity +												
Surface	35.5	32.0	26.0	32.0	16.0	11.0	17.0	20.0	27.0	42.0	34.0	34.0
Bottom	80.5	33.0	26.0	33.0	32.0	13.0	18.0	18.0	30.0	91.0	43.0	50.0
Secchi disk (m)	0.3	0.3	0.4	0.4	0.5	0.7	0.6	0.5	0.4	0.4	0.4	0.4
Solids												
Total Solids *												
Surface	62.0	-	30.0	7.2	29.4	-	20.8	25.6	48.8	60.4	100.0	66.8
Bottom	154.8	23.6	19.2	12.4	59.2	23.6	25.6	21.6	58.8	140.8	133.2	168.4
Settleable Solids *												
Surface	18.8	-	21.2	0.8	14.8	-	7.6	16.8	12.4	27.2	56.4	17.6
Bottom	59.2	10.0	11.6	6.0	36.0	15.2	9.6	14.0	23.6	73.2	82.4	123.6
Nutrients												
Nitrate **												
Surface	107.8	151.0	200.0	105.8	207.3	148.1	59.8	5.5	29.1	338.5	34.0	80.9
Bottom	104.0	161.3	213.6	102.6	232.1	155.5	57.4	6.4	-	337.7	40.3	-
Nitrite **												
Surface	4.2	1.2	1.6	5.9	5.6	3.1	3.2	4.3	0.3	3.4	4.5	2.4
Bottom	4.5	1.4	2.0	5.6	5.6	1.7	1.8	3.8	-	2.4	3.8	-
Silicate **												
Surface	1102.9	1243.4	224.8	161.6	576.0	1264.5	1138.0	800.8	407.4	934.3	688.4	-
Bottom	505.8	709.5	210.8	147.5	1278.6	1117.0	744.6	252.9	456.6	821.9	920.3	-
Phosphate **												
Surface	6.6	25.0	40.5	72.0	46.5	90.0	40.0	15.0	26.5	70.5	22.5	20.0
Bottom	6.6	25.0	43.5	42.0	70.5	79.5	55.5	28.5	43.5	38.5	39.0	40.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 11. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	9.2	9.4	17.7	19.4	22.4	24.4	26.3	29.2	27.3	25.0	11.2	9.9
Bottom	8.9	10.0	17.2	19.3	22.2	24.5	25.7	28.9	26.4	24.8	12.1	10.9
Salinity (°/oo)												
Surface	6.6	0.2	1.3	3.0	0.2	0.6	0.1	0.4	0.6	3.9	0.2	0.6
Bottom	6.7	0.3	1.6	4.2	0.2	0.4	0.1	0.2	1.1	5.1	0.1	0.4
Dissolved Oxygen *												
Surface	10.4	9.8	8.3	7.9	7.8	6.5	5.3	6.0	5.6	6.5	9.4	9.6
Bottom	10.2	9.6	8.6	7.8	7.3	6.2	5.0	5.8	5.4	6.2	9.4	9.5
pH												
Surface	7.3	7.4	7.3	7.3	7.9	7.3	7.2	6.8	6.8	7.0	7.7	7.4
Bottom	7.7	7.3	7.3	7.3	7.8	7.2	8.3	6.3	6.7	7.0	7.6	7.6
Turbidity +												
Surface	18.0	42.0	74.0	27.0	44.0	48.0	18.0	23.0	38.0	47.0	31.0	60.0
Bottom	33.0	64.0	145.0	58.0	54.0	46.0	19.0	28.0	50.0	70.5	31.0	80.0
Secchi disk (m)	0.7	0.3	0.4	0.5	0.4	0.1	0.5	0.4	0.4	0.4	0.5	0.3
Solids												
Total Solids *												
Surface	34.0	67.2	129.2	34.4	46.0	63.2	21.6	29.2	46.8	97.6	27.2	124.4
Bottom	81.6	152.8	406.4	131.6	75.6	48.0	15.6	30.4	81.2	143.2	32.8	189.2
Settleable Solids *												
Surface	9.6	24.0	54.8	1.8	18.0	24.8	10.8	8.0	16.8	40.8	9.6	80.4
Bottom	39.2	88.0	282.4	64.8	32.0	10.0	5.6	8.8	38.8	71.2	16.8	105.6
Nutrients												
Nitrate **												
Surface	70.5	128.0	141.3	86.5	25.7	43.0	-	192.4	132.6	95.1	202.7	-
Bottom	-	133.3	135.1	141.0	48.7	38.4	-	206.3	138.2	76.9	117.0	184.4
Nitrite **												
Surface	5.5	1.5	5.0	10.5	3.1	4.2	-	9.9	13.7	6.7	3.4	-
Bottom	-	1.1	4.2	8.8	3.1	4.3	-	10.0	15.1	5.3	4.8	3.9
Silicate **												
Surface	1173.2	590.1	182.6	428.5	217.8	252.9	316.1	196.7	316.1	569.0	836.0	-
Bottom	-	449.6	231.8	428.5	252.9	210.8	245.9	112.4	836.0	632.2	983.5	829.0
Phosphate **												
Surface	13.0	40.5	22.5	13.5	18.0	247.5	30.0	28.0	37.5	31.5	12.0	-
Bottom	29.5	32.0	21.0	7.5	15.0	-	6.0	18.0	27.0	16.5	214.5	16.5

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1j. Physical and chemical characteristics of water samples collected monthly at River Mile 11 (Station NS11), North Santee River estuary, South Carolina, during the two annual cycles from January, 1975 through December, 1976. Samples were taken 1 mile upriver of Highway 17 Bridge.

Parameter	1975 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	12.5	9.8	11.1	15.2	24.4	26.0	27.8	28.8	29.4	25.0	18.7	13.2
Bottom	12.5	9.9	11.2	15.2	24.4	25.7	27.8	28.5	29.5	25.3	18.6	13.2
Salinity (°/oo)												
Surface	0.4	0.3	0.2	0.2	0.2	0.1	0.2	0.2	0.3	0.1	0.4	0.3
Bottom	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.3	0.4
Dissolved Oxygen*												
Surface	9.6	10.3	9.3	6.4	6.8	5.6	6.1	5.1	7.2	6.4	8.0	8.9
Bottom	9.4	10.5	9.6	6.3	6.7	6.3	6.1	4.9	7.3	6.2	8.2	9.0
pH												
Surface	7.1	7.0	7.3	6.4	6.8	6.9	6.7	6.6	7.2	6.5	7.1	7.2
Bottom	7.2	7.0	6.9	6.4	7.0	7.0	6.7	6.7	7.3	6.5	7.2	7.4
Turbidity+												
Surface	36.0	37.0	32.0	32.0	15.0	7.0	19.0	21.0	26.0	18.0	33.0	57.0
Bottom	31.0	40.0	25.0	33.0	17.0	8.0	26.0	19.0	34.0	21.0	49.0	74.0
Secchi disk (m)	0.3	0.3	0.5	0.5	0.7	1.0	0.5	0.5	0.6	0.8	0.3	0.3
Solids												
Total Solids*												
Surface	69.2	22.4	14.0	7.2	22.4	10.4	15.6	18.8	35.6	22.8	57.2	85.6
Bottom	66.0	20.0	18.8	12.4	19.6	11.6	16.4	24.0	56.8	31.6	99.2	112.8
Settleable Solids*												
Surface	35.2	11.6	5.2	0.8	14.0	4.0	6.4	12.4	20.8	9.2	33.2	18.4
Bottom	45.6	7.6	10.4	6.0	10.8	7.6	2.4	16.8	37.2	2.4	65.2	46.8
Nutrients												
Nitrate**												
Surface	104.3	177.6	210.5	105.8	244.4	141.8	158.9	6.4	7.7	289.1	78.4	77.7
Bottom	108.0	185.1	216.3	102.6	253.9	145.3	73.8	8.6	5.2	280.4	62.7	84.3
Nitrite**												
Surface	4.2	2.6	1.6	5.9	7.3	2.4	5.3	4.1	0.7	1.7	1.4	2.1
Bottom	4.0	2.1	1.8	5.6	8.3	2.4	3.2	2.2	0.0	1.0	1.3	2.2
Silicate**												
Surface	688.5	302.1	224.8	161.6	983.5	723.6	1117.0	365.3	1145.1	1355.8	491.8	-
Bottom	-	217.8	211.8	147.5	1222.4	393.4	414.5	435.6	-	-	463.6	-
Phosphate**												
Surface	14.4	50.0	73.5	72.0	31.5	65.5	68.0	21.0	16.5	0.0	73.5	17.0
Bottom	7.2	78.0	46.5	42.0	39.0	73.0	58.5	30.0	22.5	0.0	16.5	103.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1j. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	9.8	10.4	17.3	19.8	22.4	24.2	25.5	29.2	27.2	24.9	11.5	10.2
Bottom	9.9	10.2	17.0	20.1	22.4	24.4	25.3	29.2	27.1	24.9	12.2	10.5
Salinity (°/oo)												
Surface	0.3	0.2	0.2	0.3	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.4
Bottom	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.4
Dissolved Oxygen*												
Surface	10.1	10.0	8.7	9.5	8.4	6.0	5.4	6.0	6.3	7.7	9.2	9.6
Bottom	10.2	9.8	8.8	9.6	8.3	6.0	5.3	6.1	6.4	7.6	9.4	9.3
pH												
Surface	7.3	7.2	7.4	7.3	7.3	7.3	8.4	7.2	6.9	6.9	7.5	7.6
Bottom	7.3	7.4	7.4	7.8	7.5	7.4	7.9	7.4	6.9	6.9	7.3	7.6
Turbidity+												
Surface	23.0	21.0	55.0	22.0	23.0	22.0	21.0	36.0	25.0	32.0	21.0	18.0
Bottom	27.0	25.0	77.0	30.0	54.0	35.0	26.0	32.0	32.0	57.0	20.0	18.0
Secchi disk (m)	0.6	0.7	0.5	0.6	0.5	0.6	0.5	0.2	1.0	0.3	0.7	-
Solids												
Total Solids*												
Surface	23.6	30.4	100.4	36.4	36.0	25.2	17.2	50.0	44.0	52.8	9.2	18.4
Bottom	28.8	38.0	148.4	61.2	98.0	31.2	27.6	104.4	39.6	124.8	10.0	16.4
Settleable Solids*												
Surface	9.6	16.0	68.8	16.0	22.4	10.4	8.0	30.8	10.8	20.0	4.4	3.6
Bottom	17.6	26.4	105.6	38.8	73.6	10.0	8.4	64.4	20.0	58.8	4.4.	5.2
Nutrients												
Nitrate**												
Surface	-	112.3	167.7	112.7	53.5	83.9	70.7	176.1	122.4	76.0	129.4	131.2
Bottom	-	113.3	175.0	103.2	53.8	51.9	71.7	193.2	126.4	73.2	132.9	167.8
Nitrite**												
Surface	-	1.1	3.1	5.6	1.8	5.0	2.1	8.7	2.9	2.4	2.9	5.6
Bottom	-	0.8	3.2	5.0	1.8	4.1	1.5	9.1	2.4	1.7	2.9	4.8
Silicate**												
Surface	583.1	758.7	786.8	344.2	414.5	154.6	238.8	281.0	660.4	491.8	491.8	667.4
Bottom	941.4	892.2	498.8	386.4	252.9	358.3	140.5	175.6	604.2	646.3	379.4	1095.9
Phosphate**												
Surface	17.0	18.5	20.0	0.0	3.0	91.5	2.0	25.5	24.0	164.0	43.5	7.5
Bottom	15.5	37.5	15.0	15.0	7.5	85.5	3.0	20.0	24.0	78.0	13.5	4.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1k. Physical and chemical characteristics of water samples collected monthly in North Santee Bay (Station NB04), North Santee River estuary, South Carolina, during the two annual cycles from January, 1975 through December, 1976. Samples were taken midbay on an alignment with the upriver tip of Cane Island.

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	12.0	10.8	11.5	16.0	24.4	26.0	28.2	28.8	29.4	24.4	18.5	14.9
Bottom	12.5	10.6	11.5	16.0	24.2	26.0	28.0	28.7	29.1	24.4	18.5	15.1
Salinity (°/oo)												
Surface	27.5	11.6	2.2	0.5	16.8	2.6	18.9	5.7	22.8	19.2	26.8	34.0
Bottom	30.8	17.4	2.2	0.5	17.5	3.5	20.6	5.7	23.1	19.4	26.8	34.0
Dissolved Oxygen *												
Surface	8.9	9.5	9.1	7.0	7.4	5.6	6.4	4.1	5.2	5.5	7.3	7.4
Bottom	8.7	9.9	9.2	7.2	7.2	5.2	6.2	4.1	4.8	5.3	7.1	6.1
pH												
Surface	7.8	7.2	7.1	6.5	6.8	6.7	6.5	7.0	6.8	6.8	7.3	7.6
Bottom	7.2	7.6	7.1	6.5	6.9	6.8	6.1	7.0	6.9	6.7	6.8	7.6
Turbidity +												
Surface	32.0	15.0	70.0	45.0	17.0	14.0	60.0	16.0	12.0	28.0	20.0	32.0
Bottom	56.0	88.0	80.0	46.3	32.0	14.0	27.0	26.0	120.0	35.0	28.0	62.0
Secchi disk (m)	0.3	0.5	0.2	0.3	0.7	0.7	0.3	0.2	0.7	0.4	0.5	0.4
Solids												
Total Solids *												
Surface	117.2	-	153.2	31.2	54.0	20.0	192.8	38.0	-	91.2	86.8	132.8
Bottom	-	392.8	179.2	37.6	62.0	60.4	196.8	51.6	307.2	122.4	88.8	189.6
Settleable Solids *												
Surface	5.2	-	78.4	9.2	11.6	5.2	111.6	19.2	-	40.8	23.6	26.4
Bottom	-	112.0	31.2	6.4	14.8	31.6	75.2	32.0	153.2	30.4	29.2	80.4
Nutrients												
Nitrate **												
Surface	13.4	30.5	147.4	79.9	61.4	102.6	3.5	-	18.8	170.4	26.7	21.7
Bottom	10.6	68.7	126.0	78.1	62.3	134.5	8.4	-	17.2	135.7	23.7	19.9
Nitrite **												
Surface	4.1	1.4	1.7	7.3	3.9	3.1	0.3	-	3.6	6.3	1.7	1.4
Bottom	3.8	1.3	1.4	8.7	1.7	2.7	0.4	-	3.8	6.7	1.5	1.5
Silicate **												
Surface	295.1	-	260.0	252.9	783.8	1032.7	625.2	976.5	983.5	-	667.4	407.4
Bottom	210.8	-	386.4	168.6	646.3	1299.6	555.0	892.2	1236.4	-	646.3	323.2
Phosphate **												
Surface	19.2	38.0	130.0	57.0	72.0	104.0	116.0	67.5	31.5	82.5	27.0	25.0
Bottom	43.2	180.0	139.5	43.0	109.5	177.0	159.5	102.0	12.0	124.5	28.0	17.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1k. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	7.8	9.8	21.2	19.1	20.2	25.5	26.0	26.9	25.2	24.6	10.3	12.1
Bottom	7.9	9.8	-	19.1	19.8	25.5	25.8	26.8	25.2	24.4	10.5	12.2
Salinity (°/oo)												
Surface	16.9	12.0	21.7	21.8	28.3	17.6	7.1	21.5	27.0	29.4	20.4	32.4
Bottom	17.3	12.2	-	23.6	29.7	17.2	7.3	21.5	27.1	29.7	20.4	32.3
Dissolved Oxygen*												
Surface	10.4	10.3	8.0	8.1	7.5	6.6	5.1	5.2	5.6	7.1	10.0	9.5
Bottom	10.2	10.3	-	7.9	7.0	6.8	4.9	4.8	5.4	7.0	9.8	-
pH												
Surface	7.7	7.6	5.9	7.6	7.2	7.3	6.9	7.3	6.1	7.3	7.2	7.8
Bottom	7.7	7.8	-	7.8	7.8	7.4	6.9	7.3	6.5	7.5	8.0	7.9
Turbidity+												
Surface	20.0	24.0	70.0	6.4	23.0	27.0	22.0	11.0	12.0	20.0	15.0	16.0
Bottom	32.0	70.0	-	4.4	59.0	25.0	55.0	20.0	13.0	43.0	17.0	16.0
Secchi disk (m)	0.3	0.3	0.3	0.7	0.5	0.5	0.3	0.7	0.8	0.5	0.3	0.5
Solids												
Total Solids*												
Surface	93.6	75.2	213.2	58.8	-	88.8	43.2	-	89.2	119.6	76.4	89.6
Bottom	136.4	291.6	-	207.6	152.4	92.0	105.2	-	128.0	223.6	90.4	-
Settleable Solids*												
Surface	26.0	10.4	77.2	14.8	-	26.8	17.2	-	2.0	27.2	32.0	3.2
Bottom	31.2	167.6	-	125.2	15.6	29.2	51.6	-	20.8	77.6	28.8	-
Nutrients												
Nitrate**												
Surface	67.3	25.2	52.2	52.8	32.3	20.7	-	57.0	37.1	41.4	67.6	13.3
Bottom	-	33.3	-	35.4	12.3	34.3	-	59.1	37.7	30.7	-	-
Nitrite**												
Surface	0.6	0.4	3.8	4.6	3.4	4.1	-	6.7	3.5	4.1	2.0	2.5
Bottom	-	1.0	-	3.1	3.5	5.3	-	6.7	3.6	4.3	-	-
Silicate**												
Surface	1362.8	772.8	555.0	477.7	372.3	772.8	562.0	751.7	674.4	400.4	1405.0	245.9
Bottom	1299.6	829.0	-	337.2	309.1	1131.0	449.6	723.6	667.4	386.4	1145.1	224.8
Phosphate**												
Surface	13.0	18.5	31.5	22.0	4.5	229.0	19.5	24.0	31.5	25.0	13.5	20.0
Bottom	32.0	40.5	-	36.0	19.5	13.5	18.0	27.0	43.0	25.0	49.5	28.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 11. Physical and chemical characteristics of water samples collected monthly at River Mile 1 (Station SS01), South Santee River estuary, South Carolina, during the two annual cycles from January, 1975 through December, 1976. Samples were taken 0.3 mile upriver from seaward tip of Grace Island in the main channel between Grace and Murphy Islands.

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	14.7	11.0	10.8	15.5	24.2	27.4	28.3	30.0	29.0	24.5	16.8	15.1
Bottom	14.1	10.5	10.3	15.8	23.0	27.2	28.2	30.5	28.7	24.8	16.6	15.3
Salinity (°/oo)												
Surface	29.5	26.8	7.7	1.0	24.0	5.9	31.1	9.3	31.8	27.5	24.5	27.8
Bottom	29.8	27.7	7.7	10.8	27.8	8.3	31.2	9.6	31.8	28.2	27.8	27.8
Dissolved Oxygen*												
Surface	7.6	9.7	9.3	7.7	6.9	5.4	5.9	5.5	5.9	6.0	4.7	8.5
Bottom	8.5	9.5	9.3	7.8	7.2	5.2	5.9	5.4	6.2	6.3	7.0	8.3
pH												
Surface	7.3	7.8	7.1	6.1	6.9	7.0	7.5	6.7	7.2	7.1	7.6	7.6
Bottom	7.2	7.4	7.1	6.7	7.2	7.0	7.6	6.7	7.2	7.3	7.1	7.6
Turbidity+												
Surface	40.9	73.0	25.0	33.0	18.0	13.0	89.0	14.0	18.0	31.0	7.2	19.0
Bottom	54.0	82.0	30.0	24.0	32.0	31.0	91.0	22.0	18.0	33.0	16.0	17.0
Secchi disk (m)	0.4	0.2	0.6	0.3	0.4	0.5	0.1	0.6	0.7	0.4	0.9	0.7
Solids												
Total Solids*												
Surface	-	232.0	48.8	17.2	64.0	20.8	292.0	37.6	-	122.8	62.0	-
Bottom	184.8	293.2	49.2	35.2	96.0	64.4	326.0	41.2	86.0	152.4	-	-
Settleable Solids*												
Surface	-	51.2	14.4	2.0	9.6	2.8	109.6	12.0	-	37.2	6.4	-
Bottom	40.4	113.2	10.4	17.2	9.6	34.0	152.4	6.0	10.4	73.2	-	-
Nutrients												
Nitrate**												
Surface	45.0	68.7	133.8	91.4	43.1	78.5	11.9	23.8	5.7	89.3	27.3	27.9
Bottom	17.0	69.4	148.1	45.7	34.9	52.6	2.5	32.2	58.2	118.7	23.8	25.6
Nitrite**												
Surface	4.4	1.3	1.3	5.9	0.7	3.1	1.1	3.5	2.0	9.0	2.8	2.2
Bottom	4.0	0.6	1.4	8.5	2.5	2.4	2.1	4.6	2.5	10.8	2.8	2.0
Silicate**												
Surface	400.5	976.4	533.9	281.0	583.1	-	231.8	-	688.4	1018.6	885.2	829.0
Bottom	323.2	541.0	562.0	716.6	484.7	632.2	358.3	-	484.7	1194.2	-	709.5
Phosphate**												
Surface	25.2	117.0	39.0	45.0	79.5	83.5	144.5	42.0	55.5	121.0	36.0	28.0
Bottom	12.0	142.0	82.5	-	151.5	108.0	169.5	61.5	67.5	127.5	87.0	18.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1ℓ. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	9.8	10.0	17.2	17.6	20.3	26.6	27.0	27.1	25.9	23.9	11.9	9.7
Bottom	9.5	10.6	19.0	17.8	19.2	26.5	26.8	27.1	26.2	23.8	12.4	11.5
Salinity (°/oo)												
Surface	19.3	31.3	20.5	21.1	24.0	13.4	10.0	31.0	20.7	24.0	21.5	20.8
Bottom	19.3	31.3	21.4	21.6	25.5	13.6	11.8	31.6	21.3	24.3	21.6	21.2
Dissolved Oxygen*												
Surface	10.1	9.2	8.1	7.6	7.5	7.6	6.1	7.4	5.7	6.3	8.8	10.1
Bottom	9.9	9.3	8.1	7.4	7.2	7.4	5.4	7.4	5.9	6.4	9.2	10.4
pH												
Surface	7.4	7.9	7.3	7.0	7.6	6.8	7.3	7.2	6.5	7.4	7.8	7.3
Bottom	7.8	8.0	7.5	7.1	7.7	7.0	7.3	7.7	6.8	7.5	7.4	7.3
Turbidity+												
Surface	14.0	25.0	11.0	7.7	5.2	18.0	14.0	21.0	16.0	16.0	37.0	39.0
Bottom	15.0	26.0	14.0	7.0	7.7	13.0	17.0	21.0	19.0	12.0	41.0	43.0
Secchi disk (m)	0.8	0.6	0.9	0.9	0.8	0.6	0.7	0.6	0.5	0.7	0.4	0.4
Solids												
Total Solids*												
Surface	77.6	132.8	-	73.2	62.8	44.0	45.2	84.4	71.2	66.0	147.6	128.0
Bottom	86.4	148.4	66.4	71.2	99.2	35.2	62.0	86.8	-	64.4	134.4	143.2
Settleable Solids*												
Surface	30.4	56.0	-	9.6	36.4	2.8	5.6	15.2	30.8	11.2	35.2	29.2
Bottom	31.2	57.6	3.2	1.2	48.4	2.4	23.6	33.6	-	21.6	15.2	40.8
Nutrients												
Nitrate**												
Surface	51.2	13.6	31.9	46.2	14.1	17.0	40.9	35.1	-	38.2	26.9	25.1
Bottom	55.0	7.6	38.3	43.3	12.6	8.5	49.8	13.9	61.0	40.6	26.7	40.1
Nitrite**												
Surface	2.0	0.0	2.1	9.4	1.7	3.6	2.9	1.7	-	3.4	2.9	0.1
Bottom	1.0	0.1	2.7	9.9	1.8	1.7	3.8	0.1	4.8	5.2	3.1	1.5
Silicate**												
Surface	-	161.6	463.6	1046.7	407.4	674.4	337.2	393.4	709.5	583.1	702.5	906.2
Bottom	-	84.3	400.4	1018.6	407.4	814.9	519.8	238.8	688.4	681.4	604.2	1236.4
Phosphate**												
Surface	15.5	22.5	13.0	0.0	0.0	100.5	0.0	15.0	30.0	21.0	36.0	1.5
Bottom	15.5	37.5	15.0	10.5	3.0	0.0	0.0	15.0	33.0	22.5	235.5	7.5

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1m. Physical and chemical characteristics of water samples collected monthly at River Mile 4 (Station SS04), South Santee River estuary, South Carolina, during the two annual cycles from January, 1975 through December, 1976. Samples were taken immediately seaward of intersection of South Santee River and the Intracoastal Waterway.

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	14.2	9.3	10.4	15.4	24.2	26.8	28.0	30.4	28.4	24.3	16.4	15.1
Bottom	14.1	9.3	10.3	15.3	24.0	26.6	28.4	30.0	28.5	24.2	15.2	14.9
Salinity (°/oo)												
Surface	23.7	0.5	0.3	0.4	5.9	0.2	10.1	4.6	12.1	10.8	14.2	20.8
Bottom	26.0	0.4	0.3	0.2	15.1	0.4	17.3	6.5	15.3	10.8	18.7	22.2
Dissolved Oxygen *												
Surface	8.6	10.3	9.2	6.9	7.4	5.4	6.1	6.4	5.3	5.9	8.9	8.1
Bottom	8.5	10.3	9.5	7.2	6.7	5.6	5.5	5.5	5.2	5.9	8.4	7.9
pH												
Surface	7.7	7.0	6.6	6.5	7.2	5.8	6.6	6.9	7.1	6.6	7.6	7.6
Bottom	7.4	6.8	8.0	6.4	7.2	6.8	6.9	6.9	7.3	6.7	7.7	6.8
Turbidity +												
Surface	25.0	62.0	48.0	46.0	13.0	16.0	17.0	21.0	14.0	17.0	8.1	23.0
Bottom	38.0	64.0	64.0	46.0	11.0	27.0	21.0	39.0	21.0	17.0	12.0	34.0
Secchi disk (m)	0.5	0.2	0.2	0.3	0.7	0.6	0.6	0.4	0.6	0.7	1.1	0.7
Solids												
Total Solids *												
Surface	62.0	67.6	69.6	27.6	24.8	22.4	74.4	62.0	34.0	51.2	38.8	73.6
Bottom	90.8	110.0	115.2	18.8	-	41.6	92.4	91.6	57.2	52.0	68.4	135.2
Settleable Solids *												
Surface	3.4	10.0	24.0	4.4	4.0	6.8	10.0	22.8	8.4	1.2	9.6	25.2
Bottom	8.0	44.8	48.4	4.0	-	30.4	2.8	52.4	15.6	21.6	19.6	57.4
Nutrients												
Nitrate **												
Surface	22.5	116.5	171.5	109.6	128.0	120.9	7.8	20.6	-	-	46.2	12.3
Bottom	21.4	133.8	150.7	86.2	36.7	133.5	11.3	15.4	22.6	63.8	31.2	19.5
Nitrite **												
Surface	4.8	4.2	1.4	4.5	3.6	3.4	1.3	3.9	-	-	4.6	1.0
Bottom	4.2	4.4	1.2	4.1	2.9	4.1	1.7	3.2	6.4	3.8	1.4	1.5
Silicate **												
Surface	569.1	189.7	1159.1	147.5	2451.8	555.0	751.7	723.6	899.2	1236.4	-	583.1
Bottom	449.6	428.6	119.5	140.5	1011.6	632.2	962.4	800.8	1004.6	850.0	1391.0	1011.6
Phosphate **												
Surface	9.0	34.0	36.0	136.5	47.5	59.5	76.5	52.5	19.5	105.0	49.5	18.0
Bottom	10.2	70.5	84.0	0.0	54.0	74.5	67.5	91.5	60.0	46.5	84.0	21.5

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1m. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	9.2	11.5	18.7	18.1	19.8	24.5	25.7	27.2	26.4	23.9	10.3	10.0
Bottom	9.1	10.8	18.0	18.1	21.2	25.5	25.6	27.5	26.1	23.7	10.5	9.7
Salinity (°/oo)												
Surface	8.1	7.1	12.2	14.4	15.3	7.2	0.3	11.5	12.3	16.0	11.1	8.7
Bottom	15.2	15.4	15.5	19.4	21.1	11.6	0.4	16.3	18.5	22.0	20.0	18.5
Dissolved Oxygen *												
Surface	10.4	10.0	9.9	8.0	8.9	6.0	4.3	4.8	5.7	6.7	9.3	10.4
Bottom	10.2	9.6	9.4	7.0	8.0	6.1	4.5	4.9	5.3	5.9	9.3	10.3
pH												
Surface	7.5	7.2	7.6	6.5	7.9	6.6	7.2	7.1	6.5	7.2	7.3	7.3
Bottom	7.6	7.7	7.5	7.7	7.7	6.7	7.3	7.1	6.7	7.4	7.7	7.6
Turbidity +												
Surface	9.0	26.0	14.0	7.5	14.0	21.0	44.0	18.0	13.0	13.0	14.0	14.0
Bottom	12.0	16.0	17.0	6.7	16.0	27.0	47.0	24.0	15.0	19.0	31.0	32.0
Secchi disk (m)	0.8	0.4	0.8	0.8	0.5	0.5	0.6	0.3	0.6	0.6	0.8	0.6
Solids												
Total Solids *												
Surface	-	54.4	-	58.4	92.0	40.8	61.6	50.0	48.8	49.2	35.2	-
Bottom	66.4	34.8	46.0	68.8	102.0	63.2	92.8	77.6	74.8	76.0	71.6	118.8
Settleable Solids *												
Surface	-	26.4	-	3.6	42.8	7.6	34.8	3.6	1.6	13.6	5.2	-
Bottom	13.6	8.0	0.0	26.4	27.2	11.2	63.6	22.0	6.4	20.4	4.8	17.6
Nutrients												
Nitrate **												
Surface	64.3	47.2	40.9	36.1	29.4	28.6	-	103.6	63.1	51.8	-	114.9
Bottom	65.4	49.7	43.4	35.6	13.0	16.6	-	100.7	-	53.9	57.7	42.6
Nitrite **												
Surface	2.5	0.8	1.8	8.7	1.8	2.2	-	7.7	4.5	2.4	-	1.3
Bottom	2.2	1.4	2.1	7.8	1.0	2.0	-	10.6	-	3.1	3.2	0.4
Silicate **												
Surface	-	765.7	519.8	1018.6	463.6	1011.6	147.5	477.7	611.2	470.7	997.6	941.4
Bottom	-	723.6	540.9	98.4	505.8	786.8	175.6	632.2	793.8	505.8	1215.3	1215.3
Phosphate **												
Surface	25.0	94.5	13.0	0.0	0.0	0.0	11.5	7.5	25.5	12.0	238.0	7.5
Bottom	25.0	84.0	13.0	12.0	4.5	0.0	15.0	28.0	36.0	16.5	46.5	15.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1n. Physical and chemical characteristics of water samples collected monthly at River Mile 7 (Station SS07), South Santee River estuary, South Carolina, during the two annual cycles from January, 1975 through December, 1976. Samples were taken in the channel at the upriver tip of the small, unnamed marsh island one mile upriver of Santee Gun Club dock.

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	15.0	8.6	11.5	15.3	24.4	26.0	27.4	30.4	28.0	23.8	16.8	14.3
Bottom	15.2	8.2	11.1	15.2	24.0	25.8	27.4	30.5	28.0	23.9	16.6	14.4
Salinity (°/oo)												
Surface	1.4	0.4	0.4	0.2	5.7	0.2	11.8	0.5	2.3	1.6	9.0	9.4
Bottom	1.5	0.4	0.2	0.2	6.7	0.1	13.1	1.5	3.0	1.5	10.0	9.9
Dissolved Oxygen*												
Surface	8.8	10.3	9.3	6.5	7.8	5.6	5.9	6.0	6.4	6.1	6.3	9.0
Bottom	8.6	10.4	9.1	6.6	7.3	5.7	5.6	6.0	6.0	6.0	5.7	8.7
pH												
Surface	7.1	6.6	7.2	6.0	7.0	6.8	-	6.7	6.5	6.6	6.8	7.4
Bottom	7.1	6.5	6.6	5.9	6.9	6.8	7.2	7.0	6.8	6.6	7.2	7.1
Turbidity +												
Surface	73.0	48.0	28.0	35.0	26.0	14.0	15.0	56.0	13.0	21.0	6.8	14.0
Bottom	82.0	51.0	40.0	37.0	52.0	11.0	22.0	49.0	17.0	24.0	22.0	30.0
Secchi disk (m)	0.2	0.2	0.5	0.4	0.4	0.6	-	0.4	0.6	0.5	0.8	0.5
Solids												
Total Solids*												
Surface	-	61.2	18.8	-	-	14.0	54.0	111.6	21.2	32.4	-	31.6
Bottom	-	54.4	45.6	13.2	99.2	22.8	-	122.0	36.8	-	61.6	78.0
Settleable Solids*												
Surface	-	28.4	0.8	-	-	5.6	2.8	59.6	6.4	8.4	-	6.4
Bottom	-	17.2	10.4	5.2	35.6	16.0	-	58.0	19.2	-	13.6	23.6
Nutrients												
Nitrate **												
Surface	50.8	96.9	168.8	87.9	43.6	110.2	12.3	1.8	3.2	-	20.2	14.4
Bottom	50.2	123.5	175.5	96.9	41.0	117.3	14.6	1.4	-	-	21.6	16.4
Nitrite **												
Surface	6.9	20.3	1.7	2.8	2.2	2.9	1.0	1.4	3.1	-	0.8	1.0
Bottom	7.5	4.2	1.6	3.9	3.1	2.4	1.5	1.4	-	-	1.5	1.4
Silicate **												
Surface	702.5	252.7	126.5	133.5	990.5	435.6	927.3	702.5	850.0	569.0	-	-
Bottom	1201.7	569.1	140.5	189.7	751.7	231.8	948.4	1081.8	-	505.8	1369.9	-
Phosphate **												
Surface	4.8	-	15.0	111.0	76.5	60.0	69.0	61.5	0.0	0.0	45.0	21.5
Bottom	14.4	63.0	71.0	43.5	157.5	89.5	-	93.0	1.5	0.5	93.0	17.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1n. (Continued)

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	9.2	9.8	18.3	18.8	20.9	25.9	26.2	28.0	27.0	23.8	11.8	9.7
Bottom	9.2	9.9	18.1	18.4	19.8	25.5	26.2	27.7	25.8	23.2	11.6	9.7
Salinity (°/oo)												
Surface	3.2	0.8	3.8	6.4	7.2	1.6	0.4	9.6	4.6	6.1	3.1	1.7
Bottom	3.4	2.9	5.9	10.5	11.5	1.8	0.3	10.5	5.4	8.0	5.3	2.8
Dissolved Oxygen *												
Surface	10.4	9.5	12.0	10.5	8.7	5.4	5.3	5.7	6.6	7.8	9.4	9.5
Bottom	10.2	9.7	11.0	8.0	7.1	4.8	4.8	5.8	5.0	6.3	9.4	9.5
pH												
Surface	7.3	7.2	7.6	6.7	7.9	-	6.9	6.9	6.8	7.4	7.5	7.4
Bottom	7.3	7.3	7.6	6.9	7.7	6.4	7.0	7.1	6.9	7.3	7.4	7.3
Turbidity +												
Surface	21.0	37.0	35.0	8.4	9.5	41.0	67.0	26.0	18.0	13.0	29.0	24.0
Bottom	30.0	47.0	92.0	27.0	27.0	68.0	47.0	36.0	28.0	25.0	85.0	42.0
Secchi disk (m)	0.6	0.3	0.4	0.7	0.5	0.3	0.4	0.5	0.5	0.6	0.3	0.3
Solids												
Total Solids *												
Surface	35.6	66.8	72.4	30.8	-	52.4	99.6	65.2	-	-	36.0	30.8
Bottom	47.2	80.8	156.8	71.2	-	101.6	112.0	107.6	53.2	60.4	189.2	69.2
Settleable Solids *												
Surface	15.2	16.0	33.2	2.8	-	8.2	50.8	23.6	-	-	2.0	4.0
Bottom	12.4	28.4	68.4	27.6	-	23.6	56.8	45.2	1.2	21.2	88.0	20.0
Nutrients												
Nitrate **												
Surface	45.6	51.5	16.6	-	9.7	32.8	57.4	83.3	52.0	35.0	77.6	51.1
Bottom	54.6	41.7	5.9	9.4	8.0	14.0	44.2	66.9	49.3	53.3	-	40.1
Nitrite **												
Surface	0.6	1.0	0.6	-	2.9	3.6	2.1	7.0	2.2	2.4	5.7	1.1
Bottom	0.7	0.7	0.4	3.9	3.6	2.1	2.0	5.9	1.8	2.0	-	1.5
Silicate **												
Surface	-	702.5	91.3	252.9	477.7	646.3	203.7	505.8	548.0	843.0	337.2	498.8
Bottom	-	632.2	168.6	491.8	498.8	379.4	295.0	576.0	463.6	533.9	449.6	540.9
Phosphate **												
Surface	66.5	66.5	31.5	0.0	0.0	18.0	0.0	10.5	7.0	19.0	75.0	4.5
Bottom	44.5	39.0	22.5	7.5	0.0	132.0	0.0	18.0	24.0	28.0	49.5	0.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1o. Physical and chemical characteristics of water samples collected monthly at River Mile 11 (Station SS11), South Santee River estuary, South Carolina, during the two annual cycles from January, 1975 through December, 1976. Samples were taken in the main river channel off the mouth of Hampton Creek.

Parameter	1975											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	14.1	9.7	11.7	15.4	24.3	25.7	27.4	29.8	29.3	25.1	16.0	13.9
Bottom	14.1	9.7	11.9	15.4	24.5	25.7	27.5	29.8	29.2	24.8	16.0	13.9
Salinity (°/oo)												
Surface	1.0	0.2	0.4	0.2	0.1	0.1	0.6	0.1	0.1	0.1	0.2	1.7
Bottom	0.9	0.3	0.2	0.2	0.1	0.2	0.7	0.1	0.1	0.1	0.2	1.8
Dissolved Oxygen *												
Surface	8.4	10.2	9.5	7.2	6.6	6.0	5.8	5.2	5.6	6.1	8.0	9.4
Bottom	8.6	9.9	9.5	6.8	6.8	5.9	5.8	5.2	7.4	6.2	7.6	10.4
pH												
Surface	-	6.9	6.9	7.3	7.2	7.0	-	5.4	7.2	6.6	7.2	7.1
Bottom	-	6.8	6.9	7.6	7.3	6.9	-	5.9	7.2	6.6	7.2	7.0
Turbidity +												
Surface	-	40.0	21.0	38.0	24.0	10.0	20.0	20.0	18.0	18.0	27.0	23.0
Bottom	54.0	40.0	20.0	38.0	23.0	14.1	25.0	19.0	27.0	27.0	24.0	50.0
Secchi disk (m)	0.2	0.2	0.6	0.5	0.4	0.7	0.5	0.5	0.8	0.7	0.4	0.4
Solids												
Total Solids *												
Surface	70.4	23.6	-	15.2	22.8	10.4	43.2	18.0	-	24.4	33.2	37.2
Bottom	122.0	22.0	13.6	12.0	34.4	14.8	178.0	20.4	35.6	43.6	43.6	78.4
Settleable Solids *												
Surface	20.0	12.0	-	8.4	0.8	5.6	9.6	10.4	-	13.6	18.4	18.0
Bottom	10.4	7.2	6.4	2.8	12.8	8.0	11.8	9.6	18.0	26.0	20.8	40.8
Nutrients												
Nitrate **												
Surface	45.4	153.7	197.1	111.0	148.8	173.3	44.8	136.8	129.8	217.4	74.9	43.9
Bottom	51.5	156.5	197.3	110.0	179.6	117.9	44.8	-	4.5	214.5	91.7	42.4
Nitrite **												
Surface	5.4	2.0	1.0	3.8	3.8	2.1	2.4	6.0	1.1	1.0	1.7	1.3
Bottom	6.3	2.7	1.2	5.2	4.5	1.8	2.8	-	0.7	0.4	2.1	1.4
Silicate **												
Surface	1067.8	449.6	175.7	175.6	562.0	639.3	639.3	-	-	1278.6	-	-
Bottom	1138.1	449.6	98.4	252.9	660.4	484.7	667.4	-	-	800.8	1088.9	-
Phosphate **												
Surface	38.4	39.0	37.5	34.5	48.0	69.0	43.5	43.5	0.0	0.0	42.0	13.0
Bottom	4.2	50.0	22.5	39.0	55.5	88.5	36.0	58.5	9.0	0.0	43.5	36.5

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 1o. (Continued).

Parameter	1976 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water Temp. (°C)												
Surface	9.4	9.3	17.2	19.1	19.9	25.2	24.3	28.1	25.7	24.0	11.0	10.1
Bottom	9.4	9.2	17.0	19.1	19.7	25.1	24.3	28.2	25.8	24.0	11.8	10.0
Salinity (°/oo)												
Surface	0.2	0.1	0.1	0.3	0.6	0.2	0.1	0.4	1.3	1.2	0.2	0.4
Bottom	0.1	0.1	0.1	0.1	0.6	0.2	0.1	0.4	1.4	1.4	0.1	0.4
Dissolved Oxygen *												
Surface	9.9	9.6	8.8	9.7	9.6	5.0	4.6	7.4	5.9	6.6	9.3	9.2
Bottom	9.9	9.1	8.7	10.2	9.9	5.0	4.8	7.4	5.9	8.3	9.3	9.2
pH												
Surface	7.3	7.1	7.3	6.8	7.6	6.8	7.0	7.5	6.9	-	7.2	7.5
Bottom	7.3	7.2	7.3	6.8	7.7	6.5	7.0	7.4	7.1	-	7.3	7.1
Turbidity +												
Surface	21.0	23.0	28.0	28.0	53.0	36.0	22.0	38.0	41.0	41.0	26.0	17.0
Bottom	21.0	27.0	33.0	42.0	63.0	37.0	17.0	57.0	57.0	28.0	27.0	21.0
Secchi disk (m)	0.4	0.3	0.4	0.6	0.3	0.4	0.3	0.2	0.4	0.4	0.3	0.5
Solids												
Total Solids *												
Surface	28.0	25.6	42.8	54.0	86.0	51.2	20.8	72.0	68.4	55.6	11.6	16.8
Bottom	39.2	31.2	46.0	62.0	138.4	69.6	22.8	98.8	104.4	74.0	18.0	23.2
Settleable Solids *												
Surface	18.8	16.8	29.2	29.6	54.0	23.2	12.4	23.2	32.8	26.8	4.4	4.8
Bottom	23.6	23.6	22.4	30.0	102.8	41.6	12.0	56.8	65.6	36.4	7.6	10.4
Nutrients												
Nitrate **												
Surface	61.0	61.6	186.2	30.8	14.0	51.6	53.3	99.0	-	69.7	146.3	106.3
Bottom	57.7	61.6	-	4.0	8.5	59.8	41.9	95.5	-	69.0	146.6	92.4
Nitrite **												
Surface	1.0	1.4	2.4	7.0	2.4	3.4	1.3	5.3	-	2.1	3.5	0.8
Bottom	0.4	0.7	-	3.4	1.7	3.2	1.5	5.3	-	3.1	3.2	1.8
Silicate **												
Surface	-	864.1	84.3	1250.4	526.9	526.9	154.6	393.4	562.0	526.9	470.7	295.0
Bottom	-	512.8	91.3	709.5	267.0	316.1	77.3	365.3	449.6	281.0	358.3	210.8
Phosphate **												
Surface	33.5	15.5	16.5	12.0	9.0	227.5	4.5	10.5	27.0	7.5	13.5	0.0
Bottom	17.0	18.5	21.5	6.0	1.5	28.5	9.0	9.0	22.5	4.5	28.5	0.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

APPENDIX 2

An appendix of physical and chemical values resulting from analyses of individual water samples, surface and bottom, collected quarterly (i.e. seasonally at Extensive Phase stations) over the three annual cycles from January, 1975 through December, 1977 at Station J002, vicinity of Hog Island in Charleston Harbor-Cooper River estuary and over the annual cycle from January through December, 1977 at Stations NS04 and SS04 (while part of the quarterly Extensive Phase), Estuary Mile 4, North and South Santee Rivers, South Carolina, respectively.

Individual hydrographic values for an additional 15 stations monitored monthly (Intensive Phase stations) over several annual cycles in these same estuaries are reported in Appendix 1.

Individual hydrographic values for several additional 25-hr stations occupied quarterly over several annual cycles in the Charleston Harbor-Cooper River and North and South Santee River estuaries, South Carolina, are reported in Appendix 3.

Table 2a. Physical and chemical characteristics of water samples collected quarterly at Extensive Phase Station J002, vicinity of Hog Island in Charleston Harbor, South Carolina, during the three annual cycles from January, 1975 through December, 1977.

Parameter	1975			
	Jan.	Apr.	Aug.	Oct.
Water Temp. (°C)				
Surface	11.1	16.2	28.0	23.9
Bottom	11.7	16.1	28.4	24.6
Salinity (°/oo)				
Surface	20.1	17.7	15.0	19.3
Bottom	27.6	18.4	20.9	24.4
Dissolved Oxygen *				
Surface	9.2	8.5	4.8	7.3
Bottom	8.8	8.4	4.8	5.9
Nitrate **				
Surface	48.0	55.6	36.1	15.4
Bottom	19.8	88.3	23.1	9.4
Nitrite **				
Surface	1.7	1.8	33.9	7.7
Bottom	0.5	2.4	21.6	8.1
Silicate **				
Surface	864.1	540.9	-	1313.7
Bottom	393.4	625.2	-	1194.2
Phosphate **				
Surface	0.0	68.5	67.5	0.0
Bottom	8.0	54.0	94.5	66.0
pH				
Surface	7.2	7.3	7.1	7.9
Bottom	7.5	7.8	7.2	-
Turbidity +				
Surface	5.4	14.0	6.6	4.0
Bottom	8.4	21.0	22.0	12.0
Total Solids *				
Surface	47.6	47.2	33.6	-
Bottom	64.4	63.6	82.4	89.6
Settleable Solids *				
Surface	2.4	26.4	7.2	-
Bottom	1.2	25.2	25.2	22.0
Secchi disc (m)	1.6	0.2	0.9	1.8

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 2a. (Continued).

Parameter	1976			
	Jan.	Apr.	Aug.	Oct.
Water Temp. (°C)				
Surface	10.8	17.8	29.0	24.7
Bottom	11.8	17.0	28.9	24.6
Salinity (°/oo)				
Surface	17.8	16.7	24.7	23.8
Bottom	29.2	22.0	31.5	27.2
Dissolved Oxygen *				
Surfacw	10.0	7.8	6.1	7.2
Bottom	9.3	7.5	6.1	6.9
Nitrate **				
Surface	21.7	49.8	24.1	30.3
Bottom	9.7	36.5	25.3	34.8
Nitrite **				
Surface	0.3	3.8	16.9	16.9
Bottom	0.1	3.4	0.3	11.6
Silicate **				
Surface	491.8	548.0	323.2	421.5
Bottom	337.2	449.6	309.1	274.0
Phosphate **				
Surface	20.0	28.5	24.0	28.5
Bottom	21.5	39.0	49.5	19.5
pH				
Surface	8.1	7.8	7.6	7.4
Bottom	8.1	7.9	7.8	6.9
Turbidity +				
Surface	5.3	4.7	8.9	8.0
Bottom	33.0	5.6	20.0	17.0
Total Solids *				
Surface	-	-	81.2	97.6
Bottom	108.4	-	129.6	129.6
Settleable Solids *				
Surface	-	-	18.4	37.2
Bottom	19.6	-	42.0	69.6
Secchi disc (m)	1.1	1.1	0.8	0.9

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 2a. (Continued).

Parameter	1977			
	Jan.	Apr.	Aug.	Oct.
Water Temp. (°C)				
Surface	7.6	21.2	31.2	23.9
Bottom	7.6	20.0	34.0	24.1
Salinity (°/oo)				
Surface	16.6	13.0	24.5	22.5
Bottom	24.3	20.1	26.6	26.2
Dissolved Oxygen *				
Surface	10.7	7.6	6.8	7.2
Bottom	10.3	7.6	5.4	5.8
Nitrate **				
Surface	-	39.2	2.9	-
Bottom	-	43.3	2.4	-
Nitrite **				
Surface	-	1.0	0.3	-
Bottom	-	1.5	0.8	-
Silicate **				
Surface	850.0	182.6	330.2	435.6
Bottom	463.6	224.8	224.8	330.2
Phosphate **				
Surface	10.5	15.0	11.0	47.0
Bottom	33.0	16.5	49.0	37.5
pH				
Surface	7.0	7.3	6.2	7.7
Bottom	6.9	7.4	6.4	7.3
Turbidity +				
Surface	5.6	7.4	7.1	3.6
Bottom	17.0	6.1	11.0	13.0
Total Solids *				
Surface	38.8	42.0	-	68.8
Bottom	103.6	67.2	71.6	112.0
Settleable Solids *				
Surface	1.2	10.8	-	24.0
Bottom	0.8	12.0	17.2	36.4
Secchi disc (m)	1.0	0.8	0.9	1.5

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 2b. Physical and chemical characteristics of water samples collected quarterly at Station NS04 (while it was part of the Extensive Phase), Estuary Mile 4, North Santee River estuary, South Carolina, during the annual cycle from January through December, 1977.

Parameter	1977			
	Jan.	Apr.	Aug.	Oct.
Water Temp. (°C)				
Surface	6.0	20.4	29.4	24.3
Bottom	6.0	20.3	29.0	24.2
Salinity (°/oo)				
Surface	0.1	0.2	11.8	24.0
Bottom	0.2	0.3	11.8	23.7
Dissolved Oxygen *				
Surface	10.8	8.6	5.2	6.9
Bottom	10.7	8.8	5.3	6.5
Nitrate **				
Surface	53.6	158.8	16.7	-
Bottom	65.5	158.9	23.4	-
Nitrite **				
Surface	1.4	1.8	4.3	-
Bottom	0.7	1.7	5.6	-
Silicate **				
Surface	161.6	126.4	428.5	1405.0
Bottom	133.5	126.4	618.2	1405.0
Phosphate **				
Surface	7.5	26.5	142.5	32.0
Bottom	5.0	28.5	49.0	37.5
pH				
Surface	7.7	7.1	7.3	7.3
Bottom	7.6	7.1	7.4	7.5
Turbidity +				
Surface	17.0	37.0	11.0	25.0
Bottom	22.0	38.0	11.0	38.0
Total Solids *				
Surface	7.6	43.6	-	104.8
Bottom	-	44.8	-	157.6
Settleable Solids *				
Surface	0.4	26.8	-	34.0
Bottom	-	29.6	-	57.6
Secchi disc (m)	0.6	0.2	0.6	0.3

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

Table 2c. Physical and chemical characteristics of water samples collected quarterly at Station SS04 (while it was part of the Extensive Phase), Estuary Mile 4, South Santee River estuary, South Carolina, during the annual cycle from January through December, 1977.

Parameter	1977			
	Jan.	Apr.	Aug.	Oct.
Water Temp. (°C)				
Surface	6.2	21.5	28.8	24.2
Bottom	6.4	21.4	29.6	24.2
Salinity (°/oo)				
Surface	0.2	0.4	19.0	23.9
Bottom	0.2	0.4	22.3	24.4
Dissolved Oxygen *				
Surface	11.7	8.4	5.4	7.0
Bottom	10.8	8.5	5.2	6.3
Nitrate **				
Surface	53.6	150.5	18.1	-
Bottom	56.4	141.0	30.4	40.0
Nitrite **				
Surface	2.4	2.8	3.9	-
Bottom	1.0	2.2	6.4	19.2
Silicate **				
Surface	182.6	203.7	646.3	1405.0
Bottom	140.5	267.0	1222.4	1131.0
Phosphate **				
Surface	10.5	19.5	66.0	25.5
Bottom	9.0	21.0	43.0	22.5
pH				
Surface	7.4	7.3	7.5	7.2
Bottom	7.2	7.3	7.6	7.2
Turbidity +				
Surface	24.0	63.0	9.0	21.0
Bottom	27.0	69.0	14.0	22.0
Total Solids *				
Surface	21.2	104.4	-	94.8
Bottom	22.0	107.2	-	83.6
Settleable Solids *				
Surface	6.0	70.8	-	38.8
Bottom	10.0	74.0	-	4.0
Secchi disc (m)	0.4	0.1	0.5	0.4

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units

APPENDIX 3

An appendix of physical and chemical values resulting from analyses of individual water samples, surface and bottom, collected on consecutive tide stages over 25-hr cycles quarterly (i.e. seasonally) at Estuary Mile 3 (Twenty-five Hr Station J251), Ft. Johnson, Charleston Harbor-Cooper River estuary, South Carolina during the five annual cycles from January 1972 through December 1977; and at Estuary Mile 4, (Twenty-five Hr Stations N254 and S254) on both the North and South branches of the Santee River estuary, South Carolina during the two annual cycles from January,1975 through December,1976.

Individual hydrographic values for an additional 15 stations monitored monthly (Intensive Phase stations) over several annual cycles in these same estuaries are reported in Appendix 1.

Individual hydrographic values for several additional stations monitored quarterly (Extensive Phase stations) in the Charleston Harbor-Cooper River and North and South Santee River estuaries, South Carolina are reported in Appendix 2.

Appendix Table 3a. Physical and chemical characteristics of water samples collected through consecutive tide stages over 25-hr cycles quarterly (i.e. seasonally) at Estuary Mile 3 (Station J251), Ft. Johnson, Charleston Harbor-Cooper River estuary, South Carolina. This 25-hr station was occupied during the five annual cycles from January, 1973 through December, 1977.

SPRING:

Parameter	1-2 May 1973					
Time:	0654 †	1000	1600	2200	0400	0900
Water Temp. (°C)						
Surface	19.2	19.8	20.6	19.5	19.5	20.0
Bottom	19.4	19.7	19.6	19.5	19.4	19.9
Salinity (°/oo)						
Surface	22.7	14.9	11.9	15.6	10.7	14.6
Bottom	23.7	22.3	18.3	27.2	12.7	24.5
Dissolved Oxygen *						
Surface	7.2	7.2	7.6	7.4	6.9	6.9
Bottom	7.3	7.0	6.5	7.5	6.8	7.4
Nitrate **						
Surface	32.6	57.3	76.8	51.6	53.9	38.4
Bottom	37.9	29.8	46.5	7.3	95.9	16.8
Nitrite **						
Surface	3.1	2.5	1.3	2.0	2.0	1.5
Bottom	2.0	1.4	4.1	1.8	2.8	1.4
Silicate **						
Surface	709.5	948.4	1025.7	871.1	804.4	681.4
Bottom	730.6	670.9	871.1	351.3	1405.0	358.3
Phosphate **						
Surface	6.0	14.4	6.0	11.4	5.4	9.0
Bottom	7.8	13.2	10.8	15.0	9.9	7.8
pH						
Surface	8.0	7.8	7.9	7.8	7.8	7.7
Bottom	8.0	7.9	7.9	8.1	7.8	8.0
Turbidity +						
Surface	9.4	4.4	10.0	5.3	7.3	7.0
Bottom	15.0	32.0	23.5	33.0	14.0	21.0
Total Solids *						
Surface	16.8	9.2	11.4	4.4	6.0	11.4
Bottom	25.8	54.4	69.2	53.4	21.6	33.4
Settleable Solids *						
Surface	10.4	2.0	5.8	0.8	0.4	3.8
Bottom	13.0	26.0	39.6	39.8	8.8	12.6
Secchi disc (m)	1.1	0.9	0.9	++	++	1.0

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
†Times of sampling based on 24-hr system. Respective tide stages for these times were: (left to right): late flood (0654 hr), maximum ebb (1000 hr), maximum flood (1600 hr), maximum ebb (2200 hr), maximum flood (0400 hr) and maximum ebb (0900 hr).

Appendix Table 3a. (Continued). Twenty-five hr station J251, Ft. Johnson, August, 1973.

SUMMER:

Parameter	2-3 August 1973					
Time:	0630†	0930	1530	2030	0230	0630
Water Temp. (°C)						
Surface	29.0	29.1	29.8	29.3	28.9	29.8
Bottom	28.0	28.8	29.3	29.1	28.0	28.7
Salinity (°/oo)						
Surface	11.4	15.5	16.3	14.1	16.3	11.1
Bottom	11.8	21.8	23.7	20.3	23.4	15.1
Dissolved Oxygen *						
Surface	4.3	4.8	5.7	5.3	5.1	5.5
Bottom	4.5	4.9	4.8	4.9	5.1	5.4
Nitrate **						
Surface	47.9	43.8	145.0	42.1	60.3	50.1
Bottom	61.3	47.7	35.2	65.8	65.1	62.4
Nitrite **						
Surface	10.2	13.3	7.3	8.7	15.0	3.8
Bottom	7.7	11.5	12.7	11.9	9.8	4.8
Silicate **						
Surface	1222.4	1405.0	1025.7	1405.0	1405.0	435.6
Bottom	885.2	1405.0	1327.7	-	1405.0	702.5
Phosphate **						
Surface	22.8	23.4	31.2	15.6	27.6	8.4
Bottom	18.6	31.2	120.0	25.8	27.0	18.0
pH						
Surface	7.0	7.6	7.9	7.4	7.7	8.0
Bottom	7.7	7.7	7.1	7.6	7.8	7.8
Turbidity +						
Surface	5.2	4.6	12.0	4.7	4.1	4.3
Bottom	5.5	23.0	20.0	18.0	6.1	14.0
Total Solids *						
Surface	14.6	14.8	26.2	15.2	18.6	14.4
Bottom	13.0	73.0	43.0	44.6	25.4	36.6
Settleable Solids *						
Surface	4.2	1.0	6.6	1.8	5.0	3.2
Bottom	1.6	40.8	13.8	13.2	9.0	16.0
Secchi disc (m)	1.1	1.2	0.7	++	++	++

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
†Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): early flood (0630 hr), maximum flood (0930 hr), maximum ebb (1530 hr), maximum flood (2030 hr), late ebb (0230 hr) and early flood (0630 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, November, 1973.

FALL:

Parameter	1-2 November 1973					
Time:	0630 †	0830	1530	2130	0330	0630
Water Temp. (°C)						
Surface	18.6	-	-	-	-	-
Bottom	18.6	-	-	-	-	-
Salinity (°/oo)						
Surface	21.5	21.4	23.1	21.9	21.4	21.8
Bottom	21.5	28.5	29.3	29.3	28.4	24.7
Dissolved Oxygen *						
Surface	8.1	7.2	8.8	7.6	7.5	7.1
Bottom	7.6	7.2	7.2	7.1	7.2	7.1
Nitrate **						
Surface	-	-	-	-	-	-
Bottom	6.9	-	-	-	-	-
Nitrite **						
Surface	-	-	-	-	-	-
Bottom	5.7	-	-	-	-	-
Silicate **						
Surface	569.0	393.4	653.3	231.8	449.6	-
Bottom	941.4	400.4	519.9	885.2	252.9	695.5
Phosphate **						
Surface	24.6	12.0	22.2	3.6	9.0	12.6
Bottom	27.0	19.8	27.0	14.4	19.2	30.0
pH						
Surface	6.5	6.2	6.5	6.7	6.4	6.7
Bottom	6.6	6.2	6.5	6.1	6.3	6.7
Turbidity +						
Surface	4.3	3.6	3.0	10.0	9.5	3.4
Bottom	4.9	-	30.0	9.0	41.0	5.0
Total Solids *						
Surface	-	42.0	-	64.1	-	-
Bottom	47.6	70.0	102.8	-	149.6	53.2
Settleable Solids *						
Surface	-	0.4	-	28.9	-	-
Bottom	9.2	21.6	34.4	-	56.4	12.8
Secchi disc (m)	1.3	1.3	++	++	++	1.4

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
†Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): early flood (0630 hr), maximum flood (0830 hr), maximum ebb (1530 hr), maximum flood (2130 hr), maximum ebb (0330 hr), and late ebb (0630 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, February, 1974.

WINTER:

Parameter	11-12 February 1974					
Time:	0642†	0830	1430	2030	0330	0630
Water Temp. (°C)						
Surface	13.8	13.7	14.4	13.6	16.0	13.0
Bottom	13.2	14.2	14.2	13.7	14.2	13.1
Salinity (°/oo)						
Surface	7.2	9.3	12.3	8.1	12.1	7.5
Bottom	7.7	17.1	19.0	17.3	26.4	10.5
Dissolved Oxygen *						
Surface	8.4	8.5	8.5	8.4	7.7	8.5
Bottom	8.6	7.9	7.9	8.1	7.8	8.2
Nitrate **						
Surface	-	-	-	-	-	-
Bottom	-	-	-	-	-	-
Nitrite **						
Surface	-	-	-	-	-	-
Bottom	-	-	-	-	-	-
Silicate **						
Surface	1960.0	2311.3	2551.0	1601.8	871.1	28.1
Bottom	2205.8	1180.2	864.1	1643.9	-	2170.8
Phosphate **						
Surface	13.2	26.4	43.2	27.6	32.4	22.8
Bottom	20.4	36.0	24.6	27.6	-	27.6
pH						
Surface	6.7	7.5	8.0	8.1	8.1	8.0
Bottom	7.5	7.9	8.1	8.1	8.0	8.0
Turbidity +						
Surface	7.4	7.2	8.0	6.0	6.0	6.0
Bottom	9.4	7.4	10.0	9.0	19.0	8.0
Total Solids *						
Surface	23.2	27.6	-	24.4	37.2	18.4
Bottom	28.4	74.0	-	100.8	164.4	29.6
Settleable Solids *						
Surface	2.4	4.4	-	0.8	9.6	3.2
Bottom	4.0	30.4	-	44.4	92.8	6.8
Secchi disc (m)	0.7	1.0	1.0	++	++	++

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
†Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): early flood (0642 hr), maximum flood (0830 hr), maximum ebb (1430 hr), maximum flood (2030 hr), late ebb (0330 hr) and early flood (0630 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, May, 1974.

SPRING:

Parameter	13-14 May 1974			
Time:	1500 †	2200	0400	1000
Water Temp. (°C)				
Surface	23.5	22.9	23.2	23.8
Bottom	23.3	22.8	23.0	23.6
Salinity (°/oo)				
Surface	13.7	12.7	13.7	12.4
Bottom	28.7	28.5	20.1	23.1
Dissolved Oxygen *				
Surface	7.5	7.2	7.0	6.8
Bottom	6.5	6.1	6.7	5.8
Nitrate **				
Surface	16.8	19.0	16.9	17.0
Bottom	17.7	2.2	13.4	5.4
Nitrite **				
Surface	3.5	3.4	3.4	4.0
Bottom	3.3	2.0	2.0	3.7
Silicate **				
Surface	1327.7	1341.8	1327.7	1229.4
Bottom	555.0	555.0	948.4	779.8
Phosphate **				
Surface	13.2	13.2	18.0	18.0
Bottom	19.2	24.0	33.6	30.0
pH				
Surface	7.0	7.1	6.8	7.2
Bottom	6.6	7.1	6.9	7.2
Turbidity +				
Surface	7.0	6.0	12.0	6.0
Bottom	-	15.0	9.0	11.0
Total Solids *				
Surface	27.6	20.8	-	-
Bottom	65.2	-	61.2	-
Settleable Solids *				
Surface	6.8	0.8	-	-
Bottom	4.4	-	3.6	-
Secchi disc (m)	1.5	++	++	1.7

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
† Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): maximum ebb (1500 hr), maximum flood (2200 hr), maximum ebb (0400 hr), and maximum flood (1000 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, July, 1974.

SUMMER:

Parameter	1-2 July 1974				
Time:	1500 †	2100	0300	0900	1530
Water Temp. (°C)					
Surface	27.6	27.1	26.8	26.9	28.5
Bottom	27.0	26.7	27.0	27.3	27.4
Salinity (°/oo)					
Surface	16.7	20.7	14.9	17.5	15.3
Bottom	23.8	28.0	21.3	23.9	22.5
Dissolved Oxygen *					
Surface	6.9	7.0	6.4	6.3	6.6
Bottom	6.1	6.5	6.0	6.3	6.3
Nitrate **					
Surface	36.8	17.3	16.9	12.3	30.9
Bottom	11.6	-	14.1	13.1	6.2
Nitrite **					
Surface	3.1	0.9	3.4	3.1	3.4
Bottom	3.1	-	3.4	2.7	3.0
Silicate **					
Surface	1194.2	498.8	835.9	737.6	1355.8
Bottom	583.1	238.9	772.8	667.4	758.7
Phosphate **					
Surface	-	-	-	31.0	-
Bottom	-	63.0	-	-	-
pH					
Surface	6.4	6.7	7.0	7.0	7.1
Bottom	6.5	6.8	6.9	7.1	6.4
Turbidity +					
Surface	5.7	4.1	2.7	3.9	4.0
Bottom	23.0	9.7	24.0	8.3	9.6
Total Solids *					
Surface	29.6	66.8	28.4	35.2	35.6
Bottom	74.8	96.4	108.4	66.8	91.2
Settleable Solids *					
Surface	10.0	43.2	3.2	29.6	8.4
Bottom	36.2	50.8	88.4	32.4	36.8
Secchi disc (m)	1.3	++	++	1.2	1.3

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
† Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): maximum flood (1500 hr), maximum ebb (2100 hr), maximum flood (0300 hr), maximum ebb (0900 hr), and maximum flood (1530 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, November, 1974.

FALL:

Parameter	4-5 November 1974				
	Time: 0700 †	1330	1930	0224	0712
Water Temp. (°C)					
Surface	20.3	21.3	20.4	21.2	20.3
Bottom	20.5	20.9	21.0	20.9	21.5
Salinity (°/oo)					
Surface	22.2	26.2	22.5	23.7	19.6
Bottom	27.6	30.1	24.6	27.8	22.5
Dissolved Oxygen *					
Surface	5.8	6.9	6.2	6.1	6.1
Bottom	6.0	6.5	6.1	6.3	6.1
Nitrate **					
Surface	38.9	26.7	26.8	26.1	28.1
Bottom	28.7	19.8	26.1	22.9	25.3
Nitrite **					
Surface	4.5	4.8	2.6	2.6	2.0
Bottom	4.2	2.6	2.6	2.3	2.0
Silicate **					
Surface	836.0	723.6	850.0	892.2	1145.1
Bottom	32.2	498.8	821.9	653.3	878.1
Phosphate **					
Surface	33.0	100.0	35.0	103.0	35.0
Bottom	155.0	85.0	65.0	67.0	61.0
pH					
Surface	7.3	7.7	7.7	7.7	7.5
Bottom	7.8	7.9	7.8	7.7	7.5
Turbidity +					
Surface	5.9	10.0	5.0	5.0	4.0
Bottom	4.6	12.0	22.0	12.0	6.0
Total Solids *					
Surface	109.2	65.2	50.4	48.4	45.2
Bottom	200.8	130.0	100.4	71.2	66.0
Settleable Solids *					
Surface	73.6	14.8	6.0	2.8	11.2
Bottom	127.2	72.8	42.4	17.2	17.2
Secchi disc (m)	1.2	0.9	++	++	1.3

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
† Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): maximum flood (0700 hr), maximum ebb (1330 hr), maximum flood (1930 hr), maximum ebb (0224 hr), and maximum flood (0712 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, February, 1975.

WINTER:

Parameter	12-13 February 1975			
Time:	2130†	0330	0930	1624
Water Temp. (°C)				
Surface	12.0	11.4	11.6	11.5
Bottom	12.3	12.0	12.8	12.0
Salinity (°/00)				
Surface	11.2	7.9	10.1	11.4
Bottom	26.4	8.1	30.8	12.6
Dissolved Oxygen *				
Surface	9.4	9.1	9.2	9.1
Bottom	8.5	9.1	8.2	8.9
Nitrate **				
Surface	91.1	163.5	190.3	134.9
Bottom	56.5	211.9	29.4	141.1
Nitrite **				
Surface	2.4	3.8	4.7	4.1
Bottom	2.0	4.4	2.1	4.9
Silicate **				
Surface	653.3	562.0	1067.8	885.2
Bottom	435.6	1095.9	267.0	1018.6
Phosphate **				
Surface	-	-	30.8	-
Bottom	-	43.5	131.0	67.5
pH				
Surface	7.2	6.8	7.4	6.4
Bottom	7.8	6.7	8.0	6.6
Turbidity +				
Surface	7.4	11.0	8.1	8.3
Bottom	16.0	11.0	50.0	9.6
Total Solids *				
Surface	22.0	24.8	-	26.0
Bottom	58.0	25.2	177.6	51.2
Settleable Solids *				
Surface	2.0	2.8	-	3.2
Bottom	4.8	6.8	73.6	22.8
Secchi disc (m)	++	++	0.9	0.8

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
† Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): slack before ebb (2130 hr), late ebb (0330 hr), slack before ebb (0930 hr), and slack before flood (1624 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, May, 1975.

SPRING:

Parameter	13-14 May 1975			
Time:	2200 †	0500	1000	1612
Water Temp. (°C)				
Surface	22.5	22.5	24.0	24.1
Bottom	22.1	22.4	22.1	23.0
Salinity (°/00)				
Surface	22.9	10.2	16.7	8.3
Bottom	30.4	13.9	27.3	11.0
Dissolved Oxygen *				
Surface	6.2	6.1	6.4	6.2
Bottom	6.7	5.5	6.1	6.8
Nitrate **				
Surface	68.2	93.9	169.1	53.3
Bottom	77.1	85.3	50.5	36.6
Nitrite **				
Surface	3.9	2.7	1.0	1.3
Bottom	2.0	4.3	0.6	1.8
Silicate **				
Surface	709.5	674.4	878.1	442.6
Bottom	323.2	779.8	442.6	386.4
Phosphate **				
Surface	42.0	22.5	35.5	76.5
Bottom	57.0	80.0	73.0	86.5
pH				
Surface	7.3	6.9	6.9	6.9
Bottom	7.6	7.0	7.2	7.1
Turbidity +				
Surface	44.0	4.9	4.6	6.0
Bottom	12.0	8.0	14.0	8.7
Total Solids *				
Surface	-	17.6	29.6	30.0
Bottom	-	31.6	63.6	52.4
Settleable Solids *				
Surface	-	0.8	1.2	6.8
Bottom	-	6.0	11.2	8.4
Secchi disc (m)	++	++	1.7	1.1

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
† Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): slack before ebb (2200 hr), slack before flood (0500 hr), slack before ebb (1000 hr), and slack before flood (1612 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, July, 1975.

SUMMER:

Parameter	2-3 July 1975			
	Time: 1448 †	2200	0300	1000
Water Temp. (°C)				
Surface	27.8	27.5	27.0	28.2
Bottom	27.6	27.6	27.1	27.4
Salinity (°/oo)				
Surface	22.5	14.5	15.6	13.2
Bottom	30.0	17.7	28.2	22.0
Dissolved Oxygen *				
Surface	6.6	6.1	5.9	5.9
Bottom	5.5	6.3	5.5	4.9
Nitrate **				
Surface	28.8	18.6	23.0	14.6
Bottom	9.1	14.2	17.7	26.3
Nitrite **				
Surface	3.8	1.0	1.5	0.8
Bottom	1.7	2.2	1.5	1.0
Silicate **				
Surface	871.1	498.8	604.2	491.8
Bottom	259.9	449.6	337.2	274.0
Phosphate **				
Surface	22.5	0.0	6.5	0.0
Bottom	30.5	19.0	6.5	25.5
pH				
Surface	7.9	6.9	6.7	6.5
Bottom	7.9	6.6	7.3	6.8
Turbidity +				
Surface	4.2	2.7	2.6	3.4
Bottom	6.7	5.5	5.1	6.1
Total Solids *				
Surface	60.0	-	26.0	-
Bottom	100.0	-	-	-
Settleable Solids *				
Surface	9.2	-	2.0	-
Bottom	46.4	-	-	-
Secchi disc (m)	1.7	++	++	1.7

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
† Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): slack before ebb (1448 hr), slack before flood (2200 hr), slack before ebb (0300 hr), and slack before flood (1000 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, November, 1975.

FALL:

Parameter	11-12 November 1975			
Time:	1500 †	2130	0330	0930
Water Temp. (°C)				
Surface	20.2	21.5	21.1	21.7
Bottom	21.5	21.3	21.5	21.4
Salinity (°/oo)				
Surface	12.7	12.2	13.0	12.4
Bottom	28.4	22.2	28.9	17.5
Dissolved Oxygen *				
Surface	8.1	7.6	7.6	7.5
Bottom	7.1	-	7.1	6.8
Nitrate **				
Surface	28.3	41.0	22.8	39.6
Bottom	19.7	22.0	14.4	36.5
Nitrite **				
Surface	1.5	2.4	1.7	2.0
Bottom	1.7	2.8	1.4	3.1
Silicate **				
Surface	850.0	772.8	519.8	934.3
Bottom	442.6	484.7	330.2	885.2
Phosphate **				
Surface	57.0	34.5	36.0	36.0
Bottom	34.5	40.5	37.5	49.5
pH				
Surface	7.1	7.1	7.2	7.6
Bottom	7.6	7.1	7.3	7.4
Turbidity +				
Surface	4.9	3.9	3.4	3.8
Bottom	5.2	6.3	5.2	4.2
Total Solids *				
Surface	32.0	-	25.2	32.0
Bottom	82.4	-	74.4	-
Settleable Solids *				
Surace	4.4	-	6.8	6.8
Bottom	32.8	-	26.8	-
Secchi disc (m)	1.8	++	++	1.9

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
† Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): late flood (1500 hr), late ebb (2130 hr), late flood (0330 hr), and late ebb (0930 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, February, 1976.

WINTER:

Parameter	10-11 February 1976			
Time:	1530 †	2200	0430	1100
Water Temp. (°C)				
Surface	10.3	10.3	9.8	10.6
Bottom	10.8	10.5	10.6	10.9
Salinity (°/oo)				
Surface	19.7	15.0	16.3	13.8
Bottom	28.7	23.9	29.4	23.6
Dissolved Oxygen *				
Surface	10.6	10.4	10.4	10.5
Bottom	9.4	7.5	9.3	9.3
Nitrate **				
Surface	29.9	57.4	-	45.6
Bottom	17.0	34.2	20.7	38.6
Nitrite **				
Surface	1.3	2.1	-	1.0
Bottom	1.5	1.5	1.3	3.4
Silicate **				
Surface	477.7	772.8	702.5	519.8
Bottom	498.8	709.5	428.5	337.2
Phosphate **				
Surface	18.5	27.0	28.0	6.5
Bottom	15.0	28.0	14.5	67.5
pH				
Surface	7.2	7.0	8.0	7.7
Bottom	7.8	7.7	7.3	8.1
Turbidity +				
Surface	4.8	5.7	4.5	6.6
Bottom	5.5	9.5	7.3	5.9
Total Solids *				
Surface	62.0	61.2	-	-
Bottom	108.4	-	-	-
Settleable Solids *				
Surface	18.0	30.0	-	-
Bottom	62.0	-	-	-
Secchi disc (m)	1.4	++	++	1.6

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
† Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): early ebb (1530 hr), early flood (2200 hr), early ebb (0430 hr), and early flood (1100 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, May, 1976.

SPRING:

Parameter	11-12 May 1976			
	Time: 1800 †	0030	0630	1230
Water Temp. (°C)				
Surface	21.8	22.3	21.8	24.3
Bottom	21.3	22.0	21.4	24.1
Salinity (°/oo)				
Surface	28.1	20.9	23.0	20.5
Bottom	31.3	21.7	30.6	21.2
Dissolved Oxygen *				
Surface	6.6	5.9	4.2	5.8
Bottom	6.9	5.7	4.2	5.7
Nitrate **				
Surface	20.7	21.3	40.2	59.2
Bottom	12.7	37.4	26.5	50.0
Nitrite **				
Surface	3.1	2.5	6.4	7.3
Bottom	1.7	5.0	4.3	6.0
Silicate **				
Surface	463.6	288.0	758.7	702.5
Bottom	189.7	723.6	337.2	618.2
Phosphate **				
Surface	0.0	0.0	4.5	33.0
Bottom	0.0	0.0	0.0	25.5
pH				
Surface	7.9	7.1	7.7	7.5
Bottom	7.8	7.7	8.1	7.5
Turbidity +				
Surface	4.3	6.6	4.2	4.9
Bottom	21.0	9.2	25.0	19.0
Total Solids *				
Surface	-	-	97.2	78.0
Bottom	161.2	103.6	168.0	107.6
Settleable Solids *				
Surface	-	-	20.4	5.6
Bottom	3.6	30.4	106.0	16.4
Secchi disc (m)	1.1	++	1.1	1.2

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
† Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): late flood (1800 hr), late ebb (0030 hr), late flood (0630 hr), and late ebb (1230 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, July, 1976.

SUMMER:

Parameter	13-14 July 1976			
Time:	2212 †	0442	1030	1630
Water Temp. (°C)				
Surface	28.1	27.7	28.1	28.5
Bottom	27.2	27.9	27.3	28.0
Salinity (°/oo)				
Surface	17.3	7.8	13.3	8.7
Bottom	32.3	10.3	30.0	10.9
Dissolved Oxygen *				
Surface	5.8	5.2	6.2	6.1
Bottom	6.4	5.2	6.1	5.5
Nitrate **				
Surface	51.5	43.3	51.2	44.8
Bottom	-	59.8	-	31.4
Nitrite **				
Surface	4.5	3.9	3.4	2.8
Bottom	-	4.2	-	2.9
Silicate **				
Surface	540.9	407.4	470.7	267.0
Bottom	154.6	491.8	140.5	231.8
Phosphate **				
Surface	24.0	48.0	17.0	43.0
Bottom	136.0	25.5	246.0	39.0
pH				
Surface	7.7	7.1	6.7	7.6
Bottom	7.9	8.2	7.3	6.5
Turbidity +				
Surface	3.0	5.0	3.0	7.0
Bottom	11.0	7.0	21.0	9.0
Total Solids *				
Surface	-	-	39.6	32.0
Bottom	-	-	123.6	46.8
Settleable Solids *				
Surface	-	-	17.2	6.8
Bottom	-	-	51.2	13.6
Secchi disc (m)	++	++	0.9	0.9

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
† Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): late flood (2212 hr), late ebb (0442 hr), late flood (1030 hr), and late ebb (1630 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, November, 1976.

FALL:

Parameter	8-9 November 1976			
Time:	2130 †	0530	0930	1630
Water Temp. (°C)				
Surface	12.9	13.2	13.4	13.8
Bottom	15.1	16.8	15.1	14.5
Salinity (°/oo)				
Surface	12.8	10.3	13.8	12.4
Bottom	25.9	13.9	21.8	15.4
Dissolved Oxygen *				
Surface	9.9	9.6	9.2	9.3
Bottom	9.1	9.2	8.5	9.2
Nitrate **				
Surface	67.1	68.8	66.1	43.0
Bottom	30.8	65.2	23.8	64.4
Nitrite **				
Surface	2.9	2.9	2.9	2.5
Bottom	1.8	3.4	1.8	2.8
Silicate **				
Surface	709.5	892.2	962.4	941.4
Bottom	948.4	1032.7	807.9	1046.7
Phosphate **				
Surface	20.0	100.5	18.0	10.5
Bottom	7.5	22.0	31.5	24.0
pH				
Surface	7.2	7.2	7.0	7.4
Bottom	7.6	7.3	7.3	7.4
Turbidity +				
Surface	6.1	9.0	5.2	7.0
Bottom	6.9	6.3	13.0	6.3
Total Solids *				
Surface	31.2	-	-	23.6
Bottom	83.6	-	-	39.6
Settleable Solids *				
Surface	2.0	-	-	4.8
Bottom	22.0	-	-	14.4
Secchi disc (m)	++	++	1.4	1.1

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
† Times of sampling based on 24-hr system. Respective tide stages for these were (left to right): slack before ebb (2130 hr), slack before flood (0530 hr), slack before ebb (0930 hr), and slack before flood (1630 hr).

Appendix Table 3a. (Continued). Twenty-five hr Station J251, Ft. Johnson, February, 1977.

WINTER:

Parameter	1-2 February 1977			
Time:	1854 †	0100	0730	1348
Water Temp. (°C)				
Surface	5.6	4.8	4.6	5.5
Bottom	5.8	5.2	5.9	5.7
Salinity (°/oo)				
Surface	14.8	12.5	16.2	13.4
Bottom	26.9	16.3	28.9	15.2
Dissolved Oxygen *				
Surface	11.9	11.1	11.1	11.5
Bottom	9.9	11.2	8.7	11.2
Nitrate **				
Surface	107.6	110.8	109.5	-
Bottom	-	96.8	27.0	162.3
Nitrite **				
Surface	0.6	0.8	1.1	-
Bottom	-	0.8	0.0	0.8
Silicate **				
Surface	463.6	533.9	681.4	428.5
Bottom	245.9	632.2	267.0	491.8
Phosphate **				
Surface	11.0	11.0	24.0	21.0
Bottom	10.0	25.5	12.0	17.0
pH				
Surface	7.4	7.3	7.4	7.5
Bottom	7.6	7.5	7.8	7.6
Turbidity +				
Surface	8.2	9.6	6.7	10.0
Bottom	7.3	8.0	9.8	19.0
Total Solids *				
Surface	-	41.2	-	36.0
Bottom	-	60.0	57.2	55.2
Settleable Solids *				
Surface	-	12.0	-	0.4
Bottom	-	25.6	21.2	10.0
Secchi disc (m)	++	++	1.6	1.3

* mg/liter
** µg/liter
\+ FTU - Formazin Turbidity Units
++ Readings in this column taken at night, precluding secchi disc measures.
Times of sampling based on 24-hr system. Respective tide stages for these times were (left to right): slack before ebb (1854 hr), slack before flood (0100 hr), slack before ebb (0730 hr), and slack before flood (1348 hr).

Click here to continue to Part 2