SEDIMENT INFLOW, OUTFLOW AND DEPOSITION FOR LAKES MARION AND MOULTRIE, SOUTH CAROLINA, OCTOBER 1983 - MARCH 1985

By Theodore W. Cooney

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ABSTRACT

In 1941 a Coastal Plain reach of the Santee River was impounded to form Lake Marion and diverted into a diked-off part of the Cooper River basin to form Lake Moultrie. Rates of sediment inflow and outflow of the lakes were determined previously by the U.S. Geological Survey for the period July 1966-June 1968 and during this study for the period October 1983-March 1985.

During the recent study, total sediment discharge was estimated for two inflow stations. Bedload discharge was computed by the modified Einstein procedure. Suspended-sediment discharge was monitored at three outflow stations.

Mean annual suspended-sediment inflow and outflow to Lakes Marion and Moultrie were estimated to be 722,000 and 175,000 tons, respectively, for a trap efficiency of 76 percent and a deposition rate of about 547,000 tons per year during the 1983-1985 study. This is about 33 percent less than the deposition rate determined by the 1966-1968 study.

INTRODUCTION

Background

In 1939 the South Carolina Public Service Authority began construction on the Santee-Cooper Lakes system consisting of Lake Marion and Lake Moultrie and a diversion canal connecting the lakes. The lakes (fig. 1), located in the Atlantic Coastal Plain province, receive the second-largest streamflow on the East Coast of the United States. Lake Marion, which receives drainage from about 14,700 mi^2 (square miles), is the largest reservoir in South Carolina with a surface area of approximately 110,600 acres. The lake was formed by the construction of Wilson Dam on the Santee River at river mile 87.4, as shown in figure 2. A 4-mile long diversion canal connects Lake Marion with Lake Moultrie. Lake Moultrie was formed by the construction of earth dikes and Pinopolis Dam, located about 2 miles northeast of Moncks Corner on the Cooper River. Pinopolis Dam is equipped with concrete navigation locks and a hydroelectric generating station.

Since storage began in November 1941, the Santee-Cooper system has had a significant effect on the local economy. The system provides hydroelectric power and has also developed an excellent reputation for sport fishing that has created a thriving tourist industry.

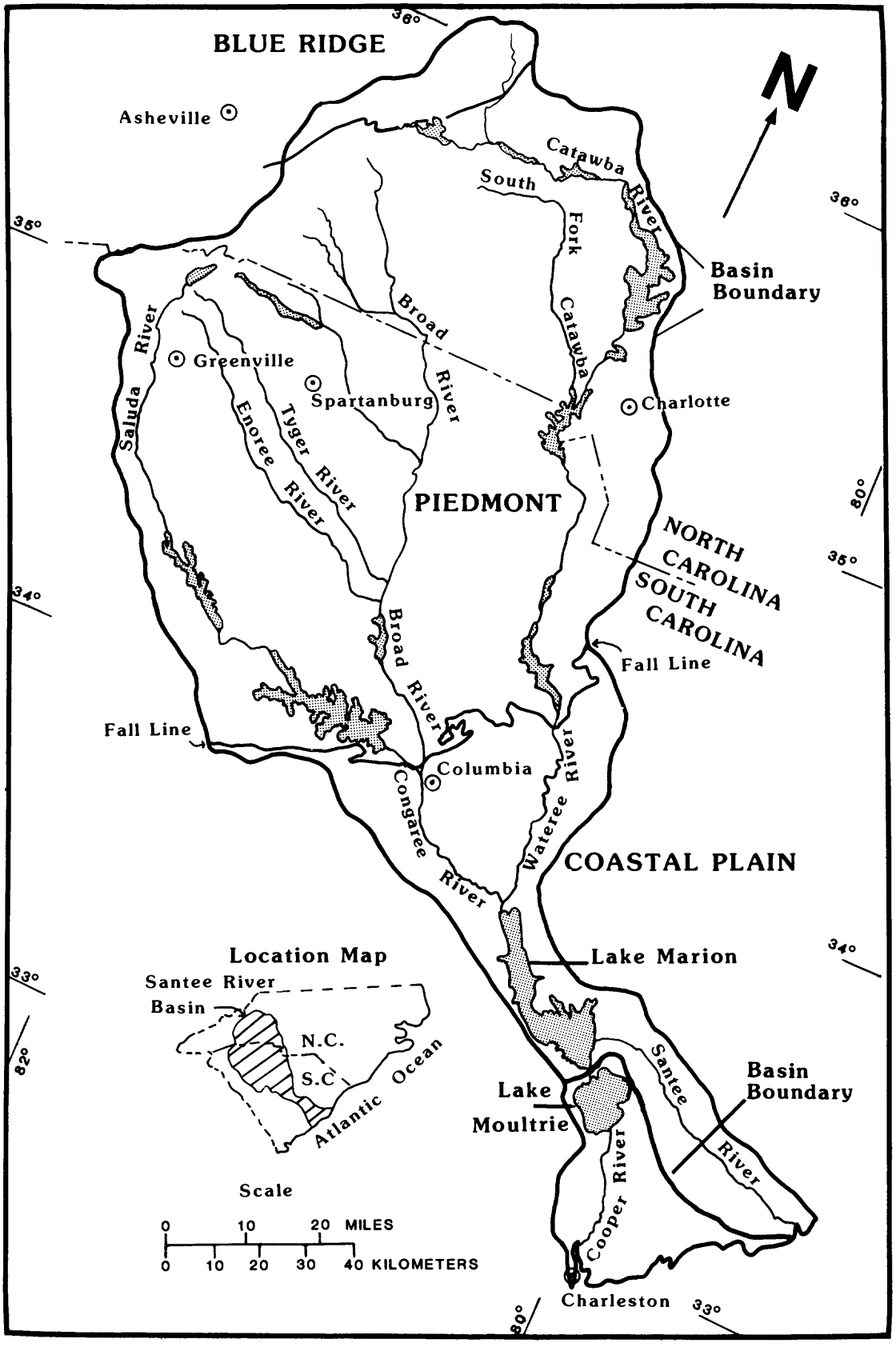

Figure 1.--Santee and Cooper River basins.

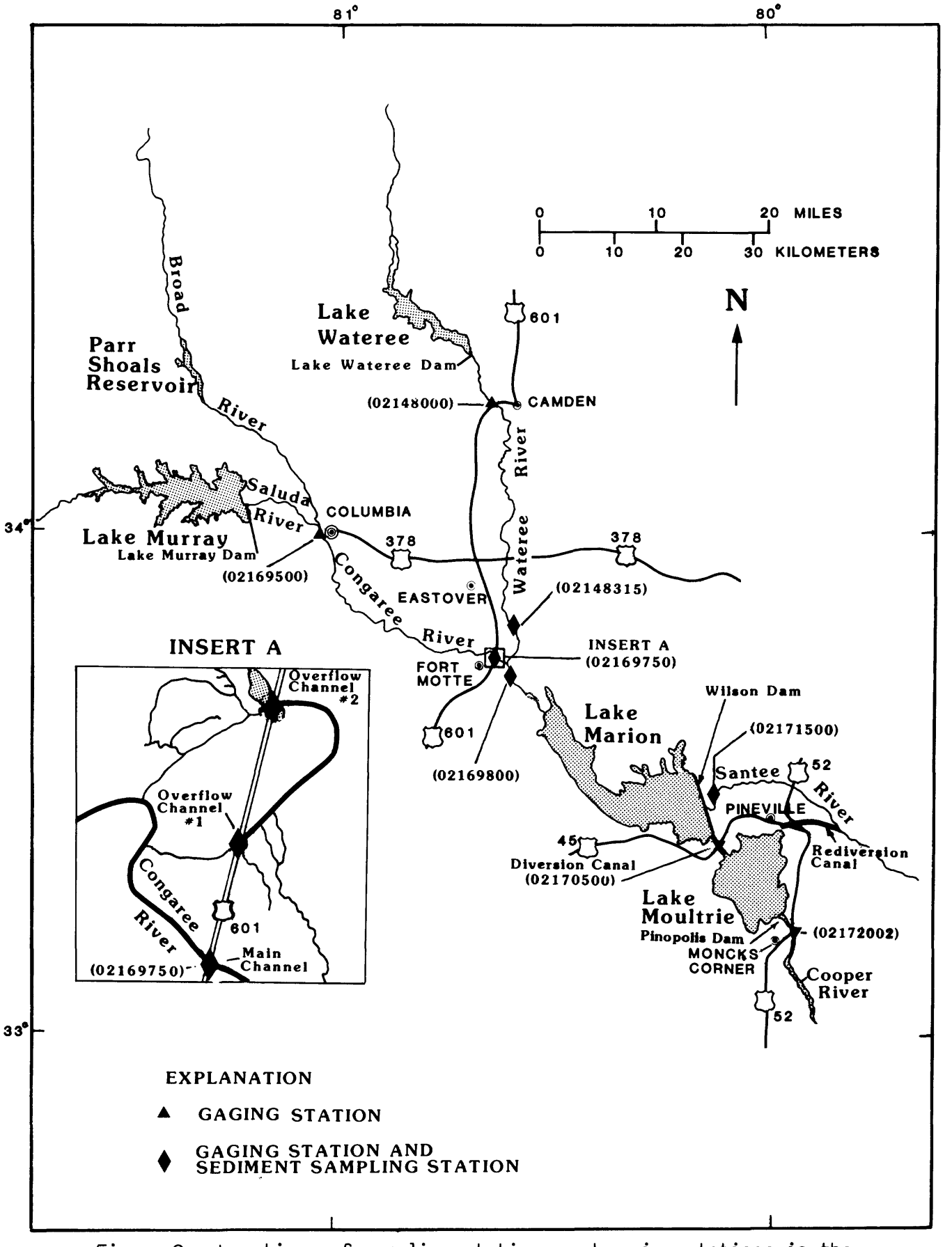

Figure 2.--Locations of sampling stations and gaging stations in the study area.

Purpose and Scope

The purpose of this study, which was conducted in cooperation with the South Carolina Department of Health and Environmental Control (SCDHEC), was to determine recent sediment inflow, outflow, and depositional rates for Lakes Marion and Moultrie, South Carolina. The scope of the work included monitoring suspended-sediment concentration at two inflow sites on a daily basis using automatic samplers and at three outflow sites on a weekly basis during the period October 1983 to March 1985.

Techniques for estimating suspended-sediment discharge and bedload discharge are discussed in this report and findings of this study are compared with the findings of a previous study conducted during the period July 1, 1966 to June 30, 1968.

Previous Investigations

During the period July 1,1966, to June 30,1968, the U.S. Geological Survey (Survey), in cooperation with the South Carolina Public Service Authority (SCPSA), conducted a sediment inflow-outflow study of Lakes Marion and Moultrie. The purpose of the study was to estimate the quantity of sediment retained in the Santee-Cooper system during the period of investigation. Results of suspended-sediment sampling were published by the U.S. Geological Survey (1966-68) in Water-Supply Papers 1991, 2011, and 2092. A summary of the data collected and estimates of sediment inflow and outflow were not published as a formal report but are on file at the U.S. Geological Survey office in Columbia.

Mean annual suspended-sediment inflow and outflow for the 1966-68 period were estimated to be 978,000 and 164,000 tons per year, respectively. These estimates indicate a reservoir trap efficiency of 83 percent and a mean annual deposition rate of 814,000 tons.

Description of Study Area

The Santee River basin has a drainage area of approximately 16,000 mi^2 in North and South Carolina with about 70 percent in South Carolina. The basin occupies parts of three physiographic provinces, the Blue Ridge, the Piedmont Plateau, and the Atlantic Coastal Plain, Lake Marion being in the Coastal Plain province. Characteristics of topography, geology, and climate in each province are given in table 1. A detailed description of the geology and soil types in the Santee River basin is included in a report by the U.S. Department of Agriculture (USDA, 1973).

The Cooper River basin is located in the Atlantic Coastal Plain province adjacent to the Santee River basin. Within its boundaries are the Diversion Canal and Lake Moultrie. Sediment inflow to the Santee-Cooper system from the Cooper River watershed is relatively insignificant compared to the sediment inflow from the Santee River watershed.

Table 1.--Characteristics of topography, geology and climate in the Santee River basin (from U. S. Department of Agriculture, 1973)

	Province		
	Blue Ridge	Piedmont	Coastal Plain
Topography			
Elevation range (feet)	3,000-5,964	300-3,000	Sea level-300
Drainage patterns	Deep, dendritic, well defined	Dendritic and well defined, but not deep	Shallow drains, poorly defined
Geology			
Major formations	Blue Ridge Belt, Bravard Belt	Charlotte Belt, Carolina Slate Belt	Tuscaloosa, Santee Limestone, and Black Mingo
Age	Precambrian, lower Paleozoic	Middle Paleozoic	Tertiary, Cretaceous
Dominant soil types	Hayesville, Evard, and Ashe	Cecil, Davidson, Pacolet, Appling, and Wilkes	Lakeland, Troup, Vaucluse Gilead, among others
Climate			
Temperature*			
January average	3 degrees Celsius	undetermined	51 degrees Celsius
July average	21 degrees Celsius		81 degrees Celsius
Precipitation*			
mean annual	52-56 inches	44-52 inches	44-48 inches

* --Mean annual for basin is about 16 degrees Celsius.
+ --Mean annual for basin is about 48 inches.

Reservoirs in the Santee River basin are a major factor in controlling fluvial sediment transport within the basin. Sediment originating in the upper part of the basin is stored in channels and reservoirs and is gradually transported downstream, mostly during flood events. Reservoirs located upstream from Lakes Marion and Moultrie also provide various degrees of flow regulation on the three main tributaries, the Saluda, Broad, and Wateree rivers (fig. 2).

Flow in the Saluda River downstream of Lake Murray is completely controlled by Lake Murray Dam. The storage capacity of Lake Murray is about 2,114,000 acre-ft (acre-feet), which is large enough to allow virtually all suspended sediment to settle out in the lake.

Flow in the Broad River receives minimal control by Parr Shoals Reservoir, which has a storage capacity of about 10,800 acre-ft and has lost about 90 percent of its volume to sediment deposition (USDA, 1973). Because flow retention time in the reservoir is low, a significant suspended-sediment load is sustained by the Broad River downstream from Parr Shoals Reservoir. The sediment-laden Broad River joins with the relatively clear Saluda River near the Fall Line (the imaginary line that separates the Piedmont and Coastal Plain provinces and is characterized by a rapid descent in elevation, (Overstreet and Bell, 1965)) in Columbia to form the Congaree River. From Columbia the Congaree River flows southeasterly for about 50 miles, through a broad, swampy flood plain, to its confluence with the Wateree River. The long-term average discharge, based on years 1940 to 1985, of the Congaree River at Columbia (02169500) is 9,318 ft^3/s (cubic feet per second).

Flow to the Wateree River is moderately controlled by Lake Wateree Dam. From the dam the Wateree River flows southerly on a winding course for about 70 miles. As it crosses the Fall Line near Camden, the steep banks of the river diminish and a broad flood plain emerges. The long-term average discharge, based on years 1905 to 1910 and 1930 to 1985, of the Wateree River near Camden (02148000) is 6,410 ft^3/s.

The Santee River is formed by the confluence of the Congaree and Wateree Rivers. About 5 miles downstream from this confluence is upper Lake Marion, formed by backwater from Wilson Dam. Lakes Marion and Moultrie have average depths of 15 and 18 feet and storage capacities of about 1,450,000 and 1,143,000 acre-ft, respectively. Under normal hydrologic conditions, flow through Wilson Dam to the lower Santee River is restricted to about 500 ft^3/s. Flow through the Diversion Canal averages about 15,000 ft^3/s. When the outflow from Lake Marion exceeds about 30,000 ft^3/s, the excess is released through a spillway at Wilson Dam.

Until 1985 the only outflow from Lake Moultrie was through Pinopolis Dam and into the West Branch Cooper River. Although the suspended-sediment concentration of the outflow was low, usually less than about 10 mg/L (milligrams per liter), the volume of flow to the Cooper River was sufficient to create sedimentation problems in Charleston Harbor (Patterson, 1983). The recent completion of a Rediversion Canal that carries water from Lake Moultrie to the lower Santee River thus bypassing the Cooper River is expected to alleviate these problems (fig. 2). The Rediversion Canal was completed in 1985 and will reduce flow through Pinopolis Dam by as

much as 90 percent. Streamflow through the Rediversion Canal is used for hydroelectric power generation, which was not in routine operation during the period of this study.

DATA COLLECTION

Streamflow

Daily streamflow records for stations Wateree River below Eastover (02148315), Congaree River near Ft. Motte (02169750), and Santee River near Pineville (02171500) were computed by standard methods (Rantz and others, 1982). Streamflow at Wateree River below Eastover (02148315) has been monitored by the U.S. Geological Survey since July 1968. When flow exceeds about 10,000 ft^3/s, it spills out of the main channel and into the flood plain, bypassing the gage. Inaccessibility of the flood plain, and the consequent lack of a suitable measuring section, prevented determination of this bypassed flow. Monthly estimates of streamflow through the flood plain were made by subtracting the monthly flow at the station from the monthly flow at the Wateree River near Camden (02148000) where all flow is measured at high stages. The drainage area of the Wateree River below Eastover (02148315) is approximately 5,590 mi^2.

Streamflow of the Congaree River and its broad flood plain was monitored at U.S. Highway 601 near Ft. Motte (02169750), located about 2 miles upstream from its confluence with the Wateree River. The highway, which spans the entire flood plain and is supported by an earthen foundation, funnels all flow from the flood plain through two channels. These channels are referred to as Overflow Channels 1 and 2 and are shown in the insert in figure 2. When low and medium flow conditions exist on the main channel, Overflow Channels 1 and 2 remain stagnant. During periods of high flow only Overflow Channel 2 sustains significant flow. The stage-discharge relation for this channel for the period of investigation was established and the water surface elevation relative to the main channel was monitored. Streamflow at Congaree River near Ft. Motte (02169750) was monitored from November 3, 1983 to March 31, 1985. The drainage area of the Congaree River near Ft. Motte (02169750) is approximately 8,550 mi^2.

Streamflow at the Santee River near Pineville (02171500) has been monitored since April 1942. Daily mean values of streamflow through the Diversion Canal (02170500) were computed by adding the daily release at Pinopolis Dam to the 24-hour change in storage in Lake Moultrie, based on the midnight stage readings. Daily mean values of streamflow from Lake Moultrie to the Cooper River, via the Tailrace Canal (02172002), were obtained from Pinopolis Dam (Jeffries Hydro-Plant) generating records.

Daily mean streamflow values for the Wateree River near Eastover (02148315) are given in table 2. Flow through the flood plain was significant from December 1983 through May 1984 and again during the month of February 1985, during which time as much as 30 percent of the monthly flow measured upstream at the Wateree River near Camden (02148000) bypassed the Wateree River near Eastover (02148315). Based on the monthly streamflow values at each station, the average flow through the flood plain during these periods was estimated at about 3,230 ft^3/s.

Table 2.--Daily mean water discharge, suspended-sediment concentration, and suspended-sediment discharge for the Wateree River below Eastover, S.C. (02148315), October 1983 - March 1985
[ft^3/s, cubic feet per second; mg/L, milligrams per liter; ton/d, tons per day; dashes indicate value not determined]

Day	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean Discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)
		October			November			December	
1	2,060	10	56	1,600	13	56	7,570	30	613
2	1,170	11	35	1,460	12	47	8,530	35	807
3	757	--	*20	1,220	12	40	8,050	51	1,100
4	908	--	*27	1,210	7	23	7,300	50	1,000
5	2,750	--	*159	1,600	13	68	8,700	48	1,130
6	3,720	--	*258	3,440	39	360	9,460	65	1,660
7	5,400	--	*466	2,520	18	125	9,840	88	2,340
8	4,000	--	*289	1,750	14	69	10,000	93	2,510
9	2,240	--	*115	2,680	19	137	10,200	85	2,340
10	1,230	--	*44	2,400	17	121	10,200	68	1,870
11	1,020	--	*33	3,100	21	176	10,200	65	1,790
12	1,160	--	*40	2,640	20	143	10,200	89	2,450
13	2,540	--	*141	2,550	16	114	10,200	82	2,260
14	2,020	--	*98	2,680	15	113	10,200	69	1,900
15	2,080	--	*102	2,210	15	97	10,200	69	1,900
16	1,340	--	*51	3,990	33	370	10,200	65	1,790
17	916	--	*28	5,350	43	621	10,200	69	1,900
18	1,410	--	*55	6,430	47	816	10,200	58	**1,600
19	2,150	22	128	6,260	31	524	10,200	50	1,380
20	1,870	12	60	6,000	33	535	10,100	55	1,500
21	1,560	12	51	5,360	23	333	10,100	53	1,450
22	1,780	15	72	3,790	14	156	10,100	55	1,500
23	1,780	17	79	2,850	17	131	10,100	50	**1,360
24	1,240	9	33	3,130	18	152	10,100	42	1,150
25	2,630	39	371	2,660	17	125	10,000	37	999
26	4,550	42	512	2,660	26	205	10,000	--	*1,240
27	3,740	22	222	6,520	74	1,400	9,990	--	*1,240
28	4,220	29	330	7,010	47	955	10,000	--	*1,240
29	3,000	30	243	5,300	33	505	10,000	--	*1,240
30	1,860	16	85	7,890	51	1,090	10,000	--	*1,240
31	1,560	13	55	---	--	---	10,000	--	*1,240
Total	68,661	--	4,258	108,260	--	9,607	302,140	--	47,739

Table 2.--Daily mean water discharge, suspended-sediment concentration, and suspended-sediment discharge for the Wateree River below Eastover, S.C. (02148315), October 1983 - March 1985--Continued

Day	Mean Discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)
		January			February			March	
1	10,000	--	*1,240	9,430	38	968	9,910	36	**963
2	9,970	--	*1,230	9,520	33	848	9,940	32	**859
3	9,930	--	*1,230	9,220	33	822	9,960	30	807
4	9,760	--	*1,190	8,670	28	655	9,960	38	1,020
5	8,570	--	*970	8,780	32	759	9,950	40	1,070
6	6,190	--	*579	8,260	30	669	9,960	43	1,160
7	6,410	--	*612	8,430	30	683	9,930	45	1,210
8	8,910	--	*1,030	8,160	26	573	9,930	45	1,210
9	9,060	--	*1,060	8,710	28	658	9,950	50	1,340
10	9,190	--	*1,080	8,910	29	698	9,950	45	1,210
11	9,590	--	*1,160	9,000	26	632	9,950	39	1,050
12	9,810	--	*1,200	9,120	33	813	9,960	36	968
13	9,930	--	*1,230	9,340	35	892	9,970	39	1,050
14	9,980	--	*1,240	9,680	51	1,330	9,960	39	1,050
15	10,000	--	*1,240	9,890	61	1,630	9,970	37	996
16	9,990	--	*1,240	9,940	46	1,230	9,970	37	996
17	9,960	--	*1,230	9,960	44	1,180	9,960	37	995
18	9,960	--	*1,230	9,970	46	1,240	9,950	38	1,020
19	9,950	--	*1,230	9,980	42	1,130	9,950	38	1,020
20	9,940	64	1,720	9,980	46	1,240	9,950	40	1,070
21	9,930	63	1,690	9,960	45	1,210	9,950	37	994
22	9,920	64	1,710	9,930	48	1,290	9,940	38	1,020
23	9,900	60	1,600	9,920	56	1,500	9,750	37	974
24	9,900	54	1,440	9,900	53	1,420	9,500	39	1,000
25	9,900	49	1,310	9,880	46	1,230	9,640	51	1,330
26	9,890	47	1,260	9,870	44	**1,170	9,850	--	*1,210
27	9,900	42	1,120	9,900	42	**1,120	9,910	--	*1,220
28	9,870	38	1,010	9,890	40	**1,070	9,920	--	*1,220
29	9,850	39	1,040	9,890	38	**1,020	9,900	--	*1,220
30	9,740	35	920	---	--	---	9,930	--	*1,230
31	9,580	36	931	---	--	---	9,960	--	*1,230
Total	295,480	--	36,972	274,090	--	29,680	307,280	--	33,712

Table 2.--Daily mean water discharge, suspended-sediment concentration, and suspended-sediment discharge for the Wateree River below Eastover, S.C. (02148315), October 1983 - March 1985--Continued

Day	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)
		April			May			June	
1	9,960	--	*1,230	9,340	31	782	9,590	--	*1,160
2	9,950	--	*1,230	9,170	30	743	9,340	--	*1,110
3	9,950	37	994	9,420	35	890	8,590	--	*974
4	9,960	35	941	9,640	43	1,130	7,970	--	*864
5	9,950	37	994	9,790	33	872	8,460	--	*950
6	9,960	39	1,050	9,870	31	826	7,570	41	838
7	9,960	34	914	9,910	29	776	7,840	50	1,060
8	9,960	34	914	9,930	32	858	8,750	47	1,110
9	9,940	29	778	9,920	30	**804	8,490	42	963
10	9,910	32	856	9,920	30	**804	8,720	45	1,060
11	9,910	39	1,040	9,900	28	748	8,870	44	1,050
12	9,900	35	936	9,850	28	745	7,970	39	839
13	9,920	34	911	9,690	29	759	6,810	42	772
14	9,920	31	830	9,520	31	797	6,530	47	829
15	9,900	28	748	9,460	33	**843	7,050	--	*712
16	9,890	29	774	9,390	36	913	7,110	--	*721
17	9,880	29	774	9,230	43	1,070	6,160	--	*574
18	9,880	31	827	9,120	35	862	3,840	--	*271
19	9,870	28	746	8,990	38	922	6,420	--	*613
20	9,890	29	774	8,000	49	1,060	7,000	--	*703
21	9,890	28	748	6,720	55	998	7,240	--	*742
22	9,880	27	720	7,500	52	1,050	7,020	--	*707
23	9,880	27	720	7,710	45	937	6,810	--	*673
24	9,890	30	801	7,490	55	1,110	7,380	--	*765
25	9,900	28	748	7,500	39	790	6,150	--	*573
26	9,910	27	722	7,870	37	786	5,740	47	728
27	9,870	25	666	8,270	41	915	5,330	48	691
28	9,830	27	717	7,960	42	903	5,730	48	743
29	9,810	26	689	8,990	68	1,640	6,030	78	1,280
30	9,610	27	701	9,670	51	1,330	4,780	49	632
31	---	--	---	9,700	36	943	---	--	---
Total	296,930	--	25,493	279,440	-	28,606	215,290	--	24,707

Table 2.--Daily mean water discharge, suspended-sediment concentration, and suspended-sediment discharge for the Wateree River below Eastover, S.C. (02148315), October 1983 - March 1985--Continued

Day	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/day)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/day)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)
		July			August			September	
1	4,120	74	853	9,250	62	1,550	4,770	71	963
2	5,830	64	1,010	9,210	47	1,170	4,510	45	572
3	6,410	57	986	8,870	38	910	3,630	37	391
4	5,900	54	860	8,980	46	1,120	4,960	35	462
5	4,930	51	679	8,990	42	1,020	3,230	21	183
6	5,910	76	1,220	7,780	34	714	1,580	9	42
7	6,780	68	1,250	6,780	51	961	1,310	--	*49
8	7,490	73	1,480	8,160	57	1,260	1,320	--	*50
9	8,240	64	1,420	8,240	43	957	1,860	--	*86
10	7,770	49	1,020	7,310	42	829	2,220	--	*114
11	5,300	38	544	6,070	62	1,010	3,230	--	*206
12	4,650	46	578	4,110	54	599	5,550	--	*486
13	5,170	49	684	5,560	75	1,130	6,210	40	671
14	5,280	53	756	4,740	47	619	5,450	31	456
15	6,300	56	953	6,570	67	1,240	5,510	35	521
16	6,900	50	931	7,620	50	1,030	5,850	34	537
17	6,790	44	807	7,340	38	753	4,090	22	243
18	6,880	46	854	6,060	34	556	2,080	12	69
19	7,920	52	1,110	5,780	63	992	1,750	20	**94
20	8,430	54	1,230	5,150	29	403	1,840	25	124
21	8,800	60	1,430	5,110	38	532	2,600	21	143
22	8,820	52	1,240	5,960	38	611	2,660	21	164
23	8,110	40	876	5,970	32	516	4,490	44	538
24	7,620	40	823	6,620	34	608	3,320	26	243
25	6,940	39	731	6,320	31	529	2,370	26	165
26	6,960	52	977	6,160	33	549	2,710	31	222
27	6,720	52	**944	5,790	27	422	1,720	--	*76
28	6,490	54	**946	4,440	30	360	1,730	--	*76
29	7,470	56	**1,130	2,850	26	200	1,450	--	*55
30	8,780	59	1,400	2,320	24	150	1,220	--	*44
31	9,360	78	1,960	2,330	27	170	---	---	---
Total	213,070	--	31,682	196,440	--	23,470	95,220	---	8,045

Table 2.--Daily mean water discharge, suspended-sediment concentration, and suspended-sediment discharge for the Wateree River below Eastover, S.C. (02148315), October 1983 - March 1985--Continued

Day	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)
		October			November			December	
1	1,270	--	*47	3,670	--	*252	5,170	19	265
2	1,750	--	*78	1,910	--	*89	3,050	16	126
3	4,620	--	*364	1,650	--	*71	1,640	17	75
4	5,800	--	*523	3,630	--	*248	2,200	14	92
5	3,000	35	283	2,030	--	*98	3,620	24	251
6	4,100	31	343	1,250	--	*46	6,580	55	1,030
7	2,400	23	149	973	--	*31	8,020	51	1,100
8	1,500	19	77	3,150	--	*198	8,030	37	802
9	1,980	19	102	2,640	--	*149	7,240	25	489
10	1,500	15	61	1,970	--	*94	5,670	18	283
11	1,090	10	29	1,860	--	*86	4,820	24	331
12	1,890	18	92	1,350	--	*52	5,680	27	414
13	1,280	11	38	2,850	--	*169	4,360	14	165
14	846	11	25	4,850	--	*393	2,530	14	96
15	712	10	19	4,160	--	*308	1,720	12	56
16	648	11	19	3,710	--	*257	1,850	9	45
17	658	15	30	3,130	--	*196	1,400	10	38
18	1,850	31	152	2,710	--	*156	1,820	16	105
19	4,140	64	694	3,080	18	150	3,420	25	231
20	4,760	--	*381	2,080	21	120	2,480	15	100
21	2,910	--	*174	2,740	23	179	3,320	23	226
22	1,450	--	*58	3,730	19	191	4,870	38	500
23	1,140	--	*40	2,880	13	**101	4,020	25	271
24	2,310	--	*121	1,900	6	31	5,230	34	480
25	2,740	--	*156	1,950	5	26	4,760	27	358
26	3,580	--	*242	1,640	11	49	3,370	20	182
27	3,350	--	*218	2,260	23	149	4,120	16	178
28	2,050	--	*100	4,040	38	496	4,200	16	181
29	1,190	--	*42	6,980	65	1,200	4,680	15	190
30	2,160	--	*109	5,170	33	461	6,110	23	379
31	4,390	--	*335	---	--	---	5,610	21	318
Total	73,064	--	5,101	85,943	--	6,046	131,590	--	9,357

Table 2.--Daily mean water discharge, suspended-sediment concentration, and suspended-sediment discharge for the Wateree River below Eastover, S.C. (02148315), October 1983 - March 1985--Continued

Day	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)
		January			February			March	
1	4,950	14	187	5,030	46	633	8,360	28	632
2	4,100	13	144	7,310	75	1,490	7,560	23	469
3	4,290	19	220	9,040	102	2,490	6,250	41	692
4	6,290	48	909	9,460	99	2,530	7,250	43	842
5	9,260	96	2,400	9,580	80	2,070	7,010	34	664
6	9,190	67	1,660	9,610	68	1,760	6,920	50	970
7	8,750	36	850	9,610	67	1,740	7,480	39	788
8	8,930	35	844	9,610	66	1,710	7,020	30	569
9	9,010	34	827	9,610	58	1,500	5,520	31	446
10	9,030	28	683	9,620	61	1,580	2,690	30	239
11	8,470	19	434	9,620	50	1,300	2,060	--	*101
12	8,320	27	606	9,560	49	1,260	3,690	--	*254
13	9,260	39	975	9,520	46	1,180	2,810	--	*165
14	9,150	33	815	9,450	39	995	3,980	--	*287
15	8,350	22	496	9,110	31	762	5,550	--	*486
16	7,290	24	472	7,540	42	855	4,380	--	*334
17	6,750	21	383	7,670	51	1,060	2,950	--	*178
18	4,220	19	216	7,550	33	673	1,770	--	*79
19	4,310	31	363	8,000	56	1,210	3,190	60	517
20	3,650	21	226	7,600	37	759	4,080	30	330
21	1,980	11	59	7,960	41	881	4,420	28	342
22	2,940	48	503	8,390	32	725	4,050	23	258
23	4,080	48	563	7,420	27	541	5,170	46	745
24	3,030	13	106	8,580	33	764	6,130	41	689
25	1,830	11	54	8,780	28	664	3,360	17	166
26	1,260	9	31	8,910	26	625	2,300	16	104
27	2,180	22	189	9,040	24	586	2,460	20	133
28	3,250	34	317	8,340	19	428	2,470	20	146
29	2,210	11	66	---	--	---	3,320	30	269
30	2,610	14	99	---	--	---	2,690	21	156
31	2,850	18	175	---	--	---	3,290	28	**249
Total	171,790	--	15,872	241,520	--	32,771	140,180	--	12,299

* Suspended-sediment discharge estimated using sediment transport curve (figure 3).
** Daily mean suspended-sediment concentration estimated for use in equation 1.

Daily mean streamflow values for the Congaree River near Ft. Motte (02169750) are given in table 3. Flow at Overflow Channel 1 was insignificant, with no flow on most days. Overflow Channel 2 sustained significant flow from December 1983 through May 1984 and again during the month of February 1985. The average streamflow in Overflow Channel 2 for these periods was about 2,240 ft^3/s.

Daily mean streamflow values at Lake Marion-Moultrie Diversion Canal (02170500), Santee River near Pineville (0217500), and Lake Moultrie Tailrace (02172002) are given in tables 4, 5, and 6, respectively.

Sediment

Suspended Sediment

Suspended sediment travels in the water column and is supported by the upward components of turbulent currents. Typically, suspended sediment consists of particles the size of fine sand, silt, and clay. For this investigation, suspended sediment includes all material, organic and inorganic, that is carried in suspension. Concentrations of all suspended-sediment samples were determined using methods outlined by Guy (1969).

Suspended-sediment concentrations at the Wateree River near Eastover (02148315) and the Congaree River near Ft. Motte (02169750) were monitored with PS-69 automatic pumping samplers. The PS-69 is designed to backflush the intake system and collect the desired volume of suspended-sediment sample as the backflush reservoir is refilled with river water. Throughout the investigation a 6-hour sampling interval was maintained, with the optimum sample volume being about 400 ml (milliliters). Operation of the PS-69 sediment samplers began on October 1, 1983 at the Wateree River near Eastover (02148315) and on November 16, 1983 at the Congaree River near Ft. Motte (02169750).

A sample collected using the pumping sampler is a fixed-point sample and does not account for lateral and vertical variations of concentration in the stream cross-section. The sediment concentrations in these fixed-point samples were adjusted to represent the cross-sectional mean concentration by frequent comparison with concentrations in cross-section samples obtained at 8 to 12 verticals in the cross section using depth-integrating methods described by Guy and Norman (1970). On-site field investigations indicated that monthly sampling was sufficient to define the relation between fixed-point and cross section concentrations. The ratio of the mean concentration in the cross section to the concentration of the fixed-point sample was used as a correction coefficient that was applied on a daily basis. The correction coefficient used for any given day was determined from a temporal graph that best fitted the data set. Guidelines for the calculation and application of correction coefficients are given by Porterfield (1972). Daily mean values of suspended-sediment concentration were computed from the concentrations in the automatically obtained samples and correction coefficients and are given in table 2 for the Wateree River near Eastover (02148315) and in table 3 for the Congaree River near Ft. Motte (02169750).

Table 3.--Daily mean water discharge, suspended-sediment concentration, and suspended-sediment discharge for the Congaree River at U.S. Highway 601 near Fort Motte, S.C. (02169750), November 1983 - March 1985

[ft^3/s, cubic feet per second; mg/L, milligrams per liter; ton/d, tons per day; dashes indicate value not determined]

Day	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)
		October			November			December	
1	---	--	---	3,130	--	*116	6,810	20	368
2	---	--	---	4,640	--	*231	6,010	19	308
3	---	--	---	3,470	--	*139	6,120	19	314
4	---	--	---	2,760	--	*93	6,540	26	467
5	---	--	---	2,430	--	*74	9,990	70	1,970
6	---	--	---	2,670	--	*88	13,300	144	5,310
7	---	--	---	2,430	--	*74	15,300	241	9,960
8	---	--	---	2,200	--	*63	17,700	191	9,090
9	---	--	---	3,130	--	*116	24,000	117	7,340
10	---	--	---	3,140	--	*117	28,100	72	5,460
11	---	--	---	2,150	--	*60	26,000	47	3,300
12	---	--	---	1,910	--	*49	22,800	43	2,650
13	---	--	---	1,890	--	*48	20,200	52	**2,840
14	---	--	---	2,590	--	*83	19,700	77	4,100
15	---	--	---	2,710	--	*90	22,700	71	4,350
16	---	--	---	3,270	24	219	22,700	46	2,820
17	---	--	---	4,870	29	381	21,100	40	2,280
18	---	--	---	4,030	14	152	19,100	34	1,750
19	---	--	---	3,560	8	79	16,000	35	1,510
20	---	--	---	4,310	13	151	14,900	44	1,770
21	---	--	---	3,610	9	88	14,500	--	*1,700
22	---	--	---	4,390	16	203	14,300	--	*1,660
23	---	--	---	5,810	24	370	13,600	--	*1,520
24	---	--	---	4,080	11	121	11,700	--	*1,170
25	---	--	---	4,960	17	249	13,500	--	*1,500
26	---	--	---	6,920	30	561	14,800	--	*1,770
27	---	--	---	8,780	65	1,800	12,800	--	*1,370
28	---	--	---	9,220	87	2,280	13,100	--	*1,430
29	---	--	---	7,260	40	784	12,300	--	*1,280
30	---	--	---	7,160	28	541	12,300	--	*1,280
31	---	--	---	---	--	---	13,500	--	*1,500
Total	---	--	---	123,480	--	9,420	485,470	---	84,137

Table 3.--Daily mean water discharge, suspended-sediment concentration, and suspended-sediment discharge for the Congaree River at U.S. Highway 601 near Fort Motte, S.C. (02169750) November 1983 - March 1985--Continued

Day	Mean discharge (ft^3/s)	Concentration (mg/L)	Mean sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	sediment discharge (ton/d)
		January			February			March	
1	13,400	--	*1,480	13,600	27	991	22,800	103	6,340
2	13,500	--	*1,500	14,000	23	869	22,600	79	4,820
3	11,600	--	*1,150	13,700	18	666	21,600	45	2,620
4	12,900	--	*1,390	13,100	14	495	20,300	30	1,640
5	13,500	--	*1,500	12,100	18	588	18,700	29	1,460
6	12,600	--	*1,330	9,510	27	693	16,000	35	1,510
7	10,200	--	*920	11,700	36	1,140	15,000	54	2,190
8	9,630	--	*832	12,600	25	850	18,100	58	2,830
9	9,470	--	*808	13,300	24	**862	22,400	41	2,480
10	8,970	--	*735	14,100	24	914	20,800	28	1,570
11	10,300	--	*936	13,800	23	857	18,300	23	1,140
12	14,000	--	*1,600	12,500	24	810	15,700	24	1,020
13	15,900	--	*2,000	11,100	21	629	14,500	23	900
14	22,600	--	*3,710	11,400	51	1,490	14,700	28	1,110
15	23,300	--	*3,920	13,500	167	6,140	14,900	36	1,450
16	19,300	33	1,720	16,200	246	10,700	15,600	35	1,470
17	15,700	36	1,530	22,900	180	**11,100	15,000	20	810
18	14,900	34	1,370	26,500	80	**5,720	13,000	29	1,020
19	15,300	31	1,280	23,800	52	**3,340	11,100	41	1,230
20	16,000	48	2,070	19,400	45	2,360	11,900	39	1,250
21	17,300	45	2,100	15,400	41	1,700	13,100	37	1,310
22	19,000	41	2,100	13,800	34	1,270	13,400	34	1,230
23	18,900	31	1,580	14,200	41	1,570	13,100	33	1,170
24	17,100	27	1,250	15,000	47	1,900	12,600	29	987
25	16,100	24	1,040	16,100	43	**1,870	11,600	32	1,000
26	15,000	20	810	17,500	41	1,940	12,300	51	1,690
27	14,200	26	997	19,100	43	2,220	13,400	44	1,590
28	14,000	22	832	21,200	78	4,460	14,000	30	1,130
29	13,200	26	927	22,000	103	6,120	14,400	40	1,560
30	12,100	29	947	---	---	---	15,400	58	2,410
31	12,800	33	1,140	---	---	---	17,700	61	**2,920
Total	452,770	---	45,504	453,110	---	74,264	494,000	---	55,857

Table 3.--Daily mean water discharge, suspended-sediment concentration, and suspended-sediment discharge for the Congaree River at U.S. Highway 601 near Fort Motte, S.C. (02169750) November 1983 - March 1985--Continued

Day	Mean discharge (ft^3/s)	Mean concentration (mg/L)	sediment discharge (ton/d)	mean discharge (ft^3/s)	Mean concentration (mg/L)	sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)
		April			May			June	
1	21,600	62	**3,620	11,900	52	1,670	18,300	152	7,510
2	21,100	60	**3,420	11,900	35	1,120	17,200	85	3,950
3	18,200	54	**2,650	11,900	33	1,060	14,500	59	2,310
4	16,700	48	**2,160	13,300	52	1,870	11,700	45	1,420
5	16,400	47	2,080	14,900	60	2,410	11,300	45	1,370
6	16,600	41	1,840	17,300	48	2,220	11,400	36	1,110
7	16,600	36	1,610	20,600	42	2,340	11,300	34	1,040
8	15,600	32	1,350	21,800	39	2,300	11,600	35	1,100
9	13,300	36	1,290	23,000	38	2,360	10,800	32	933
10	14,100	27	1,030	22,500	39	2,370	9,000	32	778
11	15,300	39	1,610	22,300	36	2,170	7,950	32	687
12	17,000	35	1,610	21,900	29	1,710	9,210	49	1,240
13	19,100	55	2,840	19,600	28	1,480	9,730	38	998
14	19,800	48	2,570	16,500	27	1,200	8,730	38	896
15	17,900	54	2,610	15,000	38	1,540	7,730	33	689
16	14,700	33	1,310	14,900	31	1,250	6,920	40	747
17	13,000	35	1,230	13,300	25	898	6,190	35	585
18	13,100	38	1,340	11,400	29	893	4,550	32	393
19	13,300	34	1,220	10,500	28	794	5,670	42	643
20	13,500	34	1,240	9,360	25	632	5,870	32	507
21	13,300	27	970	8,680	25	586	6,240	37	623
22	12,300	28	930	10,400	40	1,140	6,800	51	936
23	11,800	46	1,470	10,100	28	764	7,400	85	1,700
24	12,400	54	1,810	9,210	48	1,190	7,490	49	991
25	13,300	55	1,980	9,610	60	1,560	7,200	44	855
26	14,500	53	2,070	10,800	52	1,520	6,560	43	762
27	15,400	33	1,370	11,800	44	1,400	6,410	42	727
28	15,100	33	1,350	10,700	36	1,040	6,370	41	705
29	14,200	56	2,150	10,500	72	2,110	6,540	43	759
30	11,300	33	1,010	14,700	78	3,100	7,220	72	1,400
31	---	--	---	17,100	95	4,390	---	--	---
Total	460,500	--	53,740	447,460	--	51,087	267,880	---	38,364

Table 3.--Daily mean water discharge, suspended-sediment concentration, and suspended-sediment discharge for the Congaree River at Highway 601 near Fort Motte, S.C. (02169750) November 1983 - March 1985--Continued

Day	Mean discharge (ft^3/s)	Mean concentration (mg/L)	sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)
		July			August			September	
1	6,770	59	1,080	13,900	67	2,510	11,200	31	937
2	7,170	49	949	15,000	65	2,630	9,270	25	609
3	7,580	49	1,000	15,900	55	2,360	7,020	37	689
4	8,730	98	2,460	16,600	50	2,240	8,070	31	675
5	9,750	83	2,230	16,500	37	1,650	9,200	29	720
6	8,760	61	1,460	15,400	40	1,660	6,160	23	392
7	8,390	39	883	14,600	43	1,700	4,830	22	287
8	9,570	61	1,580	14,600	40	1,580	4,510	23	280
9	8,960	43	1,040	13,900	32	1,200	3,910	23	243
10	8,060	42	914	13,300	36	1,290	3,290	16	142
11	6,920	43	803	12,800	31	1,070	3,230	23	201
12	7,790	63	1,370	10,600	37	1,030	4,710	23	292
13	7,500	41	830	9,350	45	1,140	5,900	41	705
14	6,790	39	715	9,280	41	1,030	6,070	23	407
15	8,120	78	1,710	9,050	40	977	6,150	33	592
16	8,730	54	1,270	11,100	44	1,320	5,930	21	359
17	8,390	40	906	10,900	44	1,290	3,620	14	133
18	10,400	74	2,160	10,800	43	**1,250	2,860	19	147
19	11,300	70	2,140	9,110	42	**1,030	3,840	29	301
20	12,200	73	2,400	8,100	44	962	4,240	22	252
21	13,500	96	3,500	8,140	51	1,120	4,660	26	327
22	14,400	70	2,720	7,800	45	948	4,340	16	187
23	13,900	58	2,180	7,250	34	666	3,930	11	117
24	14,000	52	1,970	8,280	45	1,010	3,620	10	98
25	14,300	46	1,780	7,910	46	982	4,620	30	418
26	14,400	38	1,480	6,440	36	626	4,640	15	188
27	13,800	52	1,940	6,570	46	816	3,080	13	108
28	13,000	53	1,860	8,060	54	1,180	2,650	12	86
29	12,000	68	2,200	9,710	45	1,180	3,120	13	**110
30	11,800	65	2,070	10,100	40	1,090	3,200	14	**121
31	12,900	68	2,370	10,400	34	955	---	--	---
Total	319,880	--	51,970	341,450	--	40,492	151,870	--	10,123

Table 3.--Daily mean water discharge, suspended-sediment concentration, and suspended-sediment discharge for the Congaree River at U.S. Highway 601 near Fort Motte, S.C. (02169750) November 1983 - March 1985--Continued

Day	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)
		October			November			December	
1	2,850	14	108	6,820	20	368	6,860	12	222
2	2,480	16	107	5,140	21	291	4,980	6	81
3	3,170	14	120	3,910	17	179	3,970	8	86
4	4,380	20	237	4,030	15	163	3,810	8	82
5	4,660	22	277	2,990	12	97	5,510	15	230
6	4,490	--	*218	2,650	11	79	7,370	22	438
7	3,540	--	*144	2,820	16	122	9,410	34	890
8	2,550	--	*81	3,650	20	199	11,600	47	1,470
9	2,170	--	*61	3,920	13	138	12,100	49	1,600
10	2,870	--	*100	3,330	23	213	11,200	26	786
11	3,180	27	232	2,850	11	85	8,260	27	601
12	3,130	19	161	2,580	12	84	5,460	16	236
13	2,580	--	*83	2,570	8	56	5,300	12	172
14	2,070	--	*56	5,490	34	555	4,230	13	151
15	1,870	--	*47	6,760	27	493	3,090	5	42
16	2,000	--	*53	5,420	18	260	3,960	12	128
17	2,780	--	*94	4,260	9	104	3,830	14	146
18	3,720	31	311	3,320	8	72	2,280	16	100
19	4,330	29	339	3,510	4	38	2,700	9	66
20	5,060	23	318	3,000	5	40	2,700	7	51
21	4,410	22	265	4,950	31	480	2,570	7	49
22	2,750	12	91	7,530	31	630	3,280	8	71
23	2,570	13	90	5,600	14	219	3,140	9	76
24	3,760	25	265	3,760	10	103	3,770	9	92
25	6,340	48	857	2,920	7	55	4,580	11	136
26	7,370	39	810	3,060	6	50	3,750	11	111
27	7,930	56	1,240	2,970	6	48	2,850	8	61
28	5,360	25	362	3,480	4	38	2,410	10	65
29	4,290	20	232	4,790	8	103	2,540	10	69
30	5,480	32	523	7,020	22	417	2,920	11	87
31	8,190	30	663	---	--	---	4,120	14	156
Total	122,330	--	8,545	125,100	--	5,779	154,550	---	8,551

Table 3.--Daily mean water discharge, suspended-sediment concentration, and suspended-sediment discharge for the Congaree River at U.S. Highway 601 near Fort Motte, S.C. (02169750) November 1983 - March 1985--Continued

Day	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)	Mean discharge (ft^3/s)	Mean concentration (mg/L)	Sediment discharge (ton/d)
		January			February			March	
1	4,410	12	143	4,000	13	150	11,300	21	641
2	4,290	11	127	7,910	53	1,310	11,900	27	868
3	3,640	11	108	12,800	179	6,190	10,700	26	751
4	5,260	30	540	14,600	234	9,220	8,730	22	519
5	11,100	70	2,080	18,100	117	5,600	8,260	21	468
6	12,200	44	1,450	21,400	55	3,180	7,530	23	468
7	13,000	61	2,140	22,000	47	2,790	7,560	20	408
8	12,900	53	1,850	22,400	44	2,660	7,850	24	509
9	12,300	32	1,060	22,300	30	1,810	6,380	25	431
10	11,400	24	739	20,800	22	1,240	5,080	25	343
11	9,170	17	421	17,800	28	1,350	5,250	23	326
12	6,830	14	258	15,600	33	1,390	6,050	18	294
13	5,770	13	203	15,300	42	1,740	5,290	18	257
14	7,410	--	*526	15,300	30	1,240	4,800	17	220
15	7,910	--	*589	14,800	33	1,320	6,320	18	307
16	5,500	--	*312	14,300	41	1,580	6,410	16	277
17	6,520	--	*420	13,800	49	1,830	5,650	13	198
18	7,240	--	*505	13,100	30	1,060	4,960	16	214
19	6,860	--	*459	13,000	27	948	7,730	29	597
20	5,360	--	*298	12,700	22	754	8,970	19	460
21	3,350	--	*131	12,100	27	882	6,650	11	198
22	8,120	--	*617	12,000	24	778	4,660	11	138
23	11,700	21	663	11,100	25	749	6,010	21	338
24	9,890	15	404	9,610	27	701	6,670	15	270
25	4,940	17	218	8,110	27	591	5,100	13	179
26	3,030	22	180	8,470	26	595	5,150	19	264
27	4,680	24	303	8,810	23	547	4,690	15	196
28	4,120	11	131	10,400	31	870	3,910	14	148
29	2,800	8	60	---	--	---	4,920	19	248
30	4,740	15	192	---	--	---	4,650	16	211
31	3,490	10	94	---	--	---	3,520	13	**124
Total	219,930	--	17,221	392,610	--	53,075	202,650	--	10,870

* Suspended-sediment discharge estimated using sediment transport curve (figure 4).
** Daily mean suspended-sediment concentration estimated for use in equation 1.

Table 4.--Daily mean water discharge, in cubic feet per second, for Lakes Marion and Moultrie Diversion Canal near Pineville, S.C. (02170500), October 1983 - March 1985
[dashes indicate no value]

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	4,840	5,310	13,500	20,200	19,600	13,300	18,900	20,800	22,400
2	3,540	4,820	13,800	19,600	20,800	18,400	21,100	19,500	24,500
3	2,880	3,960	13,700	21,000	20,800	20,900	22,400	18,500	24,400
4	3,170	4,600	15,000	19,800	21,000	21,100	24,800	24,700	24,500
5	5,360	3,880	14,400	20,800	19,500	23,600	21,100	16,000	22,100
6	7,310	4,540	18,300	20,200	23,100	19,700	18,600	23,300	22,000
7	4,850	4,520	17,600	21,100	17,300	16,000	21,100	17,200	20,100
8	6,280	4,420	19,100	20,300	18,400	17,900	19,800	29,200	20,100
9	4,530	7,530	21,300	19,600	20,800	19,600	21,100	15,600	19,300
10	4,130	4,520	24,900	19,900	20,700	22,300	24,900	20,800	18,200
11	2,710	9,510	35,200	20,200	20,700	24,500	19,900	20,900	19,300
12	1,340	1,360	36,200	19,000	24,900	22,200	19,900	20,900	17,500
13	8,950	3,300	28,500	21,700	22,100	23,400	19,600	20,600	18,200
14	7,340	4,610	24,100	17,900	17,700	19,600	21,800	18,400	18,200
15	3,840	6,180	23,400	21,500	22,300	20,900	23,100	19,600	18,200
16	3,380	9,830	23,900	24,600	18,500	20,900	20,900	21,400	17,100
17	3,280	7,960	25,500	25,200	14,400	21,000	20,800	20,900	16,700
18	3,160	7,600	27,200	25,400	18,100	20,600	17,500	24,000	18,500
19	4,440	5,880	23,500	20,800	22,600	21,500	19,600	20,900	9,650
20	16,200	7,720	23,600	18,700	24,200	15,400	20,900	20,200	12,800
21	8,290	8,520	28,000	17,500	23,300	24,600	20,800	19,400	9,840
22	5,430	7,690	24,000	18,700	21,600	19,800	21,000	18,300	6,830
23	5,770	7,970	20,900	20,000	26,300	20,300	25,900	20,300	9,570
24	7,730	13,600	22,500	22,100	20,900	22,200	18,500	19,400	9,620
25	3,960	5,860	25,500	22,500	22,400	27,100	18,700	18,200	10,200
26	4,310	7,670	14,500	22,800	19,600	21,100	19,600	18,200	9,140
27	4,800	7,790	17,700	24,700	27,400	24,600	21,800	18,200	8,860
28	4,480	12,200	19,900	19,600	22,200	24,000	20,500	20,600	11,000
29	5,830	13,500	16,800	19,900	22,000	25,900	20,500	19,500	13,200
30	4,840	12,500	19,000	20,800	---	20,500	21,700	23,300	8,800
31	9,640	---	19,300	15,900	---	15,500	---	20,700	---
Total	166,610	209,350	670,800	642,000	613,200	648,400	626,800	629,500	480,810
Mean	5,375	6,978	21,640	20,710	21,140	20,920	20,890	20,310	16,030
Maximum	16,200	13,600	36,200	25,400	27,400	27,100	25,900	29,200	24,500
Minimum	1,340	1,360	13,500	15,900	14,400	13,300	17,500	15,600	6,830

Table 4.--Daily mean water discharge, in cubic feet per second, for Lakes Marion and Moultrie Diversion Canal near Pineville, S.C. (02170500), October 1983 - March 1985--Continued

Day	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	14,100	21,900	13,200	7,070	9,370	7,110	9,250	5,850	24,500
2	11,300	24,900	12,900	2,140	10,200	6,150	8,960	9,160	20,400
3	11,400	25,700	11,600	4,520	7,770	6,410	13,700	13,800	18,300
4	11,700	26,200	17,500	6,280	8,710	7,100	13,900	15,300	17,100
5	12,300	26,500	8,530	6,400	9,240	11,700	11,000	22,600	17,400
6	11,700	27,400	10,900	7,050	8,020	17,600	15,200	24,500	14,200
7	13,200	28,000	8,720	7,220	5,410	11,200	17,100	26,800	14,000
8	11,500	26,200	9,360	5,700	6,990	14,800	16,700	27,900	12,800
9	11,900	27,200	12,400	4,780	8,080	16,400	17,300	31,900	12,600
10	11,600	26,600	12,000	5,370	7,310	14,400	19,100	34,500	12,100
11	12,100	24,100	12,900	4,940	10,600	15,900	18,300	34,700	4,000
12	13,000	23,500	11,700	3,960	3,120	15,600	19,500	37,000	10,600
13	13,200	24,100	10,900	4,030	3,720	16,600	17,000	33,200	4,330
14	15,800	21,000	10,700	2,930	5,540	14,500	18,800	31,000	6,880
15	11,300	17,800	10,300	2,160	7,570	14,200	15,800	31,200	4,440
16	13,000	14,900	7,390	3,670	8,490	14,000	14,000	29,900	8,580
17	14,900	14,500	5,600	5,540	4,180	13,800	16,700	28,700	9,790
18	21,200	14,400	4,770	5,470	3,940	13,600	16,400	27,600	11,600
19	16,700	18,800	4,210	5,510	6,610	10,700	13,300	27,100	5,600
20	20,700	14,300	6,420	7,100	3,800	10,200	14,700	26,300	6,800
21	21,200	13,400	6,760	7,530	6,660	9,590	11,600	25,600	6,000
22	21,400	12,300	5,660	10,200	7,520	8,420	13,900	24,700	10,400
23	20,300	11,900	6,170	5,660	5,380	7,750	11,100	25,000	2,720
24	21,600	14,000	6,810	5,870	4,250	7,950	8,660	24,200	3,590
25	22,800	13,600	6,370	6,260	4,080	8,710	10,600	23,400	500
26	21,500	12,100	7,710	6,950	4,190	9,010	4,610	22,800	2,070
27	10,900	15,400	6,020	5,710	4,340	1,050	4,430	21,200	7,170
28	23,800	9,810	3,390	9,290	5,920	9,570	6,390	21,300	7,060
29	23,100	13,700	10,700	8,300	6,280	9,810	4,140	---	8,220
30	22,800	13,700	5,140	7,170	7,900	9,240	4,770	---	5,940
31	24,000	15,700	---	6,500	---	7,960	3,780	---	3,590
Total	506,000	593,610	266,730	181,280	195,190	341,030	390,690	707,210	293,280
Mean	16,320	19,150	8,891	5,848	6,506	11,000	12,600	25,260	9,461
Maximum	24,000	28,000	17,500	10,200	10,600	17,600	19,500	37,000	24,500
Minimum	10,900	9,810	3,390	2,140	3,120	1,050	3,780	5,850	500

Table 5.--Daily mean water discharge, in cubic feet per second, for the Santee River near Pineville, S.C. (02171500), October 1983 - March 1985
[dashed indicate no value]

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	586	533	572	7,360	6,840	19,100	16,500	5,850	653
2	574	543	572	6,660	6,280	19,800	16,600	5,820	794
3	551	547	573	6,360	6,050	21,700	16,600	5,840	700
4	590	522	586	6,170	5,950	21,700	16,600	8,760	613
5	594	532	578	6,130	6,200	21,600	17,200	14,000	598
6	589	533	726	4,800	5,880	21,600	16,200	14,500	594
7	597	504	968	1,320	1,760	19,500	12,900	14,800	588
8	607	515	602	764	924	15,600	12,000	16,900	586
9	592	512	665	665	835	16,100	10,600	19,400	582
10	602	486	666	631	767	18,500	9,220	19,300	579
11	603	592	1,660	675	778	18,700	14,400	19,800	579
12	582	596	13,900	1,720	758	18,600	14,900	20,600	586
13	561	528	25,400	10,600	680	18,600	15,000	20,600	584
14	391	551	23,900	14,800	1,550	17,600	15,000	17,700	581
15	570	580	19,800	15,600	9,470	13,200	15,100	13,700	585
16	573	651	19,700	15,900	14,300	12,200	15,300	7,800	579
17	567	607	19,700	16,000	21,600	11,800	15,200	3,230	579
18	564	539	20,800	16,100	22,000	11,600	13,100	1,590	585
19	535	537	20,300	18,000	22,200	11,500	8,000	1,270	574
20	518	548	13,700	19,600	22,300	11,400	6,760	965	472
21	511	558	9,270	18,300	21,000	11,400	6,290	760	545
22	541	562	9,450	18,200	14,500	6,730	6,090	690	514
23	540	548	12,500	18,200	9,670	2,190	7,450	683	544
24	516	569	16,800	16,500	8,900	955	11,800	677	571
25	544	842	19,300	13,300	11,900	777	10,400	650	570
26	567	603	11,900	12,600	11,700	1,120	6,830	641	566
27	567	575	10,200	13,600	14,300	686	6,120	637	569
28	560	547	10,100	15,600	20,000	812	5,940	640	571
29	561	598	13,600	15,800	19,900	6,750	5,860	639	572
30	549	578	16,700	13,700	---	12,300	5,850	655	578
31	551	---	9,290	8,740	---	16,100	---	699	---
Total	17,353	16,936	324,478	334,395	288,992	400,220	349,810	239,796	17,591
Mean	560	565	10,470	10,790	9,965	12,910	11,660	7,735	586
Maximum	607	842	25,400	19,600	22,300	21,700	17,200	20,600	794
Minimum	391	486	572	631	680	686	5,850	637	472

Table 5.--Daily mean water discharge, in cubic feet per second, for the Santee River near Pineville, S.C. (02171500), October 1984 - March 1985--Continued

Day	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	583	469	479	478	471	465	451	451	497
2	576	478	479	478	471	465	453	453	508
3	580	483	485	473	471	520	470	457	517
4	573	516	487	472	479	407	483	464	518
5	573	533	491	476	475	440	513	485	499
6	566	498	492	471	472	797	461	490	513
7	557	563	493	469	475	628	464	476	497
8	559	612	495	471	420	477	459	491	509
9	547	517	493	470	415	475	463	489	516
10	545	470	494	469	459	489	476	487	518
11	562	460	494	469	466	436	471	474	515
12	553	474	489	475	473	470	480	2,950	522
13	548	480	496	475	451	466	467	2,530	513
14	536	479	485	473	457	467	464	795	504
15	541	472	491	473	451	468	472	567	509
16	551	475	499	473	451	465	464	535	511
17	549	485	503	471	455	460	463	513	513
18	590	481	495	490	455	459	461	505	551
19	561	496	491	476	437	463	463	502	518
20	552	493	489	475	386	466	479	521	510
21	542	489	485	476	401	465	489	532	524
22	542	487	484	478	471	465	473	519	540
23	508	482	484	478	459	469	463	527	533
24	425	479	482	473	457	470	463	534	586
25	450	474	481	473	469	466	463	535	566
26	492	475	485	473	467	469	478	537	523
27	606	474	489	473	470	470	465	537	513
28	534	475	500	471	476	467	460	526	508
29	505	477	509	471	477	462	467	---	502
30	512	480	493	470	471	458	463	---	499
31	476	486	---	467	---	459	457	---	499
Total	16,794	15,212	14,712	14,680	13,708	14,903	14,518	18,882	16,051
Mean	542	491	490	474	457	481	468	674	518
Maximum	606	612	509	490	479	797	513	2,950	586
Minimum	425	460	479	467	386	407	451	451	497

Table 6.--Daily mean water discharge, in cubic feet per second, for Lake Moultrie Tailrace Canal at Moncks Corner, S.C. (02172002), October 1983 - March 1985
[dashed indicate no value]

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	3,350	5,550	14,900	21,100	20,800	20,900	21,100	20,800	20,000
2	3,190	4,820	15,300	21,100	20,800	20,900	21,100	18,500	20,800
3	3,230	4,890	14,300	21,000	20,800	20,900	21,100	18,200	20,700
4	4,100	5,530	16,700	21,000	20,800	20,800	21,100	21,000	20,800
5	3,510	5,620	17,300	21,100	20,700	20,800	21,100	21,000	20,800
6	3,730	5,120	18,300	21,100	20,700	20,900	21,000	20,900	20,800
7	3,460	5,210	20,100	21,100	20,700	20,900	21,100	20,900	20,700
8	4,200	4,070	21,100	21,100	20,700	21,000	21,100	20,900	20,700
9	4,180	6,600	21,100	20,500	20,800	20,900	21,100	20,800	20,600
10	3,780	5,450	21,100	21,100	20,700	21,000	21,200	20,800	20,600
11	3,980	6,850	21,100	21,100	20,700	21,000	21,100	20,900	20,600
12	6,320	5,180	23,800	21,100	20,700	20,900	21,100	20,900	20,600
13	6,870	4,810	21,200	21,100	20,600	21,000	20,900	20,900	20,600
14	7,110	6,460	21,200	21,100	20,700	20,900	20,500	20,800	20,600
15	3,260	6,990	21,000	21,200	20,600	20,900	21,000	20,900	20,600
16	3,610	9,020	21,100	21,100	19,900	20,900	20,900	20,100	20,700
17	3,630	11,200	21,200	19,800	20,400	21,000	20,800	20,900	20,500
18	3,160	7,020	21,100	21,000	20,400	20,600	20,900	24,000	17,000
19	3,510	3,800	21,300	19,600	20,300	20,600	20,900	20,900	11,500
20	10,900	6,790	21,200	21,100	20,600	20,800	20,900	20,800	8,670
21	8,980	7,360	24,100	21,100	20,900	21,000	20,800	20,700	4,400
22	5,660	9,770	21,200	21,100	20,800	21,000	21,000	20,700	3,830
23	3,690	7,390	21,100	20,000	20,900	20,900	20,900	20,600	8,880
24	3,450	7,680	20,500	20,000	20,900	21,000	20,900	20,600	6,960
25	3,150	13,500	20,700	20,600	20,900	21,000	20,000	20,700	10,400
26	3,040	6,510	21,000	20,700	21,000	21,100	20,900	20,600	9,830
27	4,570	8,600	21,100	20,800	20,900	21,200	20,500	20,600	10,600
28	5,060	10,800	21,200	21,800	20,900	20,900	20,500	20,600	11,300
29	4,900	14,300	21,100	20,800	20,800	21,000	20,500	20,700	8,900
30	4,840	15,200	21,100	20,800	---	21,100	20,500	20,600	10,300
31	7,210	---	21,200	20,800	---	21,100	---	20,700	---
Total	143,630	222,090	628,700	646,900	600,400	648,900	626,500	642,000	473,270
Mean	4,633	7,403	20,280	20,870	20,700	20,930	20,880	20,710	15,780
Maximum	10,900	15,200	24,100	21,800	21,000	21,200	21,200	24,000	20,800
Minimum	3,040	3,800	14,300	19,600	19,900	20,600	20,000	18,200	3,830

Table 6.--Daily mean water discharge, in cubic feet per second, for Lake Moultrie Tailrace Canal at Moncks Corner, S.C. (02172002), October 1983 - March 1985--Continued

Day	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	12,600	26,200	12,600	6,490	9,720	2,830	9,250	4,230	21,400
2	12,600	26,800	13,100	6,540	10,800	4,070	9,310	12,400	15,000
3	13,500	27,400	11,600	6,030	10,200	3,050	13,400	17,600	14,800
4	13,000	27,400	11,600	6,280	10,100	13,700	18,300	21,100	315,000
5	11,400	27,400	12,700	5,820	10,400	18,500	15,400	23,400	15,400
6	11,000	27,400	10,300	6,470	9,990	15,900	18,900	24,700	13,900
7	11,100	27,400	10,800	6,410	9,810	19,900	17,700	24,500	11,700
8	10,800	27,400	14,100	6,290	9,770	1,480	16,700	26,000	10,000
9	11,300	27,200	13,600	6,170	10,400	314,000	15,700	26,500	10,500
10	8,860	27,200	16,500	5,370	10,200	13,600	16,700	26,600	11,200
11	11,800	26,500	17,600	4,130	4,550	16,500	18,900	26,500	5,850
12	13,200	27,100	12,600	3,960	3,700	18,700	21,400	26,400	3,970
13	13,200	24,700	12,300	4,030	7,190	19,100	20,000	26,900	2,940
14	13,600	15,900	13,500	3,970	7,850	17,700	15,000	26,900	2,940
15	15,400	15,100	7,330	4,820	6,640	18,500	16,000	26,600	2,950
16	14,900	11,900	3,800	3,900	4,450	18,500	15,800	27,000	4,410
17	16,800	15,200	4,080	4,960	3,950	19,100	16,500	27,000	18,700
18	21,000	14,600	4,190	4,310	3,940	16,100	13,600	27,000	11,300
19	21,100	15,600	4,900	5,510	4,640	12,900	11,900	26,900	5,020
20	21,300	14,000	6,880	6,750	6,930	12,900	10,100	26,900	3,910
21	22,100	8,760	6,180	7,180	6,080	8,780	26,100	26,400	4,500
22	22,300	12,300	6,010	10,500	4,280	8,420	9,840	25,900	2,960
23	19,400	15,600	6,400	5,660	3,180	9,140	3,460	27,100	2,370
24	18,200	15,500	6,350	7,270	3,320	7,720	2,990	27,000	0
25	20,000	13,600	7,410	3,940	3,850	8,360	3,220	27,200	0
26	19,600	12,600	8,400	4,410	4,770	12,600	8,200	24,000	5,660
27	19,100	14,800	3,590	5,130	3,760	12,700	3,040	26,600	6,010
28	24,000	17,800	7,080	8,130	3,600	12,000	5,010	23,800	8,560
29	24,600	16,400	15,300	8,880	9,410	11,200	3,100	---	8,800
30	26,500	16,100	3,980	5,090	4,770	8,660	3,150	---	2,120
31	26,400	13,600	---	6,730	---	9,810	3,430	---	0
Total	520,660	609,460	284,780	181,130	202,250	686,420	382,100	683,130	541,870
Mean	16,800	19,660	9,493	5,843	6,742	22,140	12,330	24,400	17,480
Maximum	26,500	27,400	17,600	10,500	10,800	314,000	26,100	27,200	315,000
Minimum	8,860	8,760	3,590	3,900	3,180	1,480	2,990	4,230	0

The concentration of suspended sediment in the Wateree River flood plain was not measured during this study. However, in order to obtain an estimate of suspended-sediment discharge in the flood plain, the monthly mean concentration was estimated to equal the monthly mean concentration at the Congaree River Overflow Channel 2. Suspended-sediment concentration in the Congaree River Overflow Channel 2 was sampled on a weekly basis during periods of high flow in the main channel. Concentrations of suspended-sediment samples obtained at the Congaree River Overflow Channel 2 and unweighted monthly averages are given in table 7. The unweighted average concentration, based on all 39 observations, is 12 mg/L.

Samples for suspended-sediment concentration were collected at the Lake Marion-Moultrie Diversion Canal (02170500), Santee River near Pineville (02171500), and Lake Moultrie Tailrace (02172002) on a weekly basis during the period January 1984 to September 1985. A biweekly sampling schedule was implemented from October 1983 to December 1983 and from October 1984 to March 1985, the latter period being initiated after weekly results showed little or no fluctuation in concentration. Concentrations of suspended-sediment samples collected at the Lakes Marion-Moultrie Diversion Canal (02170500), Santee River near Pineville (02171500), and the Lake Moultrie Tailrace (02172002) are given in table 8.

Particle-Size Distribution

The particle-size distribution of a sample defines the amount (by dry weight) of sediment in a given size range, as a percentage of the total dry weight of sediment in the sample. Size distributions are commonly expressed with percent finer values, that is, the percent of sediment in the sample that is finer than a particular particle size. Besides being used in bedload discharge computations, particle-size distribution data have other useful purposes such as determining the density of deposited sediments.

Suspended-sediment samples were sent to the U.S. Geological Survey sedimentation laboratory at Harrisburg, Pennsylvania for concentration analysis and for particle-size distribution determination. The size distribution of suspended-sediment in a stream over a period of time is obtained when the suspended-sediment discharge for that period is collected in one place, thoroughly mixed, and then analyzed. A weighted average particle-size distribution can be obtained to represent this theoretical distribution by using the suspended-sediment discharge as the weighting factor. If, however, there is no correlation between the suspended-sediment discharge and the percent-finer values, an unweighted average of the percent-finer values will be as representative of the particle-size distribution as a weighted average (Carswell, 1981). The percent-finer values were correlated with suspended-sediment discharge for the Wateree River near Eastover (02148315) and Congaree River near Ft. Motte (02169750) stations. Correlation of the percent-finer values with the suspended-sediment discharge was found to be extremely low or nonexistent, except for the 0.004 mm (millimeter) size particles at the Congaree River near Ft. Motte (02169750). The weighted average percent-finer value for this particle size compared well with the unweighted average, with values of 14 and 18 percent, respectively. The unweighted average suspended-sediment

Table 7.--Suspended-sediment concentration data for the Congaree River Overflow Channel 2

[mg/L, milligrams per liter; dashes indicate no value]

Date	Concentration (mg/L)	Month	Estimated monthly mean concentration (mg/L)
Dec. 06, 1983	30	--	--
Dec. 14, 1983	17	--	--
Dec. 20, 1983	15	Dec. 1983	20
Jan. 05, 1984	18	--	--
Jan. 16, 1984	13	--	--
Jan. 27, 1984	15	Jan. 1984	15
Feb. 22, 1984	16	--	--
Feb. 28, 1984	10	Feb. 1984	13
Mar. 02, 1984	36	--	--
Mar. 07, 1984	11	--	--
Mar. 09, 1984	16	--	--
Mar. 12, 1984	8	--	--
Mar. 14, 1984	9	--	--
Mar. 16, 1984	11	Mar. 1984	15
Apr. 05, 1984	9	--	--
Apr. 06, 1984	8	--	--
Apr. 11, 1984	10	--	--
Apr. 20, 1984	12	--	--
Apr. 27, 1984	10	Apr. 1984	10
May 02, 1984	13	--	--
May 08, 1984	11	--	--
May 09, 1984	12	--	--
May 16, 1984	14	--	--
May 18, 1984	16	--	--
May 24, 1984	14	--	--
May 31, 1984	16	May 1984	14
Aug. 03, 1984	15	--	--
Aug. 07, 1984	9	--	--
Aug. 10, 1984	10	--	--
Aug. 20, 1984	13	Aug. 1984	12
Jan. 09, 1985	8	--	--
Jan. 11, 1985	7	--	--
Jan. 24, 1985	3	Jan. 1985	6
Feb. 04, 1985	9	--	--
Feb. 06, 1985	24	--	--
Feb. 19, 1985	6	--	--
Feb. 21, 1985	3	Feb. 1985	10
Mar. 07, 1985	6	--	--
Mar. 19, 1985	11	Mar. 1985	8

Table 8.--Suspended-sediment concentration data for the outflow sampling stations, October 1983-March 1985

[mg/L, milligrams per liter]

Santee River near Pineville, S.C. (02171500)		Lakes Marion and Moultrie Diversion Canal (02170500)		Lake Moultrie Tailrace Canal (02172002)	
Date	Concentration (mg/L)	Date	Concentration (mg/L)	Date	Concentration (mg/L)
Sep. 27, 1983	7	Sep. 28, 1983	8	Sep. 28, 1983	5
Oct. 27, 1983	6	Nov. 02, 1983	6	Oct. 28, 1983	6
Nov. 17, 1983	8	Nov. 22, 1983	5	Nov. 17, 1983	5
Nov. 29, 1983	10	Nov. 29, 1993	8	Nov. 30, 1983	5
Dec. 09, 1983	12	Dec. 07, 1983	15	Dec. 08, 1983	6
Dec. 22, 1983	15	Dec. 22, 1983	17	Dec. 22, 1983	8
Jan. 06, 1984	17	Jan. 06, 1984	10	Jan. 06, 1984	11
Jan. 18, 1984	17	Jan. 18, 1984	7	Jan. 19, 1984	10
Jan. 19, 1984	13	Feb. 02, 1984	17	Feb. 03, 1984	10
Feb. 02, 1984	11	Feb. 10, 1984	14	Feb. 10, 1984	9
Feb. 17, 1984	11	Feb. 17, 1984	13	Feb. 17, 1984	11
Mar. 02, 1984	22	Feb. 28, 1984	20	Feb. 28, 1984	16
Mar. 08, 1984	13	Mar. 02, 1984	19	Mar. 08, 1984	10
Mar. 15, 1984	10	Mar. 08, 1984	14	Mar. 15, 1984	11
Mar. 22, 1984	21	Mar. 15, 1984	16	Mar. 22, 1984	12
Apr. 04, 1984	6	Mar. 22, 1984	17	Apr. 04, 1984	10
Apr. 13, 1984	7	Apr. 04, 1984	9	Apr. 12, 1984	12
Apr. 18, 1984	8	Apr. 13, 1984	10	Apr. 17, 1984	10
Apr. 25, 1984	8	Apr. 18, 1984	15	Apr. 25, 1984	15
May 03, 1984	9	Apr. 25, 1984	14	May 03, 1984	11
May 10, 1984	8	May 03, 1984	9	May 10, 1984	8
May 17, 1984	19	May 10, 1984	11	May 17, 1984	11
May 24, 1984	30	May 17, 1984	12	May 24, 1984	9
June 06, 1984	20	May 24, 1984	11	May 31, 1984	11
June 13, 1984	11	May 31, 1984	10	June 06, 1984	10

Table 8.--Suspended-sediment concentration data for the outflow sampling stations, October 1983-March 1985--Continued

Santee River near Pineville, S.C. (02171500)		Lakes Marion and Moultrie Diversion Canal (02170500)		Lake Moultrie Tailrace Canal (02172002)	
Date	Concentration (mg/L)	Date	Concentration (mg/L)	Date	Concentration (mg/L)
June 22, 1984	8	June 06, 1984	9	June 13, 1984	8
June 28, 1984	6	June 13, 1984	10	June 22, 1984	8
July 03, 1984	5	June 22, 1984	6	June 28, 1984	8
July 12, 1984	5	June 28, 1984	7	July 03, 1984	5
July 18, 1984	5	July 03, 1984	6	July 11, 1984	5
July 26, 1984	6	July 12, 1984	8	July 18, 1984	5
Aug. 01, 1984	8	July 17, 1984	10	July 26, 1984	6
Aug. 09, 1984	7	July 26, 1984	5	Aug. 01. 1984	6
Aug. 22, 1984	7	Aug. 01, 1984	8	Aug. 10, 1984	4
Aug. 29, 1984	8	Aug. 09, 1984	6	Aug. 22, 1984	6
Sep. 06, 1984	4	Aug. 22, 1984	5	Aug. 29, 1984	5
Sep. 18, 1984	7	Aug. 29, 1984	5	Sep. 06, 1984	5
Oct. 03, 1984	4	Sep. 06, 1984	8	Sep. 18, 1984	7
Oct. 19, 1984	5	Sep. 18, 1984	8	Oct. 03, 1984	5
Nov. 02, 1984	4	Oct. 03, 1984	6	Oct. 19, 1984	5
Nov. 15, 1984	5	Oct. 19, 1984	6	Nov. 02, 1984	3
Dec. 04, 1984	10	Nov. 02, 1984	7	Nov. 15, 1984	5
Dec. 20, 1984	13	Nov. 14, 1984	7	Dec. 04, 1984	7
Jan. 09, 1985	8	Dec. 04, 1984	7	Dec. 20, 1984	5
Jan. 25, 1985	7	Dec. 20, 1984	6	Jan. 10, 1985	4
Feb. 05, 1985	6	Jan. 11, 1985	10	Jan. 25, 1985	5
Feb. 21, 1985	8	Jan. 25, 1985	7	Feb. 06, 1985	5
Mar. 07, 1985	9	Feb. 06, 1985	7	Feb. 22, 1985	8
Apr. 01, 1985	10	Feb. 21, 1985	10	Mar. 07, 1985	8
		Mar. 07, 1985	8	Apr. 02, 1985	7

particle-size distribution at each station (in percent by weight) is given in table 9. Suspended-sediment inflow and outflow were composed mostly of silt-size particles.

Table 9.--Unweighted average suspended-sediment particle-size distribution

Classification	Size (millimeters)	Particle-size distribution (percent) Inflow: Wateree River near Eastover (02148315)	Inflow: Congaree River near Ft. Motte (02169750)	Inflow: Lakes Marion-Moultrie Diversion Canal (02170500)	Outflow: Santee River near Pineville (02171500)	Outflow: Lake Moultrie Tailrace (02172002)
Clay	0.00024-0.004	20	16	8	7	7
Silt	.004 - .062	57	73	79	81	80
Sand	.062 - 2.0	23	11	13	12	13
Number of analyses		8	8	8	8	8

All channel beds were composed almost entirely of sand-size particles except the Lake Moultrie Tailrace (02172002) where the channel is composed of hard-packed clay and sand. The density of the bed material at this station and the high content of sand and gravel at the Santee River near Pineville (02171500) are good indications that the measurements of suspended-sediment concentration made at these stations were representative of the sediment concentration of the water released from the lakes, that is, the samples did not have high concentrations of bed material held in suspension. The particle-size distribution of bed material at each station (in percent by weight) is given in table 10.

Bedload

Bedload is material that moves on or near the streambed by rolling, sliding, and sometimes making brief excursions into the flow a few diameters above the bed (USGS, 1977). Particle size of bedload sediment can vary from sand, silt, and clay in low-velocity channels to gravel and boulders in high-velocity, steep-gradient streams. Bedload discharge can be measured directly or calculated by indirect methods, the latter being most common. Several bedload equations have been developed by different investigators

Table 10.--Particle-size distribution of bed material

Classification	Size (millimeters)	Particle-size distribution (percent)				
		Wateree River near Eastover (02148315)	Congaree River near Ft. Motte (02169750)	Lakes Marion-Moultrie Diversion Canal (02170500)	Santee River near Pineville (02171500)	Lake Moultrie Tailrace (02172002)
Clay	0.00024-0.004	0	1	0	10	29
Silt	.004 - .062	1	1	0	9	13
Sand	.062 -2.0	98	98	98	73	58
Gravel	2.0 -64.0	1	0	2	8	0
Number of analyses		3	2	2	1	1

Values given represent center-channel composition.

(Colby, 1964). One of the more widely used methods is the modified Einstein procedure (Colby and Hubbell, 1961), which determines the total sediment discharge in terms of the amount transported for different particle-size ranges. Essential data for its use are:

1. Stream width, average depth, mean velocity, and water discharge.
2. Average suspended-sediment concentration.
3. Particle-size distribution of the suspended sediment.
4. Average depth of the verticals where the suspended-sediment samples were collected.
5. Particle-size distribution of the bed material.
6. Water temperature.

The modified Einstein procedure was used to estimate values of bedload discharge. Computations of total sediment discharge by this procedure were made with a computer program developed by the U.S. Geological Survey (Stevens, 1985).

The difference between total sediment discharge and the measured suspended-sediment discharge is the unmeasured sediment discharge. Most suspended-sediment samplers, including those used in this investigation, are designed to sample the water column from the stream surface to a point approximately 0.3 foot above the streambed. The unmeasured sediment discharge consists of the bedload discharge plus some of the suspended-sediment discharge in the unsampled zone (some of the suspended-sediment discharge in the unsampled zone is included in the modified Einstein computation). The bedload discharge

was assumed to equal the unmeasured sediment discharge, for the following reasons:

1. The suspended-sediment concentration in the unsampled zone is nearly the same as the sampled (measured) concentration. This is a reasonable assumption when the suspended sediment is primarily (80 to 90 percent) silt or clay particles because these fine particles tend to be homogeneous in the water column.

2. The computed suspended-sediment discharge includes the suspended-sediment discharge in the unsampled zone because the streamflow in the unsampled zone is included in the computation.

Monthly estimates of bedload discharge were based on the relation between daily mean water discharge and daily bedload discharge (as a percentage of the computed daily suspended-sediment discharge). The monthly mean water discharge for each month during the investigation was converted to the appropriate percentage, which was applied to the monthly total suspended-sediment discharge.

Computations of bedload discharge made by the modified Einstein procedure are given in table 11. Based on these calculations, bedload discharge is insignificant during low-flow conditions, however, it becomes a greater percentage of the total daily sediment discharge as streamflow increases.

SEDIMENT INFLOW, OUTFLOW AND DEPOSITION

Inflow

Sediment inflow to Lake Marion was determined by summing the suspended-sediment discharge and the bedload discharge of the Wateree River near Eastover (02148315) and the Congaree River near Ft. Motte (02169750)

Suspended-sediment discharge is determined by multiplying water discharge by the suspended-sediment concentration and a constant:

$$Qs = Qw \times Cs \times K, \qquad (1)$$

where Qs is the suspended-sediment discharge, in tons per day;
Qw is the water discharge, in cubic feet per second;
Cs is the concentration of suspended sediment, in milligrams per liter; and
K is a constant equal to 0.0027, when using the above units.

Suspended-sediment discharges at the Wateree River near Eastover (02148315) and the Congaree River near Ft. Motte (02169750) were computed on a daily basis using procedures given by Porterfield (1972). Briefly, for days when water discharge or suspended-sediment concentration remained relatively constant, equation 1 was used. For days when fluctuation of either of these parameters exceeded acceptable limits (minimum value divided

Table 11.--Computations of bedload discharge made by the modified Einstein procedure

[ton/d, tons per day; ft^3/s, cubic feet per second]

Station name	Station number	Streamflow (ft^3/s)	Total sediment discharge* (ton/d)	Measured suspended-sediment discharge (ton/d)	Bedload discharge (ton/d)
Wateree River near Eastover	02148315	4,330	274	257	17
Wateree River near Eastover	02148315	9,880	1,200	880	318
Congaree River near Ft. Motte	02169750	2,780	120	120	0
Congaree River near Ft. Motte	02169750	15,500	1,550	1,420	123
Lakes Marion-Moultrie Diversion Canal	02170500	15,000	243	243	0
Lakes Marion-Moultrie Diversion Canal	02170500	20,800	712	618	94

* --Computed by the modified Einstein procedure.

by maximum value less than 0.85), subdivision of the day into shorter periods of time was required to calculate an accurate daily suspended-sediment discharge.

Estimates of daily suspended-sediment discharge, for periods of missing concentration data lasting 1 day to several days, were made by estimating the daily mean concentration for use in equation 1. A temporal graph of daily mean concentration was made for both inflow stations to assist in determining an accurate estimate. Estimates of daily suspended-sediment discharge for periods of missing concentration data lasting several days or

more were based on the relation between daily mean water discharge and daily suspended-sediment discharge. This relation can be expressed as an average curve, called a sediment transport curve, and is commonly used to estimate values of suspended-sediment discharge (Porterfield, 1972). The sediment transport curve for the Wateree River near Eastover (02148315) is shown in figure 3. The linear regression for the data set, which contains 414 observations, is expressed by the following equation:

$$SS = 0.0005484\ Q^{1.58856}, \qquad (2)$$

where SS is the suspended-sediment discharge, in tons per day; and
Q is the daily mean water discharge, in cubic feet per second.

The correlation coefficient for this regression is 0.937 (a value of 1.0 indicates a perfect positive relation and a value near zero indicates little or no relation). Equation 2 was based on the data set containing all daily mean streamflow values, including those greater than or equal to 10,000 ft^3/s. During periods of high flow, streamflow in the main channel remained at this level and a broad range in suspended-sediment concentration was observed. The fluctuation of concentration with no fluctuation of streamflow resulted in a dense vertical line of data points that may bias the regression. A linear regression of the data set containing only daily streamflow values less than 9,950 ft^3/s was determined (based on 380 observations). Computations using the equation that represents this linear regression (correlation coefficient = 0.935) differ from those using equation 2 by about 2 percent in the low-flow range and about 1 percent in the high-flow range.

The daily suspended-sediment transport curve for the Congaree River near Ft. Motte (02169750) is shown in figure 4. The linear regression (correlation coefficient = 0.910) for the data set, which contains 441 observations, is expressed by the following equation:

$$SS = 0.00008668\ Q^{1.75274}, \qquad (3)$$

where SS and Q are the same variables as in equation 2.

The relation between streamflow and suspended-sediment discharge at each inflow station varies primarily with the source of the streamflow. For example, flows derived primarily from an upstream reservoir generally produce less suspended-sediment discharge than an equal streamflow amount resulting from storm runoff in the basin. This may account for some of the scatter in the data sets used in figures 3 and 4.

Monthly mean values of water discharge and suspended-sediment concentration for the Congaree River Overflow Channel 2 were used in equation 1 and the result multiplied by the number of days in the month. Suspended-sediment discharge in the Wateree River flood plain was computed on a monthly basis, using the same methods as for Overflow Channel 2.

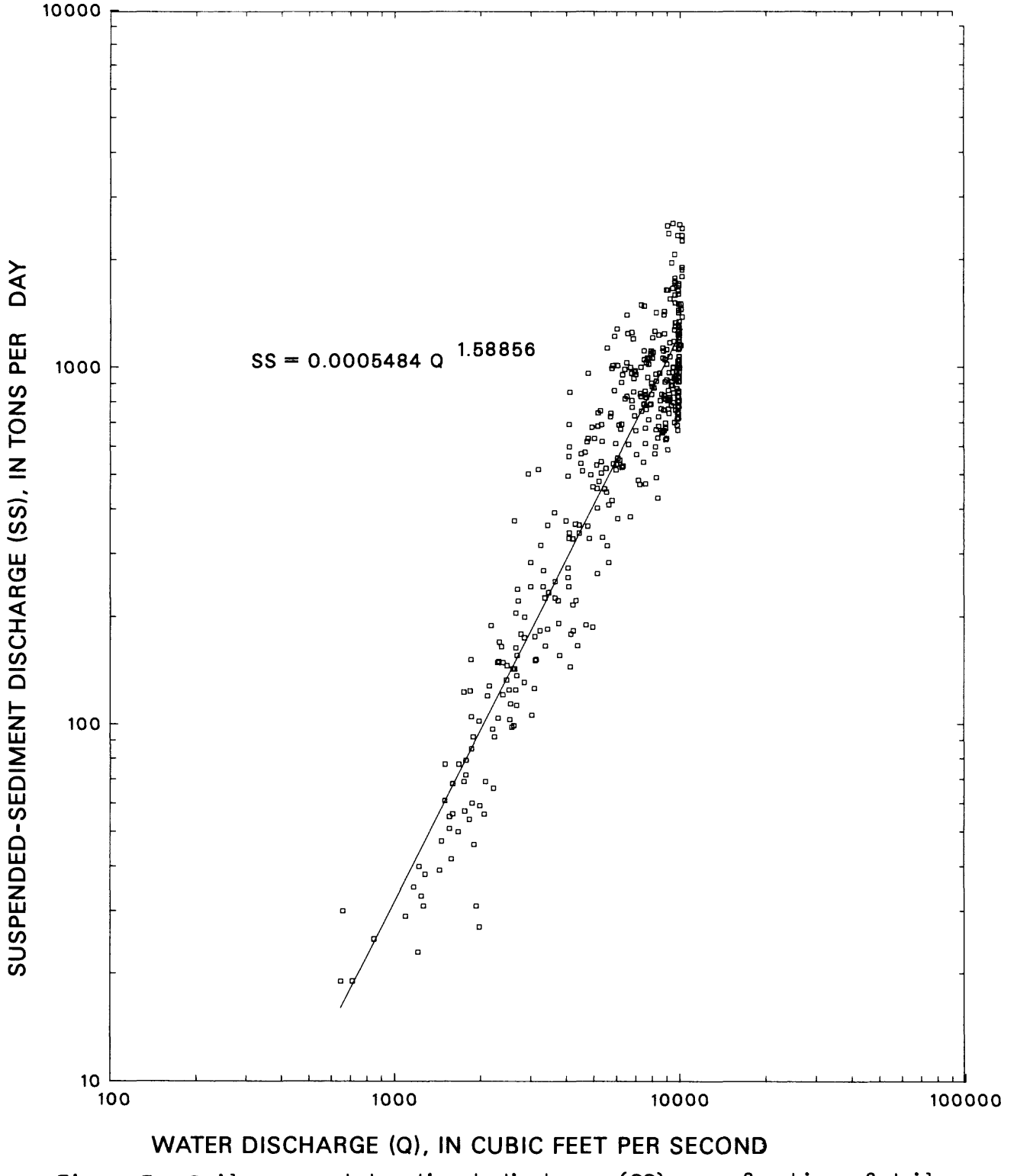

Figure 3.--Daily suspended-sediment discharge (SS) as a function of daily mean water discharge (Q) for the Wateree River below Eastover, S.C. (02148315), October 1983 - March 1985.

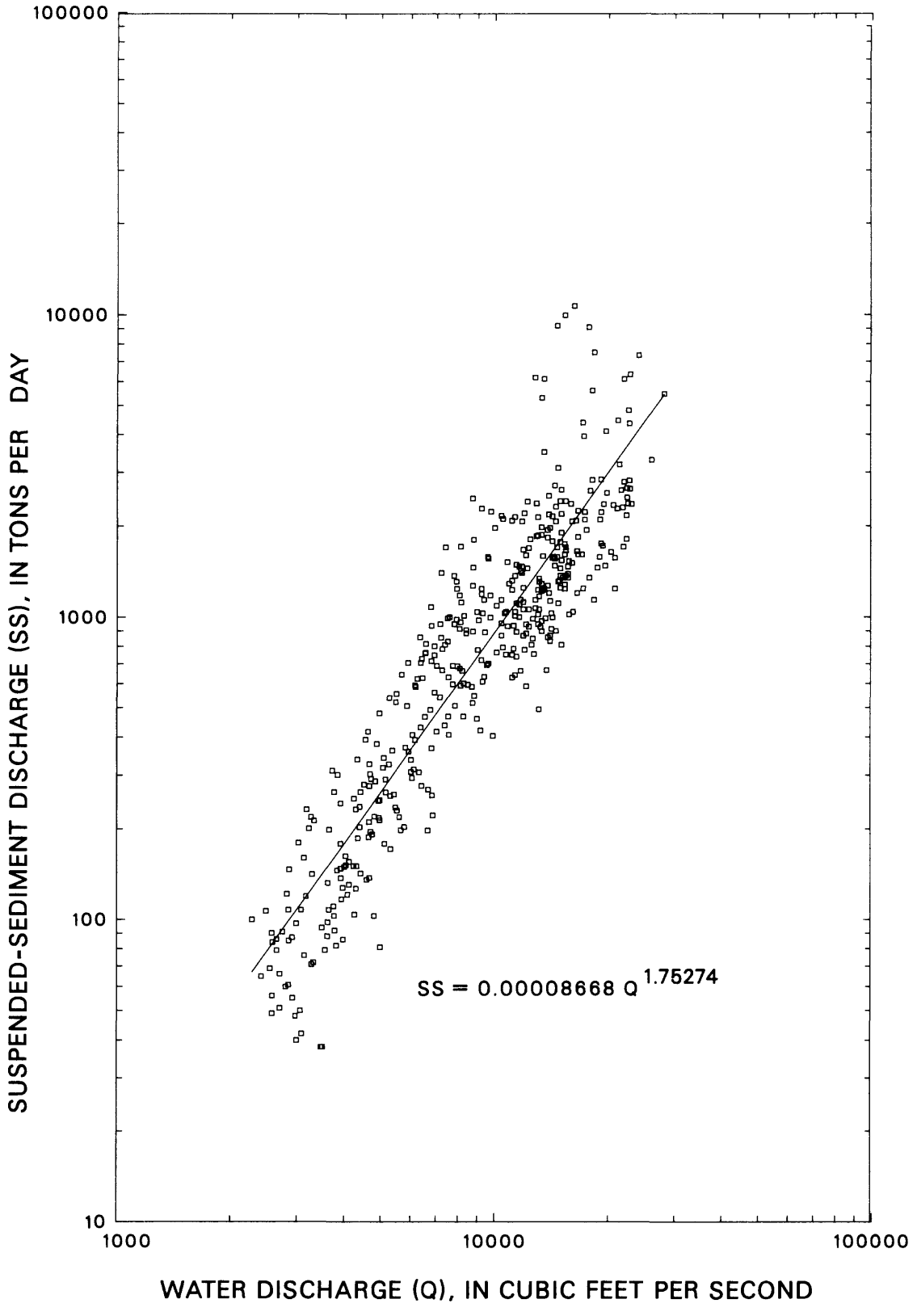

Figure 4.--Daily suspended-sediment discharge (SS) as a function of daily mean water discharge (Q) for the Congaree River at U.S. Highway 601 near Fort Motte, S.C. (02169750), November 1983 - March 1985.

The daily suspended-sediment discharges for the Wateree River below Eastover (02148315) and the Congaree River near Ft. Motte (02169750) are given in tables 2 and 3, respectively. The maximum, minimum and mean daily suspended-sediment discharge for these stations are given in table 12.

Table 12.--Maximum, minimum and mean daily suspended-sediment discharge for inflow stations

Station name	Station number	Suspended-sediment discharge (ton per day) Maximum (date)	Minimum (date)	Mean
Wateree River near Eastover	02148315	2,530 (Feb. 4, 1985)	19 (Oct. 15,16, 1984)	703
Congaree River near Ft. Motte	02169750	10,700 (Feb. 16, 1984)	38 (Nov. 19,28, 1984)	1,197
Combined total		12,300 (Dec. 7, 1983)	*66 (Oct. 15, 1984)	+ND

* -- Includes an estimated daily value. Minimum for known daily values is 81 tons on Nov.25, 1984.
\+ -- Value not determined.

A comparison of mean daily values indicates that most of the suspended-sediment discharge to Lake Marion is supplied by the Congaree River. A comparison of maximum daily values at each station indicates that during storm events the Congaree River is producing about four times the suspended-sediment discharge as that of the Wateree River. Refer to table 13 for monthly estimates of suspended-sediment discharge at each sampling station. Total suspended-sediment discharge values shown in table 13 indicate that the flood plains of both inflow stations provide only about 5 percent of the total suspended-sediment inflow to Lake Marion.

Monthly estimates of bedload discharge are given in table 14. Only the calculations at the Wateree River near Eastover (02148315) indicate bedload to be a significant portion of the total sediment discharge. The bedload discharge at this station during the period of investigation was about 25 percent of the total suspended-sediment discharge.

The mean annual sediment inflow during this investigation is estimated to be 825,000 tons, about 88 percent of which is in the form of suspended sediment. This estimate does not include sediment transported directly to

Table 13.--Monthly summary of estimated suspended-sediment discharge, October 1983-March 1985

Month	Wateree River below Eastover, S.C. 02148315		Congaree River at Highway 601 near Fort Motte, S.C. 02169750		Lakes Marion-Moultrie Diversion Canal near Pineville, S.C. 02170500	Santee River near Pineville, S.C. 02171500	Lake Moultrie Tailrace at Moncks Corner, S.C. 02172002
	Estimated suspended-sediment discharge (tons)						
	Main channel	Flood plain	Main channel	Flood plain			
October	4,260	*0	not determined		3,160	281	2,320
November	9,610	*0	9,420	*0	3,390	366	3,000
December	47,700	4,280	84,100	4,590	+27,100	+13,000	+12,500
January	37,000	3,060	45,500	2,540	+19,100	+13,600	17,500
February	29,700	3,520	74,300	2,790	+24,800	+11,100	+19,300
March	33,700	3,920	55,900	3,750	+28,000	+14,600	20,300
April	25,500	3,400	53,700	2,400	+18,600	6,630	+20,300
May	28,600	1,610	51,100	2,230	18,700	+7,430	19,100
June	24,700	*0	38,400	104	10,400	+522	11,500
July	31,700	*0	52,000	266	10,900	372	8,430
August	23,500	*0	40,500	481	9,640	279	8,250
September	8,040	*0	10,100	*0	5,040	240	4,620
October	5,100	*0	8,540	*0	2,940	217	2,450
November	6,050	*0	5,780	*0	3,690	240	2,700
December	9,360	*0	8,550	*0	5,520	463	11,100
January	15,900	*0	17,200	15	8,430	341	5,150
February	32,800	1,860	53,100	1,230	15,300	364	+12,000
March	12,300	*0	10,900	12	6,320	434	11,700
Total	386,000	21,700	619,000	20,400	221,000	70,500	192,000
Monthly average	21,400	1,210	36,400	1,200	12,300	3,920	10,700
Annual average	257,000	14,500	437,000	14,400	148,000	47,000	128,000

* --Suspended-sediment discharge is insignificant, and has been assigned a value of zero.
+ --Indicates subdivision of the month in suspended-sediment discharge calculations.

Table 14.--Monthly estimates of bedload discharge

Month	Estimated bedload discharge [As a percentage of suspended load / total for month, in tons] Wateree River near Eastover (02148315)	Congaree River near Ft. Motte (02169750)	Lakes Marion-Moultrie Diversion Canal (02170500)
October	0 / 0	not determined	0 / 0
November	0 / 0	2 / 188	0 / 0
December	35 / 16,700	9 / 7,570	16 / 4,340
January 1984	35 / 13,000	9 / 4,100	15 / 2,860
February	35 / 10,400	9 / 6,690	15 / 3,720
March	36 / 12,100	9 / 5,030	15 / 4,200
April	36 / 9,180	9 / 4,830	15 / 2,790
May	33 / 9,440	8 / 4,090	13 / 2,430
June	24 / 5,930	6 / 2,300	4 / 416
July	23 / 7,290	7 / 3,640	5 / 545
August	20 / 4,700	7 / 2,840	12 / 1,160
September	0 / 0	3 / 303	0 / 0
October	0 / 0	2 / 171	0 / 0
November	0 / 0	2 / 116	0 / 0
December	5 / 468	3 / 256	0 / 0
January 1985	15 / 2,380	5 / 860	0 / 0
February	31 / 10,200	8 / 4,250	21 / 3,210
March	8 / 984	4 / 436	0 / 0
Total, in tons	103,000	47,700	25,700
Monthly average, in tons*	5,720	2,810	1,430
Annual average, in tons+	68,600	33,700	17,200

* --Computed by dividing the total by 18, except for station 02169750, which was divided by 17.
+ --Computed by multiplying the monthly average by 12.

the lakes by small tributaries or by sheet, rill, and wind erosion. Estimated annual sediment yields for the Wateree River basin and the Congaree River basin are about 61 and 57 tons per square mile (ton/mi^2), respectively.

Outflow

Sediment outflow from Lake Marion was monitored at the Santee River near Pineville (02171500), located about 2 miles downstream from Wilson Dam and at the Diversion Canal at Highway 45 near Pineville (02170500). Sediment outflow from Lake Moultrie was monitored downstream from Pinopolis Dam at the Tailrace Canal at Highway 52 at Moncks Corner (02172002). Suspended-sediment discharge at these stations was generally computed on a monthly basis, using the methods used for Congaree River Overflow Channel 2. A temporal graph of concentration was constructed for each of these stations. When the concentration fluctuated more than 6-8 mg/L during the month, the month was subdivided into periods of relatively constant concentration and the individual periods were computed and summed to give total monthly suspended-sediment discharge. Refer to table 13 for monthly estimates of suspended-sediment discharge at each outflow station.

Suspended-sediment discharge at the outflow stations is primarily a function of streamflow, due to the relatively constant suspended-sediment concentrations observed at the outflow stations. Mean annual sediment outflow during this investigation is estimated to be 175,000 tons.

Deposition

Estimated annual averages of sediment discharge at each sampling station during this investigation are given in table 15. Based on this data, the mean annual sediment inflow to Lake Marion is estimated to be 825,000 tons, about 88 percent of which is in the form of suspended-sediment. Mean annual sediment outflow from the Santee-Cooper system is estimated to be 175,000 tons. The resulting reservoir trap efficiency for the system is about 79 percent, or 650,000 tons per year. About 94 percent of this is deposited in Lake Marion and the remaining 6 percent in Lake Moultrie.

Table 15.--Estimated annual averages of sediment discharge

Station name	Station number	Estimated annual average (tons per year) Suspended-sediment discharge	Bedload discharge	Total sediment discharge
Wateree River near Eastover	02148315	*271,000	68,600	340,000
Congaree River near Ft. Motte	02169750	*451,000	33,700	485,000
Lakes Marion-Moultrie Diversion Canal	02170500	148,000	17,200	165,000
Santee River near Pineville	02171500	47,000	not determined	47,000
Lake Moultrie Tailrace	02172002	128,000	not determined	128,000

*Includes the suspended-sediment discharge in the flood plain.

COMPARISION OF SEDIMENT INFLOW, OUTFLOW AND DEPOSITION FOR THE PREVIOUS AND PRESENT INVESTIGATIONS

The sampling schemes used to monitor suspended-sediment during the 1966-68 and 1983-85 studies are given in table 16, Although there is no significant difference in the methods used to monitor suspended-sediment outflow from Lakes Marion and Moultrie during the two investigations, the methods used to monitor suspended-sediment inflow differ substantially. The sediment concentration at the inflow sites were monitored on a weekly basis during the 1966-68 study, except for a few periods of high flow, which were monitored on a daily basis, and on a continuous basis during the 1983-85 study. Although the temporal changes in suspended-sediment concentration were not as well defined during the earlier investigation, the degree to which this affects the accuracy of the suspended-sediment discharge computations is uncertain.

The average streamflow at each sampling station in the 1983-85 study sampling network, as well as the long-term averages at two non-sampling sites (used for comparison of flow conditions during each study), are given in table 17.

Table 16.--Sampling schemes for the 1966-68 and 1983-85 investigations

Station name	Station number	Station type	Sampling frequency July 1968 - June 1968	Sampling frequency October 1983 - March 1985
Wateree River at Highway 378	none	inflow	daily* (Aug. 25-Sept. 3, 1967)	not sampled
Wateree River below Eastover, S.C.	02148315	inflow	not sampled	6-hours
Congaree River at Hwy.601 near Fort Motte, S.C.	02169750	inflow	daily (Aug. 25-Sept. 3, 1967; Jan. 11-17, 1968; June 10-16, 1968)	6-hours
Santee River near Fort Motte, S.C.	02169800	inflow	weekly+	not sampled
Lakes Marion-Moultrie Diversion Canal near Pineville, S.C.	02170500	inflow and outflow	not sampled	weekly
Lake Marion Tailrace near Pineville, S.C.	02171000	outflow	daily (Aug. 25-Sept. 4, 1967; Jan. 12-25, 1968; June 13-17,1968)	not sampled
Santee River near Pineville, S.C.	02171500	outflow	monthly	weekly
Lake Moultrie Tailrace at Moncks Corner, S.C.	02172002	outflow	weekly	weekly

* --Streamflow records at the Wateree River near Camden (02148000) gaging station were used in suspended-sediment discharge computations for this period.
+ --Samples were collected daily during the periods July 10-13, 1967 and Jan. 19-25, 1968.

Table 17.--Average streamflow at each sampling station in the 1983-85 study

Station name	Station number	Average streamflow, in cubic feet per second		
		Long-term	July 1966-June 1968	October 1983-March 1985
Wateree River near Camden	02148000	*6,410	5,239	7,484
Wateree River near Eastover	02148315	undetermined	undetermined	+6,380
Congaree River at Columbia	02169500	**9,318	8,497	10,532
Congaree River near Ft. Motte	02169750	undetermined	undetermined	+10,087
Lakes Marion-Moultrie Diversion Canal	02170500	undetermined	undetermined	14,894
Santee River near Pineville	02171500	++2,356	1,130	3,885
Lake Moultrie Tailrace	02172002	undetermined	12,589	15,920

* -- Based on 62 years of record.
\+ -- Represents flow in main channel only.
** -- Based on 46 years of record.
++ -- Based on 42 years of record.

On the basis of records at the Wateree River near Camden (02148000) and the Congaree River at Columbia (02169500), the streamflow to Lake Marion during the 1966-68 study was less than the long-term average, whereas flow during the 1983-85 study was greater than the long-term average. Streamflow into Lake Marion during the recent study was about 31 percent greater than during the previous investigation.

Maximum, minimum, and mean concentrations of samples collected at each sampling station during the previous and present study are given in table 18.

Table 18.--Maximum, minimum, and mean concentrations of samples collected at each sampling station during the previous and present study

Station name	Station number	Suspended-sediment concentration (milligrams per liter)					
		July 1966 - June 1968			October 1983 - March 1985		
		maximum	minimum	mean	maximum	minimum	mean
Wateree River near Eastover	02148315	*134	*53	+ND	116	3	+ND
Congaree River near Ft. Motte	02169750	393	49	+ND	304	5	+ND
Santee River near Ft. Motte	02169800	524	19	+ND	NOT SAMPLED		
Lakes Marion-Moultrie Diversion Canal	02170500	NOT SAMPLED			20	5	8
Santee River near Pineville	02171500	38	6	13	30	4	9
Lake Moultrie Tailrace	02172002	76	3	12	16	4	10

* -- Suspended-sediment concentration values at the Wateree River at Highway 378.
\+ -- Values not determined.

The maximum suspended-sediment concentration at each station was higher during the 1966-68 study than during the 1983-85 study. The unweighted average concentrations at the outflow stations were also higher during the early study, most probably the result of higher inflow concentrations.

A comparison of suspended-sediment inflow and outflow data during the 1966-68 and 1983-85 investigations is given in table 19. Bedload discharge was not estimated during the 1966-68 study and is therefore not included in the comparison.

Table 19.--Comparison of suspended-sediment inflow and outflow data during the 1966-68 and 1983-85 investigations

Station name	Station number	Average suspended-sediment discharge (tons per year)	
		July 1966 - June 1968	October 1983 - March 1985
Wateree River near Eastover	02148315	*978,000	+271,000
Congaree River near Ft. Motte	02169750		+451,000
Lakes Marion-Moultrie Diversion Canal	02170500	not determined	148,000
Santee River near Pineville	02171500	13,600	47,000
Lake Moultrie Tailrace	02172002	150,000	128,000

\+ --Includes estimate of suspended-sediment discharge in flood plain.
* --Combined suspended-sediment inflow for stations 02148315 and 02169750.

The annual inflow of suspended-sediment into Lake Marion appears to have decreased by about 26 percent. Precipitation during the period July 1, 1966 - June 30, 1968 in the central and north-central areas of the State averaged 43.41 inches per year, slightly less than the 46.40 inches per year average during the period of this investigation (based on climatologic data obtained from the National Oceanic and Atmospheric Administration). Streamflow was determined to be about 31 percent higher during the recent study. The streamflow-weighted suspended-sediment discharge into Lake Marion was 71.2 ton/(ft^3/s)/yr (tons per cubic foot per second per year) during the 1966-68 study and 40.1 ton/(ft^3/s)/yr during this investigation, indicating a decrease of 44 percent (based on streamflow records at the Wateree River near Camden (0214800) and the Congaree River at Columbia (02169500).

The suspended-sediment discharge for the 24-day period at the Congaree River near Ft. Motte (02169750) during the 1966-68 study was originally computed using daily streamflow data at the Congaree River at Columbia (02169500), with a 2-day offset to compensate for travel time between the two stations. Comparison of streamflow data at the Congaree River at Columbia (02169500) and the Congaree River near Ft. Motte (02169750) during the 1983-85 study indicates that the 2-day offset is correct, however, the magnitude of the peak streamflows is attenuated downstream. On the basis of these comparisons, the suspended-sediment discharge estimates for this 24-day period were re-computed using the corrected mean daily streamflow values, resulting in a reduction of about 45 percent (from 292,000 tons to 160,000 tons).

The suspended-sediment outflow from the Santee-Cooper system was slightly higher during the recent investigation. This can be largely attributed to the flow conditions of the Santee River, which sustained more than three times the streamflow during the 1983-85 study than during the 1966-68 study, based on streamflow records at the Santee River near Pineville (02171500). On the basis of streamflow records at the Santee River near Pineville (02171500) and Lake Moultrie Tailrace (02172002), the streamflow-weighted suspended-sediment discharge in the outflow from Lakes Marion and Moultrie was 11.9 ton/(ft^3/s)/yr during the 1966-68 study and 8.8 ton/(ft^3/s)/yr during the 1983-85 study. Comparison of annual suspended-sediment discharge data at the Diversion Canal was not possible because it was not part of the 1966-68 study.

This comparison of streamflow-weighted suspended-sediment discharges may be somewhat biased because several peak streamflows during the earlier study were higher than those during the recent investigation and that the majority of sediment transport occurs during flood events. The peak instantaneous streamflow at the Congaree River at Columbia (02169500) during the 1966-68 study period was 97,900 ft^3/s with six daily means greater than 50,000 ft^3/s compared to a peak instantaneous streamflow of 70,300 ft^3/s with five daily means greater than 50,000 ft^3/s during the recent study period. Peak streamflows at the Wateree River near Camden (02148000) during the 1966-68 and 1983-85 study periods did not agree as well, with peak instantaneous streamflows of 88,300 and 26,500 ft^3/s, respectively (seven and five daily means greater than 20,000 ft^3/s, respectively). With the exception of the peak instantaneous streamflows at the Wateree River near Camden (02148000), flood events during each study were fairly similar.

The trap efficiency for the Santee-Cooper system, based only on suspended-sediment transport, during this investigation was about 76 percent. This is a deposition rate of about 547,000 tons per year, which is about 33 percent less than the deposition rate determined during the 1966-68 study. Determining the exact causes for the decrease would require a detailed investigation outside the scope of this report, however, it could be the result of changes in land-use and farming techniques within the watershed.

SUMMARY

Lakes Marion and Moultrie were formed by the construction of dams, dikes, and canals on a Coastal Plain reach of Santee River during the years 1939-41. The Geological Survey has monitored sediment inflow and outflow for the lakes during two study periods in order to estimate a mean annual deposition rate. The first study monitored suspended-sediment discharge during the period July 1966-June 1968 and determined a deposition rate of about 814,000 tons per year. The recent study monitored suspended-sediment discharge during the period October 1983-March 1985.

During the recent study suspended-sediment discharge was monitored on a continuous basis at two inflow stations using automatic sediment samplers to sample the suspended-sediment concentration every 6-hours. Suspended-sediment concentration was monitored at the canal connecting the lakes and at two outflow stations on a weekly basis. The streamflow-weighted suspended-sediment discharge inflow to Lake Marion was 71.2 ton/(ft^3/s)/yr during the 1966-68 study and 40.1 ton/(ft^3/s)/yr during the recent investigation, indicating a decrease of 44 percent. The annual deposition rate determined by estimates of suspended-sediment inflow and outflow during the recent study is about 547,000 tons per year, which is 33 percent less than the deposition rate determined by the earlier study. Although the exact decrease in the annual deposition rate is uncertain and will vary from year to year with hydrologic conditions, it is probably about 33 percent less than 20 years ago.

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