TEXAS WATER DEVELOPMENT BOARD

REPORT 99

HYDROLOGIC STUDIES OF SMALL WATERSHEDS, COW BAYOU, BRAZOS RIVER BASIN, TEXAS, 1955-64

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Prepared by the U.S. Geological Survey
in cooperation with the
Texas Water Development Board and the
U.S. Soil Conservation Service

October 1969

Published and distributed
by the
Texas Water Development Board
Post Office Box 12386
Austin, Texas 78711

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ABSTRACT

A study was made of the rainfall, inflow, consumption, and outflow for a group of nine floodwater-detention structures on a 79.6-square-mile watershed near Bruceville for the six water years 1959-64. During this period annual rainfall varied from 19.18 inches in 1963 to 46.73 inches in 1961 as compared to the 32.25-inch long-term average at McGregor.

Total rainfall for the period 1959-64 ranged from 181.8 inches to 200.8 inches on the drainage areas of the nine floodwater-detention structures. Runoff from these areas, total for the 6-year period, ranged from 22.2 inches to 42.7 inches. Average total rainfall on the watershed was 192.8 inches for the 6-year period while average total runoff was 33.2 inches. At the beginning of the study period the pools contained 968 acre-feet. A total of 49,730 acre-feet entered the pools of which 3,010 acre-feet was rainfall on the pools surfaces and 46,710 acre-feet was runoff. Outflow from the pools was 41,020 acre-feet; evaporation was 4,960 acre-feet, and 3,970 acre-feet was seepage and other consumption. Net reduction in pool content during the period was 220 acre-feet, leaving 748 acre-feet in pool storage.

Every floodwater-retarding structure except one effectively contained all floodflows originating above it during the period of record. The emergency spillway at one site washed out because there had not been sufficient time after completion of the structure to establish a protective grass cover.

A rain-gage density study for the period 1955-64 indicated that two rain gages installed at certain points on the watershed would provide data within 8 percent of the weighted mean rainfall of the nine existing rain gages using a 67 percent confidence limit. An average 1-hour unit hydrograph with a 5-hour time of rise and 10,400 cfs (cubic feet per second) peak was developed for the watershed.

HYDROLOGIC STUDIES OF SMALL WATERSHEDS, COW BAYOU, BRAZOS RIVER BASIN, TEXAS, 1955-64

INTRODUCTION

History and Development of the Small Watershed Project in Texas

The Flood Control Act of 1936, as amended and supplemented, authorized the construction of floodwater-retarding structures by the Soil Conservation Service of the U.S. Department of Agriculture. This act provided that "...federal investigations of watersheds and measures for run-off and water-flow retardation and soil-erosion prevention on watersheds shall be under the jurisdiction of and shall be prosecuted by the Department of Agriculture..." The Department submitted survey reports to Congress under the authority of this act, and in 1944, pilot studies of 11 watersheds in the Nation were authorized. Subsequent legislation under Public Law 566 has further expanded the scope of this program.

Pursuant to the Flood Control Act of 1936 and subsequent legislation, the U.S. Soil Conservation Service is investigating a large part of Texas to determine the need and economic feasibility of flood control measures in accordance with the legislation. Each area investigated is subdivided into small watersheds usually consisting of one stream and its tributaries that are large enough to cause damaging floods. Many of the watersheds investigated require the building of floodwater-retarding structures (Figure 1) to help control floodflows from parts of the watersheds.

As of September 30, 1966, 1,081 floodwater-retarding structures had been built in Texas. These partly control flow from an area of 4,349 square miles. According to reports of the U.S. Study Commission-Texas (1962) and the U.S. Soil Conservation Service (1963), a total of 3,438 structures have been found physically and economically feasible for installation in Texas. Thus, only about 31 percent of the feasible structures had been built at the end of the water year 1966.

This watershed-development program will have varying but important effects on the natural surface and ground-water resources of river basins, especially where a large number of the floodwater-retarding structures are built. Therefore, a need has developed for basic hydrologic data on small watersheds that may be used to compare the hydrology under natural conditions with the hydrology under developed conditions after the floodwater-retarding structures have been built. Specifically, it is essential that hydrologic studies determine the extent to which floodwater-retarding structures affect the yield and mode of occurrence of natural water supplies.

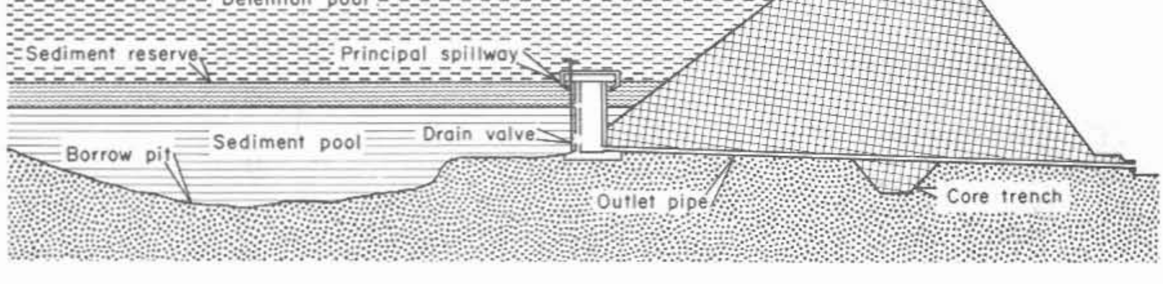

Figure 1.—Section of a Typical Floodwater-Retarding Structure With Outlet Works

Hydrologic data collection on small watersheds was started in Texas in 1951 and is now active in 11 areas in the State that have been found feasible for installation of floodwater-retarding structures (Figure 2). The Soil Conservation Service, Texas Water Development Board, San Antonio River Authority, City of Dallas, and the Tarrant County Water Control and Improvement District No. 1 are cooperating with the Geological Survey in these investigations. The 11 study areas were chosen on a statewide basis to sample watersheds having different conditions of rainfall, topography, geology, and soils. Hydrologic data will be available for "before and after" analyses of streamflow and rainfall records on four of the study areas (North, Little Elm, Pin Oak, and Mukewater Creeks). A summary of the development of floodwater-retarding structures on each study area as of September 30, 1964, is shown in Table 1.

The purpose of the investigations in Texas is to collect sufficient data to meet the following objectives:

1. To determine the net effect of floodwater-retarding structures on the regimen of streamflow at downstream points.

2. To determine the effect of the impoundments on the underlying ground-water reservoir, where

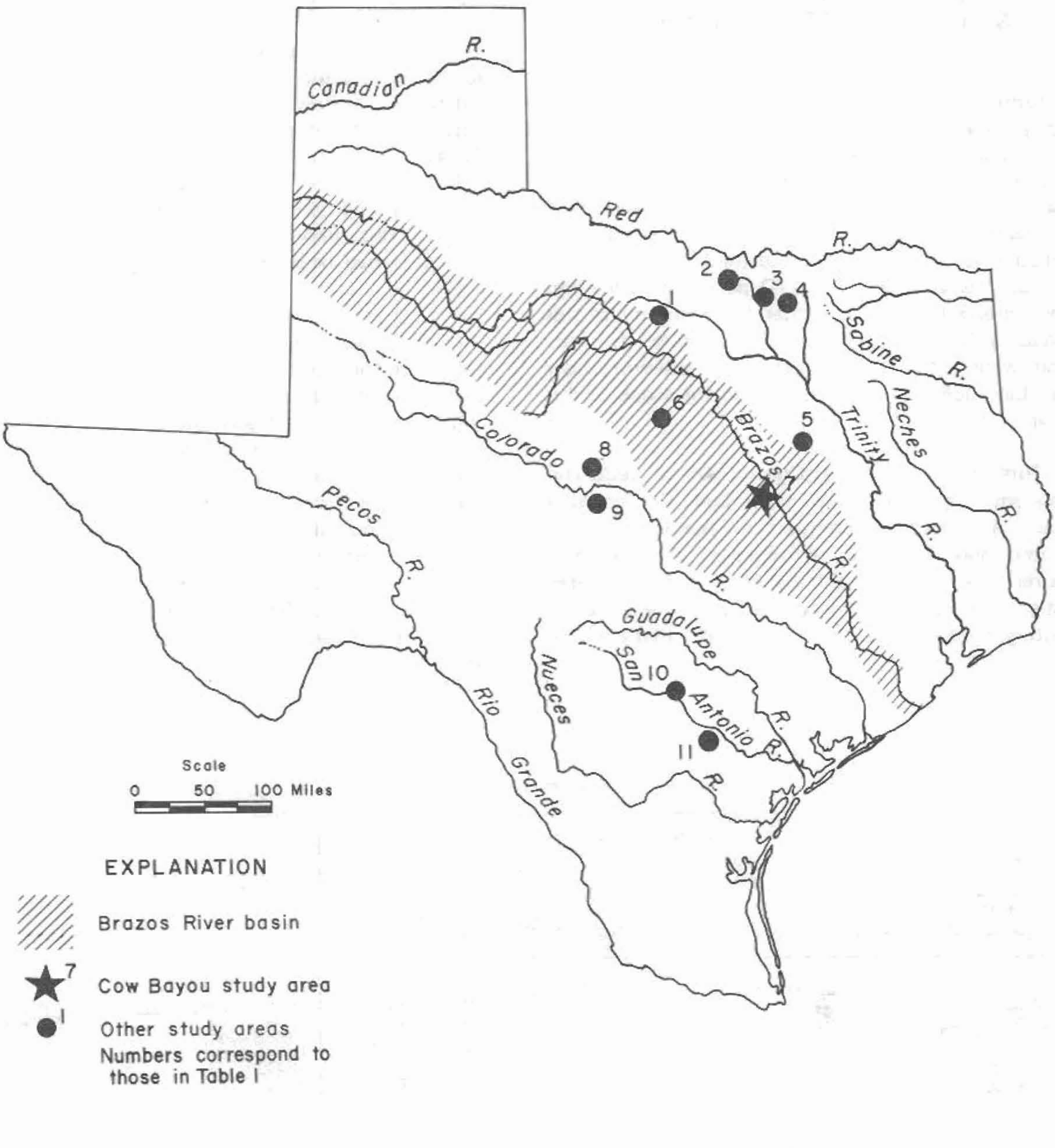

Figure 2.—Locations of Cow Bayou and Other Small Watershed Study Areas

Table 1.—Small Watershed Study Areas in Texas as of September 30, 1964

NUMBER (SEE FIGURE 2)	WATERSHED	DRAINAGE AREA ABOVE STREAM-GAGING STATION (SQ MI)	DATE HYDROLOGIC DATA COLLECTION BEGAN	FLOODWATER-RETARDING STRUCTURES ABOVE STREAM-GAGING STATION	PERIOD THE STRUCTURES WERE BUILT
	Trinity River basin:				
1	North Creek near Jacksboro	21.6	Aug. 1956	None	--
2	Elm Fork Trinity River near Muenster	46.0	July 1956	14	1954-57, 63
3	Little Elm Creek near Aubrey	75.5	June 1956	8	1965-66
4	Honey Creek near McKinney	39.0	July 1951	12	1951-57
5	Pin Oak Creek near Hubbard	17.6	Sept. 1956	5	1962-63
	Brazos River basin:				
6	Green Creek near Alexander	45.5	Oct. 1954	8	1954-56
7	Cow Bayou near Mooreville	79.6	Sept. 1954	*9	1955-58
	Colorado River basin:				
8	Mukewater Creek near Trickham	70.0	Aug. 1951	5	1961-62
9	Deep Creek near Mercury 1/	43.9	June 1951	5	1951-53
	Dry Prong Deep Creek near Mercury 1/	8.31	June 1951	1	1951
	San Antonio River basin:				
10	Calaveras Creek near Elmendorf	77.2	Aug. 1954	9	1954-58
11	Escondido Creek at Kenedy	†72.4	July 1954	10	1954-58

1/ Considered as a single study area.

* Three structures (nos. 17, 18, and 19) were completed in August 1964, but were not used in this report.

† 8.43 square miles above Escondido Creek watershed no. 11 (Dry Escondido Creek) near Kenedy is below the stream-gaging station and is not included in these totals.

observation wells are available or can be installed.

3. To determine the effect of the structures on the sediment yield of the basin and to determine the trap efficiency of the structures.

4. To develop computation techniques that will give more accurate estimates of runoff resulting from a given amount of rainfall on small watersheds.

5. To develop relationships between maximum rates of runoff and rainfall in small watersheds that will enable more accurate design of a small storm-drainage structures.

6. To check the applicability of flood-routing procedures and techniques for small watersheds.

7. To determine the minimum instrumentation necessary for making reliable estimates of total storm inflow to the structures.

8. To determine the quality of the water as to its suitability for possible uses and its flocculating characteristics as they affect the sediment-trap efficiency of the pools.

The degree of attainment of each of the enumerated objectives is discussed in the concluding section of this report entitled "Evaluations and Recommendations Concerning the Statewide Small-Watershed Studies."

Periodic evaluation reports on each study area are essential to insure that the basic hydrologic data-collection program is sufficient to meet the purposes of the statewide investigation. The Cow Bayou report is one of these periodic evaluations.

This is the eighth in the series of reports on hydrologic studies of small watersheds in Texas. Previous reports are as follows:

1. Elm Fork Trinity River (Gilbert and others, 1962).
2. Honey Creek (Gilbert and others, 1964).
3. Deep Creek (Mills and others, 1965).
4. Mukewater Creek (Sauer, 1965).
5. Little Elm Creek (Schroeder, 1966).
6. Escondido Creek (Kennon and others, 1967).
7. Pin Oak Creek (Smith and Wellborn, 1967).

Purpose and Scope of This Report

The primary purpose of this report is to present data on and analyses of the hydrologic characteristics of the Cow Bayou study area. A secondary purpose is to appraise the existing data-collection and processing program. In keeping with these purposes, this report:

1. Presents a compilation of data through September 1964, grouped in such a manner as to define factors included in the hydrologic cycle;

2. examines the quantity and quality of the data being collected; and

3. recommends the type and amount of data to be collected on the small watersheds not yet instrumented.

Acknowledgments

The Soil Conservation Service provided information on pool capacity, physical and geologic description of the watershed, climatic environment of the area, and weekly records of rainfall and pool gage heights. The results of one sedimentation survey were also provided. The Agency's assistance is gratefully acknowledged.

The Soil Conservation Service and Texas Water Development Board cooperated with the Geological Survey in providing financial assistance to collect the basic data used in this report.

This report was initiated through a cooperative agreement between the Geological Survey and the Texas Water Development Board. It was prepared under the direction of Trigg Twichell, District Chief, Water Resources Division, U.S. Geological Survey, Austin, Texas.

DESCRIPTION OF THE WATERSHED

Location, Topography, and Climate

Cow Bayou rises north of the town of Moody and flows in an easterly direction of 31 miles, where it flows into the Brazos River near the town of Satin. North Cow Bayou and South Cow Bayou are the principal tributaries. The total drainage area of the watershed is 111 square miles, of which 79.6 square miles upstream from the stream-gaging station Cow Bayou at Mooreville is the study area (Figure 3).

The topography of the study area ranges from gently to steeply rolling. Elevations range from 875 feet above mean sea level at the headwaters to 405 feet at the stream-gaging station at the downstream end of the study area. Table 2 shows the elevations of different

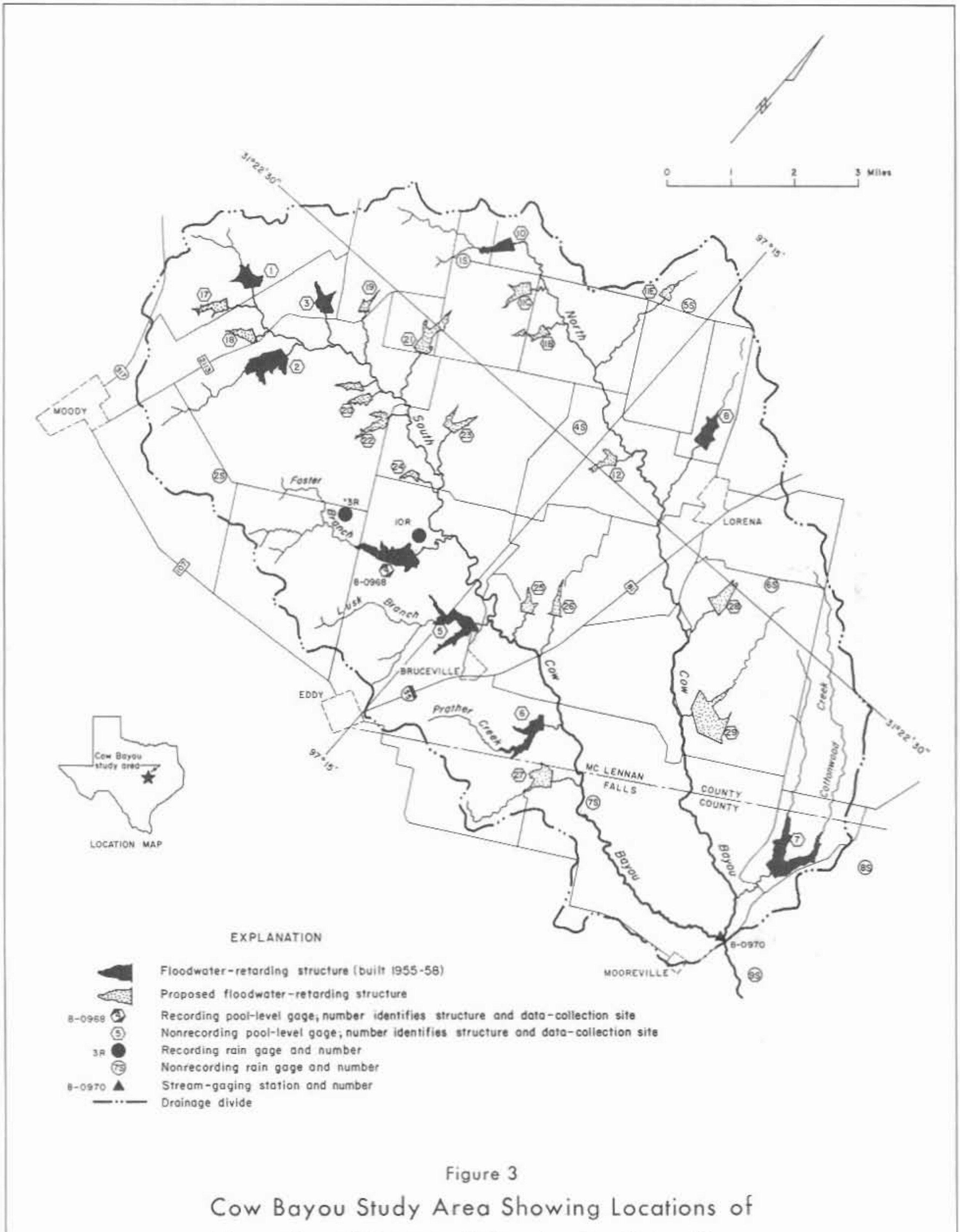

Figure 3

Cow Bayou Study Area Showing Locations of Present and Proposed Floodwater-Retarding Structures and Hydrologic Instrument Installations

Table 2.—Physical Factors for Cow Bayou Study Area

SITE NO.	ELEVATION, IN FEET ABOVE MEAN SEA LEVEL		DISTANCE FROM HEAD-WATER TO SITE, IN MILES	SLOPE TO SITE, IN FEET PER MILE	DISTANCE FROM HEADWATER TO MOUTH, IN MILES	ELEVATION AT MOUTH, IN FEET ABOVE MEAN SEA LEVEL	SLOPE FROM HEADWATER TO MOUTH, IN FEET PER MILE	MAIN-STEM RIVER MILE AT MOUTH
	HEADWATER	NEAR SITE						
				SOUTH COW BAYOU				
[a]1	805	690	1.6	71.9	20.2	406	19.8	0
2	795	650	4.0	36.2	4.3	643	35.3	17.1
3	785	650	2.0	67.5	2.5	628	62.8	16.6
4	875	570	4.9	62.2	5.8	537	58.3	11.3
5	765	520	3.6	68.1	3.9	503	67.2	8.7
6	680	500	2.8	64.3	3.2	468	66.2	6.0
				NORTH COW BAYOU				
7	660	435	7.0	32.1	8.0	415	30.6	0.7
8	715	600	2.3	50.0	3.7	521	52.4	8.2
[a]10	795	640	4.4	35.2	19.0	406	20.5	0

[a] Site 1 is on headwaters of South Cow Bayou; site 10 is on headwaters of North Cow Bayou. River mile "0" is at the confluence of these forks and is measured upstream from this zero point. The stream-gaging station is at mile "0".

points within the area. Distances and slopes in Table 2 were determined by using the maximum river distances.

Long-term mean annual rainfall is 32.25 inches at McGregor (about 6 miles northwest of site 1). This rainfall is well distributed throughout the year with the higher monthly totals usually occurring in April, May, and June. Most of the storms are thunderstorms which may or may not cover the entire study area. However, some storms, which occur mostly in the fall, are cyclonic storms that cover the area with nearly equal amounts of rainfall. See "Rain-Gage Density" section of this report for distribution of storm rainfall for the period of this report. Mean daily temperatures range from 30°C (86°F) in the summer to 9°C (48°F) in the winter.

Geology

Two reports were used as references for this section: *The Lower Cretaceous Trinity Aquifers, McLennan County, Texas* (Holloway, 1961, p. 11-20), and *Revised Work Plan for Watershed Protection and Flood Prevention, Cow Bayou Watershed, McLennan and Falls Counties, Texas* (U.S. Soil Conservation Service, 1963a, p. 3).

Stratigraphy and Structure

Three geological formations crop out in the study area. From oldest to youngest, these are the Eagle Ford Shale, Austin Chalk, and Taylor Marl (Figure 4). All of the formations are of Late Cretaceous age. The Balcones Fault Zone crosses the area.

The Eagle Ford Shale crops out in the upper part of the study area. This area is characterized by steep land-surface slopes and relatively steep stream gradients. Holloway (1961, p. 11) subdivided the Eagle Ford Shale into the Lake Waco and South Bosque Formations.[1/] The South Bosque Formation is a blue-black calcareous shale having a few thin buff limestone flags in the lower part. The Lake Waco Formation, which underlies the South Bosque Formation, is a sequence of interbedded brown to black shale and dark gray limestone flags having interbedded bentonite seams. Some carbonaceous material and vertebrate remains occur in the Lake Waco. The Eagle Ford Shale yields very little water to wells and streams.

The Austin Chalk, which crops out in the moderately rolling middle part of the study area (Figure 4), is composed of alternating layers of massive, resistant, blue-gray, marly limestone and blue-gray limy shale having a few seams of bentonite and bentonitic shale. The Austin Chalk yields no water to wells or streams.

The Taylor Marl crops out in the gently rolling lower part of the study area (Figure 4). The Taylor Marl is composed of four members—an upper marl member, Pecan Gap Chalk Member, Wolfe City Sand Member, and a lower marl member—but only the lower marl member is present in the study area. The lower member of the Taylor Marl yields no water to wells or streams.

Alluvium of Quaternary age occurs as flood-plain and higher-level terrace deposits along many of the streams in the study area. The alluvium, which was derived from the bedrock material within the watershed, consists predominantly of sandy clay and interbedded fragments of limestone. In the lower reaches of the study area, the alluvium is more widespread and more hydrologically significant than in the upper reaches.

The Balcones Fault Zone crosses the eastern half of the study area. Holloway (1961, p. 20) stated, "Similar faults have been traced from five miles south of Lorena to midway between Lorena and Waco. In addition to these faults, other small displacements constitute a zone several miles east and west of the major faults." Partly because of this fault zone, the nine pools throughout the study area experienced varying high rates of seepage.

Soils

The watershed lies entirely within the Blackland Prairies land-resource area. The soils are mostly dark clay, developed from shale, limestone, marl, and chalk, which support a tall grass-prairie vegetation. The predominating soil types include the Houston Black, Houston, Austin, and Eddy. The highly fertile alluvial soils in the flood plain are of the Trinity-Catalpa type. Figure 5 shows the general areas delineated by soil types. Small areas of the Lewisville soil type, not shown on Figure 5, have developed on terrace deposits along the streams. Detailed descriptions of soil types are given in Table 3.

Relation to Runoff

Because the relatively impermeable Eagle Ford Shale, Austin Chalk, and lower member of the Taylor Marl are overlain by more permeable alluvium along the streams, springs and seeps occur throughout much of the study area following substantial rainfall. During the wet seasons every small stream has interflow.

WATER CONSERVATION TREATMENT MEASURES

Farm Ponds

Farm ponds have been built throughout the study area. They are of various sizes and will have some effect

[1/] Names not adopted by U.S. Geological Survey.

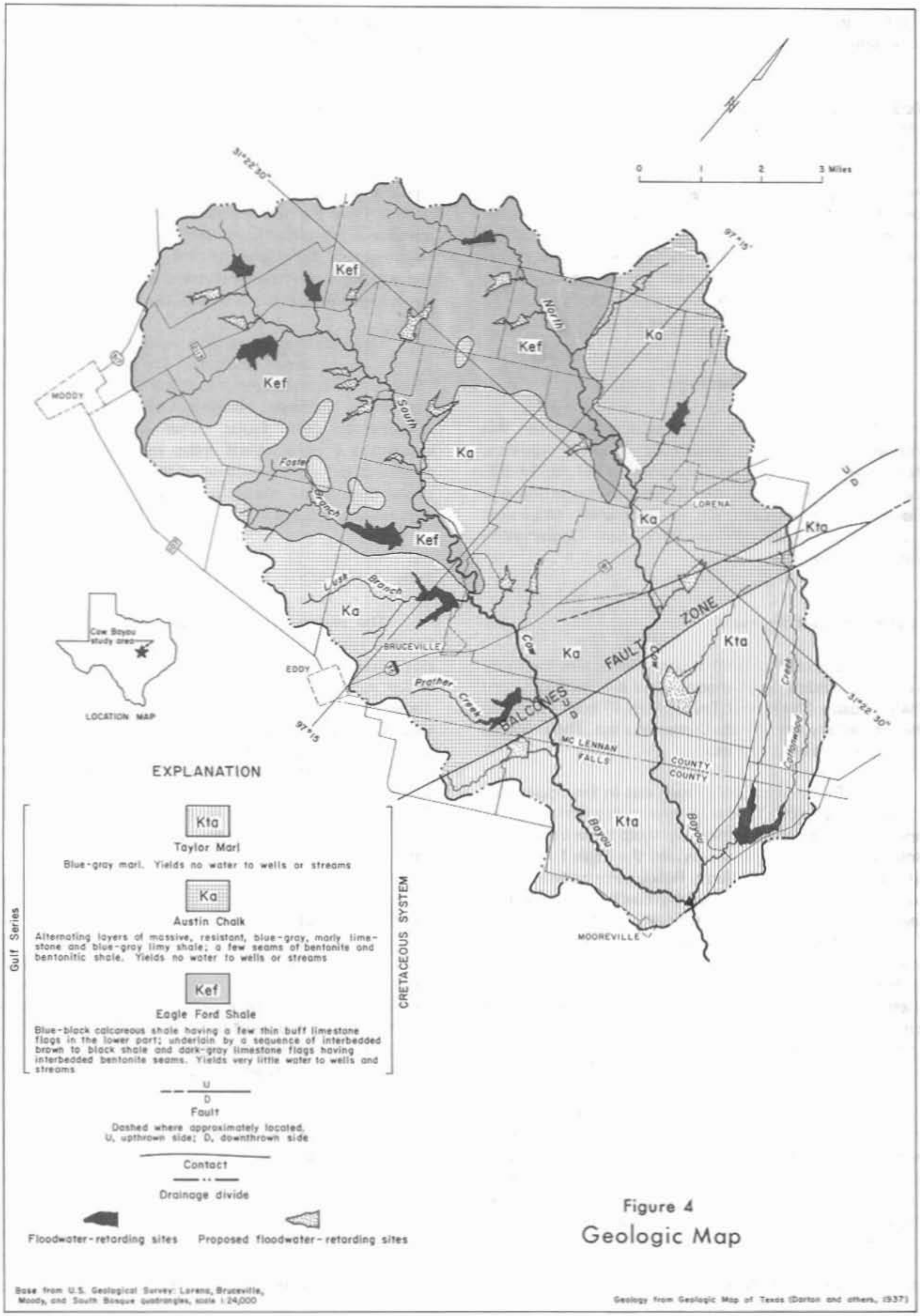

Figure 4
Geologic Map

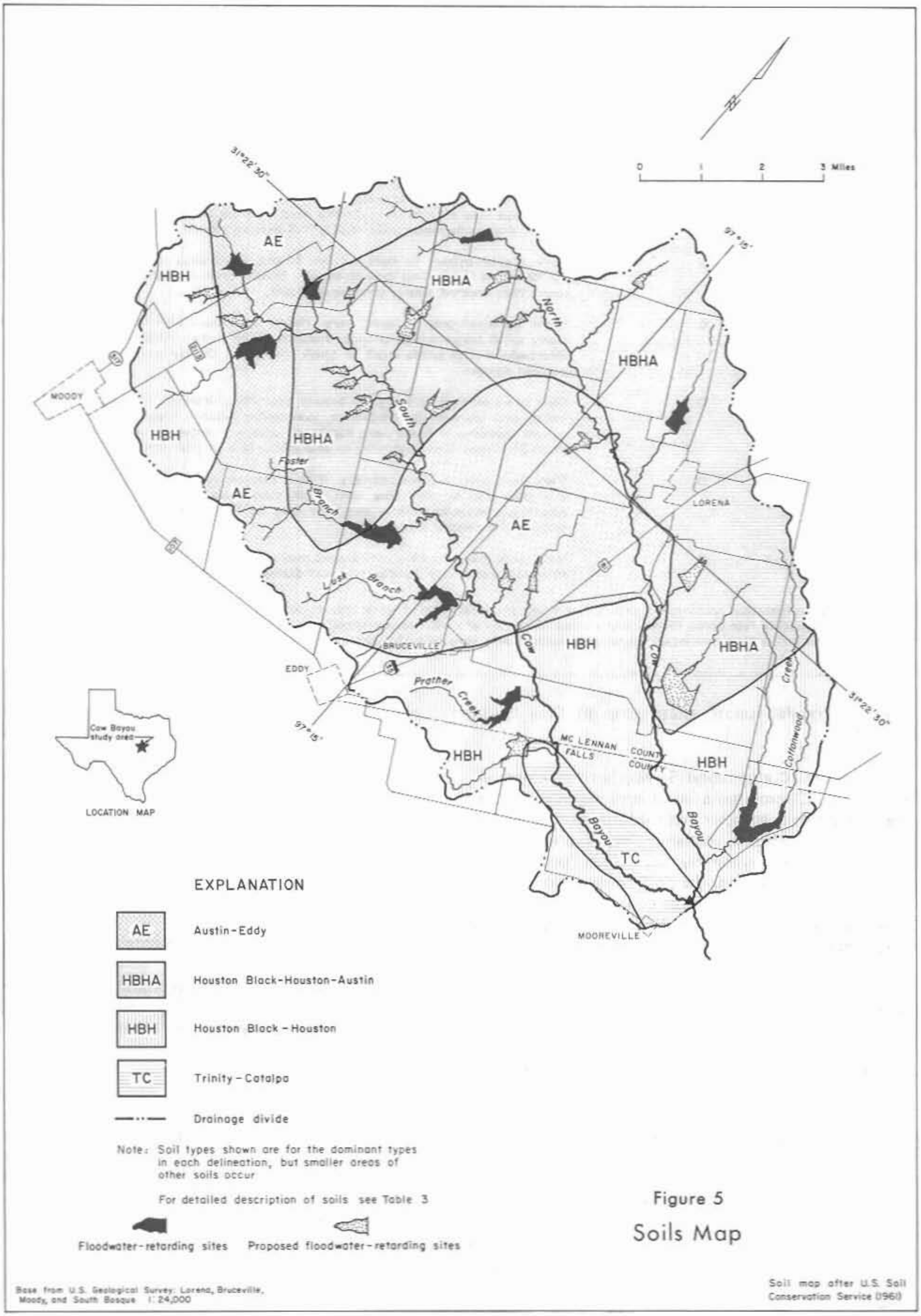

Figure 5
Soils Map

Table 3.—Description of Soils in the Cow Bayou Study Area

(From U.S. Soil Conservation Service 1957, 1961a, and 1961b)

SOIL TYPE	HYDROLOGIC GROUP 1/	DESCRIPTION
Austin	B	Dark grayish-brown to grayish-brown, friable, calcareous silty clay to clay surface, 10-14 inches thick, over brown to pale brown, friable, strongly granular, highly calcareous silty clay to clay. Chalky marl or chalk at depths of about 15-30 inches. Gently sloping to moderately rolling (1-8 percent slopes).
Catalpa	C	Dark grayish-brown to dark brown, friable, calcareous clay or clay loam surface, 10-30 inches thick, over grayish-brown, friable, granular, calcareous silty clay or clay loam. Well drained; nearly level flood plains.
Eddy	C	Light brownish-gray to gray, very friable, calcareous silty clay or clay containing many small fragments of chalky limestone, 3-15 inches thick, over soft chalky marl interbedded with white chalk or chalk fragments. Gently sloping to undulating (4-8 percent slopes).
Houston	D	Dark olive gray to dark grayish-brown, crumbly calcareous clay surface, 6-15 inches thick, over dark yellowish-brown, subangular, blocky, highly calcareous clay with yellow mottling in lower part; highly calcareous, mottled yellow and gray clay (marl) at 20-36 inches. Gently sloping to undulating (4-8 percent slopes).
Houston Black	D	Very dark gray to black crumbly, friable, calcareous clay surface, 10-25 inches thick, over dark gray or olive gray, firm, weak, subangular, blocky calcareous clay; strongly calcareous mottled yellow and gray clay at 30-60 inches. Nearly level to gently sloping (1-4 percent slopes).
Trinity	D	Very dark gray, crumbly, calcareous clay surface, 20-40 inches thick, over dark gray, firm, calcareous clay. Moderately well drained, nearly level flood plains.

1/ B Moderate infiltration rate when thoroughly wetted; moderate rate of water transmission.
C Slow infiltration rate when thoroughly wetted; slow rate of water transmission.
D Very slow infiltration rate when thoroughly wetted; very slow rate of water transmission.

upon the rainfall-runoff relationship of Cow Bayou watershed.

The Soil Conservation Service (written commun., March 5, 1962) provided a list of farm ponds in the Cow Bayou watershed together with information as to their location, size, capacity, and area. These are small ponds built for livestock water by the farmer, usually with technical assistance from the Soil Conservation Service. Table 4 contains pertinent data concerning these ponds. These ponds undoubtedly affect the rainfall-runoff relationship to some extent; however, because most of them were built prior to the start of the flood-retarding program, their effects are not considered significant for the purposes of this report.

FLOODWATER-RETARDING STRUCTURES

Nine floodwater-retarding structures had been built in the study area by 1958. Three additional structures were completed in August 1964, but no adjustment was made to runoff compilation. Of those structures completed by 1958, six are in the South Cow Bayou drainage area and three are in the North Cow Bayou drainage area. They have a total combined capacity of 9,770 acre-feet below the emergency spillway level, of which 1,480 acre-feet is sediment-pool capacity (Figure 1). Flow from 28.0 square miles is partly controlled by these nine structures. Figure 3 shows the location of the structures in the study area and Table 5 contains a summary of the physical data for each of the nine floodwater-retarding structures. Seventeen additional floodwater-retarding structures are to be built on the North and South Cow Bayous during the 1964-65 water years.

DATA-COLLECTION PROGRAM

Periods of Records

Nine rain gages (one recording and eight nonrecording) were installed during October 1954. One recording rain gage was installed at site 4 on August 12, 1958. Rainfall records include water years 1955-64.

A crest-stage gage and a wire-weight gage were installed at the streamflow-gaging station, Cow Bayou near Mooreville, on September 22, 1954. Peak stages were collected along with periodic discharge measurements until June 10, 1958, when a continuous water-stage recorder was installed. Records at this site include water years 1955-64.

The floodwater-retarding structure at site 4 was completed in July 1956, and a continuous water-stage recorder was installed September 12, 1956. First

Table 4.—Farm Ponds in the Cow Bayou Study Area[1]

AREA	NUMBER OF PONDS	POND DATA: SURFACE AREA (ACRES)	CAPACITY (ACRE-FEET)	DRAINAGE AREA ABOVE PONDS (ACRES)	PERCENT OF DRAINAGE AREA ABOVE STATION
Above site 1	3	1.8	10.7	95	10
2	23	10.1	52.4	344	12
3	7	3.7	18.7	117	13
4	28	23.4	131.7	1,039	31
5	3	1.6	7.4	114	5
6	6	2.4	10.8	123	10
7	22	12.6	59.3	492	14
8	3	4.7	24.0	110	10
10	5	3.1	15.8	142	8
Uncontrolled on South Cow Bayou	120	139.3	626.8	5,398	--
Uncontrolled on North Cow Bayou	81	128.3	664.3	6,074	--
Above streamflow station	301	331.0	1,621.9	14,048	28

[1] Data for table from U.S. Soil Conservation Service (written commun., March 5, 1962).

appreciable runoff occurred March 20, 1957. Records at this site include water years 1957-64.

Floodwater-retarding structures 1-3, 5-8, and 10 were completed during the period 1954-58; however, staff gages were not installed until August 1958. Records at these sites include water years 1959-64.

A recording hygrothermograph was installed within one-quarter mile of site 4 on March 2, 1964. Recording thermographs for air and water temperature, and a recording anemometer for wind speed were installed on the pool at site 4 on March 2, 1964. These recorders are to be operated for 2 years; therefore, no records will be published in this report.

Water samples for chemical-quality analyses were obtained beginning October 22, 1962. Records for quality of water include water years 1963-64.

Type and Amount of Data Collected

Records collected during the period of this report relate to the water quality, the sedimentation, the quantity of water available, and the disposition of the water. The data concerning the availability and disposition of water have been assembled in Table 8 and identified as the water budget of the area. Thirty-five water samples were collected during the water years 1963-64 for water-quality information.

The Soil Conservation Service made an original capacity survey at site 4 on July 24, 1956. On June 1, 1963, a survey was made to determine the area and extent of sedimentation. The Soil Conservation Service has set a schedule to make a sedimentation survey at site 4 every 5 years and after major storms. This is done so that the design criteria for sedimentation rates used by the Soil Conservation Service can be verified as often as feasible.

Data for the water budgets of each area were determined from: rainfall records at 10 points; continuous pool-stage and contents records at one floodwater-retarding structure (site 4), and weekly pool-stage and contents records at eight pools; and continuous records of flow on Cow Bayou below all floodwater-retarding structures.

Table 5. —Floodwater-Retarding Structure Data, Cow Bayou Study Area

					EMERGENCY SPILLWAY			PRINCIPAL SPILLWAY		PORTHOLES			CONTROLLED 8-IN. OPENING			
SITE NUMBER	DRAIN-AGE AREA (SQ MI)	DATE DAM COMPLETED	DATE STATION ESTABLISHED	DATUM OF GAGE, IN FEET ABOVE MEAN SEA LEVEL	WIDTH (FT)	GAGE HEIGHT (FT)	CAPACITY[a] (AC-FT)	GAGE HEIGHT (FT)	CAPACITY[b] (AC-FT)	NUMBER AND SIZE (IN.)	GAGE HEIGHT OF BOTTOM (FT)	CAPACITY (AC-FT)	GAGE HEIGHT OF BOTTOM (FT)	CAPACITY (AC-FT)	PIPE THROUGH DAM (IN.)	RANGE OF STAFF GAGES (FT)
1	1.51	Dec. 18, 1954	Aug. 14, 1958	696.00	150	[c]27.3	474	18.0	78.3	None	--	--	4.5	0	12	11.5-30.5
2	4.40	June 25, 1958	do	661.0	200	[d]31.5	1,760	18.0	491	4 8x8	11.0	200	-1.5	17.1	17	6.8-37.3
3	1.40	Nov. 1, 1955	do	655.40	175	[c]28.6	395	18.0	78.8	8 8x8	14.0	35.8	2.5	0	22	10.2-30.5
4	5.25	July 24, 1956	Sept. 12, 1956	574.46	400	[d]37.7	1,740	18.0	241	2 8x8	14.76	145	6.1	13.3	17	6.7-42.6
5	3.48	Feb. 27, 1957	Aug. 13, 1958	533.0	300	[c]49.2	1,370	18.0	166	None	--	--	2.5	19.7	17	6.8-50.9
6	1.99	Dec. 29, 1956	Aug. 14, 1958	507.6	300	[d]35.0	697	18.0	168	None	--	--	-1.5	6.0	17	10.2-37.3
7	5.47	Jan. 3, 1958	Aug. 15, 1958	441.0	250	[c]31.7	2,250	18.0	644	4 8x8	9.5	202	-0.5	11.3	17	2.0-36.6
8	1.69	May 6, 1955	Aug. 14, 1958	586.0	200	[c]28.9	587	18.0	126	None	--	--	6.5	6.6	12	6.2-30.5
10	2.84	June 25, 1958	Aug. 13, 1958	639.7	100	[d]27.3	1,110	18.0	314	4 8x8	15.3	196	6.5	27.0	17	6.7-30.5

a/ Total pool capacity.
b/ Sediment pool capacity; the capacity up to the principal spillway.
c/ Based on information from U.S. Soil Conservation Service.
d/ Based on levels by U.S. Geological Survey.

Hydrologic Instrumentation

Rain Gages

Nine rain gages were installed in accordance with U.S. Weather Bureau procedure. These gages were located to provide the best geometric coverage of the study area (Figure 3). Rain gage 3-R is a U.S. Weather Bureau 8-inch recording rain gage and the others are U.S. Weather Bureau 8-inch nonrecording rain gages. Data from the rain gage at site 4 (10-R) was rarely used because of the uncertainty of reliable records. This gage has since been modified from a tipping-bucket type to a float-operated type. All rain gages were serviced and rainfall measured weekly by employees of the Soil Conservation Service. These data were used to define the rainfall over the area.

Pool-Stage Gages

A continuous water-stage recorder is operated at site 4. This recorder was adjusted so that gage heights could be determined from the chart to the nearest 0.01 foot. On March 2, 1964, the recorder was adjusted so that gage heights can be read to the nearest 0.001 foot. Time can be determined to the nearest 5 minutes. Weekly readings of staff gages and peak marks were obtained by Soil Conservation Service personnel at each of the remaining eight floodwater-retarding structures. These data were used to compute contents, surface area, consumption, outflow, and inflow for each site.

Streamflow Gages

A continuous water-stage recorder is operated at the stream-gaging station, Cow Bayou at Mooreville. The recorder was adjusted so that gage heights could be read to the nearest 0.01 foot, and time determined to the nearest 15 minutes. These data were used to determine the integrated runoff from the nine floodwater-retarding pools and the uncontrolled area downstream from the structures.

QUALITY OF WATER

The chemical quality of water determines its suitability for possible uses and its flocculating characteristics as they affect the sediment-trap efficiency of the pools.

Relation of Water Quality to Use

Water quality is an important factor in selecting municipal water sources, in successful irrigation, and in the location of industrial plants. In order to evaluate the water quality in terms of principal types of uses, the major chemical constituents in the water in the Cow Bayou study area were determined. Table 6 shows the time that samples were taken and the results from analyses of these samples at each site during the water years 1962-64. The following discussion relates the quality of the various samples to domestic and municipal supply, to irrigation, and to industrial use.

Domestic and Municipal Supply

The standards generally quoted in evaluating the quality and safety of water supplies for domestic and municipal use are those of the U.S. Public Health Service (1962, p. 7). According to these standards, the recommended maximum limits for dissolved solids and sulfate are 500 mg/l (milligrams per liter) and 250 mg/l, respectively. Concentrations of dissolved solids are below this limit except at sites 1, 3, 4, and 10. The areas above these sites are in the upper part of the study area and are underlain by the Eagle Ford Shale. Site 2, which is in the same area, is also high in dissolved solids. Concentration of sulfate is above the maximum limit for sites 1, 3, and 4. Chloride concentration varies between 4.0 mg/l and 30 mg/l and is well below the maximum limit of 250 mg/l. Fluoride concentration is below the maximum recommended by the Public Health Service, and nitrate concentrations are well below the maximum of 45 mg/l.

Irrigation

The U.S. Salinity Laboratory Staff (1954, p. 69) established standards for determining the suitability of water for irrigation. In these standards the three following characteristics appear to be most important in determining the quality of irrigation water: total concentration of soluble salts (salinity hazard); relative proportion of sodium to other cations (sodium hazard); and concentration of boron or other elements that may be toxic. Waters in the Cow Bayou study area can be classified as high salinity hazard for sites 1, 3, 4, and 10 and medium salinity hazard for the other sites and the streamflow station. All waters can be classified as low sodium hazard. No analysis was made to determine boron concentration.

Industrial Use

The quality requirements of water for industrial purposes vary widely. For some purposes, such as cooling, water of almost any quality can be used; but in some manufacturing processes and in high pressure steam boilers, water approaching the quality of distilled water may be necessary. The water-quality requirements for many types of industry and processes (listed in Table 7) can be met by waters from the Cow Bayou study area.

Table 6. Chemical Analyses of Surface Water in the Cow Bayou Study Area, Water Years October 1962 to September 1964.

[Results in Milligrams Per Liter Except as Indicated.]

DATE OF COLLECTION	DISCHARGE (CFS)	SILICA (SiO_2)	CAL-CIUM (Ca)	MAG-NE-SIUM (Mg)	SODIUM (Na)	PO-TAS-SIUM (K)	BICAR-BON-ATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUO-RIDE (F)	NI-TRATE (NO_3)	DISSOLVED SOLIDS (CALCULATED) MILLI-GRAMS PER LITER	DISSOLVED SOLIDS (CALCULATED) TONS PER ACRE-FOOT	HARDNESS AS $CaCO_3$ CAL-CIUM, MAG-NE-SIUM	HARDNESS AS $CaCO_3$ NON-CAR-BON-ATE	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCT-ANCE (MICROMHOS AT 25°C)	pH
Site 1. Cow Bayou Subwatershed No. 1 Near Bruceville																		
Mar. 5, 1964	0.23	3.8	129	5.6	28	--	116	267	13	0.5	15	519	0.71	345	250	0.7	765	7.1
Apr. 10	2.20	3.8	114	3.8	31	--	164	206	12	.5	.5	453	.62	300	166	.8	685	7.2
Site 2. Cow Bayou Subwatershed No. 2 Near Bruceville																		
Mar. 5, 1964		2.9	104	5.0	33	--	163	176	23	0.4	1.2	426	0.58	280	146	0.9	677	7.1
Mar. 5	0.001	3.0	84	3.0	29	--	122	152	17	.7	2.0	351	.48	222	122	.8	564	7.0
June 22	18.8	8.0	44	2.2	12	--	107	46	4.9	.6	.0	171	.23	119	31	.5	282	6.4
Site 3. Cow Bayou Subwatershed No. 3 Near Bruceville																		
Mar. 5, 1964		1.0	130	6.2	40	--	104	279	38	0.6	7.2	553	0.75	350	265	0.9	837	6.9
Site 4. Cow Bayou Subwatershed No. 4 Near Bruceville																		
Oct. 22, 1962	0.10	2.0	97	7.5	34	--	46	264	22	1.2	0.0	b/460	0.63	273	236	0.9	670	6.7
Feb. 14, 1964	--	3.1	162	8.0	35	--	64	408	19	1.0	7.2	674	.92	437	384	.7	927	7.4
Mar. 6	--	1.2	168	6.8	38	--	49	436	20	1.1	6.0	701	.95	447	407	.8	951	6.9
May 1	--	1.5	154	8.8	28	--	24	420	15	1.0	2.0	642	.87	420	400	.6	885	6.5
May 15	--	1.5	184	8.8	29	--	106	428	16	1.0	1.2	722	.98	495	408	.6	981	6.8
May 28	--	1.2	162	9.7	30	--	26	444	17	1.0	.0	678	.92	444	422	.6	918	6.6
Site 5. Cow Bayou Subwatershed No. 5 Near Bruceville																		
Oct. 22, 1962	--	6.7	41	2.8	11	--	84	45	15	0.5	0.0	b/175	0.24	114	45	0.4	279	6.7
Feb. 14, 1964	--	2.4	76	2.8	11	--	108	108	14	.4	3.5	271	.37	201	113	.3	449	7.8
Mar. 6	--	1.7	85	3.4	13	--	122	126	14	.3	2.5	306	.42	226	126	.4	496	7.1
Site 6. Cow Bayou Subwatershed No. 6 Near Bruceville																		
Oct. 22, 1962		7.2	32	3.1	13	--	98	21	12	0.6	0.0	b/141	0.19	93	12	0.6	237	7.1
Mar. 6, 1964	0.18	3.5	76	5.0	25	--	163	88	22	.6	9.6	310	.42	210	76	.8	520	7.4
Mar. 6	.02	1.5	62	4.4	13	--	130	72	12	.5	1.2	231	.31	173	66	.4	401	7.2
Site 7. Cow Bayou Subwatershed No. 7 Near Bruceville																		
Oct. 22, 1962	--	6.8	38	2.8	15	--	139	8.2	10	0.4	1.2	b/160	0.22	106	0	0.6	273	6.6
Mar. 6, 1964	--	.5	42	3.7	31	--	164	25	18	.6	.5	202	.27	120	0	1.2	368	7.4

Table 6. Chemical Analyses of Surface Water in the Cow Bayou Study Area, Water Years October 1962 to September 1964.--Continued

[Results in Milligrams Per Liter Except as Indicated.]

DATE OF COLLECTION	DISCHARGE (CFS)	SILICA (SiO_2)	CAL-CIUM (Ca)	MAG-NE-SIUM (Mg)	SODIUM (Na)	PO-TAS-SIUM (K)	BICAR-BON-ATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUO-RIDE (F)	NI-TRATE (NO_3)	DISSOLVED SOLIDS (CALCULATED) MILLI-GRAMS PER LITER	TONS PER ACRE-FOOT	HARDNESS AS $CaCO_3$ CAL-CIUM, MAG-NE-SIUM	NON-CAR-BON-ATE	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCT-ANCE (MICROMHOS AT 25° C)	pH
Site 8. Cow Bayou Subwatershed No. 8 Near Bruceville																		
Oct. 22, 1962	--	4.7	35	1.9	10		106	16	9.0	0.4	0.2	129	0.18	95	8	0.4	221	6.8
Mar. 5, 1964	--	5.8	81	0.0	5.8	0.8	184	33	11	.4	17	245	.33	202	51	.2	427	7.3
Mar. 5	--	5.2	80	1.0	5.8	1.8	158	44	9.6	.3	38	264	.36	204	75	.2	437	7.1
Site 10. Cow Bayou Subwatershed No. 10 Near 10 Near Bruceville																		
Oct. 22, 1962	--	13	156	5.0	55	--	402	149	30	1.0	0.5	b/614	0.84	410	80	1.2	939	6.8
Mar. 5, 1964	--	2.6	54	1.8	39	--	143	75	18	.6	5.8	267	.36	142	25	1.4	456	7.3
June 18	25.3	9.6	31	.6	15	--	110	14	4.0	.5	1.2	130	.18	80	0	.7	218	6.9
80970. Cow Bayou at Mooreville																		
Oct. 22, 1962	a/0.15	9.0	59	4.3	24	--	197	28	17	0.7	0.0	239	0.33	165	3	0.8	414	7.0
Mar. 6, 1964	2.19	4.1	111	5.6	27	--	176	176	20	.5	2.8	434	.59	300	156	.7	680	7.5
May 1	105	12	82	2.5	11	--	212	52	5.6	.3	1.8	271	.37	215	41	.3	447	6.8
May 1	61.1	9.1	68	2.5	10	--	177	45	5.3	.3	2.2	229	.31	180	35	.3	387	6.9
May 15	3.53	2.7	85	3.6	23	--	165	115	15	.6	.0	326	.44	227	92	.7	533	7.4
May 26	.55	5.4	83	3.9	25	--	182	97	18	.6	.0	322	.44	223	74	.7	531	7.0

a/ Field estimate.
b/ Residue at 180°C.

Table 7.-Water-Quality Tolerances for Industrial Applications[1]

[Allowable Limits in Milligrams Per Liter Except as Indicated]

INDUSTRY	TURBIDITY	COLOR	COLOR + O_2 CONSUMED	DISSOLVED OXYGEN (ML/L)	ODOR	HARDNESS	ALKALINITY (AS $CaCO_3$)	pH	TOTAL SOLIDS	Ca	Fe	Mn	Fe + Mn	Al_2O_3	SiO_2	Cu	F	CO_3	HCO_3	OH	$CaSO_4$	Na_2SO_4 TO Na_2SO_3 RATIO	GENERAL[2]
Air conditioning[3]	--	--	--	--	--	--	--	--	--	--	0.5	0.5	0.5	--	--	--	--	--	--	--	--	--	A, B
Baking	10	10	--	--	--	(4)	--	--	--	--	.2	.2	.2	--	--	--	--	--	--	--	--	--	C
Boiler feed:																							
0-150 psi	20	80	100	2	--	75	--	8.0+	3,000-1,000	--	--	--	--	5	40	--	--	200	50	50	--	1 to 1	--
150-250 psi	10	40	50	.2	--	40	--	8.5+	2,500-500	--	--	--	--	.5	20	--	--	100	30	40	--	2 to 1	--
250 psi and up	5	5	10	0	--	8	--	9.0+	1,500-100	--	--	--	--	.05	5	--	--	40	5	30	--	3 to 1	--
Brewing:[5]																							
Light	10	--	--	--	Low	--	75	6.5-7.0	500	100-200	.1	.1	.1	--	--	--	1	--	--	--	100-200	--	C, D
Dark	10	--	--	--	Low	--	150	7.0-	1,000	200-500	.1	.1	.1	--	--	--	1	--	--	--	200-500	--	C, D
Canning:																							
Legumes	10	--	--	--	Low	25-75	--	--	--	--	.2	.2	.2	--	--	--	--	--	--	--	--	--	C
General	10	--	--	--	Low	--	--	--	--	--	.2	.2	.2	--	--	--	1	--	--	--	--	--	C
Carbonated beverages[6]	2	10	10	--	0	250	50	--	850	--	.2	.2	.3	--	--	--	.2	--	--	--	--	--	C
Confectionary	--	--	--	--	Low	--	--	(7)	100	--	.2	.2	.2	--	--	--	--	--	--	--	--	--	--
Cooling[8]	50	--	--	--	--	50	--	--	--	--	.5	.5	.5	--	--	--	--	--	--	--	--	--	A, B
Food, general	10	--	--	--	Low	--	--	--	--	--	.2	.2	.2	--	--	--	--	--	--	--	--	--	C
Ice (raw water)[9]	1-5	5	--	--	--	--	30-50	--	300	--	.2	.2	.2	--	10	--	--	--	--	--	--	--	C
Laundering	--	--	--	--	--	50	--	--	--	--	.2	.2	.2	--	--	--	--	--	--	--	--	--	--
Plastics, clear, undercolored	2	2	--	--	--	--	--	--	200	--	.02	.02	.02	--	--	--	--	--	--	--	--	--	--
Paper and pulp:[10]																							
Groundwood	50	20	--	--	--	180	--	--	--	--	1.0	.5	1.0	--	--	--	--	--	--	--	--	--	A
Kraft pulp	25	15	--	--	--	100	--	--	300	--	.2	.1	.2	--	--	--	--	--	--	--	--	--	--
Soda and sulfite	15	10	--	--	--	100	--	--	200	--	.1	.05	.1	--	--	--	--	--	--	--	--	--	--
Light paper, HL-Grade	5	5	--	--	--	50	--	--	200	--	.1	.05	.1	--	--	--	--	--	--	--	--	--	B
Rayon (viscose) pulp:																							
Production	5	5	--	--	--	8	50	--	100	--	.05	.03	.05	<8.0	<25	<5	--	--	--	--	--	--	--
Manufacture	.3	--	--	--	--	55	--	7.8-8.3	--	--	.0	.0	.0	--	--	--	--	--	--	--	--	--	--
Tanning[11]	20	10-100	--	--	--	50-135	135	8.0	--	--	.2	.2	.2	--	--	--	--	--	--	--	--	--	--
Textiles:																							
General	5	20	--	--	--	20	--	--	--	--	.25	.25	--	--	--	--	--	--	--	--	--	--	--
Dyeing[12]	5	5-20	--	--	--	20	--	--	--	--	.25	.25	.25	--	--	--	--	--	--	--	--	--	--
Wool scouring[13]	--	70	--	--	--	20	--	--	--	--	1.0	1.0	1.0	--	--	--	--	--	--	--	--	--	--
Cotton bandage[13]	5	5	--	--	Low	20	--	--	--	--	.2	.2	.2	--	--	--	--	--	--	--	--	--	--

1/ American Water Works Association, 1950.
2/ A - No corrosiveness; B-No slime formation; C-Conformance to Federal drinking water standards necessary; D - NaCl, 275 mg/l.
3/ Waters with algae and hydrogen sulfide odors are most unsuitable for air conditioning.
4/ Some hardness desirable.
5/ Water for distilling must meet the same general requirements as for brewing (gin and spirits mashing water of light-beer quality; whiskey mashing water of dark-beer quality).
6/ Clear, odorless, sterile water for syrup and carbonization. Water consistent in character. Most high quality filtered municipal water not satisfactory for beverages.
7/ Hard candy requires pH of 7.0 or greater, as low value favors inversion of sucrose, causing sticky product.
8/ Control of corrosiveness is necessary as is also control of organisms, such as sulfur and iron bacteria, which tend to form slimes.
9/ $Ca(HCO_3)_2$ particularly troublesome. $Mg(HCO_3)_2$ tends to greenish color. CO_2 assists to prevent cracking. Sulfates and chlorides of Ca, Mg, Na should each be less than 300 mg/l (white butts).
10/ Uniformity of composition and temperature desirable. Iron objectionable as cellulose adsorbs iron from dilute solutions. Manganese very objectionable, clogs pipelines and is oxidized to permanganates by chlorine, causing reddish color.
11/ Excessive iron, manganese or turbidity creates spots and discoloration in tanning of hides and leather goods.
12/ Constant composition; residual alumina 0.5 mg/l.
13/ Calcium, magnesium, iron, manganese, suspended matter, and soluble organic matter may be objectionable.

Relation of Water Quality to Trap Efficiency of Pools

Low sodium concentration in proportion to calcium concentration aids flocculation of clay particles. Flocculation results in the formation of larger particles which fall to the bottom of the pool. Thus, a pool is a more effective sediment trap if the water is low in sodium. Calcium-sodium ratio is approximatley 7:2 for the study area; therefore, a high sediment-trap efficiency should be effective in the pools.

Sedimentation

Sedimentation rate is one of the factors in the design of floodwater-retarding structures that must be estimated using existing design criteria. These design criteria, in turn, are assembled from field data of geologically, topographically, and hydrologically similar watersheds. The sediment survey of June 1, 1963 (Soil Conservation Service, written commun.), was made to compare the actual sedimentation rate at site 4 with the estimated sedimentation rate.

The original survey at site 4 on July 24, 1956, showed 324.4 acre-feet of sediment-storage capacity available. The 1963 survey showed that 98.4 acre-feet of sediment had been deposited during the 6.85 years. This is equivalent to an annual sedimentation rate of 2.76 acre-feet per square mile per year from the drainage area of 5.25 square miles. At this rate, in about 16 years from 1963 there would be a sufficient amount of sediment deposited in the pool to equal the sediment-pool capacity. If the 324.4 acre-feet of sediment-storage space is to be entirely filled at the end of 50 years (the design life of the sediment-storage capacity) it must gain only an average of 1.24 acre-feet per square mile per year. Sediment-pool capacity is that capacity below the top of the drop-inlet structure.

WATER BUDGET FOR POOLS

In a water-budget analysis, gains are equated to losses and to changes in storage within the study area. Two budgets are made: one accounting for the inflow, outflow, consumption, and changes in storage at each of the nine pools; and the other accounting for the rainfall and runoff from each of the areas above the 10 stations (including the stream-gaging station).

Water gains consist of all rainfall on the area, and a complete water budget accounts for its subsequent disposition. The Cow Bayou study area is inadequately controlled and insufficiently instrumented to measure every factor affecting runoff into the streams, but most factors affecting surface-water consumption at the pools can be isolated and evaluated.

The water-budget equation for determining the runoff into the pools is discussed in this section. To evaluate the water budget of an area, each factor that influences the budget must be isolated and the magnitude of that factor determined. The basic equation is

$$Q_i = Q_o + C \pm \Delta S,$$

where Q_i is total inflow, including rainfall on the pool surface (gain),

Q_o is outflow through outlet works (loss),

C is consumption (loss), and

Δ S is the indicated change in pool contents (gain or loss).

Q_i is solved for by measurement or estimate of the right-hand terms in the equation.

The summary of the factors of the water budget (except rainfall) for the nine pools for water years 1959-64 is contained in Table 8. The monthly and the annual water-budget summaries for each pool are contained in Tables 17 and 18, respectively.

The following sections are devoted to the measurements, computations, and analyses of the factors of the water budget for the pools. Because total inflow (Q_i) is computed from the other factors, those factors will be discussed first.

Outflow From Structures

Stage-discharge rating curves were derived for the uncontrolled drop-inlet type principal spillways at all sites. (See Figure 1.) These ratings were drawn on the basis of current-meter measurements of the outflow made at various heads on the outlet structure. The hydraulic characteristics of this type of outlet afford a relatively reliable rating as long as it remains free of drift and debris. Only minor trouble was experienced from drift and debris during the period of study.

Flow over the emergency spillway occurred at sites 1, 3, 4, 6, and 8 on May 11-12, 1957. There was no flow over site 5 spillway. The spillway at site 4 washed out during this period and there was some spillway damage at site 1. This damage occurred because there had not been sufficient time to establish a protective grass cover. Discharge at site 4 for this period was computed using the stage hydrograph, rainfall records, change-in-contents of pool, a theoretical rating of the emergency spillway, and an indirect measurement of maximum discharge. The other sites had not been instrumented for the May 1957 storms, and spillway discharge was not computed at them. Flow has not occurred over the emergency spillways since additional sites were built.

Table 8.—Water-Budget Summary for Gaged Pools, Cow Bayou Watershed, Water Years 1959-64

WATER YEAR	CONSUMPTION (AC-FT)	OUTFLOW (AC-FT)	CHANGE IN POOL CONTENT (AC-FT)	TOTAL INFLOW (AC-FT)	NATURAL[1/] RUNOFF (AC-FT)	NATURAL[1/] RUNOFF (INCHES)	RUNOFF AT STREAM GAGE (INCHES)
1959	1,362.9	2,461.2	+ 361.0	4,185.1	3,716.7	2.49	2.23
1960	1,683.4	13,201.0	- 405.0	14,479.4	13,829.6	9.25	9.11
1961	1,879.9	21,355.2	+ 390.3	23,625.4	22,703.6	15.19	15.44
1962	1,822.9	2,373.7	- 386.2	3,810.4	3,400.1	2.27	2.07
1963	994.4	67.4	- 484.3	577.5	395.3	0.26	.10
1964	1,189.8	1,553.5	+ 305.6	3,048.9	2,668.0	1.78	1.07
Totals	8,933.3	41,012.0	- 218.6	49,726.7	46,713.3	31.24	30.02

1/ Adjusted for the effects of rainfall directly on the pools.

Outflow for site 4 was computed by obtaining daily gage heights from the recorder chart and applying them to the stage-discharge ratings. At sites where only weekly visits were made, daily gage heights were estimated from a graph drawn using the weekly gage readings, peak marks, and reference to weather records and the recorded graph at site 4. Estimated daily gage heights were then applied to the respective stage-discharge rating to obtain outflow for each site.

Outflow obtained from the stage-discharge ratings for site 4 should be well within an accuracy range of 5 to 10 percent, while those for the other eight sites should be no more than 15 percent in error. These ratings apply only to the uncontrolled drop outlets which discharge floodwater and do not include flow through controlled drains. Flow through the controlled drains caused by the opening of the valve was computed from information in the engineer's field notes and from the additional loss in storage. Table 17 shows outflow from each structure by months; Table 18 shows outflow by years.

Some effects of the retarding structures on water yield and flood volume at points a short distance below the retarding structures can be determined by studying data contained in Tables 15, 16, 17, and 18. These tables show rainfall-runoff relations, outflow from the pools, or flow by the stream-gaging station. In a watershed without floodwater-retarding structures, there is a certain amount of natural flow that does not reach distant downstream supply points because of overbank flooding and channel storage, evaporation, and transpiration. While the structures may prevent much of the loss of water due to overbank flooding, the prolonged release of floodwater subjects it to more opportunity for evaporation and transpiration losses. How much these two losses tend to balance each other is not known. Hydrologic data obtained in this study do not permit an evaluation of whether the structures, by virtue of their change in the flow pattern of floodwater past the structures, afford more or less transmission losses downstream.

Change in Pool Content

The change in pool content was computed for each site as a part of the water-budget equation. Pool stages for site 4 were picked from the recorder charts. For the other eight sites, pool stages were obtained from the estimated graph based on weekly pool-stage readings, and crest-stage gage readings as described in the preceding section "Outflow From Structures." These stages were then converted to contents in acre-feet through use of stage-contents tables prepared for each site.

Area-capacity data for each site were furnished by the Soil Conservation Service (written commun., June 1958). The tables represent the original pool contents, and no adjustment was made for reduction in storage from sediment deposited during the period covered by this report. As most of the sediment was deposited below the stage used to compute most of the inlfow to the pools, failure to revise the original capacity tables will not introduce significant error in change-of-contents values. Table 17 shows the montly change in contents for each site. Table 18 shows the annual change in contents for each site.

Records were collected at each of the nine sites within a period ranging from 2 months to 44 months after the dam had been completed (Table 5). The pools contained 968 acre-feet at the beginning of the study period. During the 6 water years 1959-64, there was a net reduction in pool storage of 220 acre-feet, leaving a total pool storage of 748 acre-feet (Table 18).

Consumption

Consumption was divided into two components, evaporation and other consumption. Total consumption, in feet, was determined by two methods: total pool recession during period of no inflow and outflow, and addition of evaporation and other consumption. Total consumption in acre-feet was computed by multiplying the monthly mean surface area by consumption in feet.

Evaporation, in feet, was determined by applying coefficients to climatic-index evaporation computed by the Texas Water Development Board using a method patterned after Kohler, Nordenson, and Baker (1959). These coefficients were determined by correlating mass-transfer evaporation data at three sites with climatic-index data (Gilbert, 1966, written commun.). The following coefficients were used:

MONTH	COEFFICIENT	MONTH	COEFFICIENT
January	1.08	July	1.10
February	1.07	August	1.06
March	1.13	September	1.14
April	1.04	October	1.08
May	1.17	November	1.28
June	1.04	December	1.04

Other consumption was determined by two methods: subtracting evaporation from total consumption for the months of no inflow or outflow; and using the mean monthly value found by the first method for the months that had inflow or outflow.

Table 17 shows the monthly evaporation, other consumption, and total consumption. Table 18 shows the annual evaporation, other consumption, and total consumption.

Inflow

Total Inflow

Total inflow into the pool (Q_i) was computed for each site by substituting values in the water-budget equation,

$$Q_i = Q_o + C \pm \Delta S.$$

Total inflow (Q_i), as computed to this point, represents all water that enters the pool in any form including rainfall on the pool surface.

Table 17 shows monthly total inflow for each site; Table 18 shows annual total inflow for each site. Table 9 summarizes the water-budget factors for each site for the period 1959-64.

Runoff From Area Above Pools

In order to show the amount of rainfall excess, or runoff from land surface, inflow was adjusted for the effect of rainfall on the pool. Adjustments for this effect were made using the following relation:

$$Q_a = Q_i - R_p,$$

where Q_a is runoff from area above station,

Q_i is total inflow, in acre-feet (includes rainfall on pool), and

R_p is rainfall on the pool, in acre-feet.

Runoff from area above each station (Q_a) was computed for each site by substituting values in the above equation.

Monthly and yearly values of rainfall on the pools and flow from area above each station are shown in Tables 17 and 18, respectively.

During the 6-year period, the average annual runoff to the nine floodwater-retarding structures was 7,790 acre-feet (5.21 inches) or 278 acre-feet per square miles. The long-term average annual runoff for this locality is about 4 inches. Monthly runoff during the 6-year period of study ranged from 7.4 acre-feet (0.01 inch) in January 1959 to 6,170 acre-feet (4.13 inches) in December 1960.

Rainfall

Annual rainfall for the period of record ranged from 46.73 inches in 1961 (14.48 inches above the 32.25-inch long-term average at McGregor) to 19.18 inches in 1963 (13.07 inches below the long-term average). Figure 6 shows that a 3-year moving average for Cow Bayou compares fairly well with a 3-year moving average for McGregor. There was a large variation in annual rainfall during the period of study, from a wet period to a drought period. This range in annual rainfall provided data for runoff conditions which will probably be experienced in the years after the additional floodwater-retarding structures are built.

Table 16 is a summary of the rainfall data for Cow Bayou during the period 1954-64. Tables 17 and 18 list by months and years the weighted-mean rainfall on the drainage area of each station.

Area Runoff

Runoff from the area above each station was converted from acre-feet to inches so that a comparison of runoff could be made with rainfall. These data are

Table 9.—Summary of Water Budget for Pools for the Period 1959-64

SITE	EVAPORATION (ACRE-FEET)	OTHER CONSUMPTION (ACRE-FEET)	OUTFLOW (ACRE-FEET)	TOTAL INFLOW (ACRE-FEET)	PERCENT $\left(\frac{\text{COL. 2+3}}{\text{COL. 5}}\right)$	RAINFALL ON POOL (ACRE-FEET)	PERCENT $\left(\frac{\text{COL. 7}}{\text{COL. 5}}\right)$	NATURAL RUNOFF (ACRE-FEET)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	338	244	2,500	3,100	19	234	7.5	2,860
2	737	516	6,930	8,190	15	467	5.7	7,730
3	348	164	2,870	3,390	15	207	6.1	3,180
4	680	354	5,710	6,600	16	374	5.7	6,230
5	399	322	4,170	4,830	15	218	4.5	4,610
6	450	258	4,060	4,770	15	266	5.6	4,500
7	872	820	8,240	9,850	17	534	5.4	9,310
8	414	643	2,490	3,530	30	253	7.2	3,270
10	720	652	4,050	5,470	25	461	8.4	5,010
Totals	4,960	3,970	41,020	49,730	18 (Average)	3,010	6.1 (Average)	46,700

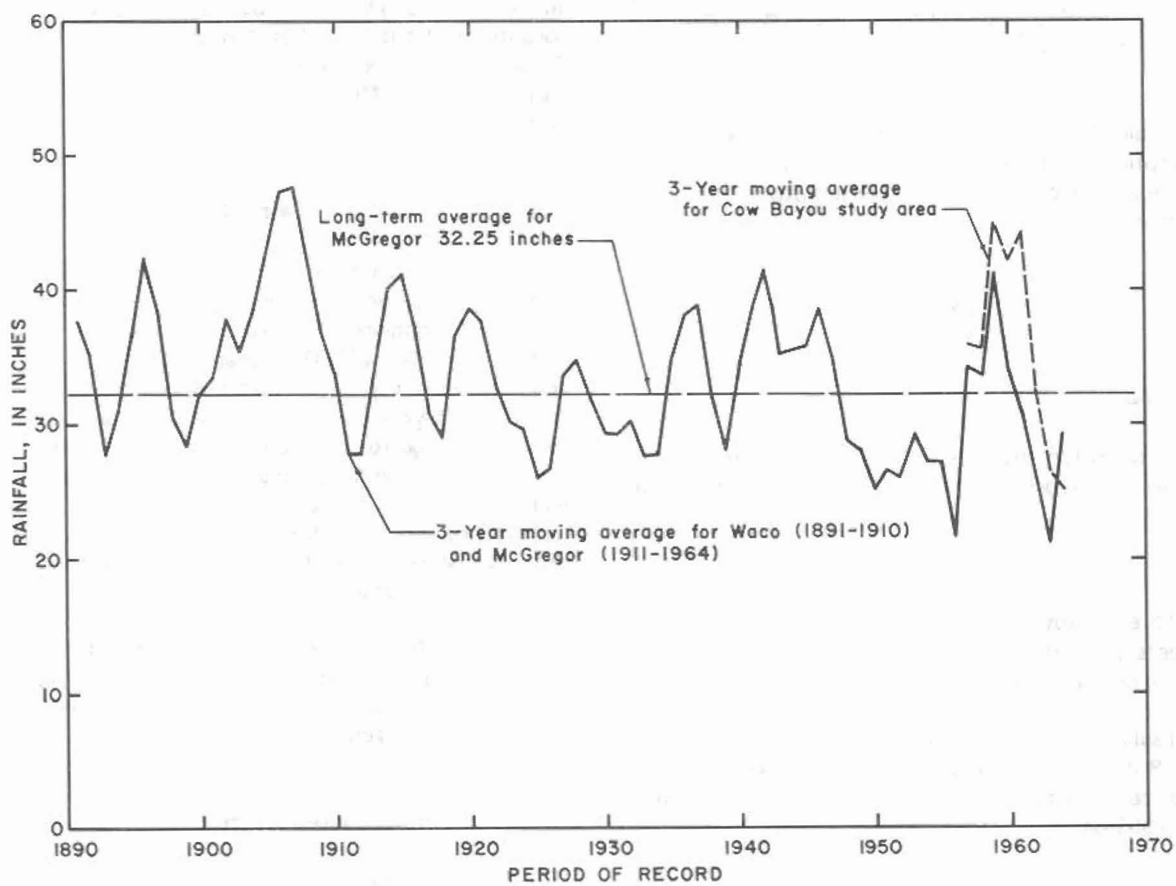

Figure 6.—Comparison of 3-Year Moving Average Rainfall at Cow Bayou Study Area With the Long-Term and 3-Year Moving Average Rainfall at Waco and McGregor

included in Tables 17 and 18. Figure 7 shows the monthly accumulation of runoff at Cow Bayou stream-gaging station, as well as runoff from the areas above all sites.

An examination of Figure 7 and Tables 17 and 18 shows no apparent direct relationship between monthly and annual rainfall and runoff. Runoff at the stream-gaging station was 7.31 inches in 1959 calendar year from 44.97 inches rainfall. Runoff for that year was 16 percent of rainfall. On the other hand, runoff for 1961 calendar year was 11.33 inches from 36.42 inches rainfall. This runoff is 31 percent of rainfall.

Antecedent rainfall appears to be a significant factor for runoff. For instance, during the month of August 1964 no runoff occurred at the stream-gaging station from 3.97 inches rainfall. Rainfall for the previous month was 0.14 inch. In contrast to this, 0.38 inch ran off in July 1961 from 3.09 inches rainfall. In June 1961 rainfall totaled 7.98 inches.

Table 10 summarizes the rainfall, runoff, and consumption for each drainage area studied for the period 1959-64.

Note in Figure 7 that accumulated runoff for the sites was only 1.15 inches more than accumulated runoff at the stream-gaging station during the water year period 1959-64. A greater difference than this was expected because the higher gradient upstream from the pools should cause a higher unit runoff into the pools and because the consumption of the pools would cause less runoff to reach the downstream station.

Possibly the major reason the runoff at the stream-gaging station and above all sites is about the same in Figure 7 is the location of the structures. Runoff at the streamflow station is integrated runoff from each part of the watershed. The sites are relatively equally spaced throughout the watershed. When combined unit runoff from the area upstream from all structures is computed, the result is an integration of runoff over the watershed.

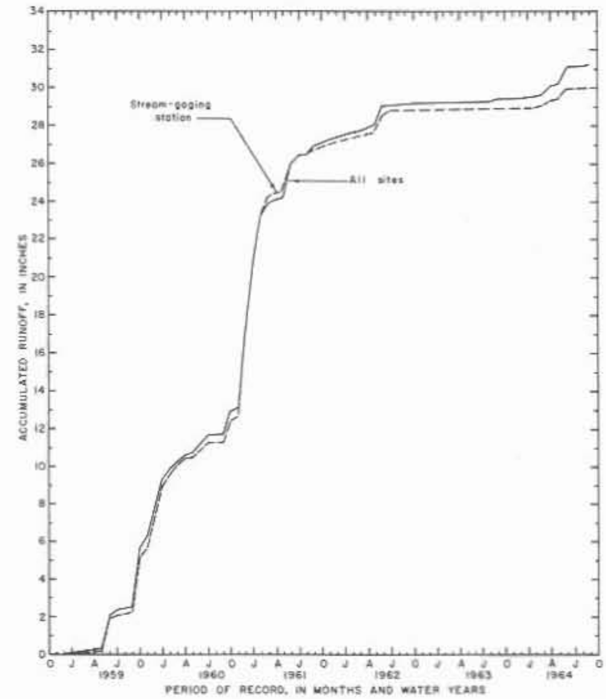

Figure 7.—Mass Diagram of Runoff From Drainage Area Above All Sites and Above the Stream-Gaging Station, Cow Bayou at Mooreville, October 1958 to September 1964

Table 10.—Summary of Water Budget of Separate Areas for the Period 1959-64

DRAINAGE AREA	RAINFALL (INCHES)	RUNOFF (INCHES)	CONSUMPTION (INCHES)	PERCENT (RUNOFF/RAINFALL)
1	194.2	35.5	158.7	18
2	193.7	32.9	160.8	17
3	193.8	42.7	151.1	22
4	183.7	22.2	161.5	12
5	181.8	24.9	156.9	14
6	200.8	42.4	158.4	21
7	192.6	31.9	160.7	17
8	183.5	36.3	147.2	20
10	193.8	33.1	160.7	17
Stream-gaging station	192.8	33.2	159.6	17

OTHER ANALYSES AND COMPARISONS

Rain-Gage Density

A study was made to evaluate the density of the rain gages in operation during the period covered by this report as compared to what would constitute a minimum density required to determine total rainfall on the watershed. Total rainfall is assumed to be that amount measured by the nine existing rain gages. This study involved two correlations, in each of which the weighted-mean storm rainfall, as indicated by nine rain gages, was plotted as the independent variable (abscissa) and the storm rainfall, as indicated by only 1 or 2 gages, was plotted as the dependent variable (ordinate). In one correlation, gage 4S was used for the dependent variable, and in the other correlation, the average of gages 1S and 7S was used. Only storms with a rainfall of 0.4 inch or more were plotted. There were 193 and 200 storms selected on this basis (Table 16). A typical correlation is shown on Figure 8.

Thus, by using the nine rain gages as a standard, reliable estimates of total rainfall for runoff-producing storms can be obtained on this watershed from fewer rain gages than are now in operation. However, fewer rain gages would not have supplied the information needed to determine precipitation on the surfaces of individual ponds.

A comparison of the results of rain-gage density studies in five small watershed study areas is given in

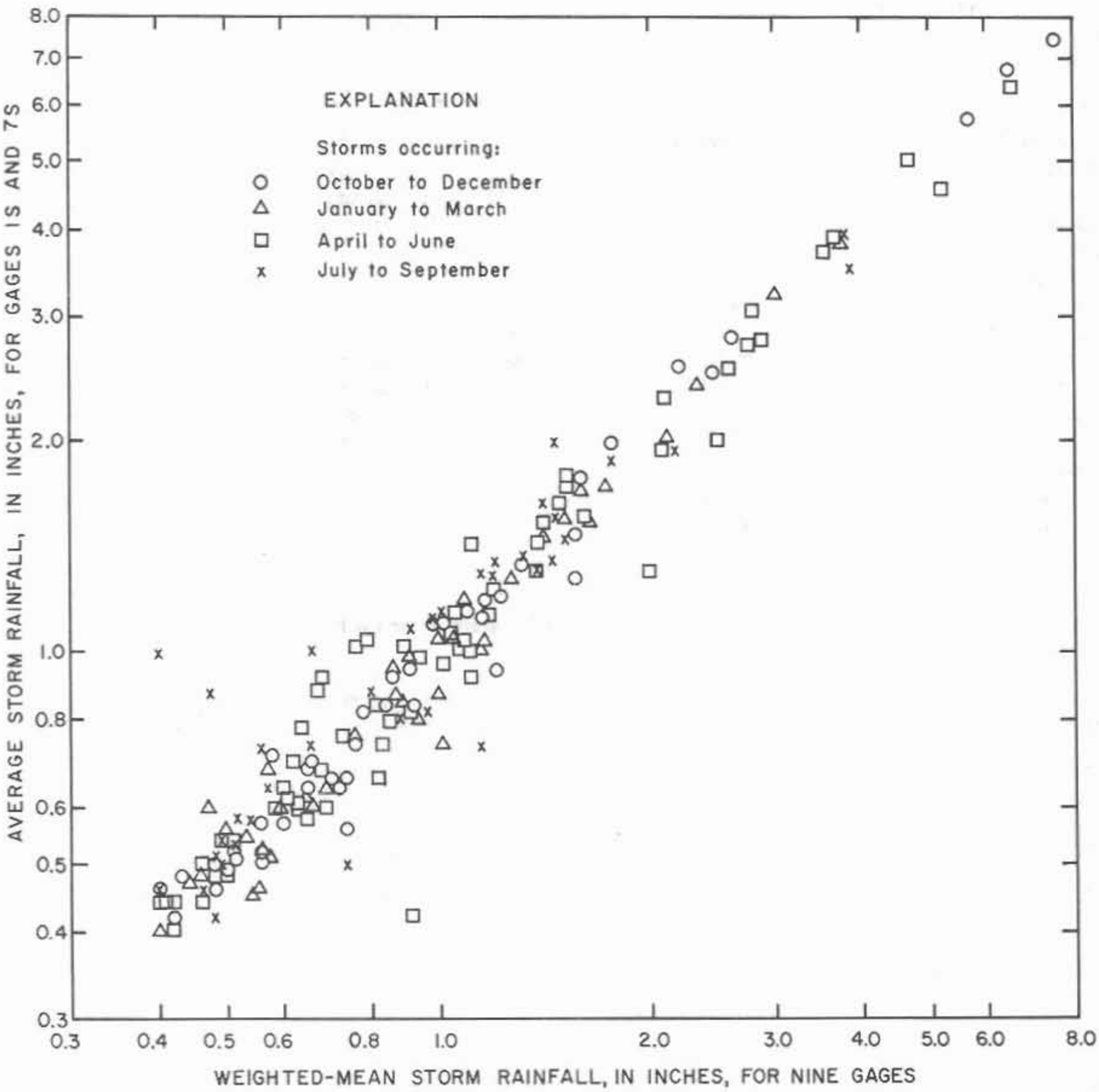

Figure 8.–Correlation of Concurrent Storm Rainfall, Two Gages (1S, 7S) and Nine Gages

Table 11. An inspection of this table shows that two-thirds of all storms on Cow Bayou drainage area as averaged for two rain gages (1S, 7S) should plot within 8 percent of the regression curve as determined from the nine rain gages. The results show that Cow Bayou has a better correlation than any of the other four small watersheds even though Cow Bayou contains the largest drainage area. This indicates more general storms occur in the Cow Bayou drainage area than occur in the other areas.

Note on Figure 8 that each storm was designated by one of four symbols, depending upon the quarter year in which the storm occurred. The following table summarizes the distribution, by quarters, of the 200 storms in the period 1956-64:

QUARTER	NUMBER OF STORMS	PERCENT
October-December	47	24
January-March	45	22
April-June	67	34
July-September	41	20
Total	200	100

In the correlations (Figure 8), plots for the July-September period had the most scatter due to more widely dispersed thunderstorms. The April-June period ranked second in the amount of scatter.

Flood Frequency

Available for flood-frequency study are 7 years (1958-64) of continuous streamflow records which were collected after the nine flood-detention structures used in this study had been built. Floods of historical significance occurred in 1944 and 1957, but as some of the nine floodwater-retarding structures were built after the 1957 flood, these floods were not used for this flood-frequency study.

The U.S. Geological Survey method is outlined by Dalrymple (1960). The formula used is

$$T = \frac{n+1}{m},$$

where T is recurrence interval, in years,

n is number of years of record, and

m is rank of flood, the highest being 1.

Table 12 shows a list of all floods above 1,400 cfs (cubic feet per second) which occurred at the stream-gaging station.

Figure 9 is a plot of annual flood data and the resulting flood-frequency curve. Figure 10 is a plot of the partial-duration series and the resulting flood-frequency curve.

A study by Benson (1952) showed that 12 years of record are required to define the mean annual flood within 25 percent if this accuracy is required 95 percent of the time. Benson concluded that short periods of record (up to about 25 years) cannot reliably define short-term flood magnitudes. Therefore, the accuracy of the curves on Figures 9 and 10 is questionable. However, they do indicate a definite trend, and they may be used to indicate a change in the rainfall-runoff relation by comparing them with flood-frequency curves subsequent to 1964.

A comparison was made of a 5-year partial-duration series for Cow Bayou at Mooreville with the same 5-year partial-duration series for Hog Creek near Crawford. This comparison was made because Hog Creek drainage area is almost equal in size (78.2 square miles for Hog Creek to 79.6 square miles for Cow Bayou), and the Hog Creek station is about 24 miles northwest of the Cow Bayou station. Both drainage areas are in the Brazos River basin. The 5-year period, 1960-64, was used because it was the only concurrent period available.

Figure 11 shows that the Cow Bayou recurrence-interval curve plots to the right of the Hog Creek curve. This could be caused by the combination of several factors. Different rainfall pattern or intensity could cause different peak flows; however, the drainage areas are so near to each other that this effect is probably low.

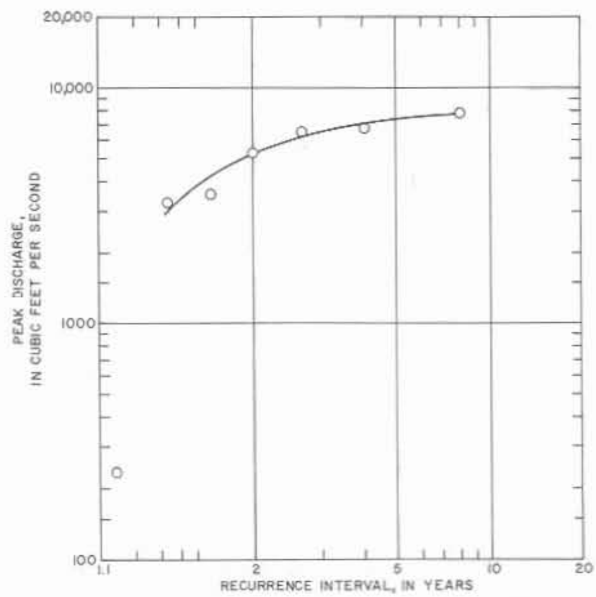

Figure 9.—Flood-Frequency Curve for Cow Bayou at Mooreville, Based on Annual Floods for Period 1958-64

Table 11.—Results of Rain-Gage Density Study for Five Small Watershed Study Areas in Texas

NUMBER OF GAGES	RAIN GAGES AT COW BAYOU	TWO-THIRDS CONFIDENCE LIMITS[a] (IN PERCENT)				
		COW BAYOU (9 GAGES; DRAINAGE AREA 79.6 SQ MI)	HONEY CREEK (14 GAGES; DRAINAGE AREA 39.0 SQ MI)	MUKEWATER CREEK (19 GAGES; DRAINAGE AREA 70.0 SQ MI)	LITTLE ELM CREEK (8 GAGES; DRAINAGE AREA 75.5 SQ MI)	DEEP CREEK (15 GAGES; DRAINAGE AREA 43.9 SQ MI)
1	4S	+15, -13	+17, -15	b/	+29, -22	b/
2	1S, 7S	+ 8, - 8	+12, -11	b/	+12, -11	+10, - 9
3	—	b/	b/	b/	+13, -12	+11, -10
4	—	b/	+ 8, - 7	+10, - 9	b/	+ 9, - 8
5	—	b/	b/	b/	b/	+ 7, - 6
7	—	b/	b/	+ 6, - 6	b/	b/
10	—	b/	b/	+ 3, - 3	b/	b/

a/ Two-thirds of the rainfall computed using the number of rain gages in column 1 should plot within the percentage shown of the rainfall computed using the number of rain gages shown in parentheses under the name of each study area.

b/ No comparison made.

Table 12.—Flood Data for Cow Bayou at Mooreville

WATER YEAR	DATE	GAGE HEIGHT (FEET)	DISCHARGE (CFS)	ANNUAL FLOODS RANK (M)	ANNUAL FLOODS RECURRENCE INTERVAL (YEARS)	PARTIAL DURATION SERIES RANK (M)	PARTIAL DURATION SERIES RECURRENCE INTERVAL (YEARS)
1944	May 1	31	a/	b/	–	–	–
1955	Apr. 9	–	5,100	b/	–	–	–
1956	–	–	3,280	b/	–	–	–
1957	–	29.4	a/	b/	–	–	–
1958	Oct. 14	22.55	6,460	3	2.67	3	2.67
1959	June 24	22.95	6,700	2	4.00	2	4.00
	June 25	18.58	2,730	–	–	15	.53
1960	Oct. 4	23.86	7,960	1	8.00	1	8.00
	Nov. 4	16.24	1,560	–	–	19	.42
	Dec. 15	21.33	4,800	–	–	5	1.60
	Dec. 31	17.64	2,150	–	–	16	.50
	Apr. 24	15.90	1,470	–	–	21	.38
	June 26	18.96	3,000	–	–	13	.62
	July 20	16.16	1,560	–	–	20	.40
1961	Oct. 18	19.01	3,000	–	–	14	.57
	Oct. 28	19.21	3,140	–	–	10	.80
	Dec. 8	21.80	5,300	4	2.00	4	2.00
	Jan. 7	19.37	3,280	–	–	8	1.00
	Jan. 12	19.16	3,140	–	–	11	.73
	Feb. 5	20.82	4,340	–	–	6	1.33
	June 9	19.08	3,070	–	–	12	.67
	June 25	16.54	1,650	–	–	18	.44
1962	June 28	19.83	3,560	5	1.60	7	1.14
	June 30	16.75	1,770	–	–	17	.47
1963	Sept. 15	7.0	231	7	1.14	–	–
1964	June 16	19.30	3,210	6	1.33	9	.89

a/ Discharge not determined.
b/ Not included in computation of recurrence interval because all structures had not been built.

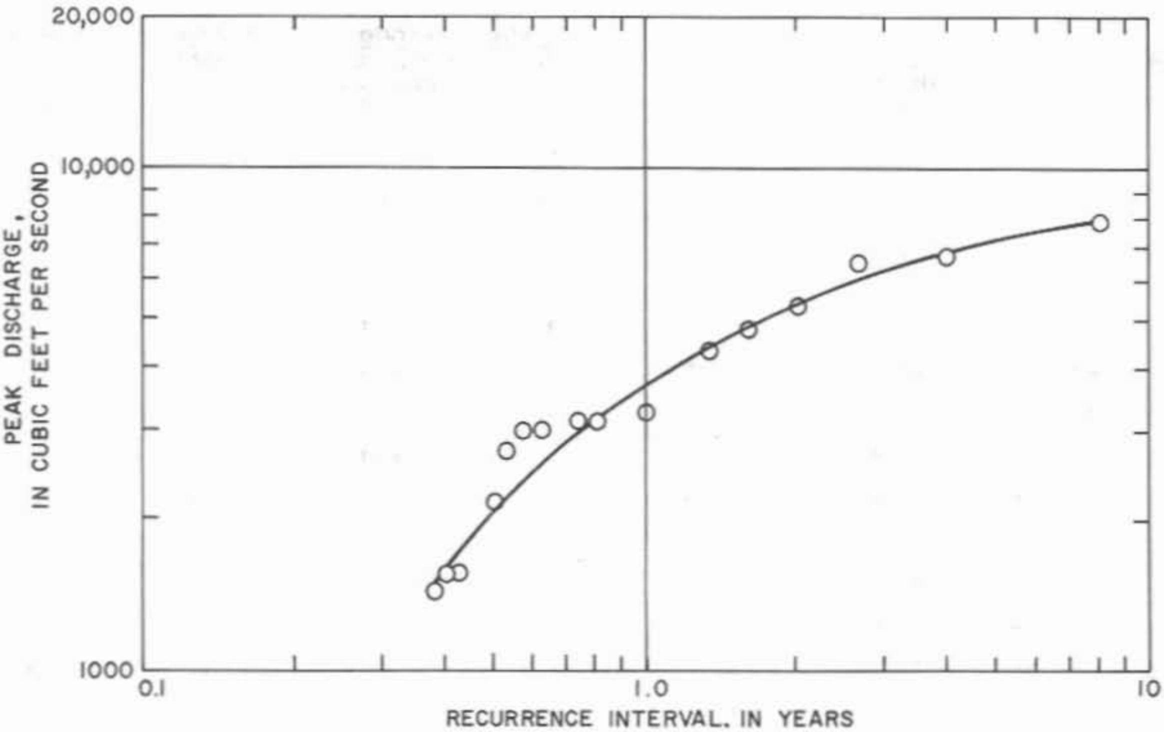

Figure 10.—Flood-Frequency Curve for Cow Bayou at Mooreville, Based on Partial-Duration Series for Period 1958-64

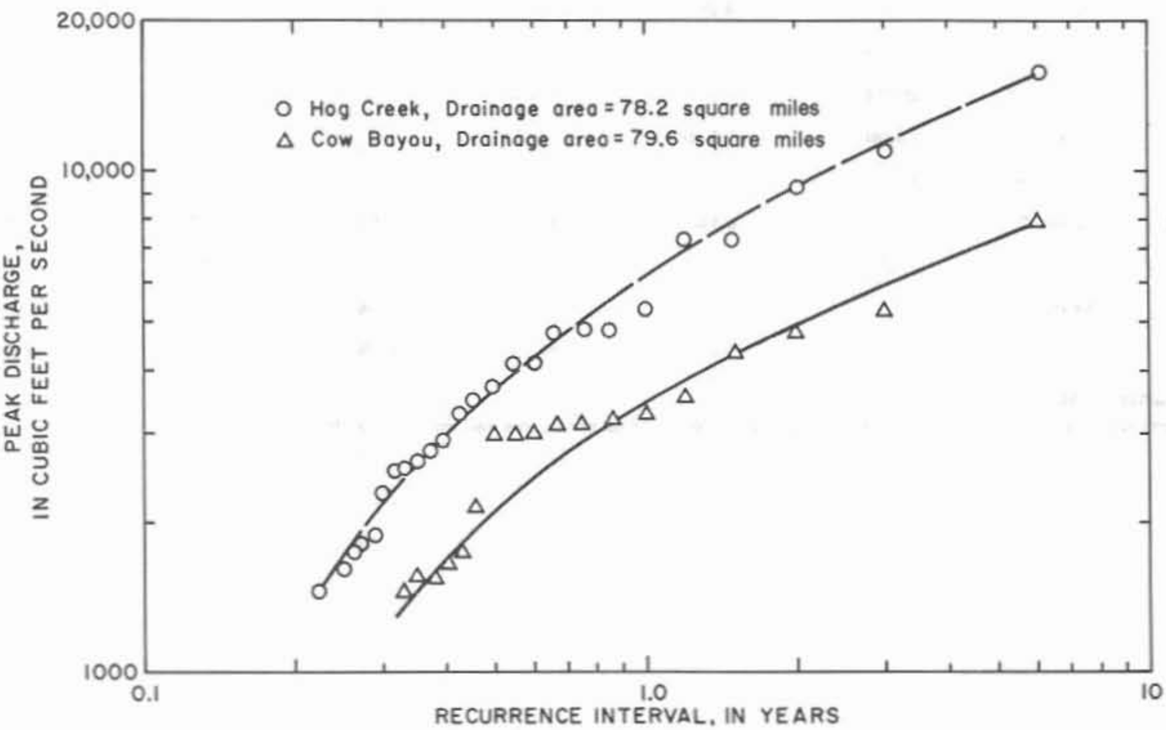

Figure 11.—Flood-Frequency Curve for Cow Bayou at Mooreville and Hog Creek Near Crawford, Based on Partial-Duration Series for Period 1960-64

The differences in geology and topography of the two areas probably cause peak runoff to be somewhat higher at Hog Creek. The drainage patterns are such that a storm is likely to produce a double peak discharge at the Cow Bayou gage and only one peak at the Hog Creek gage. There is no fault zone in the Hog Creek area comparable to the Balcones Fault Zone in the Cow Bayou area. Hog Creek falls approximately 650 feet from the headwater to the stream-gaging station (17.6 feet per mile), whereas Cow Bayou falls 399 feet (19.8 feet per mile).

Another possible reason why the flood-frequency curve of Cow Bayou plots to the right of the Hog Creek curve is the existence of nine floodwater-retarding structures in the Cow Bayou drainage area. These structures partly control 28 square miles of the drainage area. The effect of floodwater-retarding structures can be indicated by comparing the relative position of the curves on Figure 11 with curves drawn using data subsequent to 1965 and after the 17 additional structures have been built in the Cow Bayou drainage area.

Unit Hydrograph

The unit hydrograph is a hydrograph of direct runoff resulting from 1 inch of precipitation excess occurring during a unit time. Since the presentation of the unit-hydrograph concept by L. K. Sherman (1932), it has gained wide acceptance in hydrologic circles as a valuable tool in evaluating a few of the hydrologic characteristics of a watershed. The principles involved in the unit hydrograph are stated in U.S. Geological Survey Water-Supply Paper 772 (Hoyt and others, 1936).

A unit-hydrograph study was made of storms occurring during the period 1959-64 in the Cow Bayou drainage area. The nine floodwater-retarding structures upstream from the stream-gaging station probably affected the shape of the hydrograph somewhat. However, unit hydrographs for this period can be compared with unit hydrographs after the additional 17 structures have been built.

Only those storms with runoff of 0.25 inch or more were investigated for the unit hydrograph of this drainage area. Of these, some were not used because of inability to correlate rainfall and runoff for complex storms. Seven storms were selected which met the criteria of reasonably uniform hydrographs and rainfall. Each ordinate of the observed net hydrograph was adjusted to unit-hydrograph data and plotted. Figure 12 shows the unit hydrograph for each storm and Table 13 lists several parameters for each of the storms.

Brater (1940), in a study on very small watersheds ranging from 4.24 to 1,876.7 acres, concluded that any storm with sufficient intensity to produce surface runoff would produce a consistent unit hydrograph provided that the duration of rainfall was equal to or less than the time of rise. Subsequent discussions of Brater's paper by Franklin F. Snyder and L. K. Sherman indicated their disagreement with Brater's conclusion. They believed that time of rise of the unit hydrograph was not independent of duration of rainfall, even though the duration did not exceed the time of rise.

"Unit-hydrograph duration" was chosen as 2 hours. Table 13 shows that the duration of storms 1, 3, 4, 6, and 7 ranged from 62 percent to 125 percent of 2 hours. This is within the 200 percent limit set by Mitchell (1948). Effective duration is defined as that portion of a runoff-producing rainfall which has an intensity of 0.10 inch per hour or greater. Note that for storms mentioned above, the time of rise varies from 4 to 5 hours. Time or rise is defined as the time interval on the rising limb between the minimum and maximum discharge. On the other hand, storms 2 and 5 had an effective duration of 5.25 hours and 8.00 hours,

Table 13.—Parameters for Seven Storms Selected for Unit-Hydrograph Study

STORM NO.	DATE OF STORM	DURATION OF EFFECTIVE RAINFALL (HOURS)	WEIGHTED-MEAN RAINFALL (INCHES)	DIRECT RUNOFF (INCHES)	PEAK OF UNIT HYDROGRAPH (CFS)	TIME OF RISE (HOURS)
1	June 23, 1959	2.50	3.81	0.81	8,240	4
2	Oct. 4, 1959	5.25	6.57	1.32	5,980	7
3	Dec. 15, 1959	2.50	2.53	.43	11,100	5
4	Jan. 8, 1961	2.50	.43	.26	8,450	4
5	Feb. 5, 1961	8.00	2.30	.53	8,050	9
6	June 8, 1961	1.25	2.58	.28	10,800	5
7	June 28, 1962	2.25	2.89	.33	10,500	5

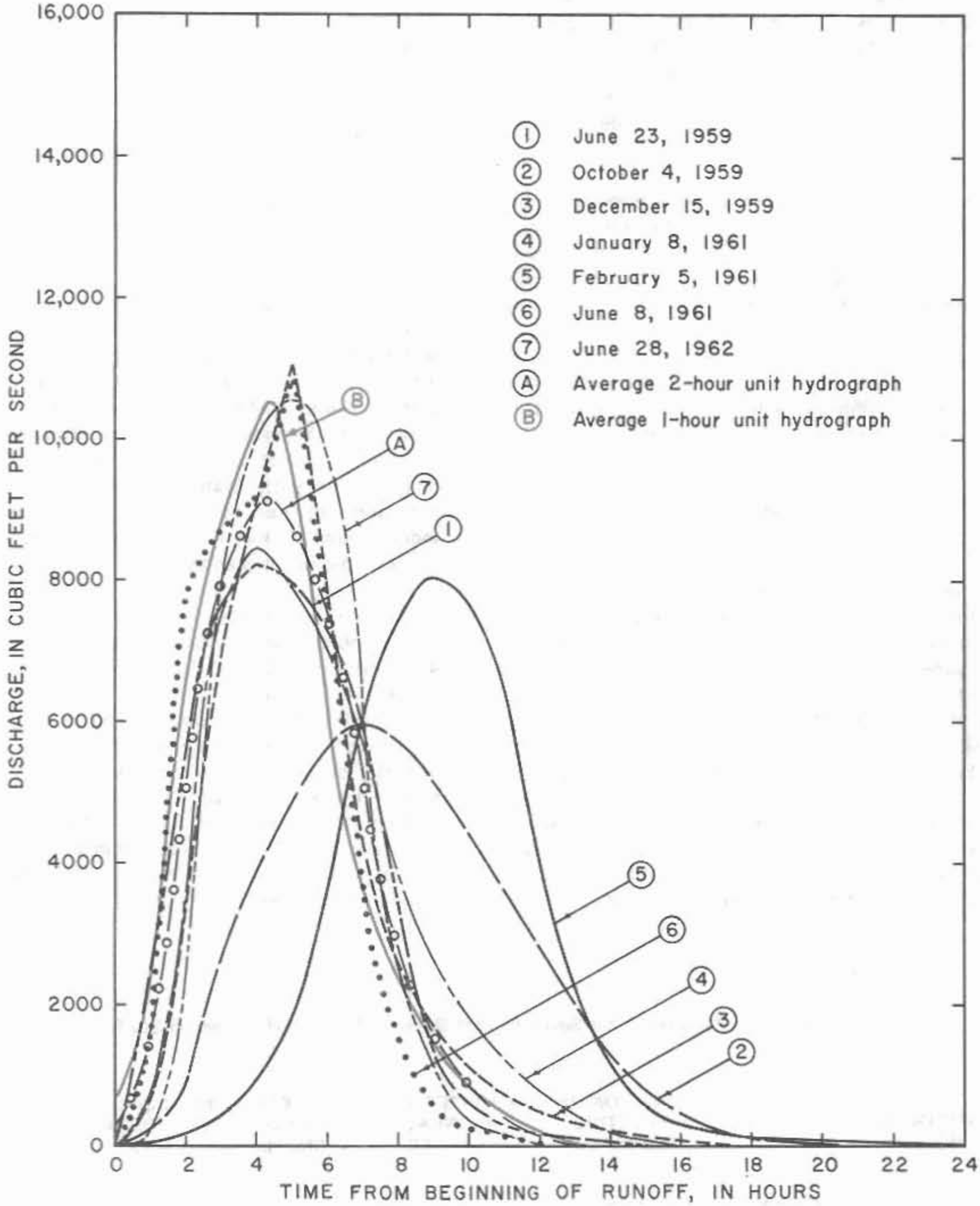

Figure 12

Selected Unit Hydrographs for Cow Bayou at Mooreville

Table 14.—Average 1-Hour Unit Hydrograph, Cow Bayou Drainage Area

TIME FROM BEGINNING OF RUNOFF (HOURS)	DISCHARGE (CFS)	TIME FROM BEGINNING OF RUNOFF (HOURS)	DISCHARGE (CFS)
1	1,100	8	3,100
2	3,900	9	2,000
3	7,400	10	1,200
4	9,400	11	600
5	10,400	12	140
6	8,200	13	60
7	4,900	14	0

respectively, and a correspondingly larger time of rise of 7 and 9 hours, respectively. These storms tend to bear out Snyder's and Sherman's reasoning that the unit hydrograph is not independent of duration of rainfall.

An average 2-hour unit hydrograph was drawn using unit hydrographs for storms 1, 3, 4, 6, and 7. This unit hydrograph was then reduced to a 1-hour unit hydrograph (Mitchell, 1948). Table 14 shows the hourly points of the 1-hour unit hydrograph.

Multiple Correlation

The amount of surface or storm runoff resulting from a given rainfall is dependent upon numerous factors which include: intensity, duration, areal distribution, and total amount of rainfall; antecedent soil-moisture conditions; surface and subsurface geology; topography; vegetal cover; land-management practices; and seasonal effects. For a particular watershed, topography and surface and subsurface geology remain essentially constant. Variations in land-management practices during the period of record did not produce detectable variations in the runoff characteristics of the study area. Vegetal cover varies and cannot be evaluated for each storm with available data; however, part of the variation will be compensated for by adjusting for the seasonal effects. This leaves intensity, duration, and areal distribution of rainfall; total storm rainfall; antecedent soil moisture conditions; and seasonal effects as variables that could be analyzed in arriving at a general rainfall-runoff relationship. An attempt was made to construct a coaxial rainfall-runoff relation for site 4 and the stream-gaging station.

Duration and total storm rainfall were used as variables, therby indirectly making rainfall intensity also a variable. All storms with rainfall above 0.4 inch, which were reasonably uniform over the study area, were selected for study. Weighted-mean rainfall, duration of rainfall, runoff, and antecedent precipitation index (API) were computed for each of these storms. Table 15 is a list of the storms and the individual factors. In addition, maximum storm rainfall for 15-minute, 30-minute, and 60-minute periods for site 4 is shown for future studies.

There were not sufficient data available to construct a reliable coaxial rainfall-runoff relation for either site 4 or the stream-gaging station. Further analyses may be possible, using techniques which are better worked with a computer.

SUMMARY AND CONCLUSIONS

1. Three geological formations crop out in the study area. These formations are relatively impervious and yield little or no water to wells. Soils over the area are fairly thin. The tight formations prevent most of the soil moisture from percolating to the water table.

2. Runoff from 28 percent of the Cow Bayou area drains into 301 farm ponds which have a combined capacity of 1,622 acre-feet. These ponds were, for the most part, in the area before the period of record; therefore, they should not be used as a variable when evaluating the data collected.

3. Water in the pools, when compared to the current quality standards, was found to be as follows:

Domestic and municipal uses—The water contained more than the recommended maximum limit of 500 mg/l for dissolved solids in the upper part of the area (sites 1, 3, 4, and 10), more than the maximum limit of 250 mg/l for sulfate in upper South Cow Bayou (sites 1, 3, and 4), and less than the maximum limit of 250 mg/l for chloride (all sites).

Irrigation—The water had a high salinity hazard in the upper portion of the area (sites 1, 3, 4, and 10), a medium salinity hazard for all other sites, and a low sodium hazard for all sites.

Industrial use—The water was of suitable quality for many types of industry and processes.

Trap efficiency of pools—The pools should have a fairly high sediment-trap efficiency because the calcium-sodium ratio is approximately 7:2.

4. An annual sedimentation rate of 2.76 acre-feet per square mile per year has occurred at site 4.

5. The data show that since 1958 when all nine structures were completed, the floodwater-retarding structures contained all floodflows into the pools, thereby causing outflow to pass through the principal

spillways designed for this purpose. In May 1957, flow over the emergency spillway occurred at sites 1, 3, 4, 6, and 8. The spillway at site 4 washed out during this flood because there had not been sufficient time to establish a protective grass cover. No other flow over the emergency spillway has occurred.

6. For the period 1959-64, 49,730 acre-feet of water entered the pools. Of this amount, 3,010 acre-feet was rainfall on the pool surfaces. Outflow was 41,000 acre-feet; 4,960 acre-feet evaporated; and 3,970 acre-feet was taken up by seepage and other losses.

7. The water budget factors for each drainage area include rainfall, runoff, and consumption. Runoff for the period 1959-64 varied from 12 percent of the rainfall on site 4 drainage area to 22 percent of the rainfall on site 3 drainage area. Seventeen percent of the rainfall on the entire watershed flowed past the streamflow-gaging station.

8. The runoff that would have flowed past the floodwater-retarding structures, had they not been built, was determined by adjusting for the effect of rainfall directly on the pools. Discharge at the stream-gaging stations cannot be completely adjusted for the effect of the floodwater-retarding structures because the final disposition of the channel losses between the sites and the stream-gaging station cannot be determined with the present instrumentation.

9. Total rainfall for the Cow Bayou drainage area computed from as few as two gages was approximately the same as total rainfall computed from nine rain gages.

10. An average 1-hour unit hydrograph was developed from five storms. Time of runoff was 14 hours, and time from beginning of rise to peak was 5 hours. Unit peak discharge was 10,400 cfs.

11. There was not sufficient data to develop a coaxial relationship.

EVALUATIONS AND RECOMMENDATIONS CONCERNING THE SMALL-WATERSHED STUDIES IN TEXAS

This section appraises the adequacy of the methodology and instrumentation now in use, and suggests other methods and additional instrumentation where these seem to be needed, for attaining the eight objectives of the investigations in Texas as given in the Introduction of this report.

Basic hydrologic data are being obtained that can be used to evaluate some surface-water and quality of water relationships. No ground-water data are being obtained. Cow Bayou is in an area that experiences base flow for a long period after a wet season. It is recommended for future studies in this type of area that ground-water observation wells be located upstream and downstream from one site so that any change in the ground-water table can be observed. In addition, inflow gages should be located at all inflow points and a tight control be exercised on any outflow. These data can be used to help identify some of the smaller items in the water budget such as seepage and transpiration.

Sufficient hydrologic data are being obtained at the stream-gaging stations to show discharge from the study area. However, more data are needed to ascertain channel losses.

1. Data obtained thus far on Cow Bayou watershed limit the extent to which the net effect of the floodwater-retarding structures on volume and rate of streamflow at downstream points can be determined. However, because more structures are to be built, the existing data-collection program may be sufficient to show the effect. For future studies at other watersheds it is recommended that the watershed be instrumented before floodwater-retarding structures are built so that "before" and "after" data are available for evaluation.

It is further recommended that a control-study area (a contiguous area if possible) be equipped for a better determination of the effects of floodwater-retarding structures. This control study area should be located near the watershed and contain as few man-made structures as possible. Runoff from both areas could be compared to see if the effects of the structures could be determined.

2. The geology of the area is such that there is little possibility of percolation of water to the water table. Even though the Austin Chalk yields no water to wells, it does contain fractures that carry water. See introductory remarks above for recommendations for ground-water observation wells.

3. Sufficient data are being collected to show the sediment yield of the area and to determine sediment-trap efficiency of the structures.

4. Sufficient data are being collected to provide methods for making reliable estimates of runoff resulting from rainfall on a small watershed.

5. When one study area is being analyzed for rainfall-runoff relationships, there are certain factors that remain relatively unchanged. Topography, geology, slope, shape, size, and ground cover (seasonally at least) are some of the factors. Assuming these factors to be constants, a study of the effect of other factors affecting the rainfall-runoff relationship could be initiated. Antecedent rainfall, intensity, overall length of the storm, and time of year are some of the factors to be considered. A combination of these factors could be programmed for a computer. By establishing coefficients

for these factors, different study areas could then be used for the size, shape, etc., factors.

6. Adequate data are not available from this investigation to check the applicability of flood-routing procedures and techniques for small streams.

7. Studies indicate that practically the same amount of total rainfall over the area could have been computed with fewer rain gages. It is recommended that for future study areas, where only total rainfall over the area is needed, fewer rain gages be installed. It is further recommended that if fewer rain gages are installed, they be standard U.S. Weather Bureau recording rain gages. The timing of a storm is as important as the quantity insofar as unit hydrographs and other rainfall-runoff relations are concerned.

8. Sufficient data are being collected to determine the quality of water as to its suitability of use and its flocculating characteristics.

GLOSSARY OF TERMS

Acre-feet (ac-ft).—A term used in measuring the volume of water, equal to the quantity of water required to cover 1 acre 1 foot in depth, or 43,560 cubic feet.

Base runoff.—Sustained or fair weather runoff.

Consumption.—That part of the total identified water that does not appear as outflow or runoff. For the pools it includes evaporation, transpiration, seepage, and other depletions; for each subarea it is rainfall minus direct runoff.

Contents.—The volume of water in a pool. Volume is computed on the basis of a level pool and does not include bank storage.

Cubic feet per second (cfs).—A rate of discharge of a stream whose channel is 1 square foot in cross-sectional area and whose average veolcity is 1 foot per second.

Cfs-day.—The volume of water represented by a flow of 1 cubic foot per second for 24 hours. It equals 86,400 cubic feet, 1.983471 acre-feet, or 646,317 gallons.

Drainage area.—Area drained by a stream at a specific location, measured in a horizontal plane, which is so enclosed by a topographic divide that direct surface runoff from rainfall normally would drain by gravity into the stream above the specified point.

Runoff.—Where expressed in acre-feet, this is the total volume of water from an area discharged through surface streams during the designated period. Where expressed in inches, it is the depth to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Sediment.—Fragmental material that originates mostly from rocks and is transported by, suspended in, or deposited from water or air, or is accumulated in beds by other natural agencies.

Water budget.—An accounting of water gains and losses in a subarea.

Water year.—The 12-month period, October 1 through September 30. The water year is designated by the calendar year in which it ends. Thus, the year ending September 30, 1961, is called the "1961 water year."

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Table 15.--Parameters That Effect Rainfall-Runoff Relation for Storms in the Cow Bayou Area, Water Years 1957-64

Date of storm	Effective storm duration (hours)	Parameters for site 4 (inches): Weighted-mean rainfall: Total	Maximum increment (minute): 15	30	60	Runoff	Antecedent precipitation index	Parameters for stream-gaging station (inches): Weighted-mean rainfall	Runoff	Antecedent precipitation index
Mar. 20, 1957	2.75	1.61	0.67	0.97	1.14	0.16	1.07			
27	1.12	.66	.40	.56	.63	.07	1.12			
31	4.50	.70	.21	.21	.33	.001	1.07			
Apr. 19	4.75	5.71	1.47	1.69	2.33	1.89	.53			
22	1.50	.49	.16	.23	.37	.02	4.25			
23	4.50	3.35	.66	.99	1.54	1.65	4.17			
24	3.00	2.77	1.17	1.78	2.25	1.82	6.62			
26-27	5.00	2.23	.77	1.06	1.47	1.28	7.27			
28	2.75	1.15	.23	.41	.64	.45	8.46			
May 9	1.25	.41	.20	.31	.37	.02	2.86			
11	4.50	7.14	1.54	2.23	3.27	5.02	2.53			
13	2.00	1.32	.71	.98	1.17	.70	7.48			
Sept. 7	1.88	1.02	.40	.50	.79	.003	.29			
21-22	13.50	4.15	.40	.71	1.13	.02	.22			
Oct. 13-14	18.50	7.24	1.03	1.39	1.59	1.33	.32			
21-22	15.38	1.49	.12	.17	.22	.09	3.34			
Nov. 2-3	6.38	.71	.09	.16	.17	.01	1.04			
5	2.12	.67	.12	.15	.27	.03	1.41			
7	1.12	.42	.15	.19	.22	.05	1.65			
21-22	10.25	.41	.04	.08	.08	.01	.79			
23-24	5.50	.93	.12	.19	.31	.32	1.08			
Jan. 12, 1958	3.75	.59	.06	.12	.20	.004	.05			
19	1.38	.41	.13	.18	.27	.009	.70			
Feb. 9-10	11.00	.66	.07	.07	.10	.009	.09			
21-23	17.75	3.76	.12	.23	.40	.11	.38			
Apr. 8-9	2.88	.63	.27	.33	.38	.004	.11			
13	3.25	.41	.08	.12	.16	.005	.44			
13	.25	.79	.79	.79	.79	.03	.85			
20	4.25	.53	.15	.15	.23	.008	.80			
26	2.88	1.67	.84	.94	1.14	.16	.62	Note.--Continuous recorder installed June 10, 1958.		
June 16	.75	.45	.25	.34	.45	0	.08			
16-17	7.62	3.34	.71	1.22	1.58	.15	.53	2.50	0.08	0.40
Aug. 23	2.75	.52	.17	.22	.26	0	.58	.57	.003	.96
24	3.62	1.09	.47	.58	.75	0	.97	1.20	.006	1.37
Dec. 29-30	5.25	.81	.07	.15	.17	.003	.04	.86	.002	.05
Feb. 12, 1959	2.50	.44	.21	.28	.30	0	.29	.43	.003	.33
14	3.25	1.17	.30	.41	.67	.006	.59	1.16	.02	.62
Apr. 11	5.50	1.28	.28	.38	.53	.006	.44	1.26	.02	.48
19	.62	.56	.36	.49	.56	.007	1.32	.57	.01	1.33
May 22-23	5.50	.85	.09	.15	.23	.001	.50	1.05	.01	.39
June 1	.40	.44	.38	.44	.44	.005	.43	.36	.004	.46
2	1.50	1.12	.65	.81	.91	.02	.77	.91	.02	.72
4	1.62	1.17	.56	.88	1.00	.06	1.46	1.09	.08	1.26
23	2.50	3.55	.66	1.04	1.92	.64	.67	3.52	.81	.78
July 20	4.00	2.63	.62	1.04	1.51	.08	.24	2.16	.05	.24
20-21	4.25	.44	.07	.11	.19	.005	2.53	.36	.003	2.11
Aug. 26	3.12	.49	.12	.14	.23	0	.33	.46	0	.50
27	2.50	.42	.07	.13	.25	0	.72	.49	0	.84
31	3.50	1.14	.68	.73	.80	.009	.68	1.33	.02	.80
Sept. 14	4.75	.74	.08	.14	.24	0	.39	.80	.003	.49
28-29	3.50	2.04	.80	1.42	1.67	.05	.55	1.45	.03	.47
Oct. 4	5.88	6.00	.57	1.09	1.82	1.42	1.52	6.41	1.32	1.19
13	7.12	1.78	.30	.39	.75	.14	2.38	1.57	.15	2.40
Dec. 15	5.50	2.62	.92	1.26	1.59	.58	.17	2.62	.43	.17
31	3.50	1.28	.15	.20	.40	.23	.46	1.31	.32	.53
Jan. 5, 1960	6.38	.63	.05	.08	.14	.17	.92	.66	.16	.97
16	1.00	.53	.19	.35	.53	.04	.51	.56	.07	.60
Feb. 3	2.50	1.00	.20	.30	.35	.13	.15	.87	.11	.18
Mar. 25-26	2.62	.62	.08	.14	.22	.01	.04	.57	.01	.07
May 20	1.25	.98	.55	.72	.89	.005	.13	1.01	.02	.10
25	.88	.79	.60	.60	.70	.003	.59	.69	.01	.59
June 12	1.50	.56	.40	.50	.55	.003	.24	.89	.02	.33
Oct. 13-14	3.50	2.27	.59	.83	1.43	.06	.25	2.21	.10	.25
18	6.75	2.16	.58	.88	1.29	.20	1.55	2.46	.43	1.52
28-29	3.88	.97	.08	.17	.32	.11	2.14	1.15	.16	2.39
Dec. 6-8	24.75	5.61	.15	.28	.54	1.50	.23	5.68	1.96	.22
28	3.75	.61	.34	.43	.51	.02	.48	.56	.02	.52
30-31	2.75	.60	.09	.16	.28	.12	.91	.65	.10	.89

Table 15.--Parameters That Effect Rainfall-Runoff Relation for Storms in the Cow Bayou Area, Water Years 1957-64--Continued

Date of storm	Effective storm duration (hours)	Parameters for site 4 (inches)						Parameters for stream-gaging station (inches)		
		Weighted-mean rainfall				Runoff	Antecedent precipitation index	Weighted-mean rainfall	Runoff	Antecedent precipitation index
		Total	Maximum increment (minute) 15	30	60					
Jan. 6-8, 1961	26.25	2.58	0.14	0.28	0.55	1.24	0.62	3.00	1.50	0.63
11-12	17.88	1.50	.07	.11	.19	1.17	1.92	1.74	.84	2.18
Feb. 5	9.50	2.28	.09	.17	.35	.56	.24	2.34	.53	.27
16	3.25	.79	.10	.18	.32	.12	.94	.76	.16	.96
Mar. 16	2.00	1.42	.52	.85	.91	.06	.07	1.41	.12	.08
27	1.62	1.36	.79	.82	.82	.08	.36	1.01	.07	.37
May 25	2.12	.71	.37	.37	.37	.01	.47	.64	.009	.37
June 8	1.25	2.80	1.23	1.88	2.73	.23	.35	2.76	.28	.33
15-16	10.38	1.32	.25	.31	.44	.02	1.73	1.38	.04	1.98
17-18	11.50	.90	.06	.09	.14	.10	3.24	.94	.25	3.54
25	.50	.98	.85	.98	.98	.04	1.69	1.20	.19	1.83
Sept. 11-12	23.12	3.76	.16	.20	.32	.06	.09	3.79	.16	.19
Oct. 2	3.12	1.32	.54	.67	.76	.01	.30	1.16	.01	.31
Nov. 2	2.88	.72	.31	.52	.57	.002	.07	.92	.01	.10
13	2.88	.50	.15	.24	.35	.002	.19	.44	.001	.25
21	4.38	.86	.24	.31	.37	.02	.38	.72	.009	.37
22	.88	.68	.20	.39	.68	.06	1.09	.56	.02	.96
Feb. 14-15, 1962	2.12	.60	.18	.20	.25	.004	.05	.55	.004	.05
23	3.25	.42	.06	.08	.16	.004	.24	.53	.003	.23
Mar. 10	2.50	.80	.31	.33	.39	.006	.10	.91	.01	.11
Apr. 4	2.62	.56	.23	.27	.32	0	.04	.60	.001	.05
22-23	3.38	.47	.13	.21	.27	.003	.13	.63	.005	.16
27	4.25	1.28	.32	.42	.45	.02	.36	1.52	.07	.47
May 28-29	5.50	2.89	.50	.85	1.32	.04	.05	2.59	.07	.05
June 1	.62	1.05	.47	.89	1.05	.04	2.21	1.05	.04	2.02
8	1.25	.51	.22	.33	.37	.003	1.45	.68	.09	1.37
9	2.25	.57	.31	.50	.50	.02	1.72	.76	.05	1.80
Sept. 7-8	4.25	.93	.19	.24	.33	0	.18	1.15	.001	.23
Oct. 8-9	5.62	.74	.14	.23	.33	0	.19	.76	.001	.13
Nov. 19	3.25	.44	.06	.06	.09	0	.13	.48	0	.15
26-27	9.25	1.42	.24	.34	.66	.004	.45	1.56	.006	.49
Dec. 2	2.12	.48	.07	.13	.21	.001	.99	.51	.001	1.08
Feb. 17-18, 1963	12.75	.80	.04	.07	.13	0	0	.86	.003	.03
Apr. 4-5	11.75	1.27	.05	.09	.17	.003	.04	1.41	.004	.04
June 16	4.00	1.46	.41	.72	.82	.001	.08	1.38	0	.07
19	1.50	.67	.42	.52	.58	0	1.05	.63	0	.99
Jan. 29-30, 1964	15.75	2.35	.22	.31	.52	.07	.24	2.12	.03	.26
Feb. 4	1.62	.72	.21	.36	.48	.01	1.37	.65	.005	1.26
Mar. 9	.88	.41	.15	.22	.34	.001	.30	.44	.002	.42
18-19	4.00	1.59	.31	.44	.69	.07	.25	1.51	.03	.30
Apr. 5	1.00	.90	.72	.78	.80	.001	.25	--	--	--
25	.75	.60	.43	.56	.60	.002	.58	.61	.003	.62
26	1.50	.67	.38	.46	.51	.02	1.04	.68	.05	1.08
May 1	.50	.50	.38	.50	.50	.001	.90	.51	.008	.93
9	1.25	.67	.27	.36	.54	.006	.67	.65	.01	.69
Aug. 15-16	4.25	1.54	.69	.95	1.06	0	.02	1.38	0	.02
21-22	2.50	1.48	.45	.72	.78	0	1.01	2.07	0	.91
Sept. 16	2.75	1.14	.56	.66	.81	0	.28	1.18	0	.38
20	.38	.52	.48	.52	.52	0	.85	.54	0	.94
24	3.62	1.06	.26	.46	.59	.002	1.18	1.47	0	1.27
27	4.75	.65	.06	.09	.11	0	1.67	.62	0	2.01

Table 16.--Summary of Rainfall, in Inches, for Cow Bayou Study Area, October 1954 to September 1964

Date of Storm	Gage Number									
	1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
	Rain gages installed Oct. 26, 1954									
1954										
Oct. 27	0	0.50	0.44	0	0.49	0.39	0.29	0.24	0	
Monthly Totals a/	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	
Nov. 3	1.04	1.17	.95	1.58	1.46	.77	.96	.94	.73	
14	1.76	2.00	1.92	2.00	1.70	2.01	2.03	2.15	2.20	
Monthly Totals	2.80	3.17	2.85	3.58	3.16	2.78	2.99	3.09	2.93	
Dec. 11	.18	.50	.28	.25	.37	.80	.14	.11	.32	
11-12	.04	.13	.07	.06	.09	.20	.04	.03	.08	
28	T	.02	.25	.25	.07	.06	.07	.02	.03	
Monthly Totals	0.22	0.65	0.60	0.56	0.53	1.06	0.25	0.16	0.43	
1954 CALENDAR YEAR TOTALS	--	--	--	--	--	--	--	--	--	
1955										
Jan. 5	.08	.08	.07	.08	.08	.07	.07	.08	.10	
7	.08	.09	.08	.10	.08	.08	.09	.09	.11	
8	.11	.11	.10	.12	.11	.10	.11	.12	.13	
9	.03	.03	.03	.04	.03	.03	.03	.03	.04	
9-10	.38	.40	.35	.44	.38	.37	.39	.42	.48	
14-15	.09	.11	.10	.10	.09	.11	.10	.10	.09	
15	.11	.14	.13	.13	.12	.14	.13	.13	.12	
16	.14	.18	.16	.16	.15	.18	.16	.16	.15	
17-18	.65	.66	.65	.66	.70	.68	.68	.74	.86	
20	0	0	.02	0	0	0	0	0	0	
Monthly Totals	1.67	1.80	1.69	1.83	1.74	1.76	1.76	1.87	2.08	
Feb. 3	.42	.46	.44	.45	.39	.48	.46	.50	.63	
4	.70	.75	.73	.74	.65	.79	.76	.82	1.05	
5-6	.38	.41	.40	.41	.36	.43	.42	.45	.58	
19	2.10	1.57	2.07	2.05	2.00	2.00	1.95	1.37	1.24	
20	.08	.06	.08	.08	.08	.08	.07	.05	.05	
Monthly Totals	3.68	3.25	3.72	3.73	3.48	3.78	3.66	3.19	3.55	
Mar. 20	1.33	1.04	.92	1.22	1.33	.94	.94	1.23	1.07	
21	.59	.46	.41	.54	.59	.41	.41	.54	.47	
31	.49	.35	.40	.59	.63	.54	.48	.46	.49	
Monthly Totals	2.41	1.85	1.73	2.35	2.55	1.89	1.83	2.23	2.03	
1955										
Apr. 8-9	0.11	0.13	0.13	0.13	0.10	0.12	0.17	0.13	0.13	
9-10	3.00	3.50	3.52	3.35	2.62	3.22	4.53	3.50	3.59	
12	T	T	.01	T	T	T	T	T	T	
20	T	T	.05	T	T	T	T	T	T	
28	T	T	.05	T	T	T	T	T	T	
30	T	T	.10	T	T	T	T	T	T	
Monthly Totals	3.11	3.63	3.85	3.48	2.72	3.34	4.70	3.63	3.72	
May 6	.85	2.42	1.15	.51	.62	.80	1.08	1.32	.93	
10	.23	.26	.25	.20	.11	.12	.12	.16	.13	
11	.39	.45	.42	.34	.19	.21	.21	.28	.23	
11	.99	1.69	1.35	1.18	.84	1.43	1.79	.93	1.97	
16	.16	.11	.10	.15	.31	.10	.08	.08	.10	
16, 17	.74	.48	.43	.69	1.38	.44	.34	.35	.45	
18	.35	.36	.30	.29	.30	.29	.23	.24	.30	
19	1.72	1.33	1.50	2.34	2.39	1.45	1.14	1.18	1.51	
23	.19	.15	.25	.14	.09	.14	.14	.11	.12	
26	.10	.20	.37	.45	.41	.62	.43	.61	.52	
Monthly Totals	5.72	7.39	6.12	6.29	6.64	5.60	5.56	5.26	6.26	
June 4	.37	.38	.26	.26	.22	.13	.16	.12	.16	
5	.38	.39	.26	.27	.23	.14	.17	.13	.17	
8	.10	T	.30	.20	.22	.20	.24	.66	.52	
8	.95	.73	.71	.83	.93	.74	.60	1.06	.82	
9-10	.06	.12	.14	.07	.05	.10	.10	.12	.12	
15	.53	.81	.56	.30	.63	.28	.89	.56	.65	
16	.01	0	0	.61	.02	0	.17	.01	T	
18	.45	.42	.39	.27	.30	.15	.40	.14	.12	
20	.17	.16	.15	.11	.11	.06	.16	.05	.04	
22	0	0	.07	0	0	.12	0	0	T	
Monthly Totals	3.02	3.01	2.84	2.92	2.71	1.92	2.89	2.85	2.60	
July 4	.20	0	.50	.03	0	0	0	0	0	
14	.42	.02	.29	.11	.26	T	T	.03	.15	
16	.12	.02	T	T	T	.81	.20	.01	0	
17	.73	.88	.39	.03	.61	.46	.38	.14	.05	
18	.63	.22	.03	.65	.51	2.00	.33	0	0	
19	.09	.24	.11	.08	.05	.06	.19	.62	.23	
20	0	0	0	0	0	0	.02	0	.03	
Monthly Totals	2.19	1.38	1.32	0.90	1.43	3.33	1.12	0.80	0.46	

a/ October 1954 rainfall total estimated by averaging rainfall at Hewitt 1SE, McGregor, and Troy.

Table 16.--Summary of Rainfall, in Inches, for Cow Bayou Study Area, October 1954 to September 1964--Continued

Date of Storm	Gage Number 1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1955										
Aug. 3	1.11	0.32	0.58	1.30	0.69	0.44	0.47	1.11	0.67	
4	.05	.02	.03	.06	.03	.02	.02	.05	.03	
10	.77	.56	.64	.92	.56	.55	.58	.85	.59	
11	1.33	.96	1.09	1.58	.96	.95	.99	1.45	1.00	
12	T	.26	1.18	T	T	.50	.89	.27	T	
18	1.26	.84	1.15	2.39	2.68	2.03	2.21	1.81	1.70	
19	.24	.26	.22	.23	.31	.16	.18	.34	.32	
20	.49	.53	.45	.46	.63	.33	.35	.68	.63	
28	.09	.02	.09	.06	.38	.03	.02	.03	.01	
30	.06	T	0	T	T	T	0	0	0	
31	.05	T	T	.15	.20	.07	.01	0	0	
Monthly Totals	5.45	3.77	4.43	7.15	6.44	5.08	5.72	6.59	4.95	
Sept. 10-11	.68	.79	.92	.64	.95	.60	.57	.71	.58	
11	.18	.12	.16	.28	.26	.31	.18	.10	T	
12	.14	.10	.13	.23	.22	.26	.15	.08	T	
23	.95	.71	.60	.77	.91	.71	.88	.62	.65	
23	.09	.07	.06	.08	.09	.07	.09	.06	.07	
26	T	T	.04	.10	.12	.70	.70	.29	.08	
Monthly Totals	2.04	1.79	1.91	2.10	2.55	2.65	2.57	1.86	1.38	
1955 WATER YEAR TOTALS	33.71	33.09	32.46	36.29	35.35	34.59	34.45	32.93	31.79	
Oct. 1	T	T	0	.12	0	.15	.04	0	.02	
6	.15	.26	.07	.33	.67	.25	.38	.37	.25	
Monthly Totals	0.15	0.26	0.07	0.45	0.67	0.40	0.42	0.37	0.27	
Nov. 8	.17	.22	.24	.18	.11	.14	.25	.24	.23	
16	.02	T	T	.02	.01	.02	.01	T	.01	
23	0	.07	.08	0	0	.08	0	0	0	
30	.80	.81	.82	.81	.79	.82	.89	.95	1.01	
Monthly Totals	0.99	1.10	1.14	1.01	0.91	1.06	1.15	1.19	1.25	
Dec. 1	.49	.50	.50	.49	.49	.50	.55	.58	.61	
22	T	T	0	T	T	T	T	0	T	
Monthly Totals	0.49	0.50	0.50	0.49	0.49	0.50	0.55	0.58	0.61	
1955 CALENDAR YEAR TOTALS	30.92	29.73	29.32	32.70	32.33	31.31	31.93	30.42	29.16	
1956										
Jan. 17-18	1.67	1.98	1.67	1.88	1.86	1.55	1.41	1.28	1.24	
21	.05	.03	.04	.05	.04	.04	.05	.07	.07	
21	1.17	.76	.90	1.04	.98	1.00	1.16	1.51	1.50	
22	.04	.03	.03	.03	.03	.03	.04	.05	.05	
29	.20	.68	.37	.30	.34	.20	.30	.31	.23	
Monthly Totals	3.13	3.48	3.01	3.30	3.25	2.82	2.96	3.22	3.09	
1956										
Feb. 1	0.21	0.25	0.28	0.34	0.26	0.27	0.40	0.35	0.36	
2	.29	.33	.38	.45	.36	.37	.54	.47	.49	
8	.90	.92	.95	.95	.97	1.00	1.18	1.09	1.06	
10	.02	.01	T	.02	.02	.02	.02	.01	T	
16	.01	T	T	.01	T	.01	.01	T	.01	
19	.06	T	T	.01	.03	T	T	T	T	
23	.01	.02	0	.01	.01	.01	.02	T	.01	
25	.35	.20	.25	.27	.12	.29	.31	.28	.17	
Monthly Totals	1.85	1.73	1.86	2.06	1.77	1.97	2.48	2.20	2.10	
Mar. 7	T	T	T	T	T	T	.01	.02	.04	
12	.06	.06	.06	.09	.04	.06	.06	.10	.03	
13	.02	.02	.02	.03	.01	.02	.02	.03	.01	
21	.06	.05	.05	.05	.03	.06	.06	.04	.06	
Monthly Totals	0.14	0.13	0.13	0.17	0.08	0.14	0.15	0.19	0.14	
Apr. 2	T	0	0	T	T	0	0	T	T	
5	.46	.24	.27	.33	.32	.42	.47	.45	.34	
9	T	.01	.01	.03	.01	.07	.08	.15	.05	
15	.01	T	T	T	.03	.01	.01	.01	.03	
19	.01	.05	.03	.01	.01	.01	.03	.02	.02	
21	.20	.23	.17	.27	.20	.20	.24	.27	.18	
30	.02	.03	.03	.01	.02	T	.05	.05	.05	
Monthly Totals	0.70	0.56	0.51	0.65	0.59	0.71	0.88	0.95	0.67	
May 1	1.30	.19	.30	.67	1.43	.44	.40	.58	.12	
1-2	3.00	3.06	3.24	3.19	3.18	2.55	2.60	2.19	2.34	
3	.01	.01	0	.01	.01	.01	.01	.03	.05	
15	.86	.29	.28	.64	.51	.72	.12	.23	.23	
26	.02	.06	.25	.70	.39	.11	.02	0	0	
28	0	.02	.11	0	T	T	T	.01	.02	
29	0	0	.03	0	0	0	0	0	0	
30	.96	.72	.46	.45	.58	.52	.81	.87	.82	
Monthly Totals	6.15	4.35	4.67	5.66	6.10	4.35	3.96	3.91	3.58	
June 9	.04	.03	.03	.04	.04	.04	.03	.03	.03	
15	0	0	0	0	0	0	.20	0	0	
28-29	T	.18	.03	0	T	.11	T	.02	.02	
Monthly Totals	0.04	0.21	0.06	0.04	0.04	0.15	0.23	0.05	0.05	
July 4	0	0	.05	0	0	0	0	0	0	
9	0	0	0	0	0	.03	.04	0	0	
20	.18	.15	.15	.22	.18	.45	.32	.37	.37	
26	0	0	0	.06	.02	.03	.23	.02	.08	
Monthly Totals	0.18	0.15	0.20	0.28	0.20	0.51	0.59	0.39	0.45	

Table 16.--Summary of Rainfall, in Inches, for Cow Bayou Study Area, October 1954 to September 1964--Continued

Date of Storm	Gage Number 1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1956 Aug. 20	0.25	0.10	0.09	0.12	0.04	0.06	0.03	0.25	0.43	
30	.27	.22	.35	.14	.18	.20	.16	.08	.07	
31	.03	0	0	.06	0	.02	.02	.14	.02	
Monthly Totals	0.55	0.32	0.44	0.32	0.22	0.28	0.21	0.47	0.52	
Sept.	0	0	0	0	0	0	0	0	0	
Monthly Totals	0	0	0	0	0	0	0	0	0	
1956 WATER YEAR TOTALS	14.37	12.79	12.59	14.43	14.32	12.89	13.58	13.52	12.73	
Oct. 9	0	.13	0	0	0	0	.03	0	0	
15	.92	.98	.50	.41	.38	.41	.50	.47	.92	
16	.09	.56	.18	.03	.03	.71	.44	.14	.11	
17	.04	.24	.08	.01	.01	.30	.19	.06	.04	
30	.03	.03	.03	.04	.02	.03	.03	.02	.03	
Monthly Totals	1.08	1.94	0.79	0.49	0.44	1.45	1.19	0.69	1.10	
Nov. 2	.52	.52	.55	.71	.73	.43	.46	.67	.57	
3-4	1.87	1.62	1.31	1.60	1.69	1.78	2.11	2.07	1.95	
20	0	0	0	0	0	.12	.05	0	0	
Monthly Totals	2.39	2.14	1.86	2.31	2.42	2.33	2.62	2.74	2.52	
Dec. 18	.17	.16	.17	.19	.17	.20	.22	.17	.24	
18	.73	.69	.72	.82	.70	.85	.92	.73	1.02	
19	.84	.79	.83	.94	.81	.99	1.05	.84	1.17	
22	.08	.08	.05	.09	.07	.07	.09	.06	.09	
Monthly Totals	1.82	1.72	1.77	2.04	1.75	2.11	2.28	1.80	2.52	
1956 CALENDAR YEAR TOTALS	18.03	16.73	15.30	17.32	16.86	16.82	17.55	16.61	16.74	
1957 Jan. 4	.72	.48	.38	.42	.47	.37	.48	.48	.45	
22	.08	.06	.06	.12	.08	.12	.16	.28	.16	
24	.17	.16	.09	.16	.15	.13	.09	.05	.07	
26-27	.11	.14	.11	.17	.15	.24	.14	.13	.10	
27	.40	.50	.40	.63	.54	.88	.50	.47	.36	
28	.03	.04	.03	.05	.04	.07	.04	.04	.03	
31	.05	.05	.05	.06	.04	.04	.03	.03	.03	
Monthly Totals	1.56	1.43	1.12	1.61	1.47	1.85	1.44	1.48	1.20	

Date of Storm	Gage Number 1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1957 Feb. 1	1.08	1.08	1.16	1.29	0.96	0.99	0.66	0.79	0.83	
13	.06	.02	0	.06	.09	.02	0	0	0	
16	.69	.27	.44	.45	.51	.55	.44	.67	.53	
17-18	.48	.44	.40	.52	.51	.50	.58	.55	.54	
19	.10	.09	.08	.11	.10	.10	.11	.11	.11	
22-23	1.03	.98	1.03	1.06	.98	1.10	1.09	.98	1.05	
Monthly Totals	3.44	2.88	3.11	3.49	3.15	3.26	2.88	3.10	3.06	
Mar. 2	.32	.84	.68	.30	.12	.35	.69	.25	.58	
6	.01	0	0	0	0	.01	.01	.01	.01	
11	1.17	1.01	1.19	1.46	1.46	1.36	.84	.82	.76	
12	.04	.04	.04	.04	.06	.03	.03	.02	.01	
17	.46	.47	.42	.47	.61	.34	.31	.26	.11	
20	.34	.25	.25	.26	.30	.23	.20	.19	.20	
20	2.14	1.63	1.60	1.65	1.92	1.47	1.26	1.25	1.25	
21	.12	.04	.05	.11	.09	.10	.05	.06	.06	
27	1.61	.56	.68	1.56	1.22	1.43	.77	.78	.82	
31	.51	.81	.68	.72	.67	.55	.77	.80	.92	
Monthly Totals	6.72	5.65	5.59	6.57	6.45	5.87	4.93	4.44	4.72	
Apr. 3	.23	.13	.09	.17	.11	.12	.08	.05	.08	
4	.01	0	0	.05	.02	.03	.02	.04	.07	
7	0	0	.04	0	0	0	0	0	0	
8	0	0	.04	0	0	0	0	0	0	
15	.35	.31	.28	.26	.30	.21	.33	.15	.22	
19	.22	.19	.18	.23	.21	.13	.08	.14	.08	
19	6.81	6.09	5.63	7.34	6.59	4.03	2.37	4.25	2.64	
22	.59	.42	.51	.64	.60	.61	.59	.60	.45	
23	4.06	3.56	3.31	3.34	3.41	4.74	3.78	2.76	2.48	
24	3.14	3.02	2.72	2.75	2.81	2.26	3.04	2.71	2.41	
26-27	1.95	2.17	2.24	1.94	1.76	2.27	1.95	2.27	2.48	
28	.09	.10	.10	.09	.08	.10	.09	.10	.11	
28	1.01	1.12	1.16	1.00	.91	1.17	1.01	1.18	1.29	
Monthly Totals	18.46	17.11	16.30	17.81	16.80	15.67	13.34	14.25	12.31	
May 1	.18	.14	.12	.20	.16	.16	.12	.28	.37	
3	.60	.12	.05	.30	.11	.05	.34	.05	.21	
4	.36	.07	.03	.18	.06	.03	.21	.03	.12	
9	.22	.44	.42	.54	.39	.37	.30	.25	.42	
9	.22	.43	.41	.53	.39	.36	.29	.25	.42	
11	5.58	6.86	7.20	6.17	5.20	5.63	7.21	8.34	6.41	
13	1.88	1.20	1.34	1.28	1.39	1.93	1.58	1.55	1.36	
18	.26	.28	.23	.20	.16	.20	.24	.19	.16	
23	.19	.51	.25	.30	.19	.42	.65	.69	.23	
26	.07	.17	.08	.10	.06	.14	.23	.24	.08	
Monthly Totals	9.56	10.22	10.13	9.80	8.11	9.29	11.17	11.87	9.78	

Table 16.--Summary of Rainfall, in Inches, for Cow Bayou Study Area, October 1954 to September 1964--Continued

Date of Storm	Gage Number									
	1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1957										
June 1	0.13	0.56	0.23	0.11	0.10	0.37	0.36	0.64	0.61	
2	.10	.41	.17	.08	.08	.27	.27	.48	.45	
3	.15	.65	.27	.12	.12	.43	.43	.76	.71	
4	.19	.82	.34	.16	.15	.55	.54	.95	.89	
12	.20	.46	.45	.35	.18	.39	.81	.58	.91	
18	.91	.17	.01	.11	.03	.13	.30	.21	.02	
21	.17	.51	.11	.30	.06	.25	.06	0	.15	
Monthly Totals	1.85	3.58	1.58	1.23	0.72	2.39	2.77	3.62	3.74	
July 22	.82	.39	.09	.27	.68	.28	.03	0	.78	
31	0	0	0	0	0	.15	0	.04	0	
Monthly Totals	0.82	0.39	0.09	0.27	0.68	0.43	0.03	0.04	0.78	
Aug. 5	.65	.82	.52	.89	.28	.09	.03	.03	0	
16	.05	0	0	.02	0	0	0	0	0	
Monthly Totals	0.70	0.82	0.52	0.91	0.28	0.09	0.03	0.03	0	
Sept. 3	.15	.19	.27	.61	.23	.49	.87	.69	1.06	
4	.10	.13	.18	.40	.15	.33	.58	.46	.70	
7	1.20	1.05	1.01	.80	.90	1.20	.42	.52	.56	
12	.06	.04	.02	.14	.02	0	.35	.05	.07	
21-22	3.56	3.89	4.20	4.22	4.27	3.51	3.47	3.97	4.37	
25	.09	.15	.10	.07	.21	.13	.23	.19	.21	
26	.04	.07	.05	.04	.11	.06	.12	.09	.10	
Monthly Totals	5.20	5.52	5.83	6.28	5.89	5.72	6.04	5.97	7.07	
1957 WATER YEAR TOTALS	53.60	53.40	48.69	52.81	48.16	50.46	48.72	50.03	48.80	
Oct. 13-14	6.25	7.85	7.12	7.25	5.91	7.69	8.78	8.21	8.55	
15	.09	.09	.56	.23	.31	.06	.06	.03	.03	
21-22	1.79	1.70	1.45	1.51	1.48	1.47	1.77	1.54	1.66	
Monthly Totals	8.13	9.64	9.13	8.99	7.70	9.22	10.61	9.78	10.24	
Nov. 2-3	.81	.74	.70	.75	.86	.69	.56	.56	.45	
4	.07	.06	.06	.06	.07	.06	.05	.05	.04	
5	.77	.69	.66	.70	.81	.65	.52	.52	.42	
6	.05	.04	.04	.04	.05	.04	.03	.03	.03	
7	.49	.44	.42	.45	.51	.42	.34	.34	.27	
11	.08	.08	.06	.07	.07	.08	.10	.11	.09	
12	.22	.22	.18	.22	.22	.24	.30	.34	.27	
12-13	.08	.08	.06	.07	.07	.08	.10	.12	.09	
13	.12	.12	.10	.12	.12	.14	.17	.19	.15	
18	.47	.44	.35	.41	.37	.39	.25	.32	.82	
21-22	.52	.48	.40	.51	.49	.53	.50	.49	.54	
23	.03	.03	.02	.03	.02	.02	.03	.02	.03	
23-24	1.16	1.08	.90	1.16	1.09	1.19	1.12	1.09	1.22	
Monthly Totals	4.87	4.50	3.95	4.52	4.75	4.53	4.07	4.18	4.42	
1957										
Dec. 5	0.06	0.07	0.08	0.07	0.06	0.06	0.03	0.04	0.03	
6	.04	.04	.05	.04	.04	.03	.02	.03	.02	
19	.02	.07	.02	.02	.03	.04	.02	.02	.02	
25	.35	.29	.23	.35	.32	.29	.27	.27	.37	
27	.21	.18	.14	.21	.19	.17	.17	.16	.23	
Monthly Totals	0.68	0.65	0.52	0.69	0.64	0.59	0.51	0.52	0.67	
1957 CALENDAR YEAR TOTALS	61.99	62.39	57.87	62.17	56.64	58.91	57.82	59.28	57.99	
1958										
Jan. 12	.67	.64	.58	.62	.64	.54	.52	.53	.59	
12-13	.30	.28	.26	.28	.29	.24	.24	.24	.26	
20	.37	.38	.38	.41	.42	.33	.37	.34	.34	
19	.39	.42	.41	.44	.45	.36	.40	.36	.36	
23	.03	.02	0	.02	.04	.03	.02	.02	.02	
28	.08	.05	.01	.05	.14	.09	.08	.07	.07	
28	0	0	.01	0	0	0	0	0	0	
Monthly Totals	1.84	1.79	1.65	1.82	1.98	1.59	1.63	1.56	1.64	
Feb. 9-10	.92	.67	.66	1.17	1.00	1.09	.77	.88	.85	
14	.25	.13	.20	.21	.24	.25	.11	.12	.11	
19	.04	.04	.02	.04	.04	.03	.04	.03	.02	
21	.37	.35	.18	.40	.39	.23	.40	.29	.18	
21-23	3.52	3.86	3.74	3.55	3.13	3.45	4.21	3.60	4.20	
26	.07	.09	.07	.08	.09	.09	.07	.10	.10	
Monthly Totals	5.17	5.14	4.87	5.45	4.89	5.14	5.60	5.02	5.46	
Mar. 1	.10	.08	.04	.09	.09	.09	.10	.10	.12	
4	.04	.04	.02	.04	.04	.04	.06	.06	.06	
5	.17	.15	.08	.17	.13	.17	.23	.22	.22	
10	.04	.04	.02	.04	.04	.04	.06	0	0	
12	.27	.30	.32	.39	.34	.35	.36	.41	.39	
18	.22	.22	.20	.23	.17	.24	.24	.20	.23	
22	.09	.12	.08	.13	.13	.36	.28	.40	.26	
29	.05	.28	.22	.12	.06	.17	.30	.35	.04	
Monthly Totals	0.98	1.23	0.98	1.21	1.00	1.46	1.63	1.74	1.32	
Apr. 8-9	1.23	.64	.63	.64	.90	.57	.85	.80	1.09	
13	.40	.41	.41	.43	.40	.39	.48	.44	.45	
13	.76	.79	.79	.84	.76	.74	.91	.85	.88	
18	.13	.19	.16	.15	.12	.17	.17	.16	.14	
20	.40	.62	.51	.46	.40	.56	.55	.51	.45	
26	1.64	1.57	1.69	1.10	.91	1.27	.62	.79	.41	
27	.03	.03	.03	.02	.02	.02	.01	.01	.01	
29	.25	.25	.24	.24	.21	.27	.26	.22	.22	
Monthly Totals	4.84	4.50	4.46	3.88	3.72	3.99	3.85	3.78	3.65	

Table 16.--Summary of Rainfall, in Inches, for Cow Bayou Study Area, October 1954 to September 1964--Continued

Date of Storm	Gage Number									
	1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1958										
May 2	0.75	0.76	0.71	0.71	0.61	0.79	0.76	0.67	0.64	
2-3	1.05	1.07	1.00	.99	.86	1.12	1.08	.94	.91	
14	.32	.17	.44	.58	.10	.11	.07	.19	.20	
28-29	.10	.10	.10	.12	.12	.11	.15	.11	.12	
Monthly Totals	2.22	2.10	2.25	2.40	1.69	2.13	2.06	1.91	1.87	
June 9	.14	.06	.03	.04	.07	0	0	.04	0	
15	.02	.03	.04	.03	.03	.03	.03	.03	.02	
16	.25	.39	.46	.38	.31	.31	.28	.33	.19	
16-17	1.89	2.88	3.44	2.83	2.33	2.32	2.10	2.45	1.44	
21	.15	.27	.07	.14	.19	.14	.14	.13	.14	
25	.04	.01	.02	.06	.08	.05	.01	0	0	
26	.08	.02	.04	.11	.17	.11	.01	.01	0	
Monthly Totals	2.57	3.66	4.10	3.59	3.18	2.96	2.57	2.99	1.79	
July 5	.79	.90	.34	1.28	2.07	.53	.21	.47	.97	
6	.11	.13	.05	.18	.30	.08	.03	.07	.14	
Monthly Totals	0.90	1.03	0.39	1.46	2.37	0.61	0.24	0.54	1.11	
Aug. 3	.17	.06	.03	.18	.03	.02	.21	.79	.75	
12	.41	0	.30	.03	0	0	.02	0	0	0.12[b]
18	.53	.46	.48	1.19	1.14	.48	1.62	1.18	1.44	.41
21	.21	.36	.31	.13	.08	.05	.11	.05	.07	.20
22	.10	.03	0	.51	.12	.36	.92	.57	.56	0
23	.53	.56	.51	.47	.65	.46	.75	.69	.53	.60
24	1.11	1.19	1.07	1.00	1.35	.97	1.57	1.45	1.12	.96
Monthly Totals	3.06	2.66	2.70	3.51	3.37	2.34	5.20	4.73	4.47	--
Sept. 5	.04	.03	.03	.06	.07	.06	.09	.08	.06	.04
6	.33	.30	.25	.47	.56	.48	.77	.70	.51	.31
7	.28	.25	.21	.40	.47	.41	.64	.59	.42	.26
11	.98	.48	.13	.06	.20	0	.99	.03	.06	.32
16-17	.16	.06	.01	.12	.03	.17	.29	.29	.49	.09
19	.08	.06	.08	.13	.12	.08	.16	.14	.10	.10
19	.32	.22	.31	.53	.47	.31	.65	.54	.41	.40
20	.08	.06	.08	.13	.12	.08	.16	.14	.10	.10
22	.75	.53	.74	1.25	1.11	.74	1.54	1.29	.96	.95
26	1.31	.92	.45	2.89	2.79	.90	.17	.21	.75	.20
30	.01	.14	0	.02	.06	0	.16	.06	.03	.02
Monthly Totals	4.34	3.05	2.29	6.06	6.00	3.23	5.62	4.07	3.89	2.79
1958 WATER YEAR TOTALS	39.60	39.95	37.29	43.58	41.29	37.79	43.59	40.82	40.53	--

b/ Installed tipping-bucket rain gage Aug. 12, 1958.

Date of Storm	Gage Number									
	1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1958										
Oct. 3	0.24	0.13	0.10	0.19	0.21	0.17	0.18	0.19	0.23	0.10
10	.34	.13	.07	.22	.09	.07	.04	.05	.06	.07
15-16	.10	.08	.05	.10	.10	.06	.06	.05	.05	.03
21	.21	.13	.06	.13	.15	.21	.28	.48	.51	.07
26	.26	.24	.18	.26	.19	.25	.28	.28	.28	.17
28	.16	.16	.12	.14	.13	.12	.13	.11	.12	.10
29	.36	.38	.27	.33	.29	.27	.31	.25	.27	.25
30	.03	.03	0	.03	.03	.03	.03	.02	.04	0
Monthly Totals	1.70	1.28	0.85	1.40	1.19	1.18	1.31	1.43	1.56	0.79
Nov. 12	.04	.04	.05	.05	.05	.05	.03	.03	.06	.04
13	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
14	.13	.16	.16	.13	.18	.17	.12	.11	.22	.13
17	.17	.14	.14	.18	.14	.15	.10	.10	.19	.10
27-28	1.33	1.15	.99	1.21	1.40	1.02	.94	.91	.94	.90
Monthly Totals	1.68	1.50	1.35	1.58	1.78	1.40	1.20	1.16	1.42	1.18
Dec. 1	.37	.32	.28	.34	.40	.29	.27	.26	.27	.34
13	.01	0	0	0	0	.01	.01	.02	.02	0
22	.06	.09	.03	.06	.06	.05	.03	.02	.04	.03
29-30	.87	.84	.80	.87	.75	.82	.96	.88	.93	.70
Monthly Totals	1.31	1.25	1.11	1.27	1.21	1.17	1.27	1.18	1.26	1.07
1958 CALENDAR YEAR TOTALS	30.61	29.19	27.00	33.63	32.38	27.20	32.18	30.11	29.44	--
1959										
Jan. 6	.02	.02	.02	.02	.02	.03	.03	.03	.02	.02
7	.07	.07	.05	.08	.08	.10	.09	.10	.08	.08
13	.02	.02	.02	.02	.02	.01	.02	.02	.02	.02
30	.34	.35	.33	.40	.31	.50	.45	.44	.45	.20
Monthly Totals	0.45	0.46	0.42	0.52	0.43	0.64	0.59	0.59	0.57	0.32
Feb. 1	.27	.28	.26	.32	.25	.39	.36	.34	.35	.30
2	.20	.20	.19	.22	.17	.29	.26	.25	.26	.16
9	.03	.03	.02	.03	.03	.03	.05	.04	.03	.02
11	.10	.12	.11	.14	.12	.12	.10	.08	.09	.10
12	.39	.46	.43	.51	.46	.48	.37	.31	.34	.40
13	.03	.03	.03	.03	.03	.03	.03	.02	.02	.02
14	1.05	1.24	1.16	1.37	1.24	1.29	1.03	.84	.90	.88
19	.31	.26	.23	.34	.27	.33	.26	.30	.25	.15
22	.09	.08	.05	.10	.11	.11	.11	.11	.15	.03
26	.62	.73	.66	.60	.47	.56	.41	.44	.31	.55
Monthly Totals	3.09	3.43	3.14	3.66	3.15	3.63	2.98	2.73	2.70	2.61

Table 16.--Summary of Rainfall, in Inches, for Cow Bayou Study Area, October 1954 to September 1964--Continued

Date of Storm	Gage Number									
	1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1959										
Mar. 4	0.16	0.18	0.24	0.28	0.18	0.18	0.40	0.44	0.66	0.20
13	0	0	.05	0	0	0	0	0	0	0
21	.06	.09	.10	.06	.06	.05	.03	.06	.05	.06
25	.37	.58	.64	.39	.40	.33	.22	.38	.31	.40
31	.12	.09	.08	.12	.12	.13	.14	.16	.16	.04
Monthly Totals	0.71	0.94	1.11	0.85	0.76	0.69	0.79	1.04	1.18	0.70
Apr. 4	.02	.05	.05	.03	.03	.06	.12	.20	.25	.07
8	.09	.18	.18	.11	.12	.22	.44	.74	.96	.26
9	.09	.10	.10	.09	.09	.09	.12	.12	.14	.10
10	.10	.12	.12	.10	.10	.11	.14	.14	.17	.10
11	1.09	1.30	1.28	1.12	1.09	1.15	1.47	1.46	1.77	1.20
15	.11	.14	.14	.12	.12	.19	.17	.15	.12	.10
15-16	.08	.10	.10	.09	.09	.13	.12	.10	.09	.10
16-17	.19	.25	.39	.34	.28	.52	.48	.41	.36	.30
17	.11	.15	.23	.20	.16	.31	.28	.24	.21	.07
19	.72	.64	.54	.48	.49	.50	.64	.54	.45	.52
20-21	.10	.11	.04	.11	.07	.12	.22	.17	.15	.07
Monthly Totals	2.70	3.14	3.17	2.79	2.64	3.40	4.20	4.27	4.67	2.89
May 2	.02	.03	.03	.08	.08	.14	.15	.14	.17	.05
5	.19	.33	.39	.46	.30	.29	.16	.11	.02	.42
9	.24	.31	.27	.25	.31	.17	.14	.13	.13	.14
10	1.01	1.31	1.14	1.08	1.32	.75	.58	.58	.57	.60
12	.02	.02	0	.02	.01	.02	.02	.02	.02	.04
17	.04	.23	.21	.07	.10	.05	.17	.08	.17	.20
22-23	.88	.92	.83	.86	.65	1.19	1.24	1.55	2.62	.93
Monthly Totals	2.40	3.15	2.87	2.82	2.77	2.61	2.46	2.61	3.70	2.38
June 1	.24	.33	.46	.46	.29	.27	.41	.26	.37	.5
2	.60	.85	1.17	1.16	.75	.69	1.04	.66	.93	1.5
4	1.22	1.19	1.17	1.16	1.27	.81	.87	1.17	1.45	1.40
5	.71	.33	.44	.62	.47	.51	.30	.41	.35	.34
12	.87	.88	.85	1.16	1.16	.82	.45	.52	.65	.91
21	.73	.62	.15	1.09	.37	.27	.02	.16	.03	.02
23	2.37	3.31	3.60	2.52	2.03	3.90	5.07	4.46	4.66	4.27
24	.19	.21	.15	.12	.16	.17	.01	.02	.01	.20
25	1.69	1.87	1.36	1.11	1.43	1.54	.14	.21	.13	.60
26	.03	.03	.03	.03	.03	0	0	.03	0	.02
Monthly Totals	8.65	9.62	9.38	9.43	7.96	8.98	8.31	7.90	8.58	9.76
July 9	.07	.15	.18	.74	.74	.04	.02	.02	.01	.03
20	2.19	2.66	2.62	2.94	1.80	1.58	1.69	1.61	1.68	2.20
20-21	.37	.45	.44	.49	.30	.26	.28	.27	.28	.31
24	.15	.25	.14	.06	.16	.56	.08	.05	.23	.10
27	.96	.91	.17	.13	.22	.08	.78	.44	.70	.05
28	0	0	0	0	0	.05	.07	0	.08	0
Monthly Totals	3.74	4.42	3.55	4.36	3.22	2.57	2.92	2.39	2.98	2.69

Date of Storm	Gage Number									
	1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1959										
Aug. 8	0.27	0.08	0.31	0.37	0.27	0.44	0.51	0.65	0.67	0.80
14	.16	.32	.73	.38	.73	.14	.68	1.06	.38	.80
15	.04	.09	.20	.10	.20	.04	.18	.29	.10	.12
21	.07	.01	.01	.18	.01	.10	.07	.02	.05	.10
23	.31	.08	.09	.82	.05	.44	.30	.10	.22	.40
25	.06	.05	0	.07	.04	.05	.05	.06	.09	.10
26	.53	.44	.50	.54	.36	.38	.38	.50	.68	.30
27	.58	.48	.41	.59	.40	.42	.41	.56	.75	.47
31	1.05	.93	1.18	1.41	1.46	1.46	1.67	1.20	1.57	1.10
Monthly Totals	3.07	2.48	3.43	4.46	3.52	3.47	4.25	4.44	4.51	4.19
Sept. 8	.15	.23	.18	.36	.23	.29	.39	.49	.29	.18
14	.78	.66	.76	.73	.73	.93	.96	.62	.72	.92
23	.03	.04	.04	.03	.02	.02	.02	.02	.02	.03
24	.02	.03	.03	.02	.01	.02	.02	.01	.01	.02
24	.25	.35	.36	.26	.18	.20	.22	.18	.17	.30
25	.11	.15	.16	.11	.09	.09	.10	.08	.07	.13
28-29	1.44	1.97	2.05	1.47	1.06	1.12	1.27	1.03	.95	1.71
Monthly Totals	2.78	3.43	3.58	2.98	2.32	2.67	2.98	2.43	2.23	3.29
1959 WATER YEAR TOTALS	32.28	35.10	33.96	36.12	30.95	32.41	33.26	32.17	35.36	31.87
Oct. 3	.21	.20	.18	.20	.19	.21	.22	.17	.17	.09
4	6.63	6.61	5.87	6.36	6.02	6.80	6.98	5.39	5.50	5.98
13	1.72	1.56	1.82	1.79	1.58	1.45	1.30	1.25	1.36	1.69
29	.49	.41	.34	.39	.36	.45	.46	.59	.49	.30
30	.09	.07	.06	.07	.06	.08	.08	.10	.09	.06
31	.05	.05	.04	.05	.05	.05	.05	.07	.06	.02
Monthly Totals	9.19	8.90	8.31	8.86	8.26	9.04	9.09	7.57	7.67	8.14
Nov. 3-4	1.20	1.93	1.57	1.85	1.72	1.50	1.35	1.59	1.59	1.31
10	.05	.05	.02	.05	.05	.05	.07	.06	.06	.02
13	.06	.06	.05	.08	.05	.08	.08	.06	.08	.05
15	.23	.20	.18	.27	.20	.27	.28	.20	.28	.18
Monthly Totals	1.54	2.24	1.82	2.25	2.02	1.90	1.78	1.91	2.01	1.56
Dec. 11	.31	.29	.25	.24	.25	.23	.25	.21	.21	.20
15	3.14	2.98	2.55	2.50	2.58	2.40	2.59	2.11	2.19	2.00
16	.21	.20	.16	.20	.19	.17	.19	.15	.15	.25
17	.20	.18	.13	.28	.24	.18	.22	.15	.15	.15
27	.17	.13	.07	.19	.15	.23	.19	.35	.24	.05
31	1.30	1.26	1.28	1.37	1.15	1.33	1.39	1.26	1.30	1.30
Monthly Totals	5.33	5.04	4.44	4.78	4.56	4.54	4.83	4.23	4.24	3.95
1959 CALENDAR YEAR TOTALS	43.65	47.25	45.22	47.76	41.61	44.14	45.18	42.11	45.04	42.48

Table 16.--Summary of Rainfall, in Inches, for Cow Bayou Study Area, October 1954 to September 1964--Continued

Date of Storm	Gage Number									
	1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1960										
Jan. 5	0.79	0.68	0.62	0.70	0.66	0.66	0.60	0.58	0.64	0.60
7	.19	.16	.15	.17	.16	.16	.14	.14	.16	.13
11	.01	.01	.01	.01	.01	.02	.02	.02	.03	.01
12	.16	.17	.10	.19	.16	.23	.21	.32	.43	.05
13	.03	.03	.02	.04	.03	.04	.04	.06	.09	.01
16	.54	.48	.54	.71	.62	.52	.51	.55	.67	.35
26	.06	.06	0	.07	.05	.09	.08	.06	.05	0
Monthly Totals	1.78	1.59	1.44	1.89	1.69	1.72	1.60	1.73	2.07	1.15
Feb. 2	.04	.05	.05	.04	.05	.03	.03	.03	.03	.04
3	.96	.99	1.00	.94	.96	.71	.78	.62	.73	.86
4	.07	.07	.07	.07	.07	.05	.06	.04	.06	.03
15	.15	.25	.16	.24	.13	.23	.21	.19	.18	.10
20	.33	.33	.29	.33	.29	.37	.37	.34	.38	.20
23	.47	.47	.41	.46	.42	.52	.52	.47	.53	.30
29	.35	.32	.26	.39	.35	.43	.34	.31	.35	.19
Monthly Totals	2.37	2.48	2.24	2.47	2.27	2.34	2.31	2.00	2.26	1.72
Mar. 1	.08	.07	.06	.09	.08	.10	.08	.07	.08	.05
8	.05	.04	0	.03	.02	.03	.03	.03	.03	0
14	.12	.11	.05	.12	.10	.13	.15	.18	.15	.04
15	.01	.01	0	.01	.01	.01	.01	.01	.01	0
25-26	.47	.69	.60	.45	.58	.57	.55	.78	.85	.42
Monthly Totals	0.73	0.92	0.71	0.70	0.79	0.84	0.82	1.07	1.12	0.51
Apr. 24	1.81	2.76	2.23	1.30	.69	.67	1.30	.75	5.41	1.20
25	.11	.16	.13	.08	.04	.04	.08	.04	.32	.06
27	.04	.08	.06	.03	.02	.02	.03	.02	.14	.04
29	.31	.38	.36	.36	.33	.48	.48	.52	1.03	.30
Monthly Totals	2.27	3.38	2.78	1.77	1.08	1.21	1.89	1.33	6.90	1.60
May 11	.08	.04	.04	.03	.04	.04	.03	.05	.03	.04
20	.90	1.03	.97	.99	.92	1.19	1.02	1.07	1.13	.80
25	.62	.52	.84	.80	.67	.62	.59	.71	1.17	.52
29	.05	.08	.03	.17	.19	.11	.11	.08	.08	.10
30	.05	.08	.02	.17	.19	.11	.11	.07	.07	.10
Monthly Totals	1.70	1.75	1.90	2.16	2.01	2.07	1.86	1.98	2.48	1.56
June 7	.40	.14	.17	.25	.66	1.04	0	.05	0	.20
12	.94	.43	.59	.85	1.35	.95	1.11	.68	1.37	.63
24	.21	.20	.21	.21	.22	.32	.39	.37	.35	.20
25	1.60	1.59	1.65	1.61	1.73	2.51	3.00	2.86	2.73	1.63
26	1.13	1.13	1.17	1.15	1.24	1.79	2.13	2.03	1.94	1.16
Monthly Totals	4.28	3.49	3.79	4.07	5.20	6.61	6.63	5.99	6.39	3.82

Date of Storm	Gage Number									
	1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1960										
July 7	0.74	1.35	0.92	1.62	1.92	1.17	2.39	1.08	2.41	0.56
17	.32	.40	.12	.10	.10	1.01	1.14	1.32	.93	.10
19	.20	.24	.07	.06	.06	.59	.67	.77	.54	.06
20	.13	.17	.05	.05	.03	.42	.47	.56	.39	.04
Monthly Totals	1.39	2.16	1.16	1.83	2.11	3.19	4.67	3.73	4.27	0.76
Aug. 2	.05	0	0	0	0	.03	.02	.03	.03	0
11	.80	.26	.23	.02	0	.02	.03	0	0	.32
14-15	0	.04	0	0	0	.03	.03	.12	.06	0
21	1.46	1.80	1.52	1.97	2.51	.70	1.44	.81	1.64	.49
28	.14	.15	.10	.14	.22	.09	.21	0	.16	.10
Monthly Totals	2.45	2.25	1.85	2.13	2.73	0.87	1.73	0.96	1.89	0.91
Sept. 3	0	0	0	0	0	0	0	0	0	.10
24	.24	.27	.31	.24	.24	.19	.14	.19	.12	.19
24	1.02	1.20	1.35	1.02	1.07	.81	.62	.84	.53	.83
26	.17	.05	.03	.03	.03	.07	.26	.02	.03	0
27	.34	.09	.06	.06	.06	.13	.52	.05	.05	.08
Monthly Totals	1.77	1.61	1.75	1.35	1.40	1.20	1.54	1.10	0.73	1.20
1960 WATER YEAR TOTALS	34.80	35.81	32.19	34.26	34.12	35.53	38.75	33.60	42.03	26.88
Oct. 4-5	.10	.27	.10	.09	.09	.19	.17	.09	.14	.06
6	.09	.09	.05	.09	.21	.05	.03	.33	.14	.05
13-14	2.38	1.99	2.33	1.93	1.31	2.19	2.74	2.08	2.09	2.62
16	.06	.05	.05	.06	.06	.06	.06	.06	.07	.05
18	2.43	2.30	2.13	2.53	2.34	2.64	2.58	2.58	2.80	2.48
25	.09	.08	.10	.10	.11	.05	.03	.03	.04	.10
28	1.13	1.22	1.00	1.19	1.74	1.54	1.26	.92	.88	.95
28-29	1.06	1.14	.94	1.12	1.64	1.45	1.19	.86	.83	.90
Monthly Totals	7.34	7.14	6.71	7.11	7.50	8.17	8.06	6.95	6.99	7.21
Nov. 8	.25	.10	.05	.17	.23	.13	.12	.11	.13	.06
20	.22	.29	.30	.24	.22	.31	.31	.33	.28	.29
20	.07	.10	.10	.08	.07	.11	.10	.11	.09	.10
20	.28	.37	.38	.31	.27	.39	.39	.43	.36	.38
21	.47	.64	.65	.54	.47	.67	.67	.73	.62	.64
21	.20	.26	.27	.22	.19	.28	.28	.30	.26	.27
Monthly Totals	1.49	1.76	1.75	1.56	1.45	1.89	1.87	2.01	1.74	1.74

Table 16.--Summary of Rainfall, in Inches, for Cow Bayou Study Area, October 1954 to September 1964--Continued

Date of Storm	Gage Number 1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1960										
Dec. 6-8	5.59	5.10	5.71	5.71	4.89	6.20	5.98	5.42	5.74	4.53
9-10	.44	.44	.14	.45	.39	.49	.47	.43	.45	.67
14	.12	.13	.05	.12	.09	.12	.13	.15	.13	.06
28	.57	.61	.61	.57	.38	.60	.57	.47	.44	.30
29	.07	.07	.07	.06	.04	.07	.07	.05	.05	.11
30-31	.71	.62	.59	.68	.68	.60	.66	.61	.63	.50
Monthly Totals	7.50	6.97	7.17	7.59	6.47	8.08	7.88	7.13	7.44	6.17
1960 CALENDAR YEAR TOTALS	35.07	35.50	33.25	34.63	34.70	38.19	40.86	35.98	44.28	28.35
1961										
Jan. 6-8	3.05	2.64	2.57	2.78	2.76	3.31	3.41	3.36	3.19	2.43
11-12	1.48	1.50	1.50	1.84	1.52	1.99	2.00	1.78	2.03	1.37
24-25	.30	.31	.24	.24	.25	.29	.23	.16	.21	.09
Monthly Totals	4.83	4.45	4.31	4.86	4.53	5.59	5.64	5.30	5.43	3.89
Feb. 5	2.39	2.22	2.29	2.26	2.09	2.40	2.41	2.46	2.67	2.04
6	.40	.37	.38	.38	.35	.40	.40	.41	.44	.34
15	.19	.25	.25	.21	.18	.25	.29	.27	.30	.10
16	.60	.78	.79	.65	.58	.78	.91	.87	.96	.53
19	.12	.16	.16	.13	.12	.16	.18	.18	.19	.09
20	.10	.13	.13	.11	.10	.12	.15	.14	.16	.09
24	.06	.03	.03	.05	.03	.09	.05	.03	.05	.05
Monthly Totals	3.86	3.94	4.03	3.79	3.45	4.20	4.39	4.36	4.77	3.24
Mar. 3-4	.01	0	0	0	.01	.02	.01	.02	.01	0
16	1.22	1.63	1.38	1.21	1.30	1.13	1.69	1.82	1.76	.94
19	.02	0	0	.01	.02	.03	.06	.07	.05	0
27	.94	.99	1.44	1.07	.85	1.15	.53	1.34	.81	1.00
31	.05	.05	.07	.05	.04	.06	.03	.06	.04	.05
Monthly Totals	2.24	2.67	2.89	2.34	2.22	2.39	2.32	3.31	2.67	1.99
Apr. 5	.02	0	0	0	.03	.01	.02	.02	.15	0
8	.43	.37	.20	.47	.27	.27	.26	.38	0	.20
11	.04	.04	.02	.05	.03	.03	.03	.04	0	.04
28	.28	.27	.16	.18	.16	.19	.14	.06	.08	.07
29	.35	.33	.20	.22	.21	.24	.18	.07	.11	.08
Monthly Totals	1.12	1.01	0.58	0.92	0.70	0.74	0.63	0.57	0.34	0.39
May 9	.40	.28	.15	.49	.48	.22	.31	.44	.25	.08
22	.70	.90	.58	.58	.30	.40	.17	.08	.07	.27
25	.76	.59	.73	.55	.35	.68	.79	.36	.32	.80
Monthly Totals	1.86	1.77	1.46	1.62	1.13	1.30	1.27	0.88	0.64	1.15

Date of Storm	Gage Number 1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1961										
June 5	0.23	0.24	0.23	0.24	0.23	0.21	0.22	0.20	0.26	0.10
8	2.80	2.86	2.79	2.93	2.76	2.61	2.68	2.38	3.10	1.35
12	.08	.21	.19	.47	.25	.31	.31	.77	.84	.05
14	.16	.40	.35	.87	.46	.56	.57	1.42	1.56	.18
15-16	1.50	1.28	1.33	1.33	1.40	1.38	1.37	1.46	1.45	.97
17	.63	.54	.56	.56	.59	.58	.58	.62	.61	.54
17-18	1.02	.87	.91	.92	.96	.94	.93	1.00	1.00	1.27
25	1.28	.78	1.02	1.35	1.57	1.30	1.18	1.20	1.01	1.01
Monthly Totals	7.70	7.18	7.38	8.67	8.22	7.89	7.84	9.05	9.83	5.47
July 2	.34	.27	.21	.48	.22	.15	.25	.76	.70	.10
3	.28	.22	.17	.38	.18	.13	.21	.61	.56	.10
8-9	.93	1.13	.65	.56	.65	.47	.54	.47	.62	.20
12	.13	.16	.09	.08	.09	.07	.07	.06	.09	.10
13	.13	.13	.13	.11	.10	.09	.13	.06	.08	.08
16	.45	.45	.45	.38	.34	.32	.44	.22	.26	.40
16-17	1.13	1.10	1.12	.93	.85	.80	1.10	.55	.65	.82
22	.35	.11	.17	.21	.27	.12	.10	.05	.22	.05
23	.17	.05	.08	.10	.13	.05	.05	.02	.10	.05
Monthly Totals	3.91	3.62	3.07	3.23	2.83	2.20	2.89	2.80	3.28	1.90
Aug. 4	.38	.20	.23	.11	.07	.96	1.62	.87	1.99	.16
7	.08	.04	.05	.03	.02	.21	.36	.19	.43	.04
11	0	0	0	.03	.02	0	0	.07	.17	0
29	.36	.53	.34	.24	.21	.72	.80	.55	1.53	.50
Monthly Totals	0.82	0.77	0.62	0.41	0.32	1.89	2.78	1.68	4.12	0.70
Sept. 4	.25	.06	.05	.11	.08	.11	.59	.06	.03	.05
11-12	3.85	4.09	3.69	3.47	3.75	3.62	4.01	3.87	4.19	3.38
Monthly Totals	4.10	4.15	3.74	3.58	3.83	3.73	4.60	3.93	4.21	3.43
1961 WATER YEAR TOTALS	46.77	45.43	43.71	45.68	42.65	48.07	50.17	47.97	51.46	37.28
Oct. 2	1.34	1.24	1.34	1.25	1.18	1.02	1.01	.88	.83	1.15
9	.18	.23	.40	1.03	.86	.97	1.15	1.05	.64	.58
25	.05	0	0	.05	.04	.09	.02	.02	0	0
Monthly Totals	1.57	1.47	1.74	2.33	2.08	2.08	2.18	1.95	1.47	1.73
Nov. 1	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
2	.86	.78	.71	.96	.85	1.47	.82	1.02	.61	.88
13	.50	.43	.51	.42	.40	.30	.45	.47	.62	.26
15	.29	.26	.30	.24	.23	.17	.26	.27	.37	.15
21	.43	.59	.92	.79	.67	.81	.85	.55	.31	.60
22	.34	.46	.72	.62	.52	.64	.66	.43	.25	.55
27	0	.01	0	.01	.02	.01	.01	.01	.02	0
Monthly Totals	2.45	2.56	3.19	3.07	2.72	3.43	3.08	2.78	2.21	2.47

Table 16.--Summary of Rainfall, in Inches, for Cow Bayou Study Area, October 1954 to September 1964--Continued

Date of Storm	Gage Number									
	1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1961										
Dec. 5-6	0.35	0.11	0.05	0.23	0.15	0.11	0.11	0.07	0.06	0.05
9	.30	.32	.28	.38	.33	.32	.34	.31	.27	.15
11	.12	.12	.11	.15	.13	.13	.13	.12	.11	.06
14	.15	.16	.14	.19	.16	.16	.17	.16	.14	.09
15-16	.37	.38	.22	.35	.51	.37	.36	.32	.54	.16
17	.30	.32	.18	.28	.42	.30	.30	.27	.45	.14
Monthly Totals	1.59	1.41	0.98	1.58	1.70	1.39	1.41	1.25	1.57	0.65
1961 CALENDAR YEAR TOTALS	36.05	35.00	33.99	36.40	33.73	36.83	39.03	37.86	40.54	27.01
1962										
Jan. 3	.06	.09	.09	.11	.11	.09	.09	.09	.05	.01
9	.08	.09	.08	.10	.11	.12	.13	.06	.16	.02
14	.15	.16	.11	.16	.15	.25	.20	.14	.11	.01
22	.26	.23	.18	.23	.22	.19	.20	.13	.21	.08
23	.07	.07	.05	.07	.06	.09	.05	.04	.06	.02
25-26	.31	.39	.29	.25	.25	.28	.33	.36	.46	.20
Monthly Totals	0.93	1.03	0.80	0.92	0.90	1.02	1.00	0.82	1.05	0.34
Feb. 14-15	.36	.65	.59	.62	.51	.57	.56	.55	.65	.28
18	.01	.02	.02	.02	.02	.01	.02	.02	0	0
23	.49	.54	.40	.54	.56	.53	.58	.61	.65	.20
Monthly Totals	0.86	1.21	1.01	1.18	1.09	1.11	1.16	1.18	1.30	0.48
Mar. 8	0	0	0	0	.01	0	.01	0	0	0
10	.83	.81	.80	.78	.69	1.04	1.13	.97	1.13	.8
20	.07	.04	.04	.05	.04	.02	.04	.02	.04	.05
24	0	0	0	0	0	0	.04	.10	.04	0
Monthly Totals	0.90	0.85	0.84	0.83	0.74	1.06	1.22	1.09	1.21	0.85
Apr. 4	.54	.63	.55	.56	.54	.52	.74	.66	.83	.41
5	.37	.44	.38	.38	.37	.36	.51	.46	.58	.29
8	.10	.07	.05	.05	.09	.11	.40	.44	.08	.09
16-17	0	0	0	0	0	0	0	.01	0	0
22-23	.49	.57	.45	.58	.59	.93	.73	.72	.59	.31
27	1.49	1.21	1.30	1.43	1.50	1.46	2.05	1.40	1.39	1.20
Monthly Totals	2.99	2.92	2.73	3.00	3.09	3.38	4.43	3.69	3.47	2.30
May 2	.11	.09	.10	.11	.11	.11	.16	.11	.11	.10
16	.03	.01	.07	.10	.05	0	0	0	.01	.06
28-29	3.12	2.96	2.88	2.76	2.86	2.54	1.96	1.86	1.54	2.9
Monthly Totals	3.26	3.06	3.05	2.97	3.02	2.65	2.12	1.97	1.66	3.06

Date of Storm	Gage Number									
	1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1962										
June 1	0.17	0.23	0.21	0.18	0.15	0.18	0.30	0.31	0.20	0.2
1	.82	1.13	1.03	.90	.73	.85	1.47	1.51	.97	1.0
4	.04	.05	.05	.04	.04	.04	.07	.07	.05	.05
7	.08	.11	.10	.09	.07	.08	.14	.15	.09	.1
8	.77	.41	.53	.55	.53	.46	1.06	.70	1.48	.3
9	.86	.46	.59	.61	.60	.51	1.19	.77	1.65	.2
26	.22	.20	.19	.18	.17	.24	.10	.15	.05	.10
27	1.37	1.25	1.20	1.17	1.09	1.52	.62	.97	.30	.64
28	.71	.34	.72	1.99	3.59	3.80	1.88	4.91	2.68	.60
30	.26	1.63	1.91	.66	.05	1.45	.59	.53	.43	.66
Monthly Totals	5.30	5.81	6.53	6.37	7.02	9.13	7.42	10.07	7.90	3.85
July 18	0	0	0	0	0	.45	0	0	0	0
Monthly Totals	0	0	0	0	0	0.45	0	0	0	0
Aug. 12	0	.32	0	0	0	0	0	0	.01	0
24	.62	.28	.15	.58	.35	.14	.25	.17	.13	.30
28	.45	.20	.11	.42	.26	.11	.19	.13	.09	.05
Monthly Totals	1.07	0.80	0.26	1.00	0.61	0.25	0.44	0.30	0.23	0.35
Sept. 1	0	0	.05	.01	0	0	0	0	.01	.10
5	.05	.04	.04	.05	.05	.04	.06	.07	.07	.03
6	.08	.06	.07	.09	.08	.06	.11	.12	.11	.06
7-8	1.14	.86	.95	1.23	1.08	.83	1.45	1.66	1.52	.81
25	.09	.12	.03	.10	.07	.09	.11	.18	.19	.03
30	.34	.43	.44	.13	.18	.09	.07	.11	.09	.4
Monthly Totals	1.70	1.51	1.58	1.61	1.46	1.11	1.80	2.14	1.99	1.43
1962 WATER YEAR TOTALS	22.62	22.63	22.71	24.86	24.43	27.06	26.26	27.24	24.06	17.51
Oct. 8-9	.81	.83	.72	.64	.50	1.14	.68	.68	.62	.6
9	.34	.35	.30	.27	.21	.48	.28	.29	.26	.3
16	.01	0	0	.01	0	0	0	.33	.01	0
20	1.05	1.15	.88	1.27	1.10	.64	1.16	.91	.52	.5
28	.34	.24	.21	.22	.38	.23	.77	.50	.54	.2
Monthly Totals	2.55	2.57	2.11	2.41	2.19	2.49	2.89	2.71	1.95	1.6
Nov. 2	.01	.01	0	0	0	0	0	0	0	0
18	.09	.10	.10	.11	.11	.11	.12	.12	.17	.08
19	.37	.43	.44	.49	.47	.50	.54	.54	.72	.35
20	.32	.37	.38	.43	.40	.43	.46	.46	.62	.31
25	.05	.05	.05	.06	.07	.06	.05	.05	.05	.05
26-27	1.57	1.33	1.44	1.61	2.03	1.81	1.40	1.38	1.54	1.33
Monthly Totals	2.41	2.29	2.41	2.70	3.08	2.91	2.57	2.55	3.10	2.12

Table 16.--Summary of Rainfall, in Inches, for Cow Bayou Study Area, October 1954 to September 1964--Continued

Date of Storm	Gage Number 1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1962										
Dec. 2	0.50	0.50	0.47	0.56	0.50	0.48	0.51	0.57	0.48	0.39
19	.07	.05	.04	.05	.06	.05	.05	.04	.06	0
20	.40	.32	.24	.32	.36	.31	.31	.23	.33	.4
23-24	.37	.29	.22	.29	.33	.28	.28	.21	.31	.2
25	.07	.05	.04	.05	.06	.05	.05	.04	.06	0
28-29	.02	.01	0	.05	.06	.03	.04	.02	.06	0
Monthly Totals	1.43	1.22	1.01	1.32	1.37	1.20	1.24	1.11	1.30	0.99
1962 CALENDAR YEAR TOTALS	23.40	23.27	22.33	24.31	24.57	26.76	26.29	27.63	25.16	17.37
1963										
Jan. 4	.09	.10	.10	.11	.10	.13	.18	.19	.18	0
18	.21	.24	.20	.22	.20	.28	.25	.25	.20	.2
26	.02	.03	.02	.03	.03	.04	.03	.04	.03	0
Monthly Totals	0.32	0.37	0.32	0.36	0.33	0.45	0.46	0.48	0.41	0.2
Feb. 11	.02	.02	0	.02	.02	.06	.13	.02	.05	0
17-18	.76	.83	.79	.80	.79	.95	.96	.94	1.10	.74
Monthly Totals	0.78	0.85	0.79	0.82	0.81	1.01	1.09	0.96	1.15	0.74
Mar. 1-3	.07	.06	.7	.12	.22	.07	.08	.08	.08	0
4	.14	.12	.13	.22	.41	.13	.16	.14	.15	0
10	.72	.82	.66	.73	.89	.73	.49	.47	.23	.4
15-18	.04	.03	0	.05	.02	.07	.10	.06	.04	0
24	.02	.01	0	0	.01	0	0	0	0	0
Monthly Totals	0.99	1.04	0.86	1.12	1.55	1.00	0.83	0.75	0.50	0.40
Apr. 4-5	1.24	1.23	1.28	1.22	1.25	1.34	1.83	1.75	1.73	1.10
16	.01	.02	0	.01	.03	0	.02	.01	.01	0
19	.25	.50	.45	.49	.16	.03	.64	.62	.38	.30
28	.04	0	0	.05	.03	.04	.02	.02	0	0
Monthly Totals	1.54	1.75	1.73	1.77	1.47	1.41	2.51	2.40	2.12	1.40
May 5	.43	.46	.10	.52	.21	.54	.14	1.29	.50	.10
13	.01	0	0	0	.02	0	0	0	0	0
18	.03	.06	.05	.06	.03	.03	.03	.04	.06	0
19	.32	.70	.60	.60	.32	.36	.36	.37	.60	.20
22	.89	.81	1.00	1.00	1.11	.60	.59	.61	.98	.40
28	.27	.24	.30	.29	.33	.17	.17	.18	.28	.10
30	0	0	0	.02	0	0	.07	0	.02	0
Monthly Totals	1.95	2.27	2.05	2.49	2.02	1.70	1.36	2.49	2.44	0.80
June 16	1.55	1.49	1.45	1.45	1.28	1.44	1.05	1.55	1.03	1.12
19	.71	.68	.67	.67	.59	.67	.49	.71	.47	.35
24	.16	0	0	.04	.15	.69	.45	.10	0	0
28	1.24	.41	.10	.86	.84	.72	.17	1.13	.57	0
Monthly Totals	3.66	2.58	2.22	3.02	2.86	3.52	2.16	3.49	2.07	1.47

Date of Storm	Gage Number 1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1963										
July 9	0.45	0.11	0.49	0.44	0.30	0.47	0.52	0.94	1.20	0.22
Monthly Totals	0.45	0.11	0.49	0.44	0.30	0.47	0.52	0.94	1.20	0.22
Aug. 8	.02	0	0	.02	.16	.41	.19	.12	.31	0
20	.10	1.16	.25	.02	.46	.28	.33	.19	.16	.70
30	1.33	.12	.07	.29	0	0	0	.07	0	0
31	.94	.09	.05	.21	0	0	0	.04	0	0
Monthly Totals	2.39	1.37	0.37	0.54	0.62	0.69	0.52	0.42	0.47	0.70
Sept. 7	.03	.02	0	0	0	.39	.37	.13	0	.10
12	.06	.08	.06	.05	.08	.03	.06	.01	0	0
13	.03	.04	.03	.02	.04	.01	.03	.01	0	0
14	1.75	2.12	1.62	1.27	2.17	.72	1.53	.34	.04	.80
15	.94	1.14	.87	.69	1.17	.39	.82	.19	.03	.50
17	.11	.13	.10	.08	.13	.04	.09	.02	0	.14
18	.04	.29	.16	.03	.07	0	.09	.16	0	0
Monthly Totals	2.96	3.82	2.84	2.14	3.66	1.58	2.99	0.86	0.07	1.54
1963 WATER YEAR TOTALS	21.43	20.24	17.20	19.13	20.26	18.43	19.14	19.16	16.78	12.18
Oct. 23	.11	.10	.07	.06	.06	.03	.03	.09	.06	0
24-25	.23	.19	.14	.12	.12	.07	.07	.19	.12	T
Monthly Totals	0.34	0.29	0.21	0.18	0.18	0.10	0.10	0.28	0.18	T
Nov. 8	.83	.85	.75	1.05	.63	.79	1.02	.71	.79	.80
17	.87	1.33	1.62	1.31	1.31	1.45	1.00	.68	1.07	1.43
19	.52	.81	.98	.79	.80	.88	.61	.41	.65	.87
21-22	.32	.29	.18	.17	.18	.06	.07	.07	.08	.04
27-28	1.09	.92	.84	.94	.96	.97	1.10	.99	1.06	.81
Monthly Totals	3.63	4.20	4.37	4.26	3.88	4.15	3.80	2.86	3.65	3.95
Dec. 10-11	.55	.54	.49	.53	.54	.65	.49	.44	.59	0
13	.41	.54	.40	.55	.36	.56	.55	.47	.58	.22
14	.14	.19	.14	.19	.13	.19	.19	.16	.20	.08
20	.51	.37	.32	.58	.59	.47	.60	.53	.45	.30
30	.02	.01	0	.02	0	0	.03	0	.02	0
Monthly Totals	1.63	1.65	1.35	1.87	1.62	1.87	1.86	1.60	1.84	0.60
1963 CALENDAR YEAR TOTALS	20.64	20.30	17.55	19.01	19.30	17.95	18.20	17.53	16.10	12.02
1964										
Jan. 8	0	.02	0	0	0	0	.03	.03	.02	0
15	.14	.14	.14	.14	.13	.13	.19	.15	.19	0
16	.21	.21	.21	.20	.20	.20	.28	.22	.29	.50
17	.80	.80	.81	.78	.77	.77	1.08	.87	1.10	.10
29-30	2.08	2.33	2.35	2.26	2.26	2.03	1.95	1.79	1.70	2.00
Monthly Totals	3.23	3.50	3.51	3.38	3.36	3.13	3.53	3.06	3.30	2.60

Table 16.--Summary of Rainfall, in Inches, for Cow Bayou Study Area, October 1954 to September 1964--Continued

Date of Storm	Gage Number									
	1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1964										
Feb. 4	0.64	0.71	0.72	0.69	0.69	0.62	0.60	0.55	0.52	0.68
12-13	.44	.33	.34	.46	.40	.64	.52	.56	.47	.20
14	.20	.15	.16	.22	.19	.30	.25	.26	.22	.10
17	.17	.13	.13	.18	.15	.24	.20	.21	.18	.10
20-21	.10	.14	.14	.12	.08	.21	.34	.06	.20	.03
24	.16	.20	.21	.18	.13	.32	.51	.09	.31	.05
Monthly Totals	1.71	1.66	1.70	1.85	1.64	2.33	2.42	1.73	1.90	1.16
Mar. 1-2	.43	.50	.15	.30	.29	.31	.34	.45	.43	.11
4	.30	.34	.11	.20	.20	.22	.24	.30	.29	.09
9	.48	.43	.40	.42	.33	.54	.46	.40	.33	.43
13	.04	.03	.04	.03	.02	.04	.06	.05	.04	0
18-19	1.57	1.52	1.61	1.51	1.48	1.38	1.53	1.42	1.27	1.40
23	.03	.03	.03	.03	.03	.03	.03	.03	.02	0
Monthly Totals	2.85	2.85	2.34	2.49	2.35	2.52	2.66	2.65	2.38	2.03
Apr. 4	.04	.03	.04	.04	.03	.04	.03	.04	.04	.03
5	.83	.75	.93	.84	.80	.91	.78	.99	.93	.68
11	.12	.04	.02	.05	.06	.05	.13	.07	.11	0
16	2.23	1.10	1.03	1.06	1.23	1.05	.61	.64	.41	.80
21	.58	.29	.27	.28	.32	.28	.16	.17	.11	.20
25	.69	.52	.62	.53	.65	.78	.54	.56	.61	.65
26	.76	.58	.69	.59	.72	.87	.60	.63	.69	.50
Monthly Totals	5.25	3.31	3.60	3.39	3.81	3.98	2.85	3.10	2.90	2.86
May 1	.17	.53	.49	.29	.29	.54	.92	.66	.70	.40
8	.12	.16	.14	.16	.17	.15	.13	.12	.04	0
8	.05	.06	.05	.06	.06	.06	.04	.05	.01	0
9	.57	.74	.65	.76	.78	.71	.60	.57	.16	.70
18	.02	.02	0	.18	0	.03	.04	.05	0	.05
30	.33	.35	.30	.42	.29	.72	.74	.51	.93	.30
31	.03	.04	.03	.04	.03	.07	.07	.05	.09	0
Monthly Totals	1.29	1.90	1.66	1.91	1.62	2.28	2.54	2.01	1.93	1.45
June 4	.35	.44	.39	.28	.22	.15	.30	.10	.08	.21
5	.04	.05	.04	.03	.02	.02	.03	.01	.01	.10
14	.06	.07	.05	.05	.05	.05	.05	.04	.04	.05
15-16	5.65	6.42	4.51	4.14	4.20	4.29	4.41	3.93	3.30	4.50
Monthly Totals	6.10	6.98	4.99	4.50	4.49	4.51	4.79	4.08	3.43	4.86
July 19	.18	.55	.05	.18	.11	.06	.07	.02	.18	0
Monthly Totals	0.18	0.55	0.05	0.18	0.11	0.06	0.07	0.02	0.18	0

Date of Storm	Gage Number									
	1-S	2-S	3-R	4-S	5-S	6-S	7-S	8-S	9-S	10-R
1964										
Aug. 13	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
15-16	1.16	1.40	1.57	1.35	1.36	1.27	1.46	1.59	1.33	1.60
16	.27	.30	.37	.32	.32	.30	.35	.38	.31	.40
21-22	1.92	1.34	1.51	2.76	1.60	2.74	1.84	3.09	1.96	1.45
23	.15	.11	.12	.22	.13	.22	.15	.25	.16	.10
Monthly Totals	3.52	3.17	3.59	4.67	3.43	4.55	3.82	5.33	3.78	3.57
Sept. 5	.17	.27	.38	0	0	0	0	0	0	0
12	.15	.14	.10	.40	.18	.41	.21	.92	.47	.20
15	.03	.03	.02	.08	.04	.08	.04	.19	.09	.02
16	1.46	1.02	1.16	1.41	.94	1.23	1.09	.95	.81	1.00
20	.67	.47	.53	.64	.43	.56	.50	.44	.37	.10
21	.35	.25	.28	.34	.22	.30	.26	.23	.19	.50
22	.29	.20	.23	.28	.19	.24	.22	.19	.16	.20
24	2.21	1.11	1.05	1.66	1.46	.85	1.77	1.23	1.66	1.18
26	.16	.19	.16	.17	.17	.14	.14	.12	.15	.10
27	.65	.73	.63	.67	.65	.54	.57	.46	.58	.50
Monthly Totals	6.14	4.41	4.54	5.65	4.28	4.35	4.80	4.73	4.48	3.80
1964 WATER YEAR TOTALS	35.87	34.47	31.91	34.33	30.77	33.83	33.24	31.45	29.95	26.83

Table 17.--Monthly Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption									
	Evaporation	Other consumption	Total	Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
SITE 4 ESTABLISHED SEPTEMBER 1956. FIRST APPRECIABLE RUNOFF OCCURRED MARCH 20, 1957. NO STAGE RECORD PRIOR TO THIS DATE.										
STREAM-GAGING STATION ESTABLISHED JUNE 1958. ANNUAL MAXIMUM ONLY OBTAINED DURING THE PERIOD SEPTEMBER 1954 TO MAY 1958										
SITES 1-3, 5-8, AND 10 ESTABLISHED AUGUST 1958										
OCTOBER 1956										
Site 4[a]	0	0	0	0	0	0	0	0	0	0.99
NOVEMBER 1956										
Site 4[a]	0	0	0	0	0	0	0	0	0	1.91
DECEMBER 1956										
Site 4[a]	0	0	0	0	0	0	0	0	0	1.76
JANUARY 1957										
Site 4[a]	0	0	0	0	0	0	0	0	0	1.17
FEBRUARY 1957										
Site 4[a]	0	0	0	0	0	0	0	0	0	3.07
MARCH 1957										
Site 4	1.5	1.2	2.7	0	+70.0	72.7	2.6	70.1	0.25	5.60
APRIL 1957										
Site 4	8.2	5.8	14.0	727.3	+1,518.7	2,260.0	76.5	2,183.5	7.80	16.44
MAY 1957										
Site 4	43.3	16.2	59.5	2,985.1	-997.8	2,046.8	88.4	1,958.4	6.99	10.15
JUNE 1957										
Site 4	17.3	7.3	24.6	415.5	-366.2	73.9	5.4	68.5	0.24	1.92
JULY 1957										
Site 4	19.8	6.6	26.4	2.6	-24.3	4.7	0.2	4.5	0.02	0.14
AUGUST 1957										
Site 4	15.7	6.0	21.7	3.0	-21.2	3.5	1.1	2.4	0.01	0.57
SEPTEMBER 1957										
Site 4	11.1	5.8	16.9	0	+6.8	23.7	11.2	12.5	0.04	5.78
OCTOBER 1957										
Site 4	7.8	6.3	14.1	479.2	+81.0	574.3	27.6	546.7	1.95	9.22
NOVEMBER 1957										
Site 4	5.1	6.3	11.4	320.1	+42.2	373.7	10.0	363.7	1.30	4.04
DECEMBER 1957										
Site 4	5.7	5.7	11.4	237.4	-72.2	176.6	1.3	175.3	0.63	0.54
JANUARY 1958										
Site 4	4.7	5.5	10.2	19.2	+14.3	43.7	4.0	39.7	0.14	1.67
FEBRUARY 1958										
Site 4	4.8	5.8	10.6	405.2	+293.5	709.3	15.0	694.3	2.48	4.92
MARCH 1958										
Site 4	9.5	6.9	16.4	444.5	-218.0	242.9	3.1	239.8	0.86	1.02
APRIL 1958										
Site 4	11.8	7.4	19.2	138.4	+4.1	161.7	13.8	147.9	0.53	4.47
MAY 1958										
Site 4	21.8	8.2	30.0	312.0	-8.8	333.2	7.2	326.0	1.16	2.22
JUNE 1958										
Site 4	22.2	8.7	30.9	70.4	-7.9	93.4	12.1	81.3	0.29	4.03
JULY 1958										
Site 4	25.1	8.5	33.6	28.0	-39.3	22.3	1.2	21.1	0.08	0.50
Stream gage								194	0.05	0.85
AUGUST 1958										
Site 4	18.7	7.6	26.3	11.7	-26.0	12.0	6.8	5.2	0.02	2.69
Stream gage								91	0.02	3.49
SEPTEMBER 1958										
Site 4	9.9	6.7	16.6	5.6	-6.7	15.5	6.8	8.7	0.03	2.42
Stream gage								291	0.07	4.35

See footnote at end of table.

Table 17.--Monthly Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption									
	Evaporation	Other consumption	Total	Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
OCTOBER 1958										
Site 1	0.5	0.7	1.2	0	-0.7	0.5	0.3	0.2	0	1.62
2	5.1	7.2	12.3	0	-7.0	5.3	2.5	2.8	.01	1.28
3	2.0	1.9	3.9	0	-1.8	2.1	1.3	.8	.01	1.70
4	6.3	5.1	11.4	0	-9.1	2.3	2.0	.3	0	.92
5	3.0	6.1	9.1	0	-8.1	1.0	1.0	0	0	.85
6	3.5	3.3	6.8	0	-1.4	5.4	1.5	3.9	.04	1.31
7	6.6	13.0	19.6	0	-15.1	4.5	3.6	.9	0	1.35
8	1.7	5.4	7.1	0	-6.1	1.0	.8	.2	0	1.19
10	3.4	6.0	9.4	0	-1.5	7.9	2.2	5.7	.04	1.70
Total	32.1	48.7	80.8	0	-50.8	30.0	15.2	14.8	0.01	--
Stream gage								57	0.01	1.30
NOVEMBER 1958										
Site 1	0.4	0.4	0.8	0	-0.5	0.3	0.2	0.1	0	1.64
2	5.0	6.3	11.3	0	-4.5	6.8	2.8	4.0	.02	1.50
3	2.0	1.4	3.4	0	+1.8	5.2	1.3	3.9	.05	1.68
4	6.1	5.2	11.3	6.0	-10.3	7.0	3.1	3.9	.01	1.38
5	3.0	5.1	8.1	0	-6.4	1.7	1.5	.2	0	1.35
6	3.1	3.1	6.2	0	+2.8	9.0	1.4	7.6	.07	1.20
7	6.2	10.8	17.0	0	-11.5	5.5	2.7	2.8	.01	1.23
8	1.6	4.6	6.2	0	-4.4	1.8	1.0	.8	.01	1.78
10	3.3	5.2	8.5	0	-3.0	5.5	2.1	3.4	.02	1.68
Total	30.7	42.1	72.8	6.0	-36.0	42.8	16.1	26.7	0.02	--
Stream gage								103	0.02	1.44
DECEMBER 1958										
Site 1	0.2	0.3	0.5	0	+0.3	0.8	0.2	0.6	0.01	1.30
2	3.1	5.4	8.5	0	-2.3	6.2	2.3	3.9	.02	1.25
3	1.3	1.1	2.4	0	0	2.4	1.0	1.4	.02	1.31
4	3.8	5.2	9.0	0	-2.8	6.2	2.5	3.7	.01	1.13
5	1.9	2.8	4.7	0	-3.3	1.4	1.3	.1	0	1.11
6	2.0	2.0	4.0	0	-1.4	2.6	1.5	1.1	.01	1.27
7	3.8	8.5	12.3	0	-8.2	4.1	2.7	1.4	0	1.18
8	.9	3.8	4.7	0	-3.2	1.5	.7	.8	.01	1.21
10	2.1	4.5	6.6	0	-3.0	3.6	1.6	2.0	.01	1.31
Total	19.1	33.6	52.7	0	-23.9	28.8	13.8	15.0	0.01	--
Stream gage								129	0.03	1.23
JANUARY 1959										
Site 1	0.3	0.4	0.7	0	-0.6	0.1	0.1	0	0	0.45
2	3.1	4.4	7.5	0	-6.5	1.0	.8	.2	0	.46
3	1.3	1.0	2.3	0	-1.8	.5	.3	.2	0	.45
4	3.8	5.1	8.9	3.5	-9.0	3.4	.9	2.5	.01	.43
5	1.9	2.1	4.0	1.9	-5.4	.5	.5	0	0	.42
6	1.7	1.2	2.9	47.2	-46.6	3.5	.6	2.9	.03	.59
7	3.7	6.4	10.1	0	-7.9	2.2	1.3	.9	0	.61
8	.7	2.3	3.0	0	-2.8	.2	.2	0	0	.43
10	1.9	3.5	5.4	0	-4.2	1.2	.5	.7	0	.45
Total	18.4	26.4	44.8	52.6	-84.8	12.6	5.2	7.4	0.01	--
Stream gage								173	0.04	0.52
FEBRUARY 1959										
Site 1	0.2	0.2	0.4	0	+0.3	0.7	0.4	0.3	0	3.16
2	2.9	2.9	5.8	0	+4.3	10.1	6.4	3.7	.02	3.43
3	1.2	.9	2.1	0	+2.7	4.8	2.4	2.4	.03	3.09
4	3.4	4.0	7.4	3.2	+3.9	14.5	7.0	7.5	.03	3.19
5	1.7	1.8	3.5	4.4	-4.0	3.9	3.4	.5	0	3.14
6	1.4	1.1	2.5	3.3	-1.0	4.8	2.7	2.1	.02	2.98
7	3.5	6.2	9.7	0	+5.2	14.9	6.1	8.8	.03	3.01
8	.7	2.2	2.9	0	+4.7	7.6	1.5	6.1	.07	3.15
10	1.9	3.3	5.2	0	+1.4	6.6	3.8	2.8	.02	3.09
Total	16.9	22.6	39.5	10.9	+17.5	67.9	33.7	34.2	0.02	--
Stream gage								255	0.06	3.23
MARCH 1959										
Site 1	0.4	0.2	0.6	0.5	-1.0	0.1	0.1	0	0	0.76
2	9.2	4.1	13.3	0	-8.6	4.7	1.7	3.0	.01	.94
3	3.9	2.0	5.9	0	-5.4	.5	.5	0	0	.71
4	11.1	4.4	15.5	6.5	-14.0	8.0	2.4	5.6	.02	1.08
5	5.3	2.5	7.8	0	-6.2	1.6	1.1	.5	0	1.11
6	4.4	1.9	6.3	7.6	-11.2	2.7	.7	2.0	.02	.79
7	11.3	7.6	18.9	0	-7.8	11.1	2.3	8.8	.03	.93
8	2.6	2.7	5.3	0	-3.0	2.3	.4	1.9	.02	.76
10	6.1	4.2	10.3	0	0	10.3	.8	9.5	.06	.71
Total	54.3	29.6	83.9	14.6	-57.2	41.3	10.0	31.3	0.02	--
Stream gage								139	0.03	0.86

Table 17.--Monthly Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption			Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
	Evaporation	Other consumption	Total							
APRIL 1959										
Site 1	0.4	0.2	0.6	0	+0.6	1.2	0.2	1.0	0.01	2.79
2	7.4	5.3	12.7	0	-4.1	8.6	5.5	3.1	.01	3.14
3	3.1	1.7	4.8	0	- .9	3.9	2.0	1.9	.03	2.70
4	8.7	4.5	13.2	8.0	-3.5	17.7	6.6	11.1	.04	3.16
5	4.2	2.9	7.1	0	0	7.1	3.1	4.0	.02	3.17
6	3.6	2.5	6.1	1.0	+11.2	18.3	3.6	14.7	.14	4.20
7	9.3	9.6	18.9	0	+13.2	32.1	9.3	22.8	.08	4.00
8	2.0	2.9	4.9	0	+ .5	5.4	1.2	4.2	.05	2.64
10	5.0	5.2	10.2	0	+1.4	11.6	3.2	8.4	.06	2.70
Total	43.7	34.8	78.5	9.0	+18.4	105.9	34.7	71.2	0.05	--
Stream gage								324	0.07	3.33
MAY 1959										
Site 1	0.7	0.4	1.1	0	-0.1	1.0	0.3	0.7	0.01	2.55
2	10.4	5.7	16.1	0	-6.1	10.0	5.4	4.6	.02	3.15
3	4.4	2.0	6.4	0	-2.6	3.8	1.7	2.1	.03	2.40
4	12.6	5.5	18.1	0	-4.2	13.9	6.2	7.7	.03	2.92
5	6.1	3.7	9.8	0	-3.5	6.3	2.8	3.5	.02	2.87
6	5.6	3.1	8.7	0	+10.0	18.7	2.2	16.5	.16	2.46
7	13.7	11.0	24.7	0	-2.7	22.0	5.8	16.2	.06	2.61
8	3.0	3.5	6.5	0	0	6.5	1.4	5.1	.06	2.77
10	7.8	6.2	14.0	0	+4.4	18.4	3.0	15.4	.10	2.40
Total	64.3	41.1	105.4	0	-4.8	100.6	28.8	71.8	0.05	--
Stream gage								253	0.06	2.72
JUNE 1959										
Site 1	8.4	5.4	13.8	108.9	+114.0	236.7	9.4	227.3	2.82	8.84
2	18.4	10.9	29.3	396.9	+156.8	583.0	26.0	557.0	2.37	9.62
3	6.4	2.8	9.2	94.8	+38.2	142.2	8.1	134.1	1.80	8.65
4	16.4	6.7	23.1	193.2	+88.1	304.4	22.8	281.6	1.01	9.42
5	8.6	5.9	14.5	329.1	+69.6	413.2	11.3	401.9	2.17	9.38
6	9.4	4.9	14.3	299.9	+84.7	398.9	10.1	388.8	3.66	8.31
7	18.8	14.7	33.5	270.3	+168.2	472.0	22.0	450.0	1.54	8.23
8	6.3	7.5	13.8	81.7	+106.3	201.8	8.2	193.6	2.15	7.96
10	11.9	9.1	21.0	18.2	+139.5	178.7	14.0	164.7	1.09	8.65
Total	104.6	67.9	172.5	1,793.0	+965.4	2,930.9	131.9	2,799.0	1.87	--
Stream gage								7,170	1.58	8.85
JULY 1959										
Site 1	13.0	8.4	21.4	102.0	-68.9	54.5	6.9	47.6	0.59	3.88
2	17.7	10.9	28.6	171.0	-75.6	124.0	10.3	113.7	.48	4.42
3	9.0	3.8	12.8	24.4	0	37.2	4.4	32.8	.44	3.74
4	20.4	8.2	28.6	3.5	+16.0	48.1	9.5	38.6	.14	3.70
5	10.6	7.7	18.3	38.8	-3.4	53.7	5.0	48.7	.26	3.55
6	10.8	5.2	16.0	.2	-1.7	14.5	4.2	10.3	.10	2.92
7	21.8	16.1	37.9	103.5	-113.9	27.5	6.7	20.8	.07	2.45
8	14.8	16.9	31.7	98.0	-2.4	127.3	7.5	119.8	1.33	3.22
10	21.8	15.8	37.6	9.5	-10.9	36.2	10.7	25.5	.17	3.74
Total	139.9	93.0	232.9	550.9	-260.8	523.0	65.2	457.8	0.31	--
Stream gage								960	0.21	3.43
AUGUST 1959										
Site 1	9.8	7.0	16.8	3.8	-12.3	8.3	3.7	4.6	0.06	2.95
2	16.0	11.6	27.6	2.8	-16.4	14.0	5.5	8.5	.04	2.48
3	8.4	4.0	12.4	2.8	-8.7	6.5	3.5	3.0	.04	3.07
4	19.7	8.3	28.0	5.0	-9.1	23.9	11.5	12.4	.04	3.27
5	10.0	8.4	18.4	.8	+1.7	20.9	5.9	15.0	.08	3.43
6	10.0	5.3	15.3	0	-3.5	11.8	5.9	5.9	.06	4.25
7	19.4	15.4	34.8	0	-6.7	28.1	12.0	16.1	.06	4.14
8	13.0	16.8	29.8	0	-9.1	20.7	7.3	13.4	.15	3.52
10	19.8	15.4	35.2	0	-17.2	18.0	8.4	9.6	.06	3.07
Total	126.1	92.2	218.3	15.2	-81.3	152.2	63.7	88.5	0.06	--
Stream gage								321	0.07	3.70
SEPTEMBER 1959										
Site 1	7.2	6.2	13.4	0	0	13.4	3.6	9.8	0.12	2.91
2	12.4	9.0	21.4	0	0	21.4	7.4	14.0	.06	3.43
3	6.3	3.0	9.3	0	+2.8	12.1	2.9	9.2	.12	2.78
4	15.4	7.4	22.8	2.0	0	24.8	8.7	16.1	.06	3.55
5	8.1	8.0	16.1	7.0	-5.1	18.0	5.0	13.0	.07	3.58
6	8.0	4.9	12.9	0	-3.3	9.6	4.2	5.4	.05	2.98
7	15.5	14.6	30.1	0	-6.4	23.7	6.4	17.3	.06	2.50
8	10.2	15.6	25.8	0	-19.1	6.7	4.6	2.1	.02	2.32
10	15.3	13.7	29.0	0	-9.6	19.4	7.3	12.1	.08	2.78
Total	98.4	82.4	180.8	9.0	-40.7	149.1	50.1	99.0	0.07	--
Stream gage								231	0.05	2.94

Table 17.--Monthly Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption			Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
	Evaporation	Other consumption	Total							
OCTOBER 1959										
Site 1	7.5	9.2	16.7	270.7	+8.6	296.0	18.4	277.6	3.44	9.13
2	12.5	13.0	25.5	837.4	+16.4	879.3	40.4	838.9	3.57	8.90
3	4.8	3.2	8.0	386.8	+7.4	402.2	11.7	390.5	5.23	9.19
4	11.6	6.9	18.5	592.1	+17.8	628.4	28.5	599.9	2.14	8.41
5	5.3	7.8	13.1	429.7	+5.1	447.9	13.8	434.1	2.34	8.31
6	5.8	5.0	10.8	440.5	+12.1	463.4	13.5	449.9	4.24	9.09
7	13.4	19.2	32.6	646.0	+23.3	701.9	33.2	668.7	2.29	8.03
8	8.6	20.2	28.8	443.5	+25.9	498.2	21.2	477.0	5.29	8.26
10	13.6	17.7	31.3	549.2	+30.4	610.9	37.9	573.0	3.78	9.19
Total	83.1	102.2	185.3	4,595.9	+148.0	4,929.2	218.6	4,710.6	3.15	--
Stream gage								12,990	2.87	8.74
NOVEMBER 1959										
Site 1	3.4	5.0	8.4	10.5	-3.5	15.4	2.9	12.5	0.16	1.68
2	5.5	8.1	13.6	195.0	-2.8	205.8	5.3	200.5	.85	2.24
3	2.9	2.5	5.4	38.9	0	44.3	2.0	42.3	.57	1.54
4	6.7	6.8	13.5	149.2	+19.8	182.5	4.6	177.9	.64	1.89
5	3.3	6.3	9.6	215.6	0	225.2	2.6	222.6	1.20	1.82
6	3.3	3.9	7.2	107.9	-1.8	113.3	2.6	110.7	1.04	1.78
7	6.7	13.3	20.0	88.9	-3.5	105.4	5.5	99.9	.34	1.91
8	4.5	15.7	20.2	24.2	+2.3	46.7	4.2	42.5	.47	2.02
10	7.0	12.9	19.9	58.9	-3.6	75.2	4.7	70.5	.47	1.54
Total	43.3	74.5	117.8	889.1	+6.9	1,013.8	34.4	979.4	0.66	--
Stream gage								3,010	0.66	1.91
DECEMBER 1959										
Site 1	3.9	4.8	8.7	74.4	+67.2	150.3	9.2	141.1	1.75	5.27
2	5.6	7.8	13.4	405.8	+92.9	512.1	13.0	499.1	2.13	5.04
3	2.6	1.9	4.5	226.3	+9.6	240.4	7.2	233.2	3.12	5.33
4	6.1	7.1	13.2	441.1	-1.2	453.1	12.5	440.6	1.57	4.54
5	2.9	3.5	6.4	232.5	+8.6	247.5	6.3	241.2	1.30	4.44
6	3.0	2.5	5.5	150.5	+5.3	161.3	7.3	154.0	1.45	4.83
7	6.0	11.0	17.0	265.8	+93.9	376.7	13.5	363.2	1.25	4.33
8	4.1	14.5	18.6	165.8	+14.7	199.1	9.4	189.7	2.11	4.56
10	6.8	12.0	18.8	257.9	+51.0	327.7	17.7	310.0	2.05	5.33
Total	41.0	65.1	106.1	2,220.1	+342.0	2,668.2	96.1	2,572.1	1.72	--
Stream gage								7,280	1.61	4.74
JANUARY 1960										
Site 1	3.6	4.3	7.9	168.6	-56.1	120.4	3.5	116.9	1.45	1.74
2	4.8	6.0	10.8	400.3	-87.3	323.8	4.0	319.8	1.36	1.59
3	2.5	1.7	4.2	117.2	-9.6	111.8	2.3	109.5	1.47	1.78
4	5.5	6.6	12.1	424.5	-62.2	374.4	4.3	370.1	1.32	1.47
5	2.7	2.6	5.3	189.2	-6.9	187.6	2.1	185.5	1.00	1.44
6	2.8	1.8	4.6	91.6	-5.3	90.9	2.4	88.5	.83	1.60
7	6.2	9.3	15.5	357.0	-86.9	285.6	5.6	280.0	.96	1.73
8	3.8	11.6	15.4	222.7	-14.7	223.4	3.6	219.8	2.44	1.69
10	6.1	9.6	15.7	285.4	-74.7	226.4	5.8	220.6	1.46	1.78
Total	38.0	53.5	91.5	2,256.5	-403.7	1,944.3	33.6	1,910.7	1.28	--
Stream gage								6,860	1.51	1.69
FEBRUARY 1960										
Site 1	4.2	3.1	7.3	38.1	+10.4	55.8	4.3	51.5	0.64	2.39
2	5.5	3.7	9.2	150.1	0	159.3	5.9	153.4	.65	2.48
3	2.9	1.6	4.5	50.6	0	55.1	3.0	52.1	.70	2.37
4	5.4	4.2	9.6	277.1	-120.7	166.0	5.2	160.8	.57	2.28
5	3.5	2.5	6.0	108.5	0	114.5	3.2	111.3	.60	2.24
6	3.4	1.8	5.2	65.4	+1.8	72.4	3.4	69.0	.65	2.31
7	6.7	8.2	14.9	97.4	+7.1	119.4	5.9	113.5	.39	2.11
8	4.5	9.5	14.0	33.1	+4.8	51.9	4.6	47.3	.53	2.27
10	4.8	5.6	10.4	122.2	-34.7	97.9	5.3	92.6	.61	2.37
Total	40.9	40.2	81.1	942.5	-131.3	892.3	40.8	851.5	0.57	--
Stream gage								3,170	0.70	2.33
MARCH 1960										
Site 1	4.9	2.9	7.8	43.7	-35.6	15.9	1.2	14.7	0.18	0.77
2	7.4	5.4	12.8	93.2	0	106.0	2.2	103.8	.44	.92
3	4.0	2.2	6.2	11.3	0	17.5	2.9	14.6	.20	.73
4	4.7	3.0	7.7	187.4	-32.6	162.5	1.0	161.5	.58	.75
5	4.5	3.4	7.9	37.7	-1.7	43.9	1.0	42.9	.23	.71
6	4.6	3.4	8.0	48.1	-1.8	54.3	1.2	53.1	.30	.82
7	9.1	10.2	19.3	74.6	-7.1	86.8	3.1	83.7	.29	1.00
8	6.1	10.8	16.9	8.7	-4.8	20.8	1.4	19.4	.22	.79
10	6.0	6.9	12.9	108.5	-67.2	54.2	1.2	53.0	.35	.73
Total	51.3	48.2	99.5	613.2	-150.8	561.9	15.2	546.7	0.37	--
Stream gage								2,030	0.45	0.81

Table 17.--Monthly Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption			Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
	Evaporation	Other consumption	Total							
APRIL 1960										
Site 1	4.8	2.9	7.7	18.2	-5.2	20.7	2.8	17.9	0.22	2.49
2	11.1	7.3	18.4	196.0	+11.6	226.0	8.2	217.8	.93	3.38
3	5.8	2.9	8.7	21.4	0	30.1	2.9	27.2	.36	2.27
4	7.4	3.7	11.1	1.1	+86.6	98.8	4.8	94.0	.34	2.88
5	6.5	4.1	10.6	59.5	0	70.1	3.9	66.2	.36	2.78
6	6.7	4.2	10.9	32.6	+1.8	45.3	2.8	42.5	.40	1.89
7	13.0	12.4	25.4	17.1	-3.5	39.0	3.8	35.2	.12	1.29
8	8.6	11.8	20.4	15.0	-11.4	24.0	2.6	21.4	.24	1.08
10	5.5	5.3	10.8	7.9	+11.4	30.1	2.8	27.3	.18	2.27
Total	69.4	54.6	124.0	368.8	+91.3	584.1	34.6	549.5	0.37	--
Stream gage								1,590	0.35	2.16
MAY 1960										
Site 1	5.5	2.6	8.1	10.6	-10.2	8.5	1.2	7.3	0.09	1.71
2	18.0	7.9	25.9	56.1	-20.0	62.0	4.1	57.9	.25	1.75
3	9.8	3.1	12.9	1.8	-4.5	10.2	2.1	8.1	.11	1.70
4	16.8	5.8	22.6	3.8	+24.6	51.0	4.6	46.4	.17	1.87
5	10.9	5.3	16.2	2.8	-1.7	17.3	2.7	14.6	.08	1.90
6	11.2	4.9	16.1	14.3	-3.6	26.8	2.7	24.1	.23	1.86
7	21.5	13.7	35.2	4.0	-10.2	29.0	5.5	23.5	.08	2.01
8	13.3	12.5	25.8	20.0	-22.7	23.1	3.5	19.6	.22	2.01
10	11.1	7.0	18.1	0	+1.8	19.9	2.4	17.5	.12	1.70
Total	118.1	62.8	180.9	113.4	-46.5	247.8	28.8	219.0	0.15	--
Stream gage								751	0.17	1.94
JUNE 1960										
Site 1	4.8	2.7	7.5	0.8	+0.9	9.2	2.3	6.9	0.09	4.12
2	17.8	9.0	26.8	8.7	0	35.5	7.9	27.6	.12	3.49
3	8.9	3.3	12.2	4.0	-7.1	9.1	4.8	4.3	.06	4.28
4	17.4	6.4	23.8	3.1	+2.2	29.1	8.4	20.7	.07	3.74
5	10.9	6.4	17.3	0	-5.1	12.2	5.3	6.9	.04	3.79
6	11.2	5.0	16.2	64.1	+1.8	82.1	9.7	72.4	.68	6.63
7	22.8	15.5	38.3	253.9	+146.5	438.7	16.7	422.0	1.45	6.18
8	12.2	11.2	23.4	20.0	-1.9	41.5	7.2	34.3	.38	5.20
10	11.9	7.8	19.7	0	+21.2	40.9	6.6	34.3	.23	4.28
Total	117.9	67.3	185.2	354.6	+158.5	698.3	68.9	629.4	0.42	--
Stream gage								1,650	0.36	5.06
JULY 1960										
Site 1	5.0	3.0	8.0	0	-4.5	3.5	1.2	2.3	0.03	1.54
2	18.5	10.4	28.9	6.3	-10.8	24.4	4.9	19.5	.08	2.16
3	9.9	3.8	13.7	0	+1.4	15.1	1.6	13.5	.18	1.39
4	17.8	6.6	24.4	7.8	-24.8	7.4	2.6	4.8	.02	1.33
5	11.1	7.4	18.5	0	-13.1	5.4	1.6	3.8	.02	1.16
6	11.9	5.3	17.2	243.0	-1.8	258.4	6.8	251.6	2.37	4.67
7	28.0	18.9	46.9	525.8	-153.2	419.5	11.9	407.6	1.40	3.56
8	12.9	13.5	26.4	0	-7.4	19.0	3.2	15.8	.18	2.11
10	14.0	9.3	23.3	0	-10.1	13.2	2.4	10.8	.07	1.39
Total	129.1	78.2	207.3	782.9	-224.3	765.9	36.2	729.7	0.49	--
Stream gage								1,690	0.37	2.59
AUGUST 1960										
Site 1	2.4	1.9	4.3	0.6	-1.1	3.8	0.7	3.1	0.04	2.41
2	14.0	11.5	25.5	3.2	+8.1	36.8	4.9	31.9	.14	2.25
3	6.8	3.7	10.5	0	-4.0	6.5	2.6	3.9	.05	2.45
4	12.5	6.0	18.5	3.4	-18.0	3.9	1.8	2.1	.01	1.92
5	8.3	7.9	16.2	0	-9.5	6.7	2.4	4.3	.02	1.85
6	9.0	5.4	14.4	0	-1.7	12.7	2.5	10.2	.10	1.73
7	14.9	13.5	28.4	39.1	-42.2	25.3	2.2	23.1	.08	.93
8	8.9	13.1	22.0	0	-5.3	16.7	3.2	13.5	.15	2.73
10	9.8	8.6	18.4	0	-5.7	12.7	3.8	8.9	.06	2.45
Total	86.6	71.6	158.2	46.3	-79.4	125.1	24.1	101.0	0.07	--
Stream gage								247	0.05	1.87
SEPTEMBER 1960										
Site 1	2.3	1.7	4.0	0	-1.5	2.5	0.4	2.1	0.03	1.74
2	14.7	9.4	24.1	0	-13.4	10.7	3.5	7.2	.03	1.61
3	6.4	2.7	9.1	.2	-7.2	2.1	1.7	.4	.01	1.77
4	12.2	5.1	17.3	2.5	-13.9	5.9	2.2	3.7	.01	1.73
5	8.0	7.0	15.0	7.7	-17.9	4.8	2.1	2.7	.01	1.75
6	9.4	4.9	14.3	0	-10.2	4.1	2.1	2.0	.02	1.54
7	14.6	12.0	26.6	0	-13.3	13.3	2.4	10.9	.04	1.13
8	8.4	11.2	19.6	2.0	-18.7	2.9	1.7	1.2	.01	1.40
10	9.3	7.2	16.5	5.3	-18.6	3.2	2.4	.8	.01	1.77
Total	85.3	61.2	146.5	17.7	-114.7	49.5	18.5	31.0	0.02	--
Stream gage								34	0.01	1.48

Table 17.--Monthly Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption			Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
	Evaporation	Other consumption	Total							
OCTOBER 1960										
Site 1	3.4	3.8	7.2	21.8	+71.0	100.0	6.3	93.7	1.16	7.30
2	8.7	8.7	17.4	220.4	+97.3	335.1	17.2	317.9	1.35	7.14
3	4.3	2.7	7.0	175.5	+22.9	205.4	8.5	196.9	2.64	7.34
4	7.7	4.8	12.5	37.5	+85.2	135.2	14.6	120.6	.43	6.78
5	5.0	7.2	12.2	65.3	+49.0	126.5	8.7	117.8	.63	6.71
6	5.4	4.5	9.9	190.6	+15.5	216.0	11.5	204.5	1.93	8.06
7	9.6	13.3	22.9	121.2	+176.1	320.2	18.8	301.4	1.03	7.33
8	4.7	10.6	15.3	32.9	+77.1	125.3	9.1	116.2	1.29	7.50
10	7.1	9.0	16.1	144.2	+151.9	312.2	16.4	295.8	1.95	7.34
Total	55.9	64.6	120.5	1,009.4	+746.0	1,875.9	111.1	1,764.8	1.18	--
Stream gage								4,990	1.10	7.41
NOVEMBER 1960										
Site 1	4.0	5.3	9.3	68.4	-52.1	25.6	1.9	23.7	0.29	1.54
2	6.0	7.9	13.9	126.0	-78.4	61.5	4.1	57.4	.24	1.76
3	3.2	2.4	5.6	10.9	-3.0	13.5	1.9	11.6	.16	1.49
4	5.9	5.4	11.3	45.4	-19.6	37.1	4.1	33.0	.12	1.75
5	3.6	6.3	9.9	44.6	-1.7	52.8	2.5	50.3	.27	1.75
6	3.7	3.9	7.6	34.2	-1.8	40.0	2.8	37.2	.35	1.87
7	7.5	13.7	21.2	103.3	-103.7	20.8	6.0	14.8	.05	1.97
8	4.6	14.6	19.2	26.8	-23.3	22.7	2.6	20.1	.22	1.45
10	7.5	12.5	20.0	43.4	-33.3	30.1	4.3	25.8	.17	1.49
Total	46.0	72.0	118.0	503.0	-316.9	304.1	30.2	273.9	0.18	--
Stream gage								1,350	0.30	1.72
DECEMBER 1960										
Site 1	2.7	5.8	8.5	265.6	+59.6	333.7	17.2	316.5	3.92	7.39
2	3.9	9.5	13.4	742.2	+32.2	787.8	26.9	760.9	3.24	6.97
3	1.6	1.9	3.5	359.0	+42.4	404.9	10.2	394.7	5.29	7.50
4	4.1	8.2	12.3	940.0	+65.2	1,017.5	20.3	997.2	3.56	7.14
5	1.9	3.8	5.7	991.7	+52.7	1,050.1	11.6	1,038.5	5.60	7.17
6	1.8	2.6	4.4	455.2	+3.5	463.1	12.6	450.5	4.24	7.88
7	6.1	18.9	25.0	1,249.0	+48.5	1,322.5	32.2	1,290.3	4.43	7.42
8	3.9	23.4	27.3	255.8	+52.4	335.5	20.2	315.3	3.50	6.47
10	4.2	12.7	16.9	598.7	+21.7	637.3	31.2	606.1	4.00	7.50
Total	30.2	86.8	117.0	5,857.2	+378.2	6,352.4	182.4	6,170.0	4.13	--
Stream gage								16,810	3.71	7.46
JANUARY 1961										
Site 1	3.8	5.3	9.1	318.0	-19.1	308.0	13.6	294.4	3.65	4.75
2	5.4	7.8	13.2	805.1	-20.9	797.4	17.4	780.0	3.32	4.45
3	2.2	1.8	4.0	353.5	-40.9	316.6	6.4	310.2	4.16	4.83
4	6.0	8.1	14.1	1,133.8	-14.3	1,133.6	14.1	1,119.5	4.00	4.33
5	2.4	2.6	5.0	676.6	-51.0	630.6	6.5	624.1	3.36	4.31
6	2.6	1.8	4.4	408.4	-1.7	411.1	8.7	402.4	3.79	5.64
7	8.3	14.2	22.5	1,238.3	-34.3	1,226.5	26.3	1,200.2	4.12	5.39
8	4.7	16.3	21.0	388.5	-36.4	373.1	12.7	360.4	4.00	4.53
10	5.6	10.0	15.6	488.5	-11.1	493.0	20.4	472.6	3.12	4.83
Total	41.0	67.9	108.9	5,810.7	-229.7	5,689.9	126.1	5,563.8	3.72	--
Stream gage								19,460	4.29	4.99
FEBRUARY 1961										
Site 1	5.2	3.4	8.6	161.1	+4.5	174.2	8.5	165.7	2.05	3.88
2	7.2	4.5	11.7	496.5	0	508.2	10.6	497.6	2.12	3.94
3	3.3	1.5	4.8	207.9	0	212.7	5.0	207.7	2.78	3.86
4	7.8	5.6	13.4	649.4	+13.3	676.1	11.1	665.0	2.37	4.01
5	3.7	2.4	6.1	412.2	0	418.3	5.8	412.5	2.22	4.03
6	3.7	1.8	5.5	359.6	0	365.1	6.6	358.5	3.38	4.39
7	9.5	10.5	20.0	676.2	-3.6	692.6	14.3	678.3	2.33	4.31
8	5.2	10.0	15.2	229.7	-2.4	242.5	7.8	234.7	2.61	3.45
10	8.4	8.8	17.2	305.3	0	322.5	13.2	309.3	2.04	3.86
Total	54.0	48.5	102.5	3,497.9	+11.8	3,612.2	82.9	3,529.3	2.36	--
Stream gage								12,170	2.68	4.05
MARCH 1961										
Site 1	8.1	3.2	11.3	49.2	-21.0	39.5	4.2	35.3	0.44	2.33
2	11.0	5.5	16.5	85.9	0	102.4	6.3	96.1	.41	2.67
3	5.8	2.2	8.0	98.8	-1.5	105.3	2.9	102.4	1.37	2.24
4	11.5	5.2	16.7	237.2	-38.9	215.0	7.2	207.8	.74	2.85
5	6.5	3.4	9.9	75.8	0	85.7	4.1	81.6	.44	2.89
6	6.7	3.3	10.0	84.1	-1.8	92.3	3.4	88.9	.84	2.32
7	13.5	10.3	23.8	109.9	+14.7	148.4	9.5	138.9	.48	3.02
8	8.9	10.8	19.7	68.2	-2.3	85.6	4.5	81.1	.90	2.22
10	14.0	11.0	25.0	57.6	0	82.6	6.8	75.8	.50	2.24
Total	86.0	54.9	140.9	866.7	-50.8	956.8	48.9	907.9	0.61	--
Stream gage								4,050	0.89	2.50

Table 17.--Monthly Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption			Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
	Evaporation	Other consumption	Total							
APRIL 1961										
Site 1	6.7	3.2	9.9	30.0	-12.3	27.6	1.3	26.3	0.33	1.10
2	12.8	7.0	19.8	25.8	-8.5	37.1	2.3	34.8	.15	1.01
3	5.9	2.4	8.3	31.1	-16.4	23.0	1.2	21.8	.29	1.12
4	13.4	5.6	19.0	32.5	-10.7	40.8	1.4	39.4	.14	.65
5	7.8	4.1	11.9	43.6	-1.7	53.8	.8	53.0	.29	.58
6	8.1	4.2	12.3	15.1	0	27.4	.9	26.5	.25	.63
7	16.0	12.5	28.5	38.1	-28.8	37.8	1.6	36.2	.12	.62
8	10.2	11.5	21.7	16.9	-15.6	23.0	1.5	21.5	.24	.70
10	16.2	12.6	28.8	11.9	-14.1	26.6	3.2	23.4	.15	1.12
Total	97.1	63.1	160.2	245.0	-108.1	297.1	14.2	282.9	0.19	--
Stream gage								1,230	0.27	0.78
MAY 1961										
Site 1	9.0	4.6	13.6	0	-1.6	12.0	2.3	9.7	0.12	1.84
2	15.8	7.7	23.5	4.0	-11.0	16.5	4.0	12.5	.05	1.77
3	6.3	2.5	8.8	7.1	-6.8	9.1	1.7	7.4	.10	1.86
4	16.8	6.4	23.2	0	-6.4	16.8	3.5	13.3	.05	1.51
5	9.8	5.2	15.0	3.8	-3.4	15.4	2.0	13.4	.07	1.46
6	10.2	4.9	15.1	5.6	-1.8	18.9	1.8	17.1	.16	1.27
7	19.2	13.6	32.8	1.2	-16.6	17.4	2.4	15.0	.05	1.01
8	11.6	12.0	23.6	20.8	-21.8	22.6	2.3	20.3	.23	1.13
10	19.4	13.4	32.8	6.0	-6.7	32.1	5.1	27.0	.18	1.86
Total	118.1	70.3	188.4	48.5	-76.1	160.8	25.1	135.7	0.09	--
Stream gage								462	0.10	1.43
JUNE 1961										
Site 1	10.7	8.6	19.3	212.6	+34.9	266.8	13.6	253.2	3.14	7.60
2	14.2	10.0	24.2	383.8	+13.8	421.8	17.2	404.6	1.72	7.18
3	6.8	3.4	10.2	218.6	+24.7	253.5	8.7	244.8	3.28	7.70
4	15.2	7.4	22.6	127.9	+41.7	192.2	18.7	173.5	.62	7.35
5	8.0	6.4	14.4	100.0	+1.7	116.1	10.4	105.7	.57	7.38
6	8.3	5.2	13.5	235.2	+1.8	250.5	11.6	238.9	2.25	7.84
7	19.5	18.3	37.8	611.5	+49.1	698.4	30.8	667.6	2.29	8.69
8	10.0	14.1	24.1	81.9	+42.1	148.1	14.3	133.8	1.49	8.22
10	18.8	17.2	36.0	347.3	+24.4	407.7	24.9	382.8	2.53	7.70
Total	111.5	90.6	202.1	2,318.8	+234.2	2,755.1	150.2	2,604.9	1.74	--
Stream gage								6,280	1.39	7.98
JULY 1961										
Site 1	12.6	9.2	21.8	59.8	-8.8	72.8	7.1	65.7	0.81	3.85
2	15.7	10.9	26.6	167.0	-5.6	188.0	8.7	179.3	.76	3.62
3	8.5	4.0	12.5	61.2	-1.5	72.2	5.1	67.1	.90	3.91
4	16.5	7.5	24.0	64.7	-42.0	46.7	7.7	39.0	.14	3.16
5	9.4	7.6	17.0	20.6	-1.7	35.9	4.4	31.5	.17	3.07
6	9.7	5.3	15.0	65.4	-1.8	78.6	4.3	74.3	.70	2.89
7	19.8	16.5	36.3	167.8	-35.9	168.2	8.4	159.8	.55	2.61
8	13.1	16.9	30.0	45.4	-7.0	68.4	6.0	62.4	.69	2.83
10	20.5	16.8	37.3	78.5	-7.2	108.6	12.1	96.5	.64	3.91
Total	125.8	94.7	220.5	730.4	-111.5	839.4	63.8	775.6	0.52	--
Stream gage								1,710	0.38	3.09
AUGUST 1961										
Site 1	11.3	8.3	19.6	1.8	-17.7	3.7	1.3	2.4	0.03	0.81
2	15.6	11.7	27.3	5.6	-13.6	19.3	1.7	17.6	.07	.77
3	8.6	4.2	12.8	2.4	-4.5	10.7	1.0	9.7	.13	.82
4	16.2	6.7	22.9	8.4	-22.5	8.8	1.6	7.2	.03	.65
5	9.5	8.3	17.8	0	-13.3	4.5	.8	3.7	.02	.62
6	9.9	5.4	15.3	12.5	-5.2	22.6	4.0	18.6	.18	2.78
7	19.1	15.7	34.8	4.6	-10.0	29.4	4.7	24.7	.08	1.75
8	12.1	16.2	28.3	11.9	-33.3	6.9	.6	6.3	.07	.32
10	19.7	15.9	35.6	0	-13.8	21.8	2.3	19.5	.13	.82
Total	122.0	92.4	214.4	47.2	-133.9	127.7	18.0	109.7	0.07	--
Stream gage								387	0.09	1.33
SEPTEMBER 1961										
Site 1	9.3	8.0	17.3	28.6	+7.5	53.4	6.1	47.3	0.59	4.11
2	13.4	9.8	23.2	102.5	+10.8	136.5	9.5	127.0	.54	4.15
3	7.1	3.4	10.5	22.0	+3.0	35.5	5.0	30.5	.41	4.10
4	13.4	5.9	19.3	6.9	+3.2	29.4	8.2	21.2	.08	3.81
5	7.8	7.8	15.6	6.6	-3.2	19.0	5.0	14.0	.08	3.74
6	8.4	5.0	13.4	83.5	+5.2	102.1	6.6	95.5	.90	4.60
7	16.7	15.6	32.3	124.8	+10.0	167.1	11.1	156.0	.54	3.87
8	9.1	13.9	23.0	15.9	+3.8	42.7	5.6	37.1	.41	3.83
10	16.8	15.1	31.9	29.6	+6.8	68.3	11.8	56.5	.37	4.10
Total	102.0	84.5	186.5	420.4	+47.1	654.0	68.9	585.1	0.39	--
Stream gage								1,090	0.24	3.99

Table 17.--Monthly Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption									
	Evaporation	Other consumption	Total	Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
					OCTOBER 1961					
Site 1	6.4	7.0	13.4	0	+6.0	19.4	2.4	17.0	0.21	1.55
2	9.0	8.5	17.5	2.8	-5.4	14.9	3.4	11.5	.05	1.47
3	5.0	3.0	8.0	7.9	-1.5	14.4	2.0	12.4	.17	1.57
4	9.1	4.9	14.0	2.0	-1.8	14.2	3.9	10.3	.04	1.69
5	5.3	7.1	12.4	0	-3.2	9.2	2.3	6.9	.04	1.74
6	5.8	4.5	10.3	46.0	0	56.3	3.2	53.1	.50	2.18
7	11.3	14.8	26.1	45.4	-6.7	64.8	5.5	59.3	.20	1.99
8	6.3	13.5	19.8	.6	-1.9	18.5	3.5	15.0	.17	2.08
10	11.4	13.5	24.9	0	-3.5	21.4	4.5	16.9	.11	1.57
Total	69.6	76.8	146.4	104.7	-18.0	233.1	30.7	202.4	0.14	--
Stream gage								449	0.10	1.93
					NOVEMBER 1961					
Site 1	3.7	5.2	8.9	24.2	0	33.1	4.0	29.1	0.36	2.47
2	5.5	7.6	13.1	22.5	+5.4	41.0	5.8	35.2	.15	2.56
3	3.0	2.4	5.4	4.6	+3.0	13.0	3.1	9.9	.13	2.45
4	5.5	5.2	10.7	21.6	+11.2	43.5	6.5	37.0	.13	3.08
5	3.2	5.9	9.1	19.7	+3.2	32.0	4.2	27.8	.15	3.19
6	3.5	3.9	7.4	37.7	0	45.1	4.5	40.6	.38	3.08
7	6.9	13.2	20.1	43.6	+17.1	80.8	7.9	72.9	.25	2.98
8	3.9	12.6	16.5	.6	+9.8	26.9	4.6	22.3	.25	2.72
10	6.9	12.1	19.0	0	+3.5	22.5	7.0	15.5	.10	2.45
Total	42.1	68.1	110.2	174.5	+53.2	337.9	47.6	290.3	0.19	--
Stream gage								683	0.15	2.94
					DECEMBER 1961					
Site 1	2.9	4.5	7.4	0	+6.3	13.7	2.6	11.1	0.14	1.55
2	4.2	6.6	10.8	13.1	0	23.9	3.2	20.7	.09	1.41
3	2.3	1.8	4.1	8.1	0	12.2	2.0	10.2	.14	1.59
4	4.2	5.3	9.5	9.0	-2.5	16.0	2.3	13.7	.05	1.05
5	2.4	3.3	5.7	0	+6.5	12.2	1.3	10.9	.06	.98
6	2.6	2.5	5.1	36.9	+1.8	43.8	2.1	41.7	.39	1.41
7	5.3	10.8	16.1	59.5	0	75.6	3.7	71.9	.25	1.29
8	3.3	13.1	16.4	0	+26.2	42.6	2.9	39.7	.44	1.70
10	5.2	10.4	15.6	0	0	15.6	4.6	11.0	.07	1.59
Total	32.4	58.3	90.7	126.6	+38.3	255.6	24.7	230.9	0.15	--
Stream gage								671	0.15	1.41
					JANUARY 1962					
Site 1	3.2	4.0	7.2	15.8	-4.3	18.7	1.8	16.9	0.21	0.95
2	4.2	5.5	9.7	12.0	0	21.7	2.4	19.3	.08	1.03
3	2.3	1.7	4.0	6.0	0	10.0	1.2	8.8	.12	.93
4	4.2	5.9	10.1	5.5	+ .8	16.4	1.0	15.4	.05	.84
5	2.5	2.5	5.0	12.0	+6.6	23.6	1.1	22.5	.12	.80
6	2.6	1.8	4.4	52.0	0	56.4	1.5	54.9	.52	1.00
7	5.3	8.4	13.7	48.2	-3.5	58.4	2.4	56.0	.19	.88
8	3.5	11.1	14.6	25.6	0	40.2	1.8	38.4	.43	.90
10	5.2	8.6	13.8	0	+3.4	17.2	2.7	14.5	.10	.93
Total	33.0	49.5	82.5	177.1	+3.0	262.6	15.9	246.7	0.17	--
Stream gage								550	0.12	0.94
					FEBRUARY 1962					
Site 1	4.1	2.2	6.3	22.1	-23.9	4.5	1.4	3.1	0.04	0.93
2	7.2	3.6	10.8	4.8	-2.7	12.9	2.8	10.1	.04	1.21
3	3.8	1.7	5.5	1.2	-1.5	5.2	1.1	4.1	.05	.86
4	7.2	3.8	11.0	3.7	-1.6	13.1	1.1	12.0	.04	1.04
5	4.4	2.3	6.7	0	+1.7	8.4	1.4	7.0	.04	1.01
6	4.5	1.8	6.3	5.6	-1.8	10.1	1.7	8.4	.08	1.16
7	8.8	7.8	16.6	15.1	-6.9	24.8	3.3	21.5	.07	1.16
8	5.9	9.2	15.1	5.0	-6.9	13.2	2.2	11.0	.12	1.09
10	9.0	7.6	16.6	6.0	-3.4	19.2	2.5	16.7	.11	.86
Total	54.9	40.0	94.9	63.5	-47.0	111.4	17.5	93.9	0.06	--
Stream gage								394	0.09	1.10
					MARCH 1962					
Site 1	6.0	2.5	8.5	0	+8.4	16.9	1.2	15.7	0.19	0.89
2	9.8	5.2	15.0	2.4	-2.7	14.7	1.9	12.8	.05	.85
3	5.4	2.1	7.5	0	-1.5	6.0	1.1	4.9	.07	.90
4	9.9	4.7	14.6	2.7	-3.6	13.7	2.0	11.7	.04	.84
5	6.0	3.4	9.4	0	0	9.4	1.2	8.2	.04	.84
6	6.3	3.4	9.7	8.0	0	17.7	1.8	15.9	.15	1.22
7	12.2	9.8	22.0	12.9	+3.4	38.3	3.1	35.2	.12	1.08
8	7.9	10.0	17.9	0	-11.0	6.9	1.4	5.5	.06	.74
10	12.4	10.4	22.8	3.0	-3.5	22.3	2.6	19.7	.13	.90
Total	75.9	51.5	127.4	29.0	-10.5	145.9	16.3	129.6	0.09	--
Stream gage								368	0.08	0.96

Table 17.--Monthly Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption			Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
	Evaporation	Other consumption	Total							
				APRIL 1962						
Site 1	6.6	4.0	10.6	0	+7.5	18.1	4.5	13.6	0.17	2.98
2	10.1	6.8	16.9	2.8	+2.7	22.4	6.6	15.8	.07	2.92
3	5.6	2.8	8.4	0	+1.5	9.9	3.7	6.2	.08	2.99
4	10.1	5.2	15.3	.9	+3.0	19.2	5.3	13.9	.05	2.76
5	6.2	4.0	10.2	0	0	10.2	3.8	6.4	.03	2.73
6	6.5	4.2	10.7	73.6	+1.8	86.1	6.5	79.6	.75	4.43
7	13.0	12.6	25.6	50.6	+10.5	86.7	10.6	76.1	.26	3.59
8	7.6	10.6	18.2	14.0	-12.3	19.9	5.1	14.8	.16	3.09
10	12.4	12.1	24.5	0	0	24.5	8.4	16.1	.11	2.99
Total	78.1	62.3	140.4	141.9	+14.7	297.0	54.5	242.5	0.16	--
Stream gage								608	0.13	3.32
				MAY 1962						
Site 1	12.4	5.6	18.0	0	+23.7	41.7	4.5	37.2	0.46	3.22
2	18.1	7.6	25.7	46.6	+19.7	92.0	6.7	85.3	.36	3.06
3	9.8	3.3	13.1	39.7	+3.0	55.8	4.0	51.8	.69	3.26
4	17.9	5.9	23.8	1.2	-7.3	17.7	6.5	11.2	.04	3.05
5	11.2	5.2	16.4	12.0	-6.7	21.7	4.2	17.5	.09	3.05
6	11.7	4.9	16.6	26.2	0	42.8	3.1	39.7	.37	2.12
7	23.0	14.0	37.0	18.6	-10.5	45.1	5.4	39.7	.14	2.18
8	12.4	11.1	23.5	14.0	-11.4	26.1	4.5	21.6	.24	3.02
10	22.1	13.2	35.3	46.4	+32.9	114.6	9.4	105.2	.69	3.26
Total	138.6	70.8	209.4	204.7	+43.4	457.5	48.3	409.2	0.27	--
Stream gage								630	0.14	2.74
				JUNE 1962						
Site 1	12.6	8.3	20.9	25.3	-23.7	22.5	10.1	12.4	0.15	5.40
2	15.4	9.3	24.7	114.4	+18.0	157.1	13.6	143.5	.61	5.81
3	8.4	3.6	12.0	33.9	0	45.9	7.3	38.6	.52	5.30
4	15.2	6.6	21.8	7.6	+37.0	66.4	7.9	58.5	.21	6.41
5	8.6	5.9	14.5	2.6	+13.5	30.6	8.9	21.7	.12	6.53
6	9.7	5.1	14.8	180.1	0	194.9	10.9	184.0	1.73	7.42
7	19.9	16.0	35.9	243.0	+538.4	817.3	36.8	780.5	2.68	9.78
8	10.0	12.0	22.0	33.7	+53.8	109.5	10.4	99.1	1.10	7.02
10	19.9	15.6	35.5	49.0	-15.2	69.3	16.1	53.2	.35	5.30
Total	119.7	82.4	202.1	689.6	+621.8	1,513.5	122.0	1,391.5	0.93	--
Stream gage								4,000	0.88	7.06
				JULY 1962						
Site 1	11.7	6.2	17.9	8.7	-24.6	2.0	0	2.0	0.02	0
2	21.0	10.5	31.5	21.7	-48.5	4.7	0	4.7	.02	0
3	11.1	3.8	14.9	3.2	-14.2	3.9	0	3.9	.05	0
4	20.7	6.5	27.2	31.6	-50.2	8.6	0	8.6	.03	0
5	12.6	7.4	20.0	8.4	-24.8	3.6	0	3.6	.02	0
6	13.0	5.1	18.1	.6	-15.3	3.4	0	3.4	.03	0
7	32.1	19.5	51.6	517.3	-545.1	23.8	0	23.8	.08	.14
8	17.4	16.3	33.7	34.9	-19.1	49.5	0	49.5	.55	0
10	25.4	15.1	40.5	1.0	-30.9	10.6	0	10.6	.07	0
Total	165.0	90.4	255.4	627.4	-772.7	110.1	0	110.1	0.07	--
Stream gage								1,030	0.23	0.06
				AUGUST 1962						
Site 1	8.2	4.6	12.8	0	-11.4	1.4	0.7	0.7	0.01	1.02
2	18.5	10.7	29.2	0	-27.3	1.9	1.6	.3	0	.80
3	8.6	3.3	11.9	0	-9.4	2.5	1.0	1.5	.02	1.07
4	17.9	6.1	24.0	3.8	-26.9	.9	.8	.1	0	.35
5	11.3	7.7	19.0	5.5	-24.2	.3	.3	0	0	.26
6	11.8	5.0	16.8	0	-14.4	2.4	.6	1.8	.02	.44
7	24.0	15.2	39.2	0	-25.6	13.6	.8	12.8	.04	.28
8	14.7	15.0	29.7	14.0	-38.3	5.4	1.2	4.2	.05	.61
10	21.4	13.3	34.7	0	-32.1	2.6	2.4	.2	0	1.07
Total	136.4	80.9	217.3	23.3	-209.6	31.0	9.4	21.6	0.01	--
Stream gage								15	0	0.59
				SEPTEMBER 1962						
Site 1	3.9	3.4	7.3	0	-5.0	2.3	1.1	1.2	0.01	1.66
2	10.9	8.0	18.9	0	-16.0	2.9	2.8	.1	0	1.51
3	4.9	2.8	7.7	0	-6.2	1.5	1.5	0	0	1.70
4	10.7	5.1	15.8	6.0	-15.1	6.7	3.0	3.7	.01	1.57
5	6.9	6.8	13.7	0	-2.8	10.9	1.9	9.0	.05	1.58
6	7.2	4.4	11.6	0	-9.0	2.6	2.3	.3	0	1.80
7	14.5	13.5	28.0	0	-14.8	13.2	5.2	8.0	.03	1.82
8	8.0	12.1	20.1	1.8	-16.3	5.6	2.0	3.6	.04	1.46
10	12.2	10.9	23.1	3.6	-17.6	9.1	3.6	5.5	.04	1.70
Total	79.2	67.0	146.2	11.4	-102.8	54.8	23.4	31.4	0.02	--
Stream gage								12	0	1.61

Table 17.--Monthly Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption									
	Evaporation	Other consumption	Total	Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
OCTOBER 1962										
Site 1	2.1	2.0	4.1	1.4	-3.9	1.6	1.2	0.4	0	2.55
2	7.8	6.7	14.5	0	-4.3	10.2	4.6	5.6	.02	2.57
3	3.3	2.5	5.8	0	-3.7	2.1	2.0	.1	0	2.55
4	7.8	3.6	11.4	3.8	-11.3	3.9	2.8	1.1	0	2.19
5	4.8	5.9	10.7	0	-8.1	2.6	2.3	.3	0	2.11
6	5.3	5.8	11.1	0	-7.4	3.7	3.5	.2	0	2.89
7	10.2	12.2	22.4	0	-5.7	16.7	6.4	10.3	.04	2.64
8	4.9	9.4	14.3	3.3	-15.1	2.5	2.5	0	0	2.19
10	8.3	8.9	17.2	0	-7.0	10.2	4.9	5.3	.03	2.55
Total	54.5	57.0	111.5	8.5	-66.5	53.5	30.2	23.3	0.02	--
Stream gage								12	0	2.48
NOVEMBER 1962										
Site 1	0.8	0.9	1.7	0	-0.4	1.3	0.6	0.7	0.01	2.39
2	4.9	6.0	10.9	0	0	10.9	4.0	6.9	.03	2.29
3	2.1	1.4	3.5	0	-1.4	2.1	1.8	.3	0	2.41
4	4.6	3.8	8.4	.9	-4.0	5.3	3.7	1.6	.01	2.39
5	2.9	4.7	7.6	0	-3.7	3.9	2.4	1.5	.01	2.41
6	3.3	3.1	6.4	0	-1.4	5.0	3.0	2.0	.02	2.57
7	6.3	10.5	16.8	0	0	16.8	5.8	11.0	.04	2.66
8	2.6	7.3	9.9	4.3	-6.9	7.3	2.6	4.7	.05	3.08
10	4.7	7.2	11.9	9.7	-17.0	4.6	4.0	.6	0	2.41
Total	32.2	44.9	77.1	14.9	-34.8	57.2	27.9	29.3	0.02	--
Stream gage								53	0.01	2.61
DECEMBER 1962										
Site 1	0.4	0.8	1.2	0	-0.7	0.5	0.4	0.1	0	1.39
2	3.0	5.1	8.1	0	-2.1	6.0	2.2	3.8	.02	1.22
3	1.2	1.2	2.4	0	-1.3	1.1	1.1	0	0	1.43
4	2.8	3.7	6.5	0	-3.6	2.9	1.7	1.2	0	1.05
5	1.7	3.1	4.8	0	-3.7	1.1	1.0	.1	0	1.01
6	2.0	2.0	4.0	0	0	4.0	1.5	2.5	.02	1.24
7	3.9	8.5	12.4	0	-2.8	9.6	2.6	7.0	.02	1.14
8	1.5	6.2	7.7	0	-5.1	2.6	1.2	1.4	.02	1.37
10	2.7	5.8	8.5	6.0	-7.7	6.8	2.3	4.5	.03	1.43
Total	19.2	36.4	55.6	6.0	-27.0	34.6	14.0	20.6	0.01	--
Stream gage								62	0.01	1.24
JANUARY 1963										
Site 1	0.6	0.6	1.2	0	0	1.2	0.1	1.1	0.01	0.33
2	3.7	4.2	7.9	0	-6.3	1.6	.6	1.0	0	.37
3	1.6	1.3	2.9	0	-2.7	.2	.2	0	0	.32
4	3.5	3.6	7.1	0	-5.9	1.2	.5	.7	0	.33
5	2.1	1.7	3.8	0	-3.5	.3	.3	0	0	.32
6	2.5	1.4	3.9	0	-2.8	1.1	.5	.6	.01	.46
7	4.9	6.6	11.5	0	-5.4	6.1	1.1	5.0	.02	.47
8	1.6	4.1	5.7	5.0	-8.7	2.0	.2	1.8	.02	.33
10	3.3	4.5	7.8	6.0	-7.3	6.5	.5	6.0	.04	.32
Total	23.8	28.0	51.8	11.0	-42.6	20.2	4.0	16.2	0.01	--
Stream gage								88	0.02	0.39
FEBRUARY 1963										
Site 1	0.6	0.4	1.0	0	-0.5	0.5	0.2	0.3	0	0.79
2	4.7	2.6	7.3	0	-4.1	3.2	1.4	1.8	.01	.85
3	2.0	.8	2.8	0	-0.8	2.0	.6	1.4	.02	.78
4	4.4	2.9	7.3	0	-4.4	2.9	1.3	1.6	.01	.80
5	2.5	1.6	4.1	0	-3.4	.7	.7	0	0	.79
6	3.2	1.4	4.6	0	-1.4	3.2	1.3	1.9	.02	1.09
7	6.1	6.1	12.2	0	-2.7	9.5	2.1	7.4	.03	.98
8	1.6	2.7	4.3	0	-3.5	.8	.5	.3	0	.81
10	4.0	3.8	7.8	0	-1.8	6.0	1.1	4.9	.03	.78
Total	29.1	22.3	51.4	0	-22.6	28.8	9.2	19.6	0.01	--
Stream gage								64	0.01	0.90
MARCH 1963										
Site 1	0.7	0.3	1.0	0	-0.6	0.4	0.2	0.2	0	1.00
2	8.6	3.8	12.4	0	-6.0	6.4	1.7	4.7	.02	1.04
3	3.5	1.2	4.7	0	-3.2	1.5	.7	.8	.01	.99
4	8.1	3.2	11.3	0	-7.7	3.6	1.4	2.2	.01	.89
5	4.7	2.2	6.9	0	-4.3	2.6	.8	1.8	.01	.86
6	6.0	2.7	8.7	0	-2.8	5.9	1.0	4.9	.05	.83
7	11.3	7.6	18.9	0	-7.8	11.1	1.7	9.4	.03	.83
8	2.6	2.7	5.3	1.0	-4.7	1.6	.7	.9	.01	1.55
10	7.2	5.1	12.3	0	-6.7	5.6	1.4	4.2	.03	.99
Total	52.7	28.8	81.5	1.0	-43.8	38.7	9.6	29.1	0.02	--
Stream gage								71	0.02	0.98

Table 17.--Monthly Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption									
	Evaporation	Other consumption	Total	Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
					APRIL 1963					
Site 1	0.1	0.1	0.2	0	-0.2	0	0	0	0	1.58
2	8.6	4.8	13.4	0	-5.7	7.7	2.8	4.9	.02	1.75
3	3.6	1.5	5.1	0	-1.6	3.5	1.0	2.5	.03	1.54
4	8.2	3.4	11.6	0	-7.4	4.2	2.6	1.6	.01	1.73
5	4.7	2.5	7.2	0	-4.1	3.1	1.5	1.6	.01	1.73
6	6.2	3.3	9.5	0	-4.2	5.3	2.9	2.4	.02	2.51
7	11.5	9.2	20.7	0	-5.1	15.6	5.1	10.5	.04	2.09
8	2.2	2.6	4.8	2.0	-4.4	2.4	.7	1.7	.02	1.47
10	7.1	5.6	12.7	0	-7.7	5.0	2.0	3.0	.02	1.54
Total	52.2	33.0	85.2	2.0	-40.4	46.8	18.6	28.2	0.02	--
Stream gage								51	0.01	1.84
					MAY 1963					
Site 1a/	0	0	0	0	0	0	0	0	0	2.01
2	10.8	5.0	15.8	0	-9.2	6.6	3.4	3.2	.01	2.27
3	4.6	1.7	6.3	0	-3.9	2.4	1.2	1.2	.02	1.95
4	10.3	3.8	14.1	0	-9.2	4.9	2.9	2.0	.01	2.09
5	5.8	3.0	8.8	0	-6.8	2.0	1.7	.3	0	2.05
6	8.0	3.8	11.8	0	-8.0	3.8	1.5	2.3	.02	1.36
7	15.0	10.2	25.2	0	-2.5	22.7	5.1	17.6	.06	2.25
8	2.4	2.4	4.8	0	-2.8	2.0	.7	1.3	.01	2.02
10	8.0	5.4	13.4	8.0	-17.3	4.1	2.1	2.0	.01	1.95
Total	64.9	35.3	100.2	8.0	-59.7	48.5	18.6	29.9	0.02	--
Stream gage								4.0	0	1.99
					JUNE 1963					
Site 1a/	0	0	0	0	0	0	0	0	0	3.44
2	11.1	5.7	16.8	0	-6.9	9.9	3.6	6.3	.03	2.58
3	4.7	1.8	6.5	0	-2.1	4.4	2.2	2.2	.03	3.66
4	10.6	3.7	14.3	0	-11.1	3.2	3.0	.2	0	2.28
5	6.0	3.5	9.5	0	-5.6	3.9	1.7	2.2	.01	2.22
6	8.4	3.7	12.1	0	-9.0	3.1	.8	2.3	.02	2.16
7	15.4	10.4	25.8	0	-14.3	11.5	6.8	4.7	.02	3.50
8	2.1	2.2	4.3	1.2	-4.3	1.2	.8	.4	0	2.86
10	6.3	4.2	10.5	6.8	-12.5	4.8	2.8	2.0	.01	3.66
Total	64.6	35.2	99.8	8.0	-65.8	42.0	21.7	20.3	0.01	--
Stream gage								0	0	2.85
					JULY 1963					
Site 1a/	0	0	0	0	0	0	0	0	0	0.38
2	12.5	6.0	18.5	0	-15.8	2.7	.1	2.6	.01	.11
3	5.6	1.9	7.5	0	-7.0	.5	.3	.2	0	.45
4	12.0	3.8	15.8	0	-14.4	1.4	.6	.8	0	.43
5	7.0	4.0	11.0	0	-7.1	3.9	.4	3.5	.02	.49
6	9.4	3.6	13.0	4.0	-16.5	.5	.5	0	0	.52
7	17.9	10.5	28.4	0	-9.2	19.2	1.8	17.4	.06	.79
8	2.1	1.8	3.9	0	-1.6	2.3	.1	2.2	.02	.30
10	6.5	3.7	10.2	0	-8.0	2.2	.3	1.9	.01	.45
Total	73.0	35.3	108.3	4.0	-79.6	32.7	4.1	28.6	0.02	--
Stream gage								0	0	0.48
					AUGUST 1963					
Site 1a/	0	0	0	0	0	0	0	0	0	2.19
2	10.4	6.2	16.6	0	-9.9	6.7	1.6	5.1	.02	1.37
3	4.0	1.7	5.7	0	-4.6	1.1	1.1	0	0	2.39
4	10.2	3.5	13.7	0	-12.7	1.0	1.0	0	0	.54
5	6.0	4.1	10.1	0	-8.3	1.8	.2	1.6	.01	.37
6	7.5	3.6	11.1	4.0	-14.6	.5	.5	0	0	.52
7	15.3	10.0	25.3	0	-17.0	8.3	.7	7.6	.03	.50
8	1.5	1.6	3.1	0	-2.3	.8	.1	.7	.01	.62
10	4.5	2.9	7.4	0	-1.4	6.0	1.2	4.8	.03	2.39
Total	59.4	33.6	93.0	4.0	-70.8	26.2	6.4	19.8	0.01	--
Stream gage								0	0	0.86
					SEPTEMBER 1963					
Site 1a/	0	0	0	0	0	0	0	0	0	3.13
2	9.0	5.5	14.5	0	+36.2	50.7	4.8	45.9	.20	3.82
3	3.5	1.4	4.9	0	- .6	4.3	1.5	2.8	.04	2.96
4	7.6	3.0	10.6	0	-6.1	4.5	3.2	1.3	0	3.01
5	4.6	3.8	8.4	0	-3.2	5.2	1.9	3.3	.02	2.84
6	6.6	3.3	9.9	0	+38.8	48.7	2.6	46.1	.43	2.99
7	11.4	9.0	20.4	0	-8.0	12.4	1.4	11.0	.04	1.08
8	1.0	1.3	2.3	0	0	2.3	.4	1.9	.02	3.66
10	4.6	3.4	8.0	0	+12.2	20.2	2.1	18.1	.12	2.96
Total	48.3	30.7	79.0	0	+69.3	148.3	17.9	130.4	0.09	--
Stream gage								68	0.02	2.56

See footnote at end of table.

Table 17.--Monthly Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet: Pool Consumption: Evaporation	Other consumption	Total	Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station	Flow from area above station, in inches	Rainfall on area above station, in inches
OCTOBER 1963										
Site 1a/	0	0	0	0	0	0	0	0	0	0.33
2	7.8	5.4	13.2	0	-10.5	2.7	.4	2.3	.01	.29
3	2.6	1.2	3.8	0	-2.1	1.7	.2	1.5	.02	.34
4	4.0	1.2	5.2	0	-5.0	.2	.2	0	0	.22
5	3.3	2.1	5.4	0	-5.3	.1	.1	0	0	.21
6	5.8	3.4	9.2	0	-8.3	.9	.1	.8	.01	.10
7	8.5	8.2	16.7	0	-11.2	5.5	.4	5.1	.02	.22
8	.8	.8	1.6	0	-1.5	.1	0	.1	0	.18
10	4.1	3.5	7.6	0	-6.2	1.4	.2	1.2	.01	.34
Total	36.9	25.8	62.7	0	-50.1	12.6	1.6	11.0	0.01	--
Stream gage								0	0	0.20
NOVEMBER 1963										
Site 1a/	0	0	0	0	0	0	0	0	0	3.75
2	5.1	4.8	9.9	0	+ .8	10.7	5.9	4.8	.02	4.20
3	1.8	.9	2.7	0	+ .6	3.3	1.8	1.5	.02	3.63
4	2.5	1.6	4.1	0	+5.2	9.3	3.0	6.3	.02	4.34
5	2.4	2.9	5.3	0	+15.1	20.4	2.6	17.8	.10	4.37
6	3.7	3.4	7.1	1.7	-3.0	5.8	4.0	1.8	.02	3.80
7	5.5	6.9	12.4	0	-3.4	9.0	4.4	4.6	.02	3.26
8	.7	1.6	2.3	0	+4.3	6.6	.6	6.0	.07	3.88
10	2.4	2.8	5.2	0	- .8	4.4	2.5	1.9	.01	3.63
Total	24.1	24.9	49.0	1.7	+18.8	69.5	24.8	44.7	0.03	--
Stream gage								39	0.01	3.96
DECEMBER 1963										
Site 1a/	0	0	0	0	0	0	0	0	0	1.63
2	1.7	4.1	5.8	0	-2.4	3.4	2.3	1.1	0	1.65
3	.6	.7	1.3	0	0	1.3	.8	.5	.01	1.63
4	.9	1.9	2.8	0	- .9	1.9	1.0	.9	0	1.40
5	.8	1.7	2.5	0	- .9	1.6	.4	1.2	.01	1.35
6	1.2	1.7	2.9	6.8	-7.4	2.3	1.9	.4	0	1.86
7	1.8	5.6	7.4	0	+1.1	8.5	2.4	6.1	.02	1.68
8	.2	1.5	1.7	0	-1.2	.5	.3	.2	0	1.62
10	.8	2.5	3.3	0	+ .5	3.8	1.2	2.6	.02	1.63
Total	8.0	19.7	27.7	6.8	-11.2	23.3	10.3	13.0	0.01	--
Stream gage								32	0.01	1.70
JANUARY 1964										
Site 1a/	0	0	0	0	0	0	0	0	0	3.28
2	3.6	3.4	7.0	0	+38.1	45.1	5.4	39.7	.17	3.50
3	1.2	.7	1.9	0	+2.4	4.3	1.6	2.7	.04	3.23
4	1.9	1.7	3.6	0	+19.7	23.3	2.8	20.5	.07	3.51
5	1.8	1.2	3.0	0	0	3.0	1.8	1.2	.01	3.51
6	2.4	1.1	3.5	4.0	-1.8	5.7	3.4	2.3	.02	3.53
7	3.8	4.3	8.1	0	+2.5	10.6	4.6	6.0	.02	3.08
8	.5	1.0	1.5	0	- .2	1.3	.6	.7	.01	3.36
10	1.7	2.1	3.8	0	+16.2	20.0	2.5	17.5	.12	3.23
Total	16.9	15.5	32.4	4.0	+76.9	113.3	22.7	90.6	0.06	--
Stream gage								137	0.03	3.36
FEBRUARY 1964										
Site 1	0.1	0	0.1	0	+0.7	0.8	0.1	0.7	0.01	1.70
2	4.1	2.8	6.9	0	+6.0	12.9	3.0	9.9	.04	1.66
3	1.2	.6	1.8	0	+ .8	2.6	.9	1.7	.02	1.71
4	2.3	1.8	4.1	0	+3.8	7.9	1.7	6.2	.02	1.69
5	1.7	1.2	2.9	0	+4.7	7.6	.8	6.8	.04	1.70
6	2.2	1.1	3.3	0	+2.0	5.3	2.3	3.0	.03	2.42
7	3.4	4.2	7.6	0	+ .2	7.8	2.6	5.2	.02	1.92
8	.6	1.4	2.0	0	+9.6	11.6	.4	11.2	.12	1.64
10	2.2	2.5	4.7	0	-2.3	2.4	1.6	.8	.01	1.71
Total	17.8	15.6	33.4	0	+25.5	58.9	13.4	45.5	0.03	--
Stream gage								245	0.05	1.94
MARCH 1964										
Site 1	2.1	1.0	3.1	0	+12.6	15.7	1.7	14.0	0.17	2.85
2	7.7	4.5	12.2	0	+44.4	56.6	5.3	51.3	.22	2.85
3	2.2	.9	3.1	0	+9.8	12.9	1.6	11.3	.15	2.85
4	4.2	2.2	6.4	0	+17.7	24.1	2.2	21.9	.08	2.43
5	2.8	1.8	4.6	0	+4.6	9.2	1.5	7.7	.04	2.34
6	2.3	3.8	6.1	0	+10.8	16.9	2.8	14.1	.13	2.66
7	6.0	5.4	11.4	0	+6.9	18.3	4.1	14.2	.05	2.61
8	1.8	2.5	4.3	0	+14.2	18.5	1.1	17.4	.19	2.35
10	4.1	3.8	7.9	0	+15.2	23.1	3.0	20.1	.13	2.85
Total	33.2	25.9	59.1	0	+136.2	195.3	23.3	172.0	0.12	--
Stream gage								399	0.09	2.58

See footnote at end of table.

Table 18.--Annual Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption			Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
	Evaporation	Other consumption	Total							
SITE 4 ESTABLISHED SEPTEMBER 1956										
STREAM-GAGING STATION ESTABLISHED JUNE 1958 ANNUAL MAXIMUM ONLY OBTAINED DURING THE PERIOD SEPTEMBER 1954 TO MAY 1958										
SITES 1-3, 5-8, AND 10 ESTABLISHED AUGUST 1958										
1957 WATER YEAR										
Site 1										
2										
3										
4	116.9	48.9	165.8	4,133.5	+186.0	4,485.3	185.4	4,299.9	15.35	49.50
5										
6										
7										
8										
10										
Total										
Stream gage										
1957 CALENDAR YEAR										
Site 1										
2										
3										
4	135.5	67.2	202.7	5,170.2	+237.0	5,609.9	224.3	5,385.6	19.23	58.64
5										
6										
7										
8										
10										
Total										
Stream gage										
1958 WATER YEAR										
Site 1										
2										
3										
4	147.1	83.6	230.7	2,471.7	+56.2	2,758.6	108.9	2,649.7	9.46	37.74
5										
6										
7										
8										
10										
Total										
Stream gage										
1958 CALENDAR YEAR										
Site 1										
2										
3										
4	144.7	80.8	225.5	1,441.0	-17.0	1,649.5	77.6	1,571.9	5.61	27.37
5										
6										
7										
8										
10										
Total										
Stream gage										

Table 18.--Annual Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet								Flow from area above station, in inches	Rainfall on area above station, in inches
	Pool Consumption									
	Evaporation	Other consumption	Total	Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station		
1959 WATER YEAR										
Site 1	41.5	29.8	71.3	215.2	+31.1	317.6	25.4	292.2	3.62	33.85
2	110.7	83.7	194.4	570.7	+30.0	795.1	76.6	718.5	3.06	35.10
3	49.3	25.6	74.9	122.0	+24.3	221.2	29.4	191.8	2.57	32.28
4	127.7	69.6	197.3	230.9	+46.0	474.2	83.2	391.0	1.40	34.15
5	64.4	57.0	121.4	382.0	+25.9	529.3	41.9	487.4	2.63	33.96
6	63.5	38.5	102.0	359.2	+38.6	499.8	38.6	461.2	4.34	33.26
7	133.6	133.9	267.5	373.8	+6.4	647.7	80.9	566.8	1.94	32.24
8	57.5	84.2	141.7	179.7	+61.4	382.8	34.8	348.0	3.86	30.95
10	100.3	92.1	192.4	27.7	+97.3	317.4	57.6	259.8	1.71	32.28
Total	748.5	614.4	1,362.9	2,461.2	+361.0	4,185.1	468.4	3,716.7	2.50	--
Stream gage								10,120	2.23	33.55
1959 CALENDAR YEAR										
Site 1	55.2	47.4	102.6	570.8	+104.3	777.7	55.2	722.5	8.96	45.37
2	121.1	93.7	214.8	2,008.9	+150.3	2,374.0	127.7	2,246.3	9.57	47.25
3	54.3	28.8	83.1	774.0	+41.3	898.4	46.7	851.7	11.41	43.65
4	135.9	74.9	210.8	1,407.3	+104.6	1,722.7	121.2	1,601.5	5.72	45.56
5	68.0	60.6	128.6	1,259.8	+57.4	1,445.8	60.8	1,385.0	7.47	45.22
6	67.0	41.5	108.5	1,058.1	+54.2	1,220.8	57.6	1,163.2	10.96	45.18
7	143.1	145.1	288.2	1,374.5	+154.9	1,817.6	124.1	1,693.5	5.81	42.75
8	70.5	120.8	191.3	813.2	+118.0	1,122.5	67.1	1,055.4	11.71	41.61
10	118.9	119.0	237.9	893.7	+182.6	1,314.2	112.0	1,202.2	7.93	43.65
Total	834.0	731.8	1,565.8	10,160.3	+967.6	12,693.7	772.4	11,921.3	7.98	--
Stream gage								33,110	7.31	44.97
1960 WATER YEAR										
Site 1	52.3	44.1	96.4	636.2	-30.6	702.0	48.1	653.9	8.11	34.99
2	135.4	99.5	234.9	2,352.1	-5.3	2,581.7	104.3	2,477.4	10.55	35.81
3	67.3	32.6	99.9	858.5	-14.0	944.4	44.8	899.6	12.05	34.80
4	124.1	68.2	192.3	2,093.1	-122.4	2,163.0	80.5	2,082.5	7.43	32.81
5	77.9	64.2	142.1	1,283.2	-42.2	1,383.1	47.0	1,336.1	7.20	32.19
6	82.3	48.1	130.4	1,258.0	-3.4	1,385.0	57.0	1,328.0	12.51	38.75
7	162.9	157.2	320.1	2,369.6	-49.1	2,640.6	109.3	2,531.3	8.68	34.21
8	95.9	155.6	251.5	955.0	-39.2	1,167.3	65.8	1,101.5	12.23	34.12
10	105.9	109.9	215.8	1,395.3	-98.8	1,512.3	93.0	1,419.3	9.37	34.80
Total	904.0	779.4	1,683.4	13,201.0	-405.0	14,479.4	649.8	13,829.6	9.27	--
Stream gage								41,300	9.11	35.32
1960 CALENDAR YEAR										
Site 1	47.6	40.0	87.6	636.4	-24.4	699.6	43.0	656.6	8.14	35.14
2	130.4	96.7	227.1	2,002.5	-60.7	2,168.9	93.8	2,075.1	8.84	35.50
3	66.1	32.0	98.1	751.9	+31.3	881.3	44.5	836.8	11.21	35.07
4	117.4	65.8	183.2	1,933.6	-28.0	2,088.8	73.9	2,014.9	7.19	33.64
5	76.9	63.9	140.8	1,507.0	+44.1	1,691.9	47.1	1,644.8	8.87	33.25
6	81.1	47.7	128.8	1,239.1	-1.8	1,366.1	60.5	1,305.6	12.30	40.86
7	160.0	159.6	319.6	2,842.4	-41.9	3,120.1	114.1	3,006.0	10.31	36.66
8	91.9	153.8	245.7	637.0	+24.1	906.8	62.9	843.9	9.37	34.70
10	97.3	101.5	198.8	1,315.6	-36.3	1,478.1	84.6	1,393.5	9.20	35.07
Total	868.7	761.0	1,629.7	12,865.5	-93.6	14,401.6	624.4	13,777.2	9.22	--
Stream gage								41,170	9.08	36.52
1961 WATER YEAR										
Site 1	86.8	68.7	155.5	1,216.9	+44.9	1,417.3	83.4	1,333.9	16.54	46.50
2	129.7	101.0	230.7	3,164.8	+16.1	3,411.6	125.9	3,285.7	14.00	45.44
3	63.6	32.4	96.0	1,548.0	+18.4	1,662.4	57.6	1,604.8	21.50	46.77
4	134.5	76.8	211.3	3,283.7	+54.2	3,549.2	112.5	3,436.7	12.27	43.99
5	75.4	65.1	140.5	2,440.8	+27.4	2,608.7	62.6	2,546.1	13.72	43.71
6	78.5	47.9	126.4	1,949.4	+11.9	2,087.7	74.8	2,012.9	18.96	50.17
7	164.8	173.1	337.9	4,445.9	+65.5	4,849.3	166.1	4,683.2	16.06	47.99
8	98.1	170.3	268.4	1,194.7	+33.3	1,496.4	87.2	1,409.2	15.64	42.65
10	158.2	155.0	313.2	2,111.0	+118.6	2,542.8	151.7	2,391.1	15.78	46.77
Total	989.6	890.3	1,879.9	21,355.2	+390.3	23,625.4	921.8	22,703.6	15.18	--
Stream gage								69,990	15.44	46.73
1961 CALENDAR YEAR										
Site 1	89.7	70.5	160.2	885.3	-21.3	1,024.2	67.0	957.2	11.87	35.84
2	129.8	97.6	227.4	2,114.6	-35.0	2,307.0	90.1	2,216.9	9.44	35.01
3	64.8	32.6	97.4	1,023.2	-42.4	1,078.2	44.1	1,034.1	13.86	36.05
4	135.6	73.8	209.4	2,293.4	-69.7	2,433.1	86.2	2,346.9	8.38	34.14
5	75.8	64.1	139.9	1,358.9	-66.1	1,432.7	47.6	1,385.1	7.47	33.99
6	79.5	47.8	127.3	1,390.0	-3.5	1,513.8	57.7	1,456.1	13.72	39.03
7	165.1	166.0	331.1	3,120.9	-45.0	3,407.0	126.2	3,280.8	11.25	37.53
8	98.4	160.9	259.3	880.4	-38.8	1,100.9	66.3	1,034.6	11.48	33.73
10	162.9	156.8	319.7	1,324.7	-21.7	1,622.7	115.9	1,506.8	9.94	36.02
Total	1,001.6	870.1	1,871.7	14,391.4	-343.5	15,919.6	701.1	15,218.5	10.18	--
Stream gage								51,330	11.33	36.42

Table 18.--Annual Water-Budget Summary for Cow Bayou Study Area, Water Years 1957-64--Continued

Station	Water Budget, in acre-feet: Pool Consumption: Evaporation	Pool Consumption: Other consumption	Pool Consumption: Total	Outflow	Change in pool content	Total inflow	Inflow from rain on pool	Flow from area above station	Flow from area above station, in inches	Rainfall on area above station, in inches
1962 WATER YEAR										
Site 1	81.7	57.5	139.2	96.1	-41.0	194.3	34.3	160.0	1.98	22.62
2	133.9	89.9	223.8	243.1	-56.8	410.1	50.8	359.3	1.53	22.63
3	70.2	32.3	102.5	104.6	-26.8	180.3	28.0	152.3	2.04	22.62
4	132.6	65.2	197.8	95.6	-57.0	236.4	40.3	196.1	.70	22.68
5	80.6	61.5	142.1	60.2	-30.2	172.1	30.6	141.5	.76	22.71
6	85.2	46.6	131.8	466.7	-36.9	561.6	38.2	523.4	4.93	26.26
7	176.3	155.6	331.9	1,054.2	-43.7	1,342.4	84.7	1,257.7	4.31	27.17
8	100.9	146.6	247.5	144.2	-27.4	364.3	39.6	324.7	3.60	24.43
10	163.5	142.8	306.3	109.0	-66.4	348.9	63.8	285.1	1.88	22.62
Total	1,024.9	798.0	1,822.9	2,373.7	-386.2	3,810.4	410.3	3,400.1	2.26	--
Stream gage								9,410	2.07	24.66
1962 CALENDAR YEAR										
Site 1	72.0	44.5	116.5	73.3	-58.3	131.5	27.5	104.0	1.29	23.38
2	130.9	85.0	215.9	204.7	-63.2	357.4	49.2	308.2	1.31	23.27
3	66.5	30.2	96.7	84.0	-34.7	146.0	25.8	120.2	1.61	23.41
4	129.0	60.9	189.9	67.7	-82.8	174.8	35.8	139.0	.50	22.49
5	79.1	58.9	138.0	40.5	-52.2	126.3	28.5	97.8	.53	22.33
6	83.9	46.6	130.5	346.1	-47.5	429.1	36.4	392.7	3.70	26.29
7	173.2	148.0	321.2	905.7	-62.6	1,164.3	82.4	1,081.9	3.71	27.35
8	96.4	130.3	226.7	150.6	-88.6	288.7	34.9	253.8	2.82	24.57
10	155.7	128.7	284.4	124.7	-98.1	311.0	58.9	252.1	1.66	23.40
Total	986.7	733.1	1,719.8	1,997.3	-588.0	3,129.1	379.4	2,749.7	1.84	--
Stream gage								7,730	1.69	24.71
1963 WATER YEAR										
Site 1	5.3	5.1	10.4	1.4	-6.3	5.5	2.7	2.8	0.03	21.18
2	95.1	61.6	156.7	0	-34.1	122.6	30.8	91.8	.39	20.24
3	39.7	18.4	58.1	0	-32.9	25.2	13.7	11.5	.15	21.44
4	90.1	42.0	132.1	4.7	-97.8	39.0	24.7	14.3	.05	17.73
5	52.8	40.1	92.9	0	-61.8	31.1	14.9	16.2	.09	17.20
6	68.4	37.7	106.1	8.0	-29.3	84.8	19.6	65.2	.61	19.14
7	129.2	110.8	240.0	0	-80.5	159.5	40.6	118.9	.41	18.93
8	26.1	44.3	70.4	16.8	-59.4	27.8	10.5	17.3	.19	20.26
10	67.2	60.5	127.7	36.5	-82.2	82.0	24.7	57.3	.38	21.43
Total	573.9	420.5	994.4	67.4	-484.3	577.5	182.2	395.3	0.26	--
Stream gage								473	0.10	19.18
1963 CALENDAR YEAR										
Site 1	2.0	1.4	3.4	0	-1.3	2.1	0.5	1.6	0.02	20.56
2	94.0	58.1	152.1	0	-39.8	112.3	28.6	83.7	.36	20.30
3	38.1	16.1	54.2	0	-28.0	26.2	11.6	14.6	.20	20.64
4	82.3	35.6	117.9	0	-79.6	38.3	20.7	17.6	.06	18.06
5	49.9	33.1	83.0	0	-37.4	45.6	12.3	33.3	.18	17.67
6	68.5	35.3	103.8	16.5	-39.2	81.1	17.6	63.5	.60	18.20
7	124.6	100.3	224.9	0	-85.5	139.4	33.0	106.4	.36	17.65
8	18.8	25.3	44.1	9.2	-30.7	22.6	5.1	17.5	.19	19.30
10	58.8	47.4	106.2	20.8	-57.0	70.0	17.4	52.6	.35	20.64
Total	537.0	352.6	889.6	46.5	-398.5	537.6	146.8	390.8	0.26	--
Stream gage								417	0.10	18.71
1964 WATER YEAR										
Site 1	70.3	38.8	109.1	337.4	+12.7	459.2	39.6	419.6	5.20	35.59
2	132.0	80.8	212.8	600.4	+59.2	872.4	78.4	794.0	3.38	34.47
3	58.3	23.2	81.5	232.4	+44.3	358.2	33.3	324.9	4.35	35.87
4	71.1	32.0	103.1	0	+39.1	142.2	32.6	109.6	.39	32.35
5	48.2	34.0	82.2	0	+23.8	106.0	20.9	85.1	.46	31.92
6	71.8	39.6	111.4	15.5	+20.5	147.4	37.6	109.8	1.03	33.24
7	105.3	89.8	195.1	0	+10.9	206.0	52.7	153.3	.53	32.17
8	35.5	41.8	77.3	0	+11.9	89.2	15.2	74.0	.82	30.77
10	125.4	91.9	217.3	367.8	+83.2	668.3	70.6	597.7	3.94	35.87
Total	717.9	471.9	1,189.8	1,553.5	+305.6	3,048.9	380.9	2,668.0	1.80	--
Stream gage								4,890	1.07	33.38
TOTALS FOR WATER YEARS 1959-64										
Site 1	337.9	244.0	581.9	2,503.2	+10.8	3,095.9	233.5	2,862.4	35.48	194.22
2	736.8	516.5	1,253.3	6,931.1	+9.1	8,193.5	466.8	7,726.7	32.91	193.69
3	348.4	164.5	512.9	2,865.5	+13.3	3,391.7	206.8	3,184.9	42.66	193.78
4	680.1	353.8	1,033.9	5,708.0	-137.9	6,604.0	373.8	6,230.2	22.24	183.71
5	399.3	321.9	721.2	4,166.2	-57.1	4,830.3	217.9	4,612.4	24.86	181.76
6	449.7	258.4	708.1	4,056.8	+1.4	4,766.3	265.8	4,500.5	42.38	200.79
7	872.1	820.4	1,692.5	8,243.5	-90.5	9,845.5	534.3	9,311.2	31.93	192.65
8	414.0	642.8	1,056.8	2,490.4	-19.4	3,527.8	253.1	3,274.7	36.34	183.48
10	720.5	652.2	1,372.7	4,047.3	+51.7	5,471.7	461.4	5,010.3	33.06	193.77
Total	4,958.8	3,974.5	8,933.3	41,012.0	-218.6	49,726.7	3,013.4	46,713.3	31.27	--
Stream gage								136,183	30.02	192.82