TEXAS WATER COMMISSION

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CIRCULAR NO. 62-05

DRAINAGE AREAS OF TEXAS STREAMS

SAN JACINTO RIVER BASIN AND

SAN JACINTO-BRAZOS COASTAL AREA

Prepared in cooperation with the U. S. Geological Survey

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INTRODUCTION

An accurate figure for drainage area is one of the most significant factors used in hydrologic investigations of a river basin and in the hydraulic computations for the design of structures on a stream. This report is being compiled so that drainage-area information of uniform accuracy and reliability will be available to all users of these data for any foreseeable hydraulic, hydrologic, or general engineering use.

In 1951 the Subcommittee on Hydrology, Federal Inter-Agency River Basin Committee, delegated the U. S. Corps of Engineers as the official coordinating agency for drainage areas in the Arkansas and Red River basins, and the U. S. Geological Survey as the official coordinating agency for all other river basins in Texas.

In November 1954 the data for the Red and Arkansas Rivers were published by the Corps of Engineers in a pamphlet entitled "Drainage Area Data, Arkansas, White, and Red River Basins".

ADMINISTRATION AND ACKNOWLEDGMENTS

In December 1960 the Sabine River Compact Administration requested the U. S. Geological Survey to update drainage-area determinations in the Sabine River Basin. The Administration made funds available to match the Geological Survey on a dollar for dollar basis. The work was done by the Surface Water District offices in Texas and Louisiana, and the pamphlet, "Drainage Area Data for Sabine River Basin, Texas and Louisiana" was released August 1961.

The compilation of drainage-area data for the balance of the State is a result of a cooperative agreement between the U. S. Geological Survey and the Texas Water Commission [formerly the Board of Water Engineers].

Computations were made in the District Office of the U. S. Geological Survey in Austin, Texas, under the general direction of Trigg Twichell, District Engineer of the Surface Water Branch.

The U. S. Corps of Engineers, Fort Worth District, and the U. S. Bureau of Reclamation, Austin Area Office, made field checks to verify delineation of non-contributing areas in the upper Colorado River Basin.

TOPOGRAPHY

The topography of Texas generally reflects the surface geology of the State. The northwestern part of the State is occupied by the High Plains, with a general surface gradient dipping in a southeasterly direction. Elevations range above 4,000 feet along the Texas-New Mexico state line and above 2,500 feet along the east escarpment. From the High Plains the land surface drops by successive steps,

generally in a southeasterly direction, to sea level along the coast of the Gulf of Mexico. The greatest abrupt change in elevation is along the High Plains Cap Rock Escarpment where in places the elevation of the land surface drops nearly 1,000 feet in just a few miles. In the El Paso-Trans-Pecos Region of west Texas, topographic features include the southern extension of the Rocky Mountain Range.

Figure 1 is a contour map of Texas which shows the four principal physiographic provinces: (1) the Gulf Coastal Plain, (2) the Central Lowland, (3) the Great Plains province, and (4) the Basin and Range province. These four principal physical divisions with the many subdivisions give the State a wide variety of surface aspects.

The drainage pattern of the State is unique, in that between the Rio Grande, which forms the southwestern border, and the Red River, which forms most of the northern border, lie nine large river basins which run approximately parallel courses from northwest to southeast. Of these, only two, the Brazos and Colorado Rivers, have their origin (small segment of total area) outside the State--the remaining lie wholly within the State, with the Sabine River forming a part of the eastern border along its lower reaches. With the exception of the Red and Canadian Rivers, all of the streams in Texas flow directly into the Gulf of Mexico--the Canadian River is a tributary to the Arkansas River which, along with the Red River, flows into the Mississippi River and thence into the Gulf of Mexico. River basins and coastal areas of Texas are shown on Figure 2.

CONCEPTS OF DRAINAGE AREAS

The drainage area of a stream at a specified location ordinarily may be defined as that area, measured in a horizontal plane, which is enclosed by a topographic divide such that direct surface runoff from precipitation normally would drain by gravity into the river basin above the specified point.

The concept of what constitutes noncontributing areas varies for individuals and for intended purpose of use. It is not susceptible to precise definitions because of judgment that must be used in determinations of what part of an area is totally noncontributing and what part contributes surface runoff only during extreme rainfall.

For this report a noncontributing area is defined as an area that contributes no direct surface runoff to a stream at any time. There may be runoff within the noncontributing area, but this runoff drains to natural surface depressions, playa lakes, and does not flow directly to the stream network that drains to the Gulf of Mexico.

The accuracy of delineating most of the noncontributing areas is considered to be a lower accuracy than that of the other work.

METHOD OF DRAINAGE-AREA DETERMINATION

Discrepancies existing in drainage-area figures determined by various agencies result in confusion. To reduce confusion and promote uniformity, the Subcommittee on Hydrology, Federal Inter-Agency River Basin Committee, recommended the procedures which were used for this report and are briefly described below:

1. Selection of Maps: First preference is the national topographic series of quadrangle maps of the U. S. Geological Survey published on the scale of 1:24,000 or 1:62,500. Second preference is advance prints or manuscript prints of the

national series of quadrangle maps, and third preference is Army Map Service topographic maps, scale 1:250,000. About half of the State is mapped with large-scale, modern topographic maps.

2. Establishment of Boundaries: The delineation of the boundary is the most important step in the process of drainage-area determinations and the biggest single factor affecting the accuracy of final results. Drainage boundaries were delineated with utmost care by personnel experienced in hydrology and cartography. Delineations were reviewed by the engineering staff of the Texas Water Commission, and for some basins by the engineering staffs of the Corps of Engineers and the Bureau of Reclamation.

3. Continuity Between Maps: An index map of the entire area was prepared to show the relative position of the different maps used. To assure accurate determinations, the maps were checked for gaps or overlaps between adjacent sheets, continuity of topographic or cultural detail between adjacent sheets, and agreement of latitude and longitude at borders of adjacent maps.

4. Planimetering: All areas and subareas within a quadrilateral were measured by planimeter. A quadrilateral encompasses the area bounded by latitude and longitude lines within a quadrangle. Actual areas within each quadrilateral have been computed accurately and are available from Smithsonian Geographical Tables, and from Bulletin 650 and other publications of the Geological Survey. Thus an exact check was provided between total planimetered area and actual area within each quadrilateral.

TABULATION OF DATA

In this report the drainage areas determined in each major river basin are tabulated in separate sections devoted to that particular basin. Within each major basin, drainage areas were determined at sites of existing and discontinued continuous-record gaging stations and partial-record gaging stations, at sites of existing and authorized major dams, and at the mouths of principal tributaries.

Points at which drainage areas were determined are tabulated sequentially in the downstream direction along the main stem, with a point on a tributary that enters between two main-stem points tabulated between them. A similar order is followed for all tributaries. The tabulation includes the name of the stream at the point where the drainage area was determined; identification of the point, such as gaging station, dam or mouth; and the latitude and longitude of the point. As an added means of identification, the permanently assigned station number is shown for each gaging station and partial-record station. These numbers were assigned using the same criteria as above for downstream direction.

Drainage areas are given in square miles. Although areas are measured to the nearest hundreth of a square mile, the areas are rounded off in the listings to the nearest square mile for areas of more than 100 square miles, to tenths for areas from 10 to 100 square miles, and to hundreths for areas of less than 10 square miles.

FUNCTION OF COORDINATING OFFICE

The U. S. Geological Survey at 807 Brazos Street, Austin, Texas, as coordinating agency, serves as a repository for work maps and computations and also serves as a clearing house for dissemination of drainage-area data.

Anyone cognizant of a significant discrepancy or contradiction between figures of drainage areas now in use should consult the Geological Survey and seek to reach an understanding and agreement between interested agencies represented in the area involved.

SAN JACINTO RIVER BASIN

The headwaters of the San Jacinto River are in Grimes and Walker Counties. The basin is fan shaped and the main stream flows in a southeasterly direction into San Jacinto Bay, then through Trinity Bay into Galveston Bay and the Gulf of Mexico. Elevation ranges from about 325 feet in the headwaters to sea level at the mouth.

The entire basin is in the Texas Gulf Coastal Plain, which is part of a great plain bordering the Atlantic Ocean and the Gulf of Mexico. The northern 70 percent of the basin is a gently rolling sandy area of slow-draining soils, covered principally with pine and hardwood forests. The remainder of the basin is relatively flat with heavy dark clay and sandy loam soils. Streams throughout the basin have gentle slopes.

More than 80 percent of the drainage areas of the basin were delineated on recent large-scale topographic maps, and the work is to be considered of permanent value. Drainage areas for the remainder of the basin were delineated on small-scale topographic maps and may be subject to minor revisions when new large-scale maps become available. Drainage areas tabulated on the following pages were determined in October 1961 for the San Jacinto River Basin and August 1962 for the San Jacinto-Brazos Coastal Area.

The drainage area is 3,976 square miles at the mouth where the river enters Galveston Bay at Morgan Point, Texas.

In 1946 the U. S. Corps of Engineers-Galveston District determined drainage areas in the Buffalo Bayou Watershed from large-scale topographic maps. Drainage ditches constructed since 1946 have modified the drainage in this flat coastal area. During extreme floods when capacity of drainage ditches is exceeded, the drainage area is defined by the natural ridge lines (1946 determinations); both areas are shown in the tabulation.

Drainage areas in the San Jacinto River Basin and the San Jacinto-Brazos Coastal Area are shown in Tables 4 and 4a on the following pages. Tables 1 and 1a, containing drainage-area data for the Sabine River Basin and the Sabine-Neches Coastal Area, were published in Circular No. 62-02. Drainage areas for the Neches River Basin and the Neches-Trinity Coastal Area were published as Tables 2 and 2a in Circular No. 62-03.

Table 4.--San Jacinto River Basin

Name of stream	Point of determination of drainage area	Area above location (sq. mi.)
West Fork San Jacinto River	Honea dam site lat. 30°21'24", long. 95°33'34"	445
Lake Creek	Lake Creek at mouth lat. 30°16'03", long. 95°29'37"	320
West Fork San Jacinto River	Conroe dam site lat. 30°16'02", long. 95°29'31"	804
West Fork San Jacinto River	U.S.G.S. gage 8-680, West Fork San Jacinto River near Conroe lat. 30°14'41", long. 95°27'26"	809
Spring Creek	U.S.G.S. gage 8-685, Spring Creek near Spring lat. 30°06'37", long. 95°26'10"	409
Cypress Creek	U.S.G.S. gage 8-690, Cypress Creek near Westfield lat. 30°02'08", long. 95°25'44"	285
Cypress Creek	Cypress Creek at mouth lat. 30°01'57", long. 95°18'41"	322
Spring Creek	Spring Creek dam site lat. 30°01'58", long. 95°18'32"	755
West Fork San Jacinto River	U.S.G.S. gage 8-695, West Fork San Jacinto River near Humble lat. 30°01'37", long. 95°15'28" Prior to July 17, 1933 After July 17, 1933	 1,736 1,741
East Fork San Jacinto River	Cleveland dam site lat. 30°23'12", long. 95°06'42"	316
East Fork San Jacinto River	U.S.G.S. gage 8-700, East Fork San Jacinto River near Cleveland lat. 30°20'11", long. 95°06'14"	325
Caney Creek	U.S.G.S. gage 8-705, Caney Creek near Splendora lat. 30°15'36", long. 95°18'08"	105
Peach Creek	U.S.G.S. gage 8-710, Peach Creek at Splendora lat. 30°13'57", long. 95°10'05"	117

Table 4.--San Jacinto River Basin--Continued

Name of stream	Point of determination of drainage area	Area above location (sq. mi.)
Peach Creek	Peach Creek at mouth lat. 30°07'06", long. 95°10'20"	158
Caney Creek	Caney Creek below mouth of Peach Creek lat. 30°07'06", long. 95°10'20"	341
Luce Bayou	Luce Bayou at mouth lat. 30°02'50", long. 95°06'56"	217
San Jacinto River	U.S.G.S. discontinued gage 8-715, San Jacinto River near Huffman lat. 29°59'41", long. 95°07'42"	2,800
San Jacinto River	U.S.G.S. gage 8-720, Lake Houston near Sheldon, at intake structure 100 feet upstream from right end of dam lat. 29°54'58", long. 95°08'28"	2,828
Buffalo Bayou	Corps of Engineers upper gage on Buffalo Bayou in Barker Reservoir lat. 29°43'08", long. 95°43'53"	[a] 89.2
Buffalo Bayou	Corps of Engineers gage 8-725 at outlet works on Barker Reservoir near Addicks lat. 29°46'11", long. 95°38'49"	[b] 134
South Mayde Creek	Corps of Engineers gage on South Mayde Creek in Addicks Reservoir lat. 29°48'03", long. 95°41'32"	[c] 34.9
Langham Creek	Corps of Engineers gage on Langham Creek in Addicks Reservoir lat. 29°50'08", long. 95°37'30"	[d] 45.1
South Mayde Creek	Corps of Engineers gage 8-730 at outlet works on Addicks Reservoir near Addicks lat. 29°47'28", long. 95°37'24"	[e] 133
Buffalo Bayou	U.S.G.S. gage 8-735, Buffalo Bayou near Addicks lat. 29°45'42", long. 95°36'20"	[f] 293
Buffalo Bayou	U.S.G.S. gage 8-740, Buffalo Bayou at Houston	
	Prior to January 1962 at Waugh Drive lat. 29°45'42", long. 95°23'54"	[g] 359
	After January 1962 at Shepherd Drive lat. 29°45'37", long. 95°24'30"	358

Table 4.--San Jacinto River Basin--Continued

Name of stream	Point of determination of drainage area	Area above location (sq. mi.)
Whiteoak Bayou	U.S.G.S. gage 8-745, Whiteoak Bayou at Houston lat. 29°46'31", long. 95°23'54"	[h] 84.7
Whiteoak Bayou	Whiteoak Bayou at mouth lat. 29°45'54", long. 95°21'29"	108
Buffalo Bayou	U.S.G.S. gage 8-746, Buffalo Bayou at Main Street, Houston lat. 29°45'54", long. 95°21'32"	469
Buffalo Bayou	U.S.G.S. gage 8-747, Buffalo Bayou at 69th St., Houston lat. 29°45'15", long. 95°17'51"	476
Brays Bayou	U.S.G.S. gage 8-750, Brays Bayou at Houston lat. 29°41'49", long. 95°24'43" After Nov. 26, 1959 at Main Street Prior to Nov. 26, 1959 at Old Main Street	88.4 [i] 89.1
Brays Bayou	U.S.G.S. gage 8-752, Brays Bayou at Broadway Blvd., Houston lat. 29°43'39", long. 95°16'43"	128
Sims Bayou	U.S.G.S. gage 8-755, Sims Bayou at Houston lat. 29°40'27", long. 95°17'21"	64.0
Sims Bayou	Sims Bayou at mouth lat. 29°43'04", long. 95°14'34"	94.4
Buffalo Bayou	Buffalo Bayou below mouth of Sims Bayou lat. 29°43'10", long. 95°14'30"	705
Greens Bayou	U.S.G.S. gage 8-760, Greens Bayou near Houston lat. 29°55'05", long. 95°18'24"	72.7
Halls Bayou	U.S.G.S. gage 8-765, Halls Bayou at Houston lat. 29°51'42", long. 95°20'05"	24.7
Halls Bayou	Halls Bayou at mouth lat. 29°50'16", long. 95°14'02"	41.3
Greens Bayou	Greens Bayou at mouth lat. 29°44'54", long. 95°10'04"	213

Table 4.--San Jacinto River Basin--Continued

Name of stream	Point of determination of drainage area	Area above location (sq. mi.)
Carpenters Bayou	Sheldon Reservoir lat. 29°51'14", long. 95°10'01"	9.3
Carpenters Bayou	Carpenters Bayou at mouth lat. 29°45'35", long. 95°05'32"	29.4
Buffalo Bayou	Buffalo Bayou at mouth lat. 29°45'45", long. 95°05'16"	1,034
San Jacinto River	San Jacinto River below mouth of Buffalo Bayou lat. 29°45'47", long. 95°04'45"	3,940
San Jacinto River	San Jacinto River at mouth lat. 29°41'04", long. 95°58'58"	3,976

During extreme floods when the capacity of drainage ditches is exceeded, the drainage area is defined by natural ridge lines and is:

a 105 sq. mi.
b 150 sq. mi.
c 30 sq. mi.
d 49 sq. mi.
e 129 sq. mi.
f 310 sq. mi.
g 362 sq. mi.
h 92.0 sq. mi.
i 100 sq. mi.

Table 4a.--San Jacinto-Brazos Coastal Area

Name of stream	Point of determination of drainage area	Area above location (sq. mi.)
Coastal area	Intervening coastal area from mouth of San Jacinto River to mouth of Clear Creek	12.6
Clear Creek	U.S.G.S. discontinued gage 8-770, Clear Creek near Pearland lat. 29°35'51", long. 95°17'10"	38.8
Hickory Slough	U.S.G.S. discontinued gage 8-775, Hickory Slough near Pearland lat. 29°35'04", long. 95°17'10"	8.9
Hickory Slough	Hickory Slough at mouth lat. 29°35'38", long. 95°16'10"	9.7
Clear Creek	Clear Creek at headwaters of Clear Lake lat. 29°33'01", long. 95°04'20"	175
Middle Bayou	Middle Bayou at mouth lat. 29°33'45", long. 95°04'19"	54.9
Clear Creek	Clear Creek at mouth (below Clear Lake) lat. 29°32'52", long. 95°01'03"	260
Coastal area	Intervening coastal area from mouth of Clear Creek to mouth of Dickinson Bayou	6.3
Dickinson Bayou	Dickinson Bayou at mouth lat. 29°27'58", long. 94°57'13"	106
Coastal area	Coastal area from mouth of Dickinson Bayou to mouth of Highland Bayou	46.3
Highland Bayou	Highland Bayou at mouth lat. 29°18'51", long 94°56'25"	38.4
Coastal area	Intervening coastal area from mouth of Highland Bayou to mouth of Halls Bayou	51.4
Halls Bayou	Halls Bayou at mouth lat. 29°10'20", long. 95°06'49"	65.8
Coastal area	Intervening coastal area from mouth of Halls Bayou to mouth of Mustang Bayou	7.0
Mustang Bayou	Mustang Bayou at mouth lat. 29°11'45", long. 95°07'37"	81.8

Table 4a.--San Jacinto-Brazos Coastal Area--Continued

Name of stream	Point of determination of drainage area	Area above location (sq. mi.)
Coastal area	Intervening coastal area from mouth of Mustang Bayou to mouth of Chocolate Bayou	4.2
Chocolate Bayou	U.S.G.S. gage 8-780, Chocolate Bayou near Alvin lat. 29°22'19", long. 95°19'14"	87.7
Chocolate Bayou	Chocolate Bayou at mouth lat. 29°12'42", long. 95°12'06"	159
Coastal area	Intervening coastal area from mouth of Chocolate Bayou to mouth of Bastrop Bayou	41.4
Austin Bayou	U.S.G.S. discontinued gage 8-785, Austin Bayou near Danbury lat. 29°14'41", long. 95°19'47"	46.6
Flores Bayou	Flores Bayou at mouth lat. 29°10'44", long. 95°19'28"	36.2
Austin Bayou	Austin Bayou at mouth lat. 29°05'51", long. 95°17'58"	123
Bastrop Bayou	Bastrop Bayou at mouth lat. 29°06'09", long. 95°11'42"	229
Coastal area	Intervening coastal area from mouth of Bastrop Bayou to mouth of Old Brazos River	35.9
Oyster Creek	U.S.G.S. gage 8-790, Oyster Creek near Angleton, subsequent to 1958 lat. 29°09'30", long. 95°28'30"	207
Oyster Creek	U.S.G.S. gage 8-790, Oyster Creek near Angleton, prior to 1958 lat. 29°09'25", long. 95°28'34"	217
Oyster Creek	Oyster Creek at Intracoastal Canal lat. 28°58'29", long. 95°16'49"	247
Old Brazos River	Old Brazos River at mouth lat. 28°56'00", long. 95°17'42"	32.6
Coastal area	Intervening coastal area from mouth of Old Brazos River to mouth of Brazos River	13.8
Coastal area	Total coastal area from mouth of San Jacinto River to mouth of Brazos River	1,440