TEXAS WATER COMMISSION

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CIRCULAR NO. 63-07

DRAINAGE AREAS OF TEXAS STREAMS

SAN ANTONIO RIVER BASIN

Prepared by the U. S. Geological Survey
in cooperation with the
Texas Water Commission

October 1963

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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 U. S. 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.

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.

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 U. S. Geological Survey. Thus an exact check was provided between total planimetered area and actual area within each quadrilateral.

TABULATION OF DATA

Within the San Antonio River 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 U. S. Geological Survey and seek to reach an understanding and agreement between interested agencies represented in the area involved.

SAN ANTONIO RIVER BASIN

The San Antonio River has its headwaters in Olmos Creek, which rises in central Bexar County north and west of San Antonio. The principal tributary of the San Antonio River, the Medina River, rises much farther west in Bandera County. The name San Antonio River is applied to the stream that has its source at springs in the city of San Antonio, just above the point where Olmos Creek joins. The San Antonio River flows south and southeast, and joins the Guadalupe River 10 or 11 miles above its mouth. The basin is slightly less than 200 miles long and has a maximum width of 50 miles. Elevations range from about 2,300 feet in the headwaters of the Medina River to about 2 feet at the mouth. The physiography varies from rough and rugged terrain with narrow valleys and thin soil cover above the Balcones escarpment to flat prairie areas near the mouth.

About 90 percent of the drainage areas of the basin were delineated on recent large-scale topographic maps, and the work is 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 large-scale topographic maps become available. Drainage-area determinations tabulated on the following pages were completed in June 1963.

The drainage area is 4,180 square miles at the mouth where the river enters the Guadalupe River.

Drainage areas in the San Antonio River Basin are shown in the table on the following pages. Drainage-area determinations have been published in Circulars of the Texas Water Commission for other areas as follows:

Sabine River Basin and Sabine-Neches Coastal Area, tables in Circular No. 62-02.

Neches River Basin and Neches-Trinity Coastal Area, tables in Circular No. 62-03.

San Jacinto River Basin and San Jacinto-Brazos Coastal Area, tables in Circular No. 62-05.

Trinity River Basin and Trinity-San Jacinto Coastal Area, tables in Circular No. 63-01.

San Antonio River Basin

Name of stream	Point of determination of drainage area	Total drainage area (sq. mi.)
San Antonio River	U.S.G.S. gage 8-1780, San Antonio River at San Antonio lat. 29°24'35", long. 98°29'40"	41.8
San Pedro Creek	U.S.G.S. discontinued gage 8-1785, San Pedro Creek at San Antonio lat. 29°25'02", long. 98°29'54"	2.16
Zarzamora Creek	At confluence with Alazan Creek lat. 29°24'30", long. 98°30'34"	22.0
Alazan Creek	At confluence with Zarzamora Creek lat. 29°24'30", long. 98°30'34"	17.9
San Pedro Creek	At mouth, lat. 29°23'26", long. 98°29'53"	43.7
Salado Creek	U.S.G.S. gage 8-1787, Salado Creek (upper station) at San Antonio lat. 29°30'57", long. 98°25'51"	137
Salado Creek	Below Rittman Road lat. 29°29'03", long. 98°24'58"	160
Salado Creek	U.S.G.S. gage 8-1788, Salado Creek (lower station) at San Antonio lat. 29°21'25", long. 98°24'45"	189
Rosillo Creek	At mouth, lat. 29°19'12", long. 98°24'23"	28.0
Salado Creek	At mouth, lat. 29°16'55", long. 98°26'04"	223
Medina River	U.S.G.S. gage 8-1790, Medina River near Pipe Creek lat. 29°40'40", long. 98°58'41"	474
Red Bluff Creek	U.S.G.S. gage 8-1791, Red Bluff Creek near Pipe Creek lat. 29°40'48", long. 98°57'20"	56.3
Red Bluff Creek	At mouth, lat. 29°40'04", long. 98°58'10"	58.2
Medina River	U.S.G.S. gage 8-1795, Medina Lake near San Antonio lat. 29°32'17", long. 98°56'00"	634
Medina River	U.S.G.S. gage 8-1805, Medina River near Rio Medina lat. 29°30'01", long. 98°54'18"	650

Name of stream	Point of determination of drainage area	Total drainage area (sq. mi.)
Medio Creek	At mouth, lat. 29°16'59", long. 98°37'20"	53.3
Elm Creek	At mouth, lat. 29°14'59", long. 98°33'39"	78.4
Culebra Creek	At mouth, lat. 29°28'20", long. 98°38'10"	83.1
Indian Creek	At mouth, lat. 29°17'30", long. 98°34'29"	11.0
Leon Creek	At mouth, lat. 29°15'51", long. 98°29'37"	237
Medina River	U.S.G.S. gage 8-1815, Medina River near San Antonio lat. 29°15'15", long. 98°28'20"	1,317
Medina River	At mouth, lat. 29°14'03", long. 98°24'29"	1,354
Seco Creek	East Lake dam near San Antonio lat. 29°14'35", long. 98°21'54"	9.41
Seco Creek	At mouth, lat. 29°14'14", long. 98°21'55"	9.82
San Antonio River	U.S.G.S. gage 8-1818, San Antonio River near Elmendorf lat. 29°14'15", long. 98°21'43"	1,743
Calaveras Creek	U.S.G.S. gage 8-1824, Calaveras Creek Subwatershed No. 6 near Elmendorf lat. 29°22'53", long. 98°17'34"	7.01
Calaveras Creek	U.S.G.S. gage 8-1825, Calaveras Creek near Elmendorf lat. 29°15'38", long. 98°17'34"	77.2
Calaveras Creek	At mouth, lat. 29°13'11", long. 98°15'54"	94.3
San Antonio River	U.S.G.S. discontinued gage 8-1830, San Antonio River at Calaveras lat. 29°12'54", long. 98°15'39"	1,851
Picosa Creek	At mouth, lat. 29°05'45", long. 98°09'52"	49.1
San Antonio River	U.S.G.S. gage 8-1835, San Antonio River near Falls City lat. 28°57'05", long. 98°03'50"	2,113
Conquista Creek	At mouth, lat. 28°56'36", long. 98°03'20"	30.4
Cibolo Creek	U.S.G.S. gage 8-1839, Cibolo Creek near Boerne, lat. 29°46'25", long. 98°41'52"	68.4

Name of stream	Point of determination of drainage area	Total drainage area (sq. mi.)
Cibolo Creek	U.S.G.S. gage 8-1840, Cibolo Creek near Bulverde lat. 29°43'33", long. 98°25'37"	198
Cibolo Creek	U.S.G.S. discontinued gage 8-1845, Cibolo Creek above Bracken lat. 29°40'30", long. 98°23'00"	250
Cibolo Creek	U.S.G.S. gage 8-1850, Cibolo Creek at Selma lat. 29°35'35", long. 98°18'40"	274
Escondido Creek	At mouth, lat. 29°26'24", long. 98°15'16"	6.29
Saltrillo Creek	At mouth, lat. 29°26'39", long. 98°13'19"	29.5
Martinez Creek	At mouth, lat. 29°26'19", long. 98°08'05"	88.5
Cibolo Creek	U.S.G.S. discontinued gage 8-1855, Cibolo Creek at Southerland Springs lat. 29°16'45", long. 98°03'09"	647
Cibolo Creek	U.S.G.S. gage 8-1860, Cibolo Creek near Falls City lat. 29°00'50", long. 97°55'48"	827
Cibolo Creek	At mouth, lat. 28°57'10", long. 97°52'22"	855
San Antonio River	Below mouth of Cibolo Creek lat. 28°57'10", long. 97°52'22"	3,147
Rhymes Creek	At mouth, lat. 29°02'37", long. 97°49'30"	18.8
Dry Ecleto Creek	At mouth, lat. 28°59'19", long. 97°48'56"	31.5
Ecleto Creek	U.S.G.S. gage 8-1865, Ecleto Creek near Runge lat. 28°55'12", long. 97°46'19"	239
Ecleto Creek	At mouth, lat. 28°52'38", long. 97°45'15"	262
Olmos Creek	At mouth, lat. 28°50'37", long. 97°56'15"	4.42
Bucker Creek	At mouth, lat. 28°49'50", long. 97°54'16"	12.7
Doe Creek	At mouth, lat. 28°49'43", long. 97°53'07"	11.9
Escondido Creek	U.S.G.S. gage 8-1870, Escondido Creek Subwatershed No. 1 near Kenedy lat. 28°46'42", long. 97°53'42"	3.29

Name of stream	Point of determination of drainage area	Total drainage area (sq. mi.)
Panther Creek	At mouth, lat. 28°49'11", long. 97°52'16"	11.2
Escondido Creek	U.S.G.S. gage 8-1875, Escondido Creek at Kenedy lat. 28°49'11", long. 97°51'32"	72.4
Nichols Creek	At mouth, lat. 28°49'27", long. 97°50'32"	5.78
Dry Escondido Creek	U.S.G.S. gage 8-1879, Escondido Creek Subwatershed No. 11 near Kenedy lat. 28°51'39", long. 97°50'39"	8.43
Dry Escondido Creek	U.S.G.S. discontinued gage 8-1880, Dry Escondido Creek near Kenedy lat. 28°51'41", long. 97°50'14"	9.88
Dry Escondido Creek	At mouth, lat. 28°50'03", long. 97°48'16"	14.8
Escondido Creek	At mouth, lat. 28°50'40", long. 97°44'50"	115
Hord Creek	At mouth, lat. 28°40'05", long. 97°33'50"	43.7
Cabeza Creek	At mouth, lat. 28°38'35", long. 97°29'10"	93.8
San Antonio River	U.S.W.B. and U.S.G.S. gage 8-1885, San Antonio River at Goliad lat. 28°38'50", long. 97°22'50"	3,921
Manahuilla Creek	At mouth, lat. 28°39'20", long. 97°16'55"	102
San Antonio River	At mouth, lat. 28°30'32", long. 96°53'27"	4,180