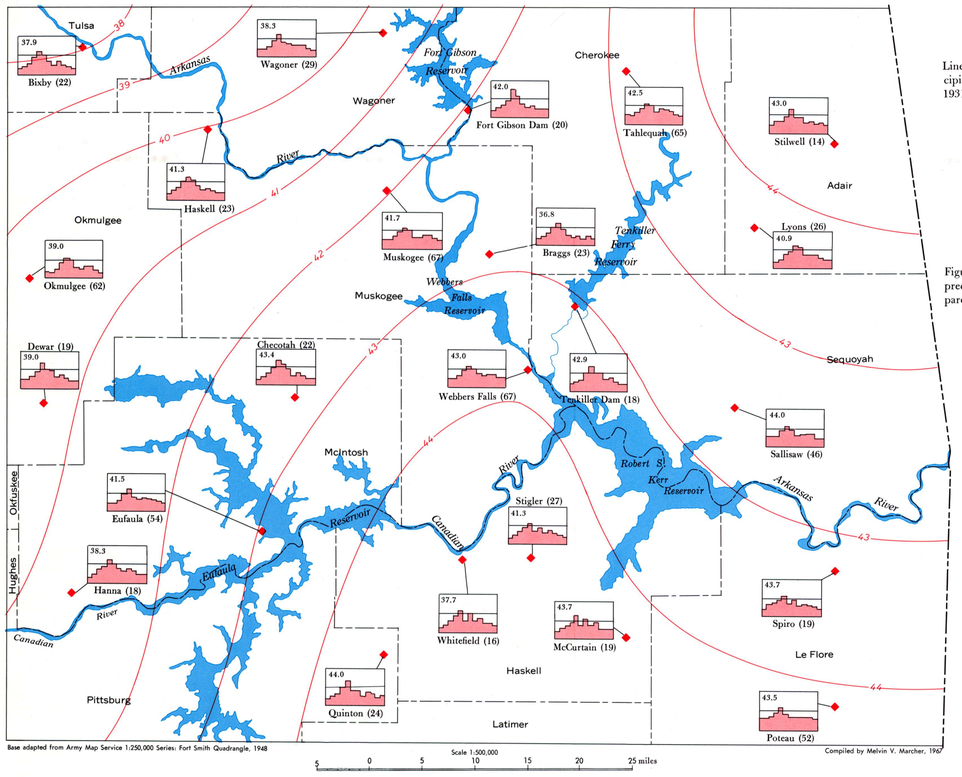


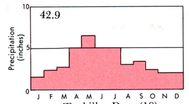
PRECIPITATION MAP

Rainfall ranges from about 38 inches in the northwest corner of the area to about 44 inches in the northeastern and southeastern parts. About 60 percent of the average annual rainfall occurs during the growing season from April to September. May is the wettest month and December or January is usually driest.

EXPLANATION

39

Line connecting points of equal mean annual precipitation, based upon normal annual precipitation 1931-1960. Interval: 1 inch



Tenkiller Dam (18)

Graph of average monthly precipitation. Figure in upper left of graph is average annual precipitation for the period of record; figure in parentheses after station name is years of record.

Weather station

EXPLANATION

(Data for mapped points are given in the accompanying tables)

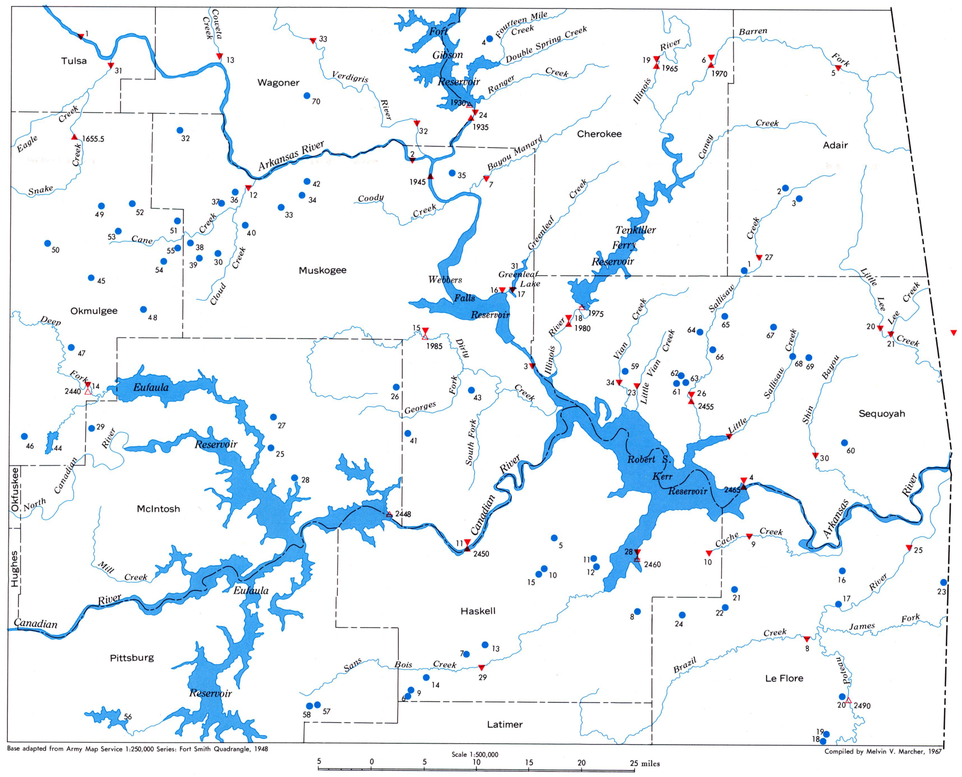
1945 Active stream gage and number

1985 Discontinued stream gage and number

2448 Active lake-stage gage and number

11 Surface-water quality sampling site and number

55 45 Lake and number



LOCATION MAP OF GAGING STATIONS, WATER-QUALITY SAMPLING SITES, AND LAKES

Summary of Streamflow Records

Station name	Station number	Drainage area (square miles)	Period of record	Discharge[1] (cubic feet per second) Maximum	Minimum	Average
Snake Creek near Bixby	7-1655.5	50	1961-	2,050	0.0	16.7
Fort Gibson Reservoir near Fort Gibson	1930	12,492	1949-			
Neosho River below Fort Gibson Reservoir near Fort Gibson	1935	12,495	1950-	223,000	12	6,534
Arkansas River near Muskogee	1945	98,674	1925-	700,000	66	19,890
Illinois River near Tahlequah	1965	959	1935-	150,000	0.1	858
Barren Fork at Eldon	1970	307	1948-	37,600	1.7	266
Tenkiller Ferry Reservoir near Gore	1975	1,610	1952-			
Illinois River near Gore	1980	1,626	1924-25; 1939-	180,000	2.0	1,493
Dirty Creek near Warner	1985	227	1939-46	42,000	0.0	224
Deep Fork near Dewar	2440	2,307	1937-50	57,400	1.8	1,337
Eufaula Reservoir near Brooken	2448	47,522	1964-			
Canadian River near Whitefield	2450	47,576	1938-	281,000	0.4	5,617
Sallisaw Creek near Sallisaw	2455	182	1942-	110,000	0.0	186
Sans Bois Creek near Keota	2460	346	1938-42	26,300	0.0	241
Arkansas River near Sallisaw	2465	147,757	1947-	544,000	161	26,740
Poteau River at Poteau	2490	1,240	1937-45	73,000	0.2	1,511

[1] Discharge data are given for the period of record for discontinued stations and through the water year ending September 30, 1965, for active stations.

Average yearly runoff ranges from about 8 inches in the western part of the Fort Smith quadrangle to about 14 inches in the eastern part.

Because precipitation is not uniformly distributed throughout the year and because evaporation and transpiration are greatest during the hot summer months, streamflow is highly variable. The greatest amount of runoff occurs during the spring months when rainfall is greatest and evaporation and transpiration are relatively low. High runoff may occur during any month of the year, depending upon storm occurrence, but streamflow generally is lowest in the summer. For example, the mean monthly flow of the Illinois River in September is about 11 percent of the mean monthly flow in May. This percentage is probably greater than percentages for other streams in the area because the Illinois River drains an area underlain by rocks that store large amounts of water that feed the streams during dry months.

Streamflow or reservoir data are available at 16 sites in the quadrangle and are detailed in annual publications of the U. S. Geological Survey. The locations of the gaging stations are shown on the map and pertinent data from the records are summarized above.

A long-term record on Arkansas River at Van Buren, Arkansas, shows that total discharge at the eastern edge of the report area has averaged 22.2 million acre-feet per year during 1927-1966. This tremendous quantity of water is regulated to a significant degree by major impoundments, such as the Tenkiller Ferry, Fort Gibson, and Eufaula Reservoirs and several impoundments upstream from this area. Further regulation will be provided by the two impounding structures now under construction on the Arkansas River—Webbers Falls Dam and Robert S. Kerr Lock and Dam.

Summary of Chemical Analyses of Surface Water

Location number	Name of stream and location	Type of sampling,[1] water year, and (number of analyses)	Maximum: Total dissolved solids (ppm)	Chloride (ppm)	Hardness (ppm)	Sulfate (ppm)	SAR[2]	Specific conductance[3]	Minimum: Total dissolved solids (ppm)	Chloride (ppm)	Hardness (ppm)	Sulfate (ppm)	SAR[2]	Specific conductance[3]
1	Arkansas River at Bixby	D, 49	3,090	1,410	648	437		4,610	475	158	162	59		1,100
2	Arkansas River near Muskogee	M, 57(2), 62(11), 63(11)	2,140	940	758	265	14	3,860	695	248	235	63	3.7	1,220
3	Arkansas River at Webbers Falls	D, 49, 57-61; M, 62(10), 63(11)	3,500	1,800	650	292	17	6,070	139	22	60	13	0.8	174
4	Arkansas River near Sallisaw	M, 57(1), 62(11), 63(11); D, 59-61	1,380	575	385	172	10	2,500	169	28	104	20	0.7	252
5	Barren Fork near Baron	M, 58(5), 59(11)	133	7.4	112	7.4	0.4	209	84	2.0	66	1.2	0.0	119
6	Barren Fork near Eldon	M, 58(5), 59(26), 60(22)	124	5.0	99	6.2	0.2	185	78	1.5	60	2.1	0.0	94
7	Bayou Manard near Fort Gibson	M, 61(5)	142	6.5	147	20	0.2	261	124	3.2	118	15	0.1	224
8	Brazil Creek near Panama	M, 60(11), 61(6)	264	10	220	118	1.4	400	55	2.2	33	13	0.5	80
9	Cache Creek near Cowlington	M, 59(10), 60(12), 61(5)	377	20	261	171	2.8	520	35	2.9	21	9.9	0.6	70
10	Cache Creek near Keota	M, 58(5), 59(3)		8.2	953	414	5.0	1,830		4.6	12	5.8	0.2	53
11	Canadian River near Whitefield	D, 45, 47-64	15,000	8,380	3,080	238	33	3,030	76	3.5	18	1.6	0.1	95
12	Cane Creek near Jamesville	M, 60(2), 61(7)	1,010	450	315	94	5.6	1,730	397	170	130	4.3	3.4	707
13	Coweta Creek near Coweta	M, 61(2)	1,000	452	260	37	6.2	1,660	482	215	116	9.5	4.3	799
14	Deep Fork near Dewar	D, 49-51	2,730	1,550	624	71		4,290	84	31	40	8.3		144
15	Dirty Creek near Warner	M, 60(2), 61(4)	731	32	410	428	1.3	965	220	9.0	92	97	0.9	304
16	Greenleaf Creek near Braggs	M, 53(4), 54(2), 55(1)		28	168		0.5	385		3.8	58		0.2	134
17	Greenleaf Lake near Braggs	M, 52(6)		21	137			288		3.5	67			150
18	Illinois River near Gore	D, 48, 54-63; M, 52(4), 64(22)	214	68	120	16	1.7	396	55	1.2	33	3.0	0.1	123
19	Illinois River near Tahlequah	M, 60(24), 61(6)	127	9.0	116	10	0.0	199	97	2.8	70	2.5	0.4	157
20	Little Lee Creek near Nicut	M, 59(3), M, 61(4)	79	3.7	64	14	0.3	130	52	1.0	48	2.5	0.1	105
21	Lee Creek near Short	M, 58(5), 59(11), 60(8), 61(4)		5.0	50			121		3.0	46			107
22	Little Sallisaw Creek near Sallisaw	M, 59(4)		13	244	255		759		3.4	52	55		162
23	Little Vian Creek near Vian	M, 60(2)		3.4	64			146		2.8	60			129
24	Neosho River near Fort Gibson	D, 52	554	93	312	238	1.0	1,000	128	2.0	82	21	0.1	118
25	Poteau River near Braden	M, 58(5), 59(11), 62(11), 63(11)	150	29	72	31	10	233	61	2.2	17	11	0.3	60
26	Sallisaw Creek near Sallisaw	M, 52(13), 53(11), 54(7), 55(6) 56(12), 57(7), 58(15), 59(29) 60(30), 61(11), 62(10), 63(8)	130	26	112	11	1.0	219	71	0.5	24	2.1	0.0	66
27	Sallisaw Creek near Bunch	M, 58(5), 59(11)	150	6.2	122	4.9	0.2	242	103	20	60	2.9	0.0	122
28	Sans Bois Creek near Keota	M, 58(5), 59(12), 60(11) 61(6), 62(9), 63(11)	809	612	380	414	10	1,160	77	2.0	18	9.4	0.3	71
29	Sans Bois Creek near Kinta	M, 61(6)	84	6.8	70	23	1.1	177	43	36	17	4.7	0.4	61
30	Skin Bayou near Gans	M, 58(5), 59(12)	69	5.6	42	11	0.6	111	36	1.2	8	1.6	0.1	29
31	Snake Creek near Leonard	M, 60(2), 61(7)	1,070	460	325	117	6.9	1,940	195	57	76	15	1.8	333
32	Verdigris River near Okay	M, 52(8), 53(3), 60(11) 61(10), 62(1), 63(11)	1,020	445	300	76	6.3	1,800	157	22	88	15	0.5	250
33	Verdigris River near Wagoner	M, 52(8), 53(3), 57(1)	916	400	290	55	5.7	1,630	266	38	132	21	3.9	386
34	Vian Creek near Vian	M, 58(5), 59(10)	157	9.2	124	11	0.3	254	82	0.6	34	5.4	0.0	79

[1] D, daily; M, miscellaneous.
[2] Sodium adsorption ratio.
[3] Micromhos per centimeter at 20°C.

The usability of surface water for municipal, industrial, and irrigation purposes depends largely upon its chemical quality. Available information on the chemical quality of surface water in the Fort Smith quadrangle is summarized above. The U. S. Geological Survey has published an annual series of Water-Supply Papers, "Quality of Surface Waters of the United States," from 1941 through 1963. Records for streams in the Fort Smith quadrangle are in Part 7 of this series. Beginning with the 1964 water year, water-quality data were published in a series of annual releases on a state-wide basis. Data on fluvial sediment and water temperature are also included in these reports. Chemical-quality data given in these reports include concentrations of certain dissolved constituents, such as sodium, calcium, sulfate, and chloride, and other characteristics, such as hardness, sodium adsorption ratio, specific conductance, and pH. Fluvial-sediment information is given for suspended-sediment discharges and concentrations and for partial-size distribution of suspended sediment and bed material. Water-temperature data are given only for daily observations.

Lakes in the Fort Smith Quadrangle[1]

Map number	Designation	Use[2]	Area (acres)	Capacity (acre-feet)
	Adair County			
1	Sallisaw Creek site 11	F	11	77
2	Sallisaw Creek site 18	F M	188	3,183
3	Sallisaw Creek site 20	F	14	87
	Cherokee County			
4	Rogers Lake	P	21	160
	Haskell County			
5	Club Lake	P	11	40
6	Coblentz Lake	P	20	208
7	Kinta Lake	P	35	210
8	McCurtain Lake	P	112	1,680
9	Quinton Lake	M	20	208
10	Stigler Lake	M	28	330
11	Curry Lake	P	12	96
12	Curry Lake No. 2	P	12	96
13	Fish Creek Lake	P	16	128
14	Quinton Club Lake	P	50	500
15	John Wells	M R	237	2,917
	Le Flore County			
16	Spiro Lake	M	60	475
17	New Spiro Lake	M	445	3,115
18	Long Lake	R	28	280
19	Terrell Lake	P	26	104
20	Poteau Lake	R	13	108
21	Evans Coal Company	P I	24	192
22	Bokoshe City Lake	P	25	200
23	Wofford Lake	P	42	400
24	Reese Lake	P	16	64
	McIntosh County			
25	Checotah Lake (Onapa Lake)	M	49	1,137
26	Warner Lake	M	18	144
27	Checotah Hatchery	I	12	96
28	Koch Lake	P	10	80
29	L. L. Cowden Lake	P	16	133
	Muskogee County			
30	Boynton City Lake	M	17	85
31	Greenleaf Lake	R	920	14,720
32	Haskell Lake	M	17	170
33	Taft Institution	I	61	900
34	Coburn Ranch	P	14	50
35	Ross Lake	Ir	50	100
36	Cane Creek site 1	F Ir	24	104
37	Cane Creek site 2	F	22	105
38	Cane Creek site 20	F	14	56
39	Cane Creek site 22	F	34	162
40	Cane Creek site 29	F	26	127
41	Dunagan Lake	P	10	66
42	Fewel Ranch	P	27	85
43	Shakleford Ranch	P	13	50
	Okmulgee County			
44	Henryetta Lake	M	616	8,624
45	Morris Lake	M	26	187
46	Nichols Park Lake	R	26	312
47	Pitcher Lake	P	65	200
48	Bogie Lake	I	12	48
49	Jimmie Foster	P	10	40
50	Okmulgee Creek site 1	F	94	299
51	Cane Creek site 5	F	33	94
52	Cane Creek site 9	F	13	60
53	Cane Creek site 11	F	41	220
54	Cane Creek site 18	F	31	172
55	Cane Creek site 19	F	18	92
	Pittsburg County			
56	McAlester Lake	M	2,100	45,475
57	Alyne Lake	P	12	96
58	Ruby Lake	P	15	120
	Sequoyah County			
59	Vian Lake	R	10	152
60	Muldrow City Lake	M	65	1,500
61	Sallisaw Creek site 2	F	11	49
62	Sallisaw Creek site 3	F	12	58
63	Sallisaw Creek site 4	F	10	38
64	Sallisaw Creek site 6	F	11	60
65	Sallisaw Creek site 28	F	25	257
66	Sallisaw Creek site 29	F M	227	3,430
67	Sallisaw Creek site 30	F	28	213
68	Sallisaw Creek site 36	F	16	214
69	Sallisaw Creek site 37	F	10	39
	Wagoner County			
70	Vann's Lake	P	65	190
	Lakes in Several Counties			
	Eufaula Reservoir	Mt	102,000	2,376,000
	Tenkiller Ferry Reservoir	Mt	12,500	628,700
	Fort Gibson Reservoir	Mt	19,100	365,000
	Robert S. Kerr Reservoir[3]	Mt	35,200	380,000
	Total		175,222	3,845,167

[1] Data provided by the Oklahoma Water Resources Board, U. S. Department of Agriculture Soil Conservation Service, and U. S. Army Corps of Engineers.
[2] F, flood control (may be used for recreation); I, industrial; Ir, irrigation; M, municipal; Mt, multiple use; P, private; R, recreation.
[3] Under construction.

Man-made lakes and reservoirs constitute the major part of the area's water resources and are the prime source of water for municipal and industrial use. Because of the limited availability of ground water in most of the area and because of the lack of sustained low flow in the smaller streams, development of storage is necessary to provide dependable water supplies.

Data compiled by the Oklahoma Water Resources Board indicate that about 18,000 farm ponds provide water for stock.

Most of the lakes of 10 or more acres are listed above. The Robert S. Kerr Reservoir and the associated locks upstream will provide water necessary for navigation on the Arkansas and Verdigris Rivers as far upstream as Catoosa near Tulsa. Although the prime purpose of the large reservoirs is to impound water for flood control, power generation, and water supply, recreation is a secondary benefit of economic and social importance.

RECONNAISSANCE OF THE WATER RESOURCES OF THE FORT SMITH QUADRANGLE, EAST-CENTRAL OKLAHOMA

Melvin V. Marcher

1969

Cartography by Roy D. Davis, Oklahoma Geological Survey