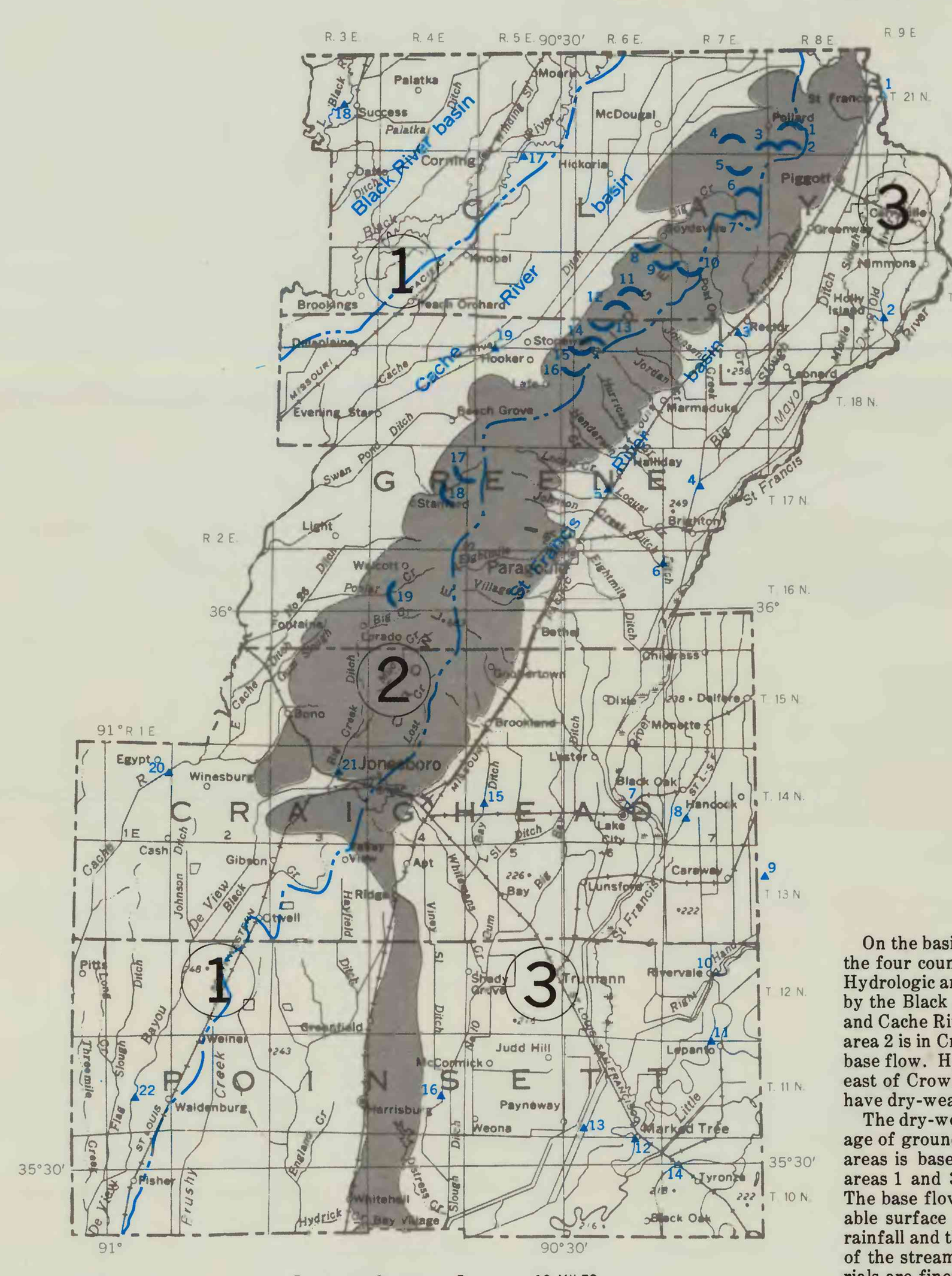
SURFACE WATER



HYDROLOGIC AREAS AND SURFACE-WATER DATA-COLLECTION SITES

EXPLANATION

Geological Survey gaging station or partial record site

Corps of Engineers gaging station

Potential reservoir site
Number beside symbol refers to tabular data

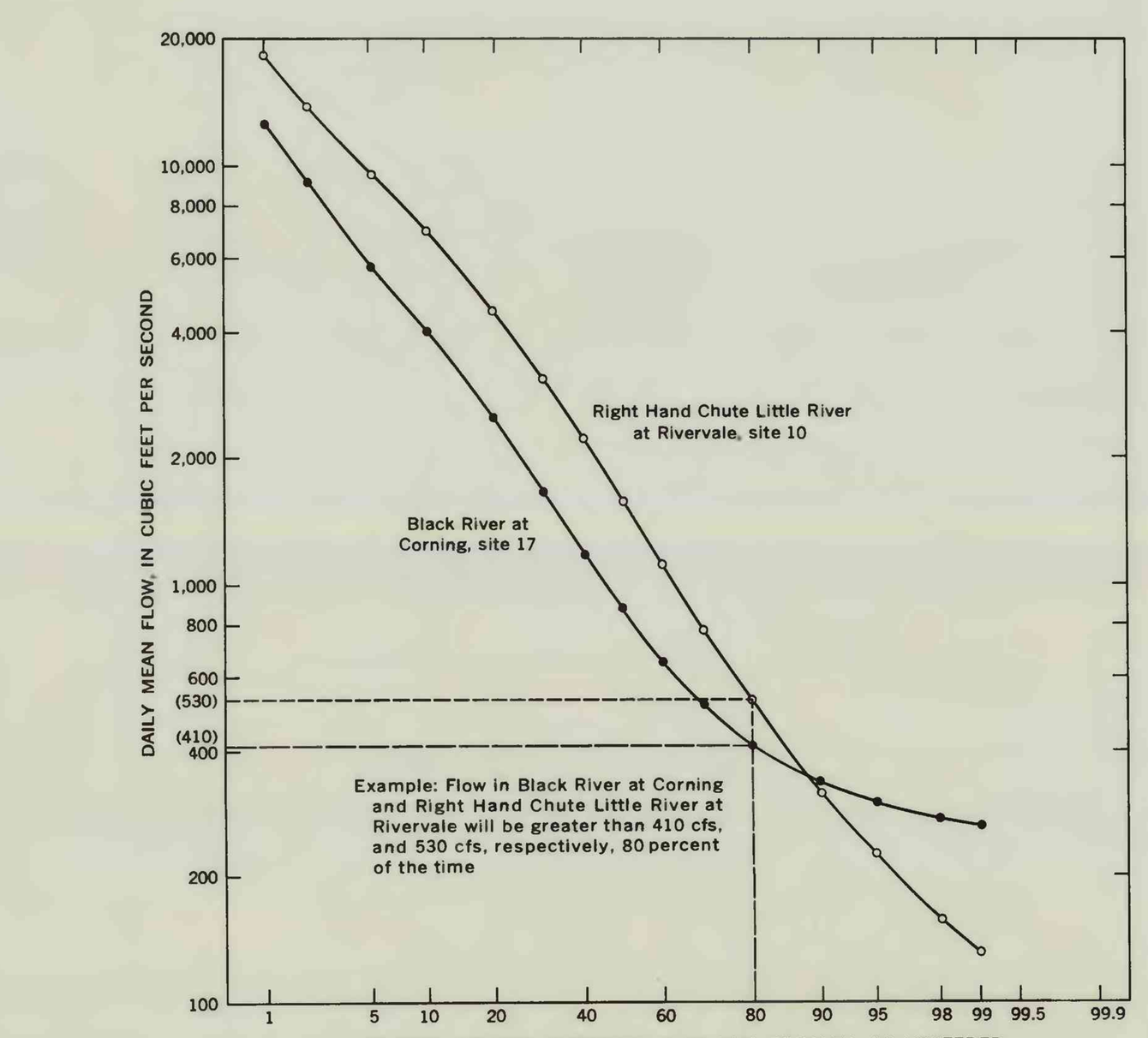
River basin boundary (or surface water divide)

Hydrologic Area (see text)

Crowleys Ridge

On the basis of dry-weather flow characteristics, streams of the four counties can be grouped into three hydrologic areas. Hydrologic area 1, west of Crowleys Ridge, is drained chiefly by the Black and Cache Rivers. All streams except the Black and Cache Rivers have very little or no base flow. Hydrologic area 2 is in Crowleys Ridge where streams have no significant base flow. Hydrologic area 3 is in the St. Francis River basin east of Crowleys Ridge. Most streams in Hydrologic area 3 have dry-weather flow.

The dry-weather streamflow is derived from effluent seepage of ground water; thus the distinction of these hydrologic areas is based on ground-water characteristics. Hydrologic areas 1 and 3 are underlain by alluvium of Quaternary age. The base flow in area 3 is accounted for by the more permeable surface materials which permit greater infiltration of rainfall and the high water table which is intersected by most of the stream channels. West of the ridge the surface materials are finer grained and permit less recharge from precipitation, and the water table is at greater depths below the surface and is intersected only by the larger streams. Crowleys Ridge, hydrologic area 2, is underlain by less permeable material than areas 1 and 3. Also, stream channels in area 2 generally do not intersect the water table.



FLOW DURATION

Flow duration shows the percentage of time a daily mean flow is equaled or exceeded. For example, the curves show that the flow in Black River at Corning will be greater than 410 cfs 80 percent of the time, and the flow in Right Hand Chute Little River at Rivervale will be greater than 530 cfs 80 percent of the time. If water supplies of 410 and 530 cfs are required from Black River at Corning and Right Hand Chute Little River at Rivervale, then 20 percent of the time, or on the average 73 days each year, flow in the streams will be deficient. The duration curves show that sustained flow (higher percentages) are available from Black River even during severe droughts; whereas, flows in Right Hand Chute may recede considerably below 100 cfs during extended dry periods.

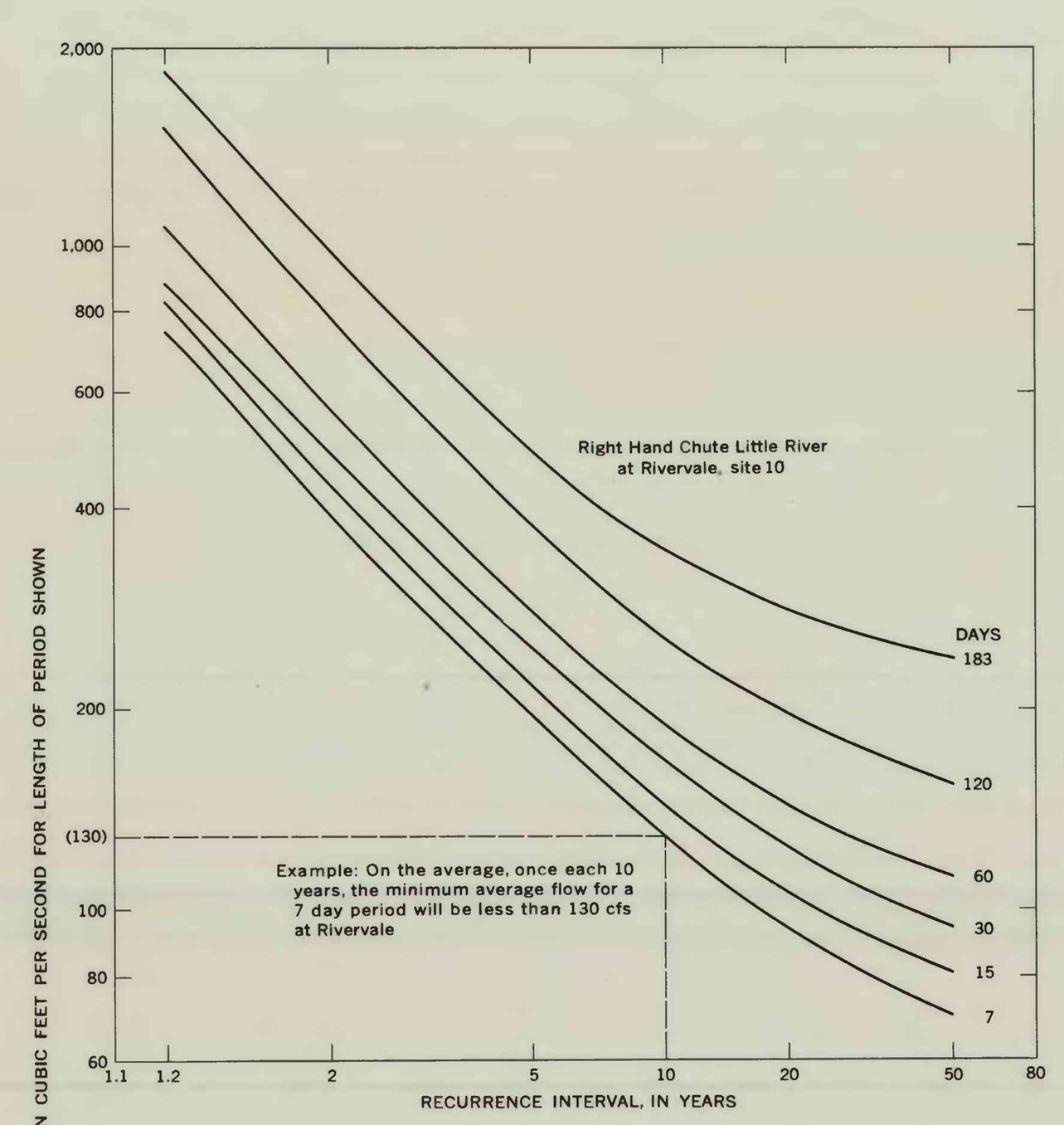
WATER-SUPPLY CHARACTERISTICS OF SELECTED STREAMS

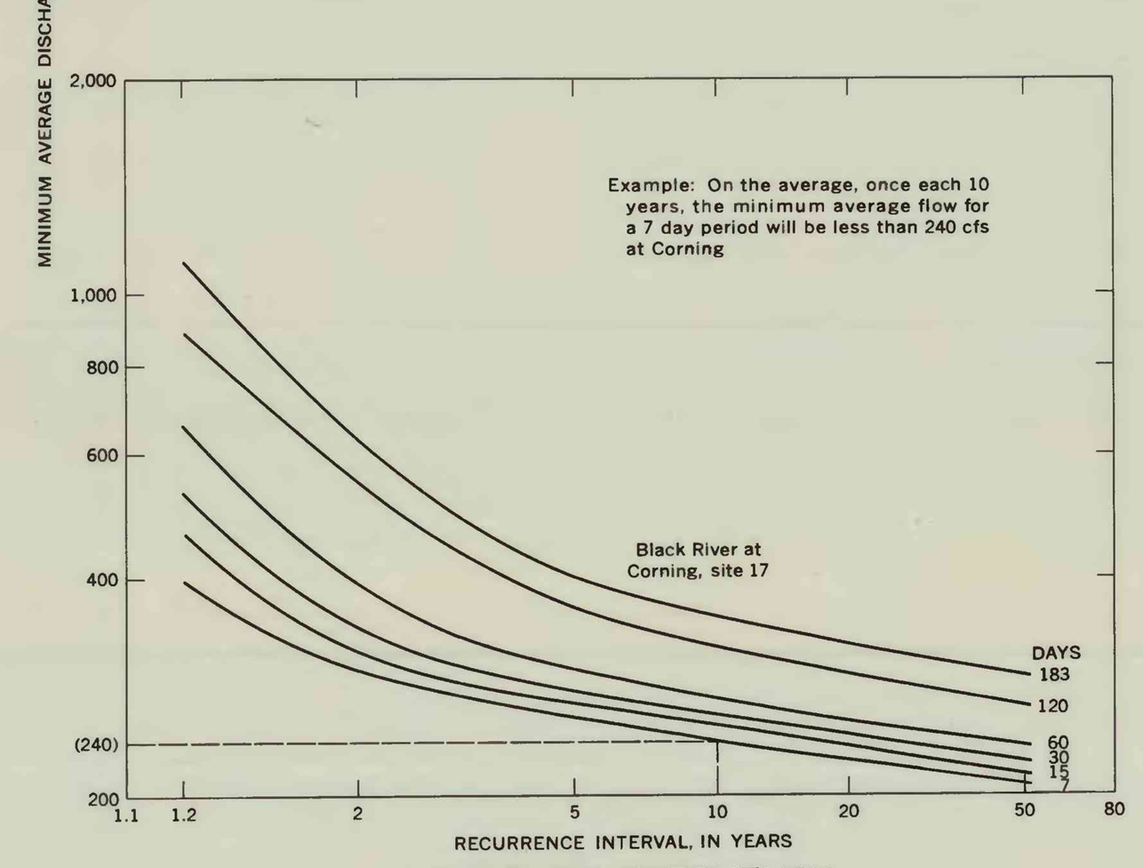
Three of the most useful water-supply characteristics of a stream are the average flow, low-flow frequency, and flow duration. The low-flow frequency and flow duration shown below are indices of the dry-weather flow of the streams. Streams in the St. Francis River basin (hydrologic area 3) typically have greater dry-weather flow than streams of comparable drainage areas in the Black and Cache River basins (hydrologic area 1).

The 7-day, 50-year flow is a good index for water supply without storage.

Map number	Station name	Tributary to—	Drainage area (sq mi)	Estimated flow (cfs) Average	7-day[1] 2-year[2]	7-day[1] 50-year[3]	95-percent duration[4]	Remarks
	St. Francis River basin							
2	Mayo Ditch near Holly Island.	Big Slough Ditch	33.7	50	5.9	2.0	5.3	Perennial stream. Numerous bank seeps. Deep dredged channel.
3	Post Oak Creek near Rector.	Big Slough Ditch	9.82	10	0	0	0	Flow present only immediately after rainfall in basin.
4	Big Slough Ditch near Marmaduke.	St. Francis River	247	360	68	23	55	Perennial stream. Dredged channel.
5	Locust Creek near Paragould.	St. Francis River (through Locust Creek Ditch).	19.8	25	.3	<.1	.3	No flow during severe drought.
6	Locust Creek Ditch near Paragould.	St. Francis River	78.3	105	1.4	<.1	.9	Do.
8	Cockle Burr Slough near Black Oak.	St. Francis River	[5] 108	160	48	23	45	Perennial stream. Dredged channel.
9	Buffalo Creek Ditch near Caraway.	Left Hand Chute Little River.	[5] 235	380	70–80	20–30	60–70	Do.
10	Right Hand Chute Little River at Rivervale.	St. Francis River	2,106	2,734	[6] 268	[6] 56	[6] 226	Do.
15	Little Bay Ditch near Jonesboro.	St. Francis Bay (through Ditch 10).	27.1	35	0	0	0	No flow in most years. Dredged channel.
16	Ditch No. 1 near Harrisburg.	St. Francis Bay (through Ditch 10).	61.5	80	0	0	0	Do.
	White River basin							
17	Black River near Corning.	White River	1,749	1,742	[6] 295	[6] 205	[6] 298	Perennial stream. Headwaters in Interior Highlands in Missouri.
18	Little Black River at Success.	Current River	384	450	30	13	33	Do.
19	Cache River near Stonewall.	White River	285	380	1.2	<.1	1.1	No flow during severe drought. Dredged channel.
20	Cache River near Egypt.	White River	698	920	21	.2	18	Perennial stream. Dredged channel. Affected by irrigation.
21	Big Creek near Jonesboro.	Bayou De View	51.1	65	.4	<.1	.3	Base flow is untreated urban runoff.
22	Bayou De View near Waldenburg.	Cache River	----	----	----	----	----	Low flow is mostly leakage from ricefields. Natural base flow unknown. Measured flow, 20 cfs on June 23, 1966.

[1] Minimum average flow for 7 consecutive days will be less than value shown in columns, and with average recurrence, in years, as shown in column head.
[2] Recurrence interval of 2 years, or 50-percent chance of occurrence in any year.
[3] Recurrence interval of 50 years, or 2-percent chance of occurrence in any year.
[4] Percentage of time daily mean flow will exceed value shown in column.
[5] Estimated.
[6] Not estimated but adjusted to base period 1929–57.





LOW-FLOW FREQUENCY

The minimum streamflow for a given period of time expressed in terms of frequency of occurrence is referred to as low-flow frequency. For example, the low-flow frequency expression "7-day, 20-year flow" means the minimum average flow expected to occur during a 7-day period on the average of once each 20 years.

The average minimum flows for consecutive-day periods have significant application in utilizing streamflow. For example, an industry at Rivervale which plans to use 130 cfs from Right Hand Chute Little River can expect streamflow to be insufficient for 7 days once each 10 years.

SURFACE-WATER RECORDS

Streamflow data, consisting of various combinations of daily flow, low-flow discharge measurements, and chemical analysis, have been collected at 23 sites in the four-county area.

Period of record: A, adjusted to base period 1929–57; C, chemical analysis made periodically; D, daily discharge or chemical analysis; E, estimated; M, miscellaneous chemical analysis; Mb, miscellaneous base-flow discharge measurements or chemical analysis of base flow; Sc, temperature and dissolved-solids duration curves; Sf low-flow and flow-duration data.

Records available from: CE, District Engineer, Department of the Army, Memphis District, Corps of Engineers, 668 Federal Building, Memphis, Tenn. 38103; GS, District Chief, Water Resources Division, U.S. Geological Survey, 2301 Federal Office Building, Little Rock, Ark. 72201.

Map number	Streamflow station	Period of record: Streamflow	Period of record: Chemical analysis	Records available from—
1	St. Francis River at St. Francis	D 1930–	C	CE, GS
2	Mayo Ditch near Holly Island	Mb 1966–67, Sf E	----	GS
3	Post Oak Creek near Rector	Mb 1966–67, Sf E	----	GS
4	Big Slough Ditch near Marmaduke	Mb 1959–63, Sf A	Mb	GS
5	Locust Creek near Paragould	Mb 1966–67, Sf E	Mb	GS
6	Locust Creek Ditch near Paragould	Mb 1957–63, Sf A	Mb	GS
7	St. Francis River at Lake City	D 1931–	C	CE, GS
8	Cockle Burr Slough near Black Oak	Mb 1966–67, Sf E	----	GS
9	Buffalo Creek Ditch near Caraway	Mb 1966–67, Sf E	----	GS
10	Right Hand Chute Little River at Rivervale	D 1947–, Sf A	C, D 1958–59	CE, GS
11	Left Hand Chute Little River near Lepanto	Mb 1965	Mb	GS
12	St. Francis River at Marked Tree	D 1934–	C, D 1949–55, Sc 1953–55	GS
13	St. Francis River floodway near Marked Tree	D 1927–31, 1934–	C	GS
14	Tyronza River near Tyronza	D 1949	Mb	CE, GS
15	Little Bay Ditch near Jonesboro	Mb 1959–63, Sf A	Mb	GS
16	Ditch No. 1 near Harrisburg	Mb 1966–67, Sf E	----	GS
17	Black River near Corning	D 1939–, Sf A	C, D 1956–59, Sc 1957–59	GS
18	Little Black River at Success	Mb 1964, Sf E	Mb	GS
19	Cache River near Stonewall	Mb 1959–63, Sf A	Mb	GS
20	Cache River near Egypt	D 1964, Sf E	C	CE, GS
21	Big Creek near Jonesboro	Mb 1959–63, Sf A	Mb	GS
22	Bayou De View near Waldenburg	Mb 1966–67, Sf E	----	GS
23	Bayou De View near Hickory Ridge	Mb 1965	M	GS

POTENTIAL RESERVOIR SITES ON CROWLEYS RIDGE FOR SURFACE-WATER SUPPLY

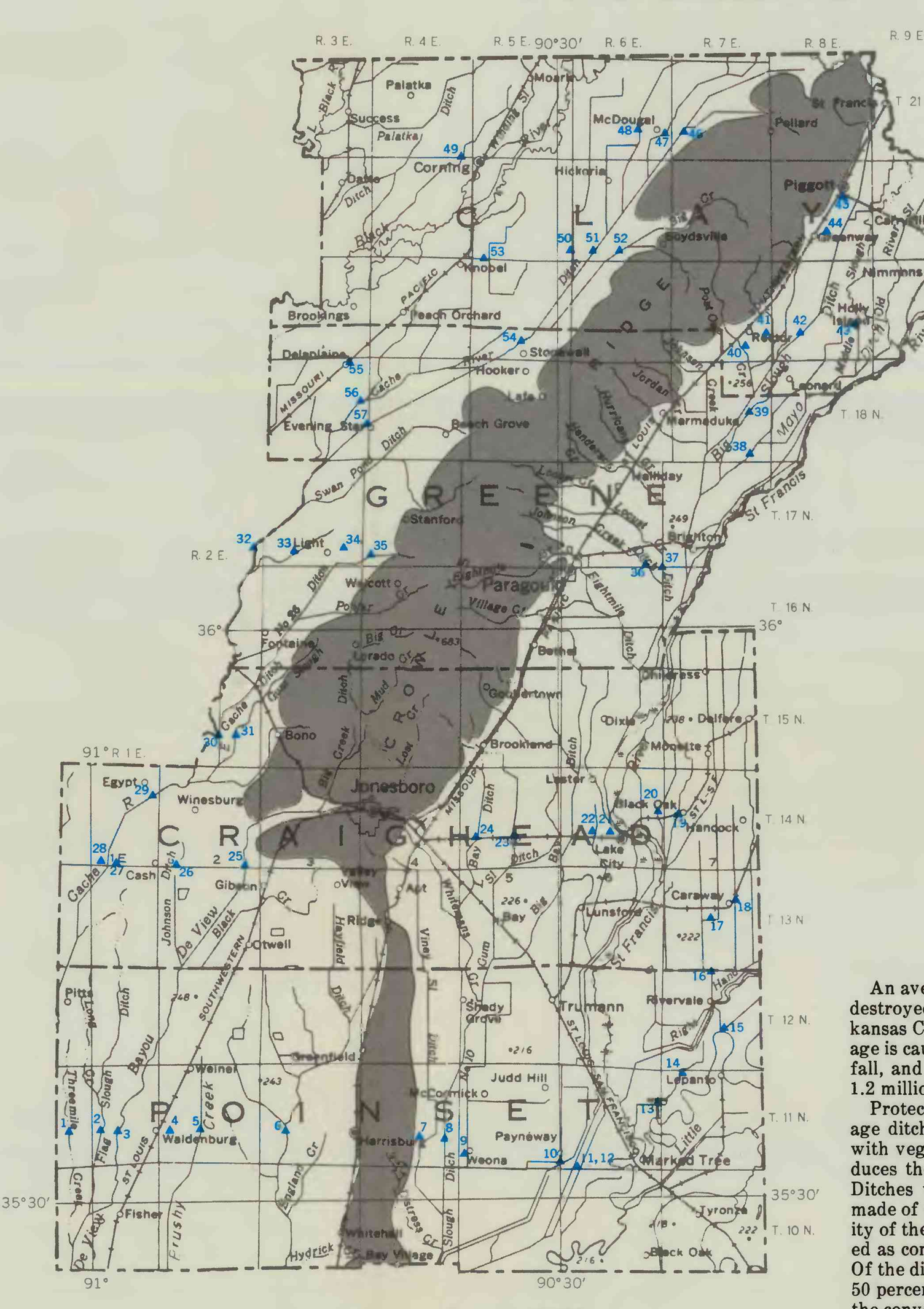
The water-supply characteristics of a stream with little or no low flow can be enhanced by surface-water reservoirs. Hydrologic area 2 is favorable for surface storage because the topography is suitable for construction of reservoirs. Reservoirs can provide a year-round water supply in area 2 on streams that would not otherwise provide sufficient water during dry weather.

[Reservoir sites, storage capacity, and drainage area furnished by Soil Conservation Service, U.S. Department of Agriculture]

Map number	Damsite	Stream name	Storage capacity, acre-ft	Drainage area square miles	Estimated average annual runoff, acre-ft	Draft,[1] cubic feet per second
1	21N–8E–NW sec. 29	Pollard (Horse) Creek tributary	449	1.53	1,470	0.89
2	21N–8E–NW sec. 32	Pollard Creek (Horse Creek)	846	2.56	2,460	1.66
3	21N–7E–NE sec. 36	Housman Creek	399	1.80	1,730	.88
4	21N–7E–SE sec. 27	Sales Creek	784	2.58	2,480	1.64
5	20N–7E–NW sec. 11	South Fork Big Creek tributary	651	2.18	2,090	1.30
6	20N–7E–NW sec. 14	South Fork Big Creek tributary	419	1.43	1,370	.83
7	20N–7E–SW sec. 23	South Fork Big Creek	378	1.29	1,240	.75
8	20N–6E–SW sec. 35	Big Creek tributary	375	1.28	1,230	.75
9	19N–6E–SE sec. 1	Big Creek tributary	730	2.40	2,300	1.52
10	19N–7E–NE sec. 7	Big Creek tributary	609	2.04	1,960	1.22
11	19N–6E–NW sec. 15	Johnson Creek	639	2.14	2,050	1.27
12	19N–6E–NW sec. 21	Dart Creek	452	1.54	1,480	.90
13	19N–6E–N sec. 29	Mill Creek tributary	346	1.18	1,130	.69
14	19N–6E–SW sec. 29	Mill Creek	475	1.62	1,560	.94
15	19N–6E–SW sec. 30	Mill Creek tributary	311	1.06	1,020	.62
16	18N–5E–NE sec. 12	Big Creek	609	2.04	1,960	1.22
17	17N–4E–SW sec. 12	Sugar Creek tributary	888	6.31	6,060	2.18
18	17N–4E–SW sec. 14	Sugar Creek	2,014	10.36	9,950	4.67
19	16N–4E–SW sec. 17	Poplar Creek	2,362	7.03	6,750	4.57
	Total		13,736	52.37	50,300	28.50

[1] Permissible rate of withdrawal on a day-to-day basis, 20 year frequency (supply will be deficient on the average of once in 20 years).
Note.—1 cubic foot per second=0.646 million gallons per day, 448.8 gallons per minute or 1.98 acre-ft per day.

PROBLEMS



SITES ON DRAINAGE DITCHES WHERE CONVEYANCE LOSS WAS ESTIMATED

EXPLANATION

Site on drainage ditch where conveyance loss was estimated
Number referes to table

Crowleys Ridge

An average of about 500,000 acres of crops are damaged or destroyed annually in the area by water, according to the Arkansas Conservation Needs Committee. Surface-water damage is caused by inundation from streams, slow runoff of rainfall, and rejected recharge. Flood protection is required for 1.2 million acres, and drainage is a problem on 724,000 acres.

Protection from surface water is provided mostly by drainage ditches. With time, drainage ditches become overgrown with vegetation and partially filled with sediment. This reduces the efficiency of the ditches to remove storm runoff. Ditches were observed at 57 sites in 1967, and judgments made of the present capacity compared with the design capacity of the ditches to transmit water. These estimates, expressed as conveyance loss, are shown in the accompanying table. Of the ditches observed, the conveyance loss was greater than 50 percent, perhaps as much as 70 percent, at five sites, and the conveyance was at or near design capacity at 11 sites (10-percent conveyance loss).

Channel rectification is in progress in the upper reaches of some ditches, but not in the lower reaches. Coordination and planning of this work are needed to prevent flooding and crop loss.

CONVEYANCE LOSS IN DRAINAGE DITCHES

[Estimated conveyance loss, percent: Based on condition of channel in 1967 and estimate of original channel conditions when constructed]

Site number	Drainage ditch and location	Estimated conveyance loss, percent
1	Three Mile Creek at State Highway 14	20
2	Flagg Slough Ditch at State Highway 14	40
3	Bayou De View at State Highway 14	10
4	Brushy Creek Ditch tributary 1 mile east of Waldenburg at State Highway 14	20
5	Brushy Creek at State Highway 14	10
6	L'Anguille River at State Highway 14	10
7	Ditch 1, 4.5 miles east of Harrisburg at State Highway 14	10
8	Ditch 10, 5 miles east of Harrisburg at State Highway 14	10
9	Ditch 11 at Weona	20
10	Ditch 123 at Payneway	10
11	Ditch 60 at Payneway	10
12	Ditch 61 near Payneway at U.S. Highway 63	20
13	Ditch 45, 4.5 miles north of Marked Tree at State Highway 140	20
14	Ditch 69 near Lepanto at State Highway 140	20
15	Ditch 12 near Rivervale at State Highway 135	10
16	Ditch 1 north of Rivervale at State Highway 135	10
17	Ditch 4 near Caraway at State Highway 135	>50
18	Asher Ditch near Caraway at State Highway 158	>50
19	Little Slough Ditch at Black Oak at State Highway 18	40
20	Big Slough Ditch near Black Oak at State Highway 18	40
21	Purcell Slough near Lake City at State Highway 18	20
22	Big Bay Ditch near Lake City	20
23	Maple Slough Ditch near Jonesboro at State Highway 18	30
24	Little Bay Ditch near Jonesboro at State Highway 18	10
25	Bayou De View Main Ditch near Jonesboro at State Highway 226	20
26	Johnson Ditch near Cash at State Highway 226	30
27	Cache River Ditch tributary near Cash at State Highway 226	40
28	Cache River Ditch near Cash at State Highway 226	20
29	Cache River Ditch near Egypt at State Highway 91	20
30	Cache River Ditch near Bono at State Highway 230	20
31	Gum Slough near Bono at State Highway 230	20
32	Cache River near Light at State Highway 25	30
33	Lateral 3 near Light at State Highway 25	30
34	Main Lateral near Light at State Highway 24	>50
35	Caney Slough near Light at State Highway 25	40
36	Johnson Ditch near Paragould at State Highway 25	20
37	Locust Creek Ditch near Paragould at State Highway 25	20
38	Mayo Ditch near Rector at State Highway 139	10
39	Big Slough Ditch near Rector at State Highway 139	20
40	White Walnut Creek near Rector at State Highway 139	30
41	White Walnut Creek tributary near Rector at State Highway 1	20
42	Big Slough Ditch near Rector at State Highway 90	20
43	Middle Slough Ditch at Holly Island at State Highway 90	20
44	Quick Creek at Greenway at State Highway 1	20
45	Sugar Creek at Piggott at State Highway 1	30
46	Cache River Ditch 1 near McDougal at U.S. Highway 62	40
47	Little Cache River Ditch near McDougal at U.S. Highway 62	30
48	Ditch 19 near McDougal at U.S. Highway 62	>50
49	Cypress Ditch near Corning at U.S. Highway 67	>50
50	Ditch 20 near Boydsville at State Highway 90	30
51	Cache River Ditch 1 near Boydsville at State Highway 90	20
52	Ditch 10 near Boydsville at State Highway 90	30
53	Kramer Ditch near Knoble at State Highway 90	40
54	Cache River Ditch 1 near Hooker at State Highway 135	30
55	Main Canal Lateral 1 at Delaplaine at State Highway 34	40
56	Cache River Main Canal Lateral 13 near Delaplaine at State Highway 34	30
57	Cache River Ditch 1 at Evening Star at State Highway 34	40

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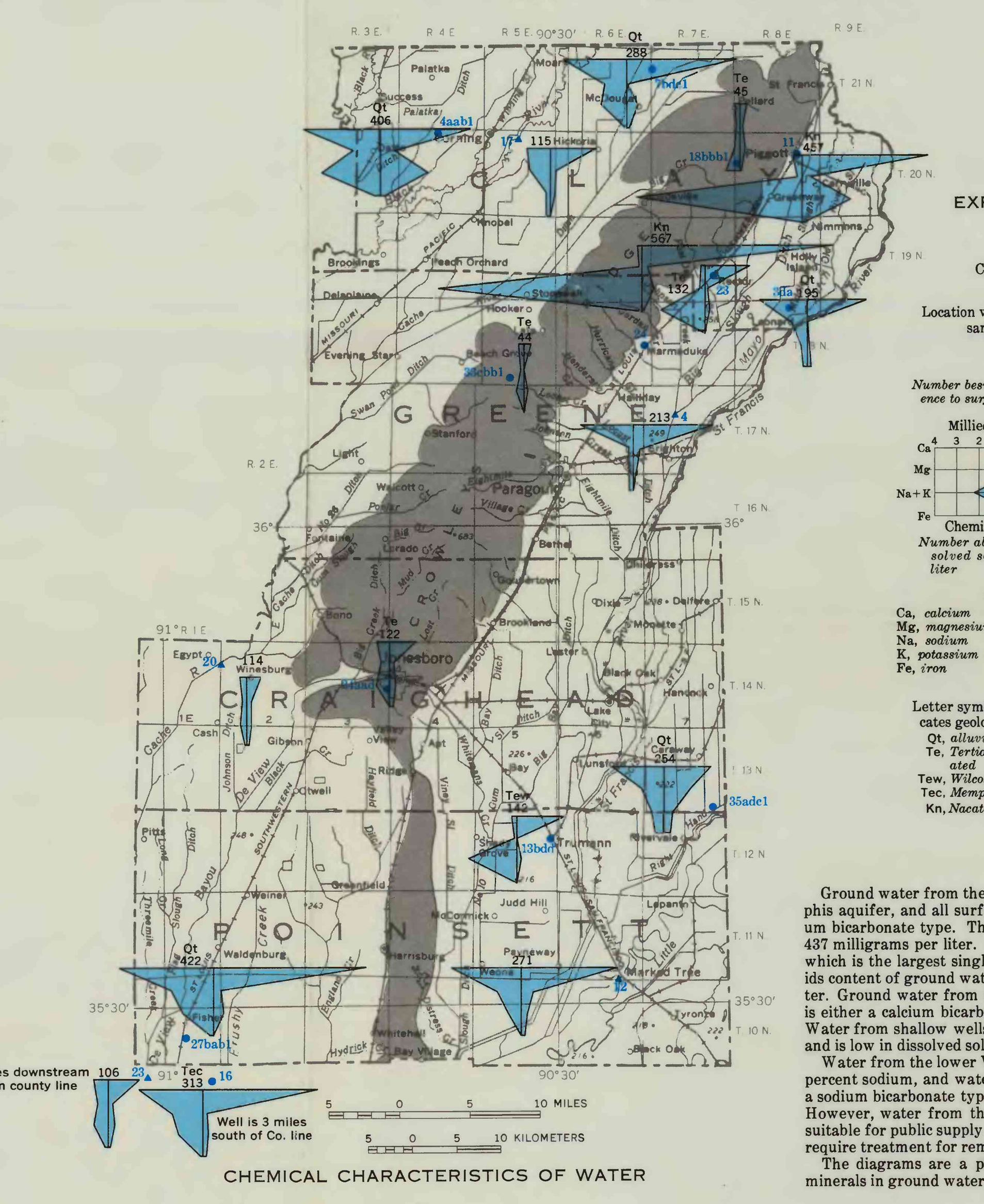
QUALITY OF WATER



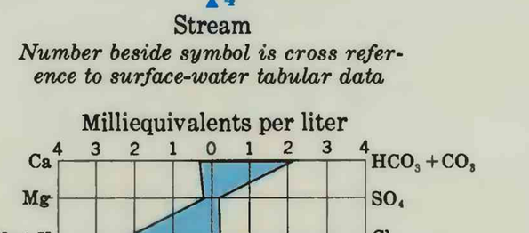
CHEMICAL CHARACTERISTICS OF WATER

EXPLANATION

Crowleys Ridge

Location where quality of water sample was taken

Stream
Number beside symbol is cross reference to surface-water tabular data



Chemical-quality diagram
Number above diagram is total dissolved solids in milligrams per liter

Constituents

Ca, *calcium*	HCO_3, *bicarbonate*
Mg, *magnesium*	CO_3, *carbonate*
Na, *sodium*	SO_4, *sulfate*
K, *potassium*	Cl, *chloride*
Fe, *iron*	NO_3, *nitrate*
	F, *flouride*

Letter symbol above diagram indicates geologic system and aquifer
Qt, *alluvium and terrace deposits*
Te, *Tertiary deposits, undifferentiated*
Tew, *Wilcox Group, undifferentiated*
Tec, *Memphis aquifer*
Kn, *Nacatoch Sand*

Ground water from the Quaternary alluvium and the Memphis aquifer, and all surface water in the area, is of the calcium bicarbonate type. The total dissolved solids is as much as 437 milligrams per liter. The water is suitable for irrigation, which is the largest single use. In general, the dissolved-solids content of ground water is higher than that of surface water. Ground water from other formations below the alluvium is either a calcium bicarbonate or a sodium bicarbonate type. Water from shallow wells in Crowleys Ridge is a mixed type, and is low in dissolved solids.

Water from the lower Wilcox aquifer, which contains a high percent sodium, and water from the Nacatoch Sand, which is a sodium bicarbonate type, may not be suitable for irrigation. However, water from the lower Wilcox and the Nacatoch is suitable for public supply. Water from the Nacatoch does not require treatment for removal of iron and manganese.

The diagrams are a pictorial comparison of the dissolved minerals in ground water and surface water in the area.

REPRESENTATIVE CHEMICAL ANALYSES OF GROUND WATER

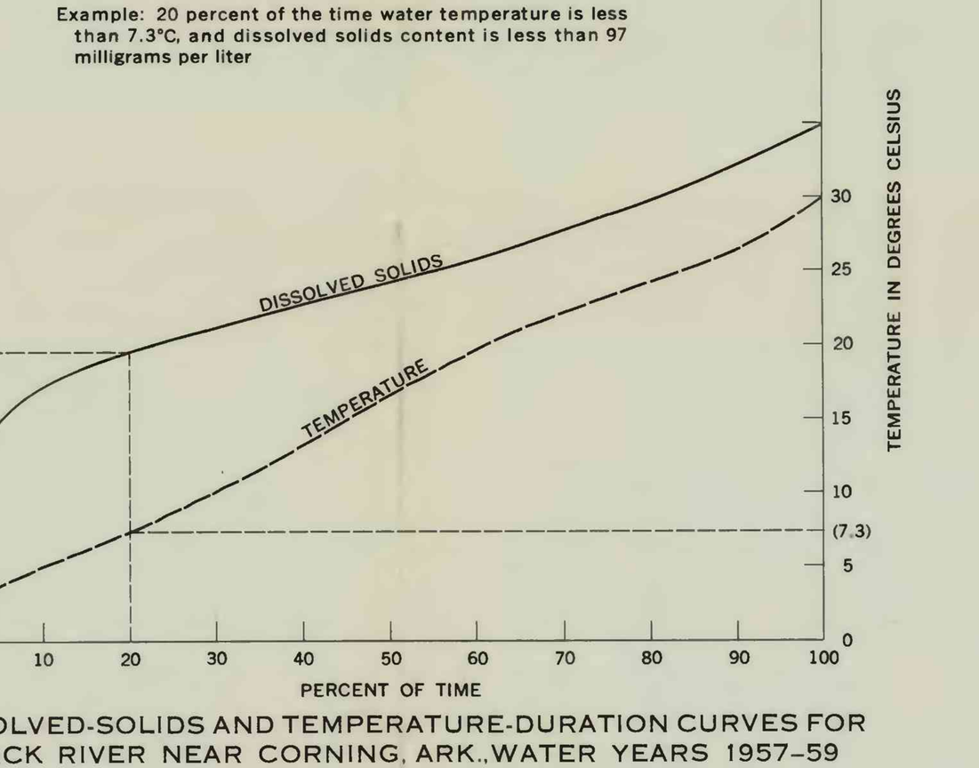
Well	Date of collection	Temperature (°C)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Color	Water-bearing formation
9N-1E-16	Oct. 1963[1]	----	----	1.9	0	56	17.7	24	2.5	----	----	2	6.5	0.2	----	313	218	0	----	----	7.2	----	Tecc
10N-1E-27babl	8-9-67	17	32	4.0	.55	88	23	32	3.0	416	0	15	20	.2	0.1	422	314	0	17.9	694	7.6	2	Qt
12N-5E-13bdd	4-6-46	----	9.6	3.1	----	1.5	1.3	50	1.8	127	0	4.7	6.5	.3	.2	142	9	0	90	221	7.7	----	Tew
13N-7E-35adcl	8-9-67	19	29	5.9	.39	47	12	11	1.2	130	0	55	14	0	8.5	254	167	60	12.5	391	7.2	4	Qt
14N-3E-24aad	5-3-50	16	32	.10	----	12	4.0	11	1.4	64	0	3.6	9.5	0	8.6	122	46	0	33	165	6.7	----	Te
18N-5E-33cbbl	8-8-67	20	21	0	0	2.6	1.0	4.1	.5	19	0	.2	3.2	0	.8	44	10	0	45.0	46	6.3	1	Te
6E-24	Mar. 1965[1]	----	----	.1	0	3.2	0	210	2.8	----	----	10	22	.5	----	567	8	0	----	----	8.3	----	Kn
8E-3da	8-16-55	17	----	2.6	----	43	8.3	5.0	----	161	5	4.0	3.0	----	.7	195	141	1	7	276	8.5	6	Qt
19N-7E-23	6-19-56	23	9.2	.07	----	4.1	.7	45	1.5	122	0	2.6	9.2	.1	.4	132	13	0	87	213	7.1	5	Te
20N-4E-4aabl	8-8-67	17	26	3.5	.75	69	14	54	3.0	268	0	28	74	.2	0	406	230	10	33.5	694	7.8	1	Qt
8E-11	6-19-56	23	8.1	.03	----	7.9	1.3	168	4.9	352	0	9.4	74	.3	1.4	457	25	0	92	768	8.0	10	Kn
8E-18bbbl	8-8-67	20	15	13	.12	1.7	.7	3.6	.7	19	0	.2	2.5	0	.2	45	7	0	50.0	40	6.3	1	Te
21N-7E-7bdcl	8-8-67	18	27	3.2	.25	60	13	25	2.3	287	0	.2	20	.2	0	288	203	0	20.5	485	8.2	1	Qt

[1] Analysis by Arkansas State Department of Health.
Note.—Degrees Fahrenheit=1.8 × degrees Celsius +32. Degrees Celsius=(degrees Fahrenheit −32)÷1.8.

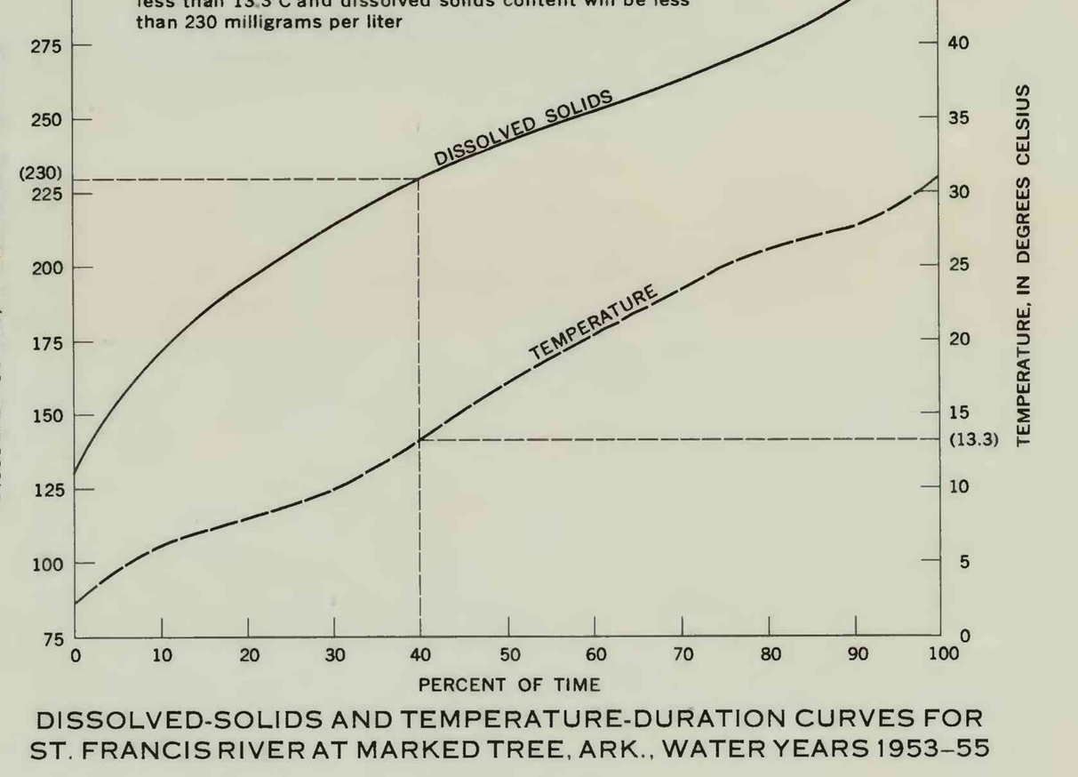
REPRESENTATIVE CHEMICAL ANALYSES OF SURFACE WATERS

Mean discharge (cfs)	Date sampled	Temperature (°C)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Phosphorous as PO_4	Dissolved solids	Hardness as $CaCO_3$: Calcium magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color	Turbidity	Dissolved oxygen, mg/l
4. Big Slough Ditch near Marmaduke																									
169	10-28-65	15	24	0.9	0.00	49	11	10	1.0	206	0	13	3.2	0.2	0.0	----	----	213	171	2	342	7.8	4	5	7.8
12. St. Francis River at Marked Tree																									
1,610	3-29-66	----	19	0.06	0.04	65	14	12	2.2	257	0	23	8.7	0.2	0.1	0.13	0.31	271	220	9	458	7.7	7	26	----
17. Black River near Corning																									
810	12-16-65	----	8.0	0.35	0.01	22	11	2.4	1.4	120	0	5.8	2.2	0.0	0.3	0.00	0.10	115	100	2	205	7.2	15	35	----
20. Cache River at Egypt																									
827	12-14-65	----	9.7	0.82	0.00	7.0	2.7	5.6	5.2	32	0	9.6	5.0	0.2	0.6	----	----	114	28	20	98	6.7	140	140	----
23. Bayou De View near Hickory Ridge																									
3.05	10-27-65	12	11	0.75	0.00	15	5.5	10	5.4	84	0	7.0	9.2	0.2	0.2	----	----	106	60	0	165	8.0	18	22	8.4

Note.—Degrees Fahrenheit=1.8 x degrees Celsius + 32. Degrees Celsius=(degrees Fahrenheit − 32) ÷ 1.8.



DISSOLVED-SOLIDS AND TEMPERATURE-DURATION CURVES FOR BLACK RIVER NEAR CORNING, ARK., WATER YEARS 1957–59



DISSOLVED-SOLIDS AND TEMPERATURE-DURATION CURVES FOR ST. FRANCIS RIVER AT MARKED TREE, ARK., WATER YEARS 1953–55

VARIATION IN DISSOLVED SOLIDS AND WATER TEMPERATURE

Dissolved-solids and temperature-duration curves are shown for Black River at Corning and St. Francis River at Marked Tree. Chemical and physical characteristics of other perennial streams in the area are similar to those for Black and St. Francis Rivers, but in some of these streams the dissolved-solids content may be lower. Representative chemical analyses of ground water and surface water are shown in the tables.

Base from U.S. Geological Survey
State base map

WATER RESOURCES OF CLAY, GREENE, CRAIGHEAD, AND POINSETT COUNTIES, ARKANSAS

By
Marion S. Hines, Raymond O. Plebuch, and A. G. Lamonds

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