STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
DIVISION OF RESOURCES PLANNING

REPORT ON WATERMASTER SERVICE IN SURPRISE VALLEY WATERMASTER SERVICE AREA MODOC COUNTY, CALIFORNIA 1959 SEASON

EDMUND G. BROWN
Governor

HARVEY O. BANKS
Director of Water Resources

September, 1960

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SUBMISSION TO, AND ADOPTION BY
DEPARTMENT OF WATER RESOURCES

STATE OF CALIFORNIA

I, William L. Berry, Chief Engineer, Division of Resources Planning, Department of Water Resources of the State of California, submit this "Report on Watermaster Service in Surprise Valley Watermaster Service Area, Modoc County, California, 1959 Season".

William L. Berry, Chief Engineer
Division of Resources Planning

I, Harvey O. Banks, Director of the Department of Water Resources of the State of California, approve and adopt this "Report on Watermaster Service in Surprise Valley Watermaster Service Area, Modoc County, California, 1959 Season", as a report of the Department of Water Resources.

WITNESS my hand and the seal of the State of California this 30th day of September, 1960.

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

HARVEY O. BANKS
Director of Water Resources

ORGANIZATION
DEPARTMENT OF WATER RESOURCES
DIVISION OF RESOURCES PLANNING

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INTRODUCTION

This is the twentieth annual report on watermaster service in Surprise Valley Watermaster Service Area and covers the period of water distribution in 1959 beginning March 19 and terminating September 30.

The service area was created by the Department of Public Works on January 10, 1939, and was supplemented and revised by order of December 31, 1941, to include water rights determined by decrees of the Superior Court, Modoc County, on various streams in Surprise Valley as follows:

Stream	Case	Number
Mill Creek	Warren vs. Wimer	3024
Soldier Creek	San Francisco Cattle Loan Co. vs. Cramton	2405
Pine Creek	Gaustad vs. McCulley	3391
Cedar Creek	Hill vs. Acty Lighty vs. Cook	2343 1206
Deep Creek	Tyeryar vs. Benner	3101
Owl Creek	Cummins vs. Allen	2401
Rader Creek	Powers vs. Woodruff	3626
Eagle Creek	Harris vs. Adams	3284
Emerson Creek	Murphy vs. Warren	2840

Prior to January 10, 1939, service areas had been created as water rights were determined on each stream system. These smaller service areas were combined into a single administrative unit when the present Surprise Valley Watermaster Service Area was formed.

Watermaster service has been provided during each irrigation season since the service area was created and annual reports prepared to show the work accomplished during each season.

The report is presented under four headings as follows: Introduction; Water Supply; Distribution of Water; and Changes in Ownership of Lands and Water Rights. Appendix A contains fourteen tables presenting precipitation data and water supply records at various locations within the area.

WATER SUPPLY

At the beginning of the irrigation season soil moisture conditions were very poor due to the light rains and snow during the preceding winter months. The snow pack was dangerously below normal at the beginning of the growing season.

Precipitation

Data on precipitation at Lake City, as compiled from records of the United States Weather Bureau for the period October 1, 1958, to September 30, 1959, are shown in Table A-1. Precipitation at this station for the period was 12.20 inches, which is equivalent to 63 per cent of mean. Data on precipitation at Cedarville, as compiled from records of the United States Weather Bureau for the period October 1, 1958, to September 30, 1959, are shown in Table A-2. Precipitation at this station for the period was 9.10 inches, which is equivalent to 74 per cent of mean.

Water content of the snow pack on Eagle Peak, Blue Lake Ranch, and Cedar Pass snow courses on April 1, 1959, as published in the Department of Water Resources Bulletin entitled "Water Conditions in California, Basic Data Supplement, April 1, 1959," averaged 7.5 inches or 50 per cent of the combined mean for the three courses. The April 1 mean water content of the snow pack on the three courses near Surprise Valley, together with the water content on those courses on April 1, 1959, and per cent of mean, are shown in the following tabulation:

Snow course	Elevation in feet	Water content of snow in inches: 50-year computed mean	Water content of snow in inches: 1959	Per cent of mean
Eagle Peak	7,200	16.2	9.1	56
Blue Lake Ranch	7,300	11.3	5.7	50
Cedar Pass	7,100	17.0	7.6	45

Stream flow measuring stations equpped with water stage recorders were maintained during the period of watermaster service at the following locations:

Bidwell Creek below Bray diversions

Mill Creek above diversion

Soldier Creek above diversions

Pine Creek at division between North and South channels

Cedar Creek above diversions

North Deep Creek above diversions

South Deep Creek below Espil Ditch

Owl Creek below Allen-Arreche Ditch

Rader Creek at Cockrell diversion

Eagle Creek below Gill Ditch

Emerson Creek above diversions

Records of discharge at the above stations are presented in Tables A-3, A-4, A-5, A-6, A-7, A-8, A-10, A-11, and A-12, respectively. Computed daily mean discharge of Deep Creek, comprising discharges of North Deep Creek and South Deep Creek, is presented in Table A-8.

DISTRIBUTION OF WATER

Distribution of water from the various creeks was in accordance with rights to water set forth in the decrees. Percentages of allotments available for distribution on each stream were determined from the daily mean discharge at the measuring stations.

Bidwell Creek

Due to the very dry years, watermaster service was requested by most of the ranchers in April. Watermaster service was supplied to all Bidwell Creek users in conformance with the Order of Determination that was entered on April 6, 1959. Our estimate cost for this special service was approximately $1,000.

Distribution under watermaster service began on April 11, when 26 cubic feet per second, 57 per cent of first priority water rights, were available for Schedule 3. The creek held to approximately 25 cubic feet per second from April 11 to June 5, when it peaked for a daily average of 34 cubic feet per second, 74 per cent of first priority, Schedule 3. Afterwards, it began decreasing slowly until the latter part of July, then the water supply had declined to 3.6 cubic feet per second, 50 per cent of first priority water rights, Schedule 4. The flow then remained nearly constant for the remainder of the season.

On June 16, a final hearing was held in and before the Superior Court of California, in Modoc County Courthouse, Judge A. K. Wylie presiding, before writing a final draft of the court decree for Bidwell Creek stream system. The hearing precipitated only minor changes in water rights as originally set forth in the Order of Determination, dated April 6, 1959.

Mill Creek

The flow of Mill Creek gradually increased during April and May and began decreasing slowly by the first of June. By the latter part of August, the water supply had declined until only 74 per cent allotments of first priority were being satisfied. The flow of the creek remained nearly constant for the remainder of the season.

On the Wimer Branch, the following construction took place this fall:

(a) N. Bettandorf built a concrete diversion dam and one-foot Parshall flume on the Streiff Ditch.

(b) C. Phipps built a concrete diversion dam and one-foot three-inch Parshall flume on the Wimer Upper Ditch No. 20. Mr. Phipps' idea was to consolidate the Wimer Upper Ditch, Diversion No. 20, and the Wimer lower ditch, Diversion No. 23, into one diversion.

(c) H. Davst built a concrete diversion dam and one-foot Parshall flume on the Wilson Ditch.

The above structures were designed and supervised by the Soil Conservation Service and the Department of Water Resources.

Soldier Creek

Distribution of water on Soldier Creek began on March 19, when the water was turned to the lower users for the first rotation. The maximum flow of the creek occurred during the first week of April, when very hot dry weather cuased high snow melt. Water was available for all priority rights only through the first week in April. After rotation was discontinued for the year on June 19, only the first priority water rights of 1.90 cubic feet per second were fulfilled for the upper users until July 10. The supply decreased gradually thereafter until July 26, when approximately 71 per cent of the first priority water rights were available. The flow remained nearly constant for the remainder of the season.

At the end of the watermaster season, Mr. E. Daniels was in the process of constructing a concrete two-foot Parshall flume on the Daniels Ditch, Diversion No. 3. The watermaster built and installed a five-foot weir on the west channel that can be removed during the winter months.

Pine Creek

Rotation on Pine Creek began March 20, when the entire flow was diverted into the North Channel. The lands irrigated from this channel were quite dry. The water was never shifted to the South Channel this year because the flow dropped below 4.00 cubic feet per second before the North Channel users' acre-foot allotments were fulfilled. See Court Decree No. 339, Paragraph No. 7.

Water ran in the North Channel until the first rotation allotment of 62.5 acre-feet was completed. On April 3, L. Davis' (now deceased) first rotation out of the North Channel was fulfilled on April 10, and by this time the flow was down to 3.30 cubic feet per second. On April 16, the flow dropped below 1.60 cubic feet per second, and the entire amount was diverted into the Cressler Ditch to Raymond Bordwell. On May 2, the flow increased to 1.60 cubic feet per second; hence, was put back in the North Channel. Then, on May 10, the water again dropped below 1.60 cubic feet per second and was rediverted into the Cressler Ditch to Raymond Bordwell for the remainder of the season.

This year being a dry year, the above-named ranchers were the only ones to receive water in 1959.

Cedar Creek

The flow of Cedar Creek was greatest during May. Thereafter, the available water supply decreased rapidly, and by the middle of July, only the first priority right was being supplied.

The Thoms Creek Ditch, diverting from the Pit River watershed into Cedar Creek, was not opened until the first part of April, because of snow in the ditch on the summit. Water from Thoms Creek was rediverted for use on the Wallace, Warrens, and Van Ness Ranches. Flow available for the Thoms Creek

Ditch failed about June 1. During the period of diversion from April 1 to June 1, the flow in the ditch averaged about eight-tenths second-feet.

The construction program consisted of O. Cramton rebuilding his concrete diversion dam and putting in a two-foot concrete Parshall flume in the McCulley Ditch No. 1. The structure was designed by the Soil Conservation Service and supervised the construction of same.

Deep Creek

There was never sufficient flow in North Deep Creek this year to supply first priority rights; hence, the entire flow was diverted by the Company Ditch. The peak flow was reached in the first week of April, 65 per cent of first rights (5.70 cubic feet per second). After April 11, the water supply decreased gradually and by the middle of September the flow was less than 0.40 second-feet. However, most ranches on the Company Ditch were supplied stock water nearly all season.

Due to the dry year, only the first two priority water rights of the total of five priority water rights of South Deep Creek were on and this was for only the first week in April. The first priority water rights held from April 1 to April 18.

The creek held to approximately 75 per cent (4.10 cubic feet per second) from April 18 through May 31, then gradually decreased to 7 per cent of the first right (0.40 cubic feet per second) by August 8, and remained approximately the same for the remainder of the season.

Owl Creek

Maximum flows were reached during the last part of May. Thereafter, the flow decreased until the middle part of August, when water was available only through second priority rights.

Difficulty was encountered in delivering stock water to the Berryessa Ranch and the Four Star Cattle Ranch because of ditch loss and the hot dry summer. Finally, Ed Berryessa's stock water would not even reach his ranch, even though he switched the water to the Miura Ditch; this was in the middle of August.

A new wooden 3-foot Parshall flume has been installed in the Company Ditch; a 2-foot Parshall flume has been installed in the Cook Ditch; and a 2-foot wooden Parshall flume has been built and scheduled to be installed in the Miura Ditch this fall.

The major diversion works project, proposed by the Soil Conservation Service and Department of Water Resources, was presented to the State Soil Conservation Commission, State of California, for a state loan. A loan of $12,726,000 was granted under the AB1144 fund for a flood control works on July 14, 1959. The final plans are now in the process of being drawn up and should be submitted to contractors for bids by this spring. This project will cost somewhere between $35,000 and $40,000 and the ranchers will pay the difference out of their own pockets or by obtaining a personal loan.

Rader Creek

Runoff of Rader Creek increased during April, and peaked from May 15 to June 18 at approximately 14 cubic feet per second (average for a day). After this peak runoff period, the flow decreased gradually until the latter part of July when only 1.40 cubic feet per second were available. The Cockrell diversion was opened May 20, and closed July 15.

Mr. L. Cockrell cleaned the diversion dam this spring and installed a 9-foot weir on the mainstream and a 1-1/2-foot weir on his ditch. These were put into operation on June 20. The diversion dam has been out of operational condition since the flash flood of June 1958. See 1958 Watermaster Report, Page 10.

Eagle Creek

Runoff of Eagle Creek increased during April, May, and peaked in June. Thereafter, the supply decreased gradually until the first part of August, when only 1.40 cubic feet per second were flowing. The town users and Powers Ranch (the old Bone Ranch) had been diverting the entire flow of Eagle Creek since June 26, as compared to September 1 of last year.

During the summer, several concrete control and measuring structures were designed by the Soil Conservation Service and Department of Water Resources for the Kelley Diversion No. 12 and Myers Diversion No. 13. These diversions are on Mr. L. John Boyer's property and he has given permission for entrance to Mr. Diemer, Kelley Diversion, and Mr. R. Roberts, Myers Diversion, for building these structures and straightening the main channel at these diversion sites.

Emerson Creek

Distribution of water on Emerson Creek began on April 1 with the creek peaking in the first week of April, at approximately 8.0 cubic feet per second, 69 per cent of second priority. Then it receded and held at approximately 6.70 cubic feet per second, 58 per cent of second priority until June 3. Thereafter, it receded slowly and by August 17 it was down to 2.50 cubic feet per second. Emerson Creek remained there for the rest of the watermaster season.

This creek did not come up to any appreciable flow because of the light snow pack for the winter of 1958. It should be noted this creek is not one of the major stream systems in Surprise Valley, but it does hold fairly well in the latter part of the season, due to the numerous springs feeding this creek.

CHANGES IN OWNERSHIP OF LANDS AND WATER RIGHTS

Changes in ownership of lands and water rights which occurred subsequent to filing of the 1959 statement and which were included in "Statement for Surprise Valley Watermaster Service Area, County of Modoc, State of California, 1960," are listed in the following tabulation:

Tract number	Name of water right owner appearing in 1959 statement	Name of water right owner appearing in 1960 statement	Amount of water in second-feet
8-136	Bone, John B.	Powers, Harold J.	5.00
8-149	Street, Grace A.	Lown, Thomas & Francis	0.08
8-106	Toney, J. Ervin & Toney, Ruby E.	Espil, John M. & Peggy	1.05
8-70	Davis, LeRoy	Davis, Blanch I.	2.50
8-62 8-63	McMullen, Geo. C. Estate	Stewart, Mae W. Testamentary Trustees	1.64
8-161	Harden, Frank	Harden, Ava Jo & Harold	0.03
8-128 8-129	Dollarhide, Lillie L.	Stevens, Jesse W.	3.50
8-32 8-34	Steward, Brucie D.	Wimer, Lipwall & Husband	0.28
8-120	Berryessa, Bertha	Berryessa, Bertha	2.82
8-156	Berryessa, Bertha	Miura, Eulalio & Elmore	0.185
8-166	Grove, Jack & Irvine	Boyer, John M.	4.40

TABLE A-1

PRECIPITATION AT LAKE CITY, MODOC COUNTY, CALIFORNIA

1958-1959

In Inches

Month	Mean precipitation	Precipitation 1958-1959
October	1.80	0.65
November	2.16	2.66
December	2.77	1.59
January	2.78	2.00
February	2.11	0.61
March	2.25	0.86
April	1.60	0.47
May	1.62	1.67
June	1.41	0.60
July	0.21	0.36
August	0.20	0.06
September	0.55	0.67
TOTALS	19.46	12.20

TABLE A-2

PRECIPITATION AT CEDARVILLE, MODOC COUNTY, CALIFORNIA

1958-1959

In Inches

Month	Mean precipitation	Precipitation 1958-1959
October	1.05	0.80
November	1.49	1.56
December	1.55	1.15
January	1.74	1.19
February	1.51	0.87
March	1.46	0.47
April	0.94	0.18
May	1.00	1.60
June	0.74	0.33
July	0.44	0.19
August	0.17	0.22
September	0.48	0.54
TOTALS	12.37	9.10

TABLE A-3

DAILY MEAN DISCHARGE OF MILL CREEK

March 23 to September 21, 1959

In Cubic Feet per Second

Day	March	April	May	June	July	August	September
1		6.5	13.4	8.3	2.7	1.5	1.5
2		7.4	23.0	7.1	3.2	1.6	1.5
3		12.0	19.0	7.1	3.2	1.6	1.5
4		14.0	11.0	7.4	3.2	1.6	1.5
5	N	17.0	9.8	7.4	3.2	1.7	1.5
6	O	18.0	9.8	7.7	3.2	1.7	1.5
7		17.0	9.8	7.7	3.0	1.6	1.5
8		14.0	9.8	7.7	3.0	1.6	1.6
9		13.0	9.8	7.7	3.0	1.6	2.3
10	R	13.0	9.8	7.4	3.0	1.6	1.8
11	E	12.0	9.8	7.1	3.0	1.6	2.0
12		12.0	9.8	6.8	3.0	1.6	2.0
13	C	12.0	9.8	6.3	3.0	2.0	2.1
14		13.0	9.8	5.9	2.7	2.0	2.1
15	O	11.0	9.8	5.5	2.7	2.0	2.1
16	R	9.8	9.8	5.1	2.7	1.8	2.1
17		9.8	9.8	4.7	2.3	1.6	2.1
18	D	9.5	9.8	4.4	2.3	1.6	2.1
19		8.6	9.5	3.7	2.3	1.8	2.1
20		8.0	8.7	3.7	2.3	2.7	2.1
21		7.7	8.3	4.7	2.4	4.2	2.0
22		7.7	8.0	4.8	2.2	3.4	
23	5.3	8.0	8.0	4.8	2.1	2.7	N
24	5.9	8.0	8.0	4.8	2.0	1.5	O
25	7.1	8.6	7.7	4.7	1.8	1.5	
							R
26	6.8	6.0	11.0	4.4	1.7	1.5	E
27	6.8	9.0	21.0	4.4	1.6	1.5	C
28	6.5	9.8	17.0	4.4	1.7	1.5	O
29	6.5	9.8	13.0	4.4	1.7	1.5	R
30	6.5	9.5	13.0	4.4	1.7	1.5	D
31	6.5	9.5	9.2	----	1.6	1.5	
Mean	6.4	11.0	11.0	5.8	2.5	1.8	1.6
Runoff in acre-feet	636	681	345	153	110	66	114

Total for period: 2105 acre-feet.

TABLE A-4

DAILY MEAN DISCHARGE OF BIDWELL CREEK

January 1 to September 30, 1959

In Cubic Feet per Second

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.
1	6.2	5.6	11	15	26	27	7.6	3.6	2.8
2	5.1	5.3	14	24	23	28	7.2	3.6	2.8
3	5.1	6.5	14	33	22	30	6.9	3.4	2.8
4	5.1	6.2	13	40	19	31	6.5	3.2	2.8
5	4.8	5.6	13	43	21	33	6.2	3.2	2.8
6	6.2	5.9	12	42	19	34	6.2	3.2	2.8
7	6.2	6.2	12	33	19	32	5.9	3.2	2.8
8	6.2	6.2	12	28	19	28	5.6	3.4	2.8
9	8.7	6.5	12	26	21	26	5.6	3.4	2.8
10	9.1	6.6	11	25	21	24	5.3	3.4	2.8
11	9.1	7.2	10	26	22	22	5.1	3.4	2.8
12	20.0	7.6	12	28	25	19	5.1	3.2	2.8
13	15.0	8.7	14	28	30	19	4.8	3.2	2.8
14	11.0	8.3	12	26	33	18	5.1	3.2	3.4
15	9.5	7.2	11	24	30	18	4.8	3.2	4.5
16	8.7	6.9	11	22	28	16	4.5	3.2	3.8
17	7.9	6.9	13	20	31	15	4.3	3.2	3.6
18	7.6	6.5	14	19	28	14	4.5	3.2	4.8
19	6.5	6.2	13	17	25	13	4.3	3.4	5.3
20	6.2	5.9	11	16	24	12	4.3	3.2	4.3
21	8.3	6.5	12	16	23	11	4.0	3.4	3.8
22	8.3	6.5	11	18	22	10	4.0	3.2	3.8
23	7.2	6.2	11	21	21	9.9	4.0	3.2	3.6
24	7.2	6.4	10	23	21	9.9	4.0	3.2	3.4
25	6.5	6.2	9.4	27	22	10	3.8	3.2	3.4
26	6.5	6.2	9.9	28	28	13	3.8	3.0	3.8
27	8.3	7.2	8.7	24	27	10	3.4	3.0	3.6
28	7.9	8.7	9.1	22	27	9.1	3.6	2.8	3.6
29	6.5	---	9.5	21	26	8.3	3.6	2.8	3.6
30	6.9	---	9.9	21	27	8.3	3.6	2.8	3.6
31	6.2	---	9.9	22	27	---	3.6	2.8	---
Mean	7.9	6.7	11.5	25	24	19	4.9	3.2	3.4
Runoff in acre-feet	484	369	705	1,497	1,498	1,108	300	197	203

Total for period: 6,361 acre-feet.

TABLE A-5

DAILY MEAN DISCHARGE OF SOLDIER CREEK

March 21 to September 21, 1959

In Cubic Feet per Second

Day	March	April	May	June	July	August	September
1		24.0	18.0	4.3	2.1	1.3	1.4
2		31.0	15.0	4.3	2.1	1.3	1.4
3		32.0	15.0	4.1	2.0	1.3	1.3
4		32.0	13.0	4.1	2.0	1.3	1.3
5		31.0	13.0	3.7	1.9	1.3	1.3
6		25.0	15.0	3.7	1.9	1.4	1.3
7	N	19.0	12.0	3.5	1.9	1.4	1.3
8		18.0	11.0	3.5	1.9	1.5	1.3
9	O	16.0	11.0	3.2	1.8	1.5	1.3
10		18.0	9.2	3.2	1.8	1.5	1.3
11	R	18.0	9.2	2.8	1.8	1.5	1.3
12		17.0	9.2	2.7	1.8	1.5	1.3
13	E	15.0	9.7	2.5	1.8	1.5	1.4
14		13.0	8.8	2.5	1.8	1.5	1.4
15	C	11.0	6.9	2.4	1.8	1.5	1.4
16	O	8.8	5.7	2.4	1.8	1.5	1.4
17		8.4	7.6	2.4	1.7	1.5	1.3
18	R	8.4	6.0	2.4	1.7	1.5	1.3
19		7.9	5.4	2.4	1.7	1.5	1.3
20	D	7.6	5.2	2.4	1.7	1.5	1.3
21	8.4	8.4	5.0	2.4	1.6	1.5	1.3
22	6.9	11.0	5.2	2.3	1.6	1.5	
23	6.2	12.0	5.2	2.3	1.6	1.5	N
24	5.4	12.0	5.0	2.3	1.6	1.5	
25	6.6	12.0	4.7	2.4	1.6	1.5	O
26	6.9	12.0	9.2	3.2	1.5	1.4	R
27	7.9	12.0	9.7	3.4	1.5	1.4	E
28	7.2	12.0	6.9	2.4	1.4	1.4	C
29	7.6	12.0	6.0	2.3	1.4	1.4	O
30	7.2	12.0	5.2	2.2	1.3	1.4	R
							D
31	9.2		4.7		1.3	1.4	
Mean	8.0	15.8	9.1	2.9	1.7	1.4	1.3
Runoff in acre-feet	158	939	559	172	104	86	54

Total for period: 2,072 acre-feet.

TABLE A-6

DAILY MEAN DISCHARGE OF PINE CREEK

March 20 to May 11, 1959

In Cubic Feet per Second

Day	March	April	May	June	July	August	September
1	N	4.3	---	N	N	N	N
2		8.9	2.2				
3	O	10.0	2.4	O	O	O	O
4		11.0	1.9				
5		8.9	2.5				
6	R	6.1	3.1	R	R	R	R
7		4.4	2.4				
8	E	3.6	1.9				
9		3.7	1.7				
10	C	3.1	1.3	E	E	E	E
11	O	3.3	1.0				
12		3.3	N				
13	R	2.8		C	C	C	C
14		2.5	O				
15	D	2.2					
16		1.4	R	O	O	O	O
17		1.5					
18		1.5	E				
19		1.5					
20	2.4	1.5	C	R	R	R	R
21	2.4	1.5	O				
22	1.8	1.5					
23	1.6	1.5	R				
24	1.6	1.5		D	D	D	D
25	1.5	1.5	D				
26	1.9	1.5					
27	1.9	1.3					
28	2.2	---					
29	1.9	---					
30	2.0	---					
31	2.7						
Mean	2.2	3.5	2.0				
Runoff in acre-feet	48	187	40				

Total for period: 275 acre-feet.

TABLE A-7

DAILY MEAN DISCHARGE OF CEDAR CREEK

January 1 to September 30, 1959

In Cubic Feet per Second

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.
1	1.0	1.7	3.4	5.9	5.4	2.2	0.7	0	0
2	0.8	1.7	3.7	7.0	4.9	2.2	0.7	0	0
3	0.8	2.0	5.4	7.0	5.4	2.0	0.6	0	0
4	0.8	1.7	5.4	7.0	5.4	2.0	0.7	0	0
5	0.8	1.7	4.9	7.0	6.4	2.2	0.8	0	0
6	0.9	1.7	4.9	5.9	6.4	2.2	0.8	0	0
7	0.9	1.7	4.5	5.4	5.9	2.0	0.7	0	0
8	0.9	1.5	4.5	6.4	5.4	1.7	0.6	0	0
9	1.0	1.5	4.1	5.9	5.4	1.7	0.7	0	0
10	1.4	1.5	3.7	5.4	4.9	1.7	0.5	0	0
11	1.4	1.5	3.7	5.4	4.5	1.5	0.6	0	0
12	6.2	1.5	4.5	5.4	4.1	1.2	1.0	0	0
13	3.4	1.4	5.9	4.9	4.1	1.2	1.0	0	0
14	2.2	1.4	4.9	4.5	4.1	1.0	1.0	0.1	0.1
15	2.0	1.4	4.5	4.1	3.7	1.0	0.8	0	0.2
16	1.7	1.5	5.4	4.1	3.4	1.0	0.3	0	0.2
17	1.5	1.5	4.9	3.7	3.4	0.9	0.2	0	0.1
18	1.5	1.5	4.5	3.7	3.4	0.8	0.1	0	0.2
19	1.4	1.5	4.1	3.4	2.8	0.8	0.1	0	0.3
20	1.2	1.7	4.1	3.4	2.5	0.8	0.2	0.3	0.3
21	1.4	1.7	4.1	3.4	2.5	0.7	0.1	0.3	0.3
22	1.4	1.7	4.1	3.4	2.8	0.7	0.1	0.2	0.3
23	1.4	1.7	4.1	3.7	2.5	0.7	0.2	0.2	0.2
24	1.4	1.7	3.7	4.1	2.5	0.8	0.2	0.1	0.2
25	1.4	1.7	3.7	4.5	2.8	1.0	0.1	0.1	0.2
26	1.4	1.7	3.7	4.9	4.5	1.0	0.1	0.1	0.2
27	1.7	2.0	3.7	4.5	4.1	1.0	0	0	0.3
28	2.0	2.5	4.1	4.1	3.4	0.9	0.1	0	0.3
29	1.7		4.1	3.7	3.1	0.8	0.1	0	0.3
30	2.0		4.1	3.4	2.5	0.8	0.1	0	
31	2.0		4.1		2.5		0.1	0	
Mean	1.6	1.7	4.3	4.8	4.0	1.3	0.4	0	0.1
Runoff in acre-feet	99	92	267	288	247	76	26	3	8

Total for period: 1,106 acre-feet.

TABLE A-8

DAILY MEAN DISCHARGE OF NORTH & SOUTH DEEP CREEKS

March 24 to September 21, 1959

In Cubic Feet per Second

Day	Mar.	Apr.	May	June	July	Aug.	Sep.
1		12	7.7	4.3	1.3	1.2	0.9
2		16	6.3	4.1	1.0	1.2	0.9
3	N	18	6.3	4.0	1.0	1.1	0.9
4		19	6.3	4.0	1.0	1.0	0.9
5	O	20	6.2	3.8	1.0	1.0	0.9
6		18	6.2	3.8	0.9	1.0	0.9
7		15	6.2	3.5	0.9	1.0	0.9
8	R	12	6.5	3.2	0.9	0.9	0.8
9		11	6.6	3.1	0.9	0.8	0.8
10	E	11	6.5	2.9	0.9	0.8	0.8
11	C	11	6.5	2.9	0.9	0.8	0.8
12		11	6.2	2.6	0.9	0.8	0.8
13	O	10	6.0	2.4	1.1	0.8	0.8
14		9.7	6.0	2.4	0.9	0.8	0.8
15	R	8.8	5.5	2.3	0.8	0.8	0.7
16	D	8.2	5.1	2.1	0.7	0.8	0.7
17		7.9	5.4	2.0	0.6	0.8	0.7
18		6.8	5.1	2.0	0.7	0.8	0.7
19		6.8	4.7	1.9	0.8	0.8	0.8
20		6.5	4.5	1.6	0.7	0.8	0.9
21		6.5	4.3	1.5	0.8	0.8	0.9
22		6.5	4.0	1.3	0.9	0.8	
23		6.5	4.0	1.1	1.1	0.8	N
24	6.4	6.5	3.8	1.2	1.3	1.0	O
25	6.2	6.7	5.7	1.3	1.3	0.9	
							R
26	6.4	7.5	9.5	1.9	1.2	0.9	E
27	6.4	7.2	6.5	1.9	1.2	0.9	C
28	6.4	7.1	5.9	1.5	1.2	0.9	O
29	6.4	6.8	5.4	1.2	1.2	0.9	R
30	8.8	6.9	4.5	1.4	1.2	0.9	D
31	9.2		4.5		1.2	0.9	
Mean	6.9	10	5.8	2.4	1.0	0.9	0.9
Runoff in acre-feet	115	606	356	142	62	56	38

Total for period: 1,375 acre-feet

TABLE A-9

DAILY MEAN DISCHARGE OF OWL CREEK

March 24 to September 22, 1959

In Cubic Feet per Second

Day	March	April	May	June	July	August	Sept.
1		11	29	22	8.0	1.8	1.3
2		24	24	23	7.0	1.8	1.3
3	N	23	20	23	6.5	1.8	1.3
4		25	17	23	6.0	2.0	1.3
5	O	25	14	23	5.7	2.0	1.3
6		22	13	23	5.2	2.0	1.3
7		19	14	23	5.2	1.8	1.3
8		16.8	14	23	4.9	1.8	1.5
9	R	16	16	23	4.6	1.7	1.7
10		17	16	22	4.3	1.7	1.7
	E						
11		19.9	18	21	4.0	1.7	1.6
12	C	21	15	21	3.7	1.7	2.4
13		21	16	20	3.3	1.7	1.7
14	O	21	18	19	3.7	1.7	1.7
15		19	16	17	3.5	1.7	1.6
	R						
16		18	15	16	3.1	1.7	1.4
17	D	18	16	16	2.9	1.4	1.4
18		17	15	16	2.6	1.4	1.4
19		16	14	15	2.6	1.4	1.4
20		16	12	14	2.6	1.8	1.4
21		17	12	14	2.6	1.7	1.4
22		21	12	14	2.4	1.7	1.4
23		22	17	13	2.6	1.5	
24	4.5	23	12	12	2.6	1.5	N
25	4.5	22	21	12	2.0	1.5	O
26	4.5	21	49	14	2.0	1.3	R
27	4.5	19	26	13	1.8	1.3	E
28	4.0	20	23	10	2.1	1.3	C
29	4.0	21	21	9	2.2	1.3	O
30	5.4	21	21	8.5	2.1	1.3	R
							D
31	7.8		20		2.0	1.3	
Mean	4.9	20	18	17	3.7	1.6	1.5
Runoff in acre-feet	78	1,176	1,117	1,036	227	98	62

Total for period: 3,794 acre-feet.

TABLE A-10

DAILY MEAN DISCHARGE OF RADER CREEK

April 1 to September 21, 1959

In Cubic Feet per Second

Day	April	May	June	July	August	September
	4.5	6.5	14	4.5	1.6	1.1
2	4.5	6.0	14	4.5	1.6	1.1
3	4.5	6.0	14	4.2	1.6	1.1
4	3.5	6.0	15	4.2	1.6	1.0
5	3.5	5.4	16	4.0	1.4	1.0
6	3.5	5.4	17	4.0	1.4	1.0
7	4.5	5.4	18	3.8	1.3	1.0
8	5.4	5.4	16	3.8	1.3	1.0
9	6.0	6.0	15	3.6	1.3	1.0
10	6.0	7.0	15	3.3	1.3	1.0
11	6.0	8.0	15	3.3	1.3	1.0
12	6.0	9.0	15	2.8	1.3	1.0
13	6.0	10.0	14	2.8	1.3	1.0
14	6.0	12.0	14	2.7	1.3	1.0
15	6.0	12.0	14	2.7	1.3	1.1
16	6.0	12.0	14	2.7	1.3	1.1
17	6.0	12.0	14	2.7	1.3	1.1
18	6.0	12.0	12	2.5	1.3	1.1
19	6.0	13.0	11	2.5	1.3	1.1
20	6.0	13.0	10	2.3	1.3	1.1
21	6.0	13.0	9.5	2.1	1.3	1.1
22	5.4	13.0	8.0	1.9	1.3	
23	5.4	13.0	7.2	1.9	1.3	N
24	5.4	13.0	7.5	1.9	1.3	O
25	5.4	13.0	7.2	1.9	1.1	
26	5.4	13.0	6.5	1.9	1.1	R
27	5.4	13.0	6.0	1.8	1.1	E
28	5.4	13.0	6.0	1.8	1.1	C
29	5.4	13.0	5.5	1.8	1.1	O
30	6.5	14.0	4.5	1.8	1.1	R
						D
31		14.0		1.4	1.1	
Mean	5.4	10.0	12.0	2.8	1.3	1.0
Runoff in acre-feet	321	626	707	172	80	42

Total for period: 1,948 acre-feet.

TABLE A-11

DAILY MEAN DISCHARGE OF EAGLE CREEK

January 1 to September 30, 1959

In Cubic Feet per Second

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.1	2.3	2.4	4.2	8.2	12	4.7	1.4	0.9
2	3.0	2.3	2.6	5.6	7.0	15	4.5	1.4	0.9
3	5.8	2.6	2.6	6.6	6.8	17	4.4	1.4	0.8
4	12.0	2.3	2.6	7.0	6.4	18	4.0	1.3	0.8
5	12.0	2.1	2.6	2.2	6.4	21	3.8	1.3	0.8
6	4.7	2.1	2.6	6.6	6.2	23	3.6	1.3	0.8
7	2.0	2.2	2.6	5.8	6.2	21	3.6	1.3	0.8
8	1.9	2.8	2.6	5.4	6.6	18	3.3	1.2	0.8
9	2.2	4.8	2.6	5.4	7.0	18	3.0	1.2	0.8
10	2.1	4.5	2.6	5.6	7.2	15	2.8	1.2	0.8
11	2.2	2.5	2.7	6.2	8.4	15	2.7	1.2	0.8
12	3.8	2.5	2.8	6.8	11.0	17	2.7	1.2	0.8
13	2.6	2.5	3.0	6.8	15.0	17	2.6	1.2	0.8
14	2.5	2.3	2.8	6.6	16.0	16	2.7	1.2	0.9
15	2.3	1.5	2.8	6.2	14.0	14	2.5	1.2	0.9
16	2.2	1.2	3.0	6.0	13.0	13	2.4	1.1	0.9
17	2.2	1.1	3.0	5.6	12.0	11	2.3	1.1	0.8
18	2.2	1.5	3.0	5.4	11.0	12	2.2	1.0	1.0
19	2.2	1.9	2.8	5.2	9.2	12	2.2	1.1	0.9
20	3.0	1.9	2.7	5.4	8.7	12	2.0	1.2	1.0
21	5.0	2.0	2.8	5.8	8.4	12	1.9	1.1	0.9
22	3.0	2.0	2.7	6.6	7.9	11	1.8	1.0	0.9
23	2.1	2.0	2.7	7.7	7.9	9.8	1.9	1.0	0.8
24	2.4	2.0	2.7	8.4	7.9	8.7	1.8	0.9	0.9
25	2.4	1.9	2.7	8.2	8.7	8.7	1.8	0.9	0.9
26	2.4	2.0	2.6	7.5	9.2	8.4	1.6	0.9	1.2
27	2.5	2.0	2.6	6.4	8.9	7.5	1.5	0.9	1.0
28	2.4	2.2	2.6	6.4	8.9	6.2	1.5	0.9	1.0
29	3.0		2.7	6.6	8.7	5.8	1.5	0.9	1.0
30	3.2		2.8	7.7	8.9	5.2	1.5	0.9	1.0
31	2.5		3.0		10.0		1.4	0.9	
Mean	3.4	2.3	2.7	6.4	9.1	13.0	2.6	1.1	0.9
Runoff, in acre-feet	206	125	167	379	559	794	160	69	53

Total for period: 2,512 acre-feet.

TABLE A-12

DAILY MEAN DISCHARGE OF EMERSON CREEK

March 26 to September 21, 1959

In Cubic Feet per Second

Day	Mar.	Apr.	May	June	July	Aug.	Sept.
1		7.1	6.8	6.5	3.8	2.7	2.4
2		7.5	6.6	6.2	3.4	2.7	2.3
3		8.0	6.5	6.1	3.4	2.7	2.4
4		8.0	6.1	6.0	3.4	2.7	2.4
5	N	8.0	6.0	6.0	3.4	2.7	2.4
6	O	7.8	6.1	6.0	3.4	2.7	2.4
7		7.0	6.1	5.8	3.4	2.7	2.5
8		7.0	6.1	5.8	3.4	2.7	2.5
9	R	6.8	7.1	5.8	3.2	2.7	2.5
10		6.6	7.0	5.7	3.1	2.7	2.5
	E						
11		6.8	7.0	5.7	3.0	2.7	2.5
12	C	7.1	7.0	5.4	3.0	2.7	2.5
13		7.1	7.0	5.2	2.9	2.7	2.5
14	O	7.1	7.1	5.0	2.7	2.7	2.7
15		7.0	7.1	5.0	3.1	2.7	2.7
	R						
16		6.2	7.1	4.5	2.7	2.7	2.7
17	D	6.1	7.1	4.1	2.7	2.5	2.7
18		6.1	7.1	4.1	2.7	2.5	2.7
19		6.1	7.0	4.1	2.7	2.5	2.7
20		6.1	6.8	4.1	2.7	2.5	2.7
21		6.5	6.6	4.0	2.7	2.5	2.7
22		6.2	6.6	4.0	2.7	3.3	
23		6.5	6.6	4.0	2.7	2.5	N
24		6.5	6.6	4.0	2.7	2.5	O
25		6.5	6.5	4.1	2.7	2.5	
							R
26	5.3	6.5	6.5	5.2	2.7	2.5	E
27	5.5	6.6	6.5	5.4	2.7	2.5	C
28	5.8	6.6	6.5	5.0	2.7	2.5	O
29	6.1	6.6	6.5	4.3	2.7	2.5	R
30	6.5	6.6	6.6	4.1	2.7	2.4	D
31	6.8		6.6		2.7	2.4	
Mean	6.0	6.8	6.7	5.0	3.0	2.7	2.5
Runoff, in acre-feet	404	411	297	184	166	104	71

Total for period: 1,637 acre-feet.