### Eighteenth Biennial Report

OF THE

### STATE ENGINEER

TO THE

Governor of Colorado



For the Years 1915-1916

DENVER, COLORADO EAMES BROS., STATE PRINTERS 1916



#### LETTER OF TRANSMITTAL

Sir: I have the honor to transmit herewith the Eighteenth Biennial Report of the Office of the State Engineer, for the period from December 1st, 1914, to November 30th, 1916, inclusive.

Respectfully,

ADELBERT A. WEILAND, State Engineer.

To His Excellency, GEORGE A. CARLSON, Governor of Colorado.



### TABLE OF CONTENTS

List of Officials in Charge of Water Distribution	Page . 4
CHAPTER I	
Introduction	. 7
CHAPTER II Financial	. 10
Financial	. 10
CHAPTER III	
Water Right Decrees	. 14
CHAPTER IV	
Claims for Appropriations of Water	19
CHAPTER V	
Annual Reports of Division Engineers	27
Division No. 1	
Division No. 2	
Division No. 3	63
Division No. 4	84
Division No. 5	108
CHAPTER VI	
Evaporation Losses from Stream-Bed Reservoir	124
CHAPTER VII	
The Venturi Flume	138
CHAPTER VIII	
Vertical Velocity Determinations	145
CHAPTER IX	
Hydrographic Data	148
Index	311

### LIST OF OFFICIALS IN CHARGE OF WATER DISTRIBUTION

#### STATE ENGINEERS OF COLORADO

#### Since Organization of Department, June 3, 1881.

Eugene K. Stimson	June	1881	to	April	1883
Edwin S. Nettleton	April	1883	to	April	1887
J. Sire Greene		1887	to	April	1889
James P. Maxwell	April	1889	to	April	1893
Charles B. Cramer	April	1893	to	April	1895
Horace A. Sumner	April	1895	to	April	1897
John E. Field				April	
Addison J. McCune					
Louis G. Carpenter	April	1903	to	April	1905
Thomas W. Jaycox	April	1905	to	April	1909
Charles W. Comstock	April	1909	to	April	1913
John E. Field					
Adelbert A. Weiland					

#### LIST OF OFFICERS AND EMPLOYEES

#### State Engineering Department.

Adelbert A. Weiland	State Engineer
	eputy State Engineer
Thomas Grieve, Jr	Chief Hydrographer
J. H. Baily	Hydrographer
M. N. Grant, Jr.	Hydrographer
H. D. Amsley	Hydrographer
H. E. Turner	
R. G. HoseaHydrographer for The Colorad	o Water Users' Ass'n
Josephine Kelly	Office Clerk
C. C. Hezmalhalch	Draftsman
Ellie H. Rhodes	Filing Clerk
Arah Shaw	Stenographer

#### IRRIGATION DIVISION ENGINEERS

Div. No. 1 Div. No. 2		Denver Pueblo
Div. No. 2 Div. No. 3	DeWitt A. Norton	Alamosa
Div. No. 4 Div. No. 5		MontroseGlenwood Springs

#### WATER COMMISSIONERS.

Div. No.	Dist. No.	Name	Address
1	1	William S. Simpson	Fort Morgan
1 1	$rac{2}{3}$	J. C. WylieJohn L. Armstrong	Fort Colling
1	3 4		
1	5	A. D. Alps A. P. Nelson	
1	6	Moses Hoover	
1	7	K. S. Rhea.	
1	8	S. F. Couch	Littleton
1	9	J. W. McLean	
$\dot{\hat{2}}$	10	William Frizzell	
$ar{2}$	11	A. M. Carpenter	
$ar{2}$	12	F. X. Miller	Canon City
$ar{2}$	13	D. Geroux	
$ar{f 2}$	14	D. W. Danielson	Pueblo
$\overline{2}$ .	15	R. H. Totten	
2	16	Parson S. Brown	Walsenburg
2	17	S. W. Cressy	Rocky Ford
<b>2</b>	18	H. C. Cossum	
<b>2</b>	<b>19</b> ·	L. W. Hubbartt	
3	20	R. W. Maddox	Monte `Vista
3	21	Jose De la Luz Marquez	Capulin
3	<b>22</b>	B. W. Harrison	Manassa
1-2	23	Jacob Dessrich	
3	24	J. J. Romero	
3	25	A. G. Morris	
3	26	George Burch	
3	27	Juan Trujillo	La Garita
4	28	J. Roy Hicks	Sargents
4	29	No commissioner	<b></b>
4	30	William E. Tyner	Durango
4	31	No commissioner	
4	32	No commissioner	771:
4 4	33 34	Orville J. Leggett H. M. Barber	
3	3 <del>4</del> 35	Stephen Calkins	
ა 5	აა 36	No commissioner	Dianca
5 5	37	E. E. Lea	Carnaum
5	. 38	Thomas Lawrence	Carbondala
5	39	Isam W. Graham	Rifla
4	40	George Hider	
4	41	W. O. Hersum	
4	42	J. E. Harris	De Beque
5	43	W. S. Fisk	
5	44	Arthur Collom	
5	45	S. B. Potter	
1	46	Clarence A. Manville	
1	47	Clarence Boston	

Div.	Dist.		
No.	No.	Name	Address
1	48	R. E. Moan	Glendevey
<b>2</b>	49	No commissioner	·
5	50	No commissioner	•
5	51	Roy L. Curtis	Granby
5	52	Clarence B. Rundell	Sheephorn
5	<b>53</b>	James H. Macfarlane	Yampa
5	<b>54</b>	E. W. Leggett	Baggs, Wyo.
5	. 55	No commissioner	
5	<b>56</b>	No commissioner	
5	<b>57</b>	No commissioner	
5	<b>58</b>	J. B. Lansing	Yampa
4	· <b>59</b>	J. A. Miller	Gunnison
4	60	H. C. Browning	Norwood
4	61	S. P. Wells	Paradox
4	62	W. O. Brower	Cimarron
4	63	No commissioner	
1 .	64	T. W. Jenkins	Sterling
1	65	Frank S. Johnson	Wray
2	66	No commissioner	
<b>2</b>	67	-Harry A. Pettee	Holly
4	<b>68</b>		Ridgway
4	69	No commissioner	`
5	70	George F. Newton	De Bequĕ

#### CHAPTER I

#### INTRODUCTION

The past two years have seen very little new irrigation development. During the years from 1908 to 1912 there was, in Colorado and the West, an unprecedented growth and development of irrigation projects. Many of them had merit, some were of precarious worth and others were purely financial inflations with no merit at all. The boom in mining stocks and in mining development during the early days, in the West, never reached such flagrant stages as did this inflation of irrigation securities and devel-This speculation in lands and water rights was partly fostered and perpetuated by the irrigation district laws on the statute books of Colorado. While these laws are, in a sense, modeled after municipal laws and the organization is intended to work financially as a municipality, the fact is everywhere evident that the irrigation district laws have failed to accomplish the end sought. Such flagrant abuses were practiced under this law, so many districts were organized for no other purpose than to assess lands to pay the salaries of officers of the district, that the depreciation of irrigation securities was inevitable. Promoters, aided and fostered by certain classes,-boomers, real estate men and so-called colonizers,—loaded many acres of Colorado's lands to the hub with worthless irrigation securities. They sowed to the wind, and Colorado, for several years past, has been reaping the whirlwind. Our irrigation securities became a byword and a jest in the financial market. They were repudiated at home and abroad. So worthless were some of the projects that our own financial houses hung their heads in shame when asked about them by eastern capital. This fact is regretable, for, after a few years of winnowing and sifting out the bad projects; after a most trying period of depreciation of the bonds; repudiation of debts; abandonment of projects, the sound irrigation development is beginning to revive. The good project has had to bear the sins and burdens of the bad. This is not fair. Colorado has many excellent propositions that only need financial aid to make them complete successes. The citizens of Colorado should all see to it that our irrigation securities be, in the future, kept free from criticism and that the moneyed interests of the United States are made to appreciate the value of our irrigation securities. The time is now ripe for the placing of our irrigation securities on a par with any other gilt-edge investment and what it needs is the proper presentation of our case to people who are interested in investments.

What has been said relative to our difficulty in financing bona fide irrigation propositions, can be said with equal force about the financing of our drainage districts. It has been exceedingly difficult to secure money for the reclamation of our lands that have been rendered untillable on account of seepage and alkali. It is now becoming less difficult to finance our drainage districts, and, as a result, some quite satisfactory work is being done in the reclamation of our seepage lands. Much more yet remains to be done, and the investor should be made to appreciate that one of the best investments obtainable is in drainage securities whether private or district.

While no great development has been carried on in the past two years, yet it is gratifying to see great progress in our irrigation development. It is one thing to get the physical structures built and to place the water available to the farmer; it is another thing to secure the proper settler who will develop the land into a paying farm. Within the last two years, the farmers under our new irrigation projects and, in fact, under all of our irrigation projects, have been getting a better hold on the physical conditions to be met and are learning more scientific farming. They are also learning the value of water and the proper methods of applying the same to crops as relates to time and quantity.

Many of our farms, under the irrigation propositions in the state, are too large. What we need is farms cut up into smaller units with a substantial farmer on each smaller unit. It is the accomplishing of the development of our irrigated area that takes the time and, after all, leads to the greatest results. It has been variously estimated that a farmer and his family is worth at least \$5,000 per year to the commonwealth in which he lives. The present irrigable area in the State of Colorado is not far from 3,000,000 acres of land. The average holding of our present farmer is in the neighborhood of 100 acres. Assuming that there are practically 30,000 farmers in the State of Colorado, their average worth to the state is approximately \$150,000,000. The size of each farm can be reduced to at least 50 acres, for with 50 acres of irrigated land, any farmer can make a good living for his family. Every effort should be made to reduce the acreage of each farm and increase the number of farmers. In other words, we should have on our irrigated lands in the state at least 60,000 heads of families. This would add to the wealth of the state each year an additional \$150,000,000. The State of Colorado can afford to spend a large amount of money each year to get in contact with the class of people that should be located on our irrigated farms, and it would be a far-sighted and winning policy for the State of Colorado to make some large provision for the intensive settlement and cultivation of our irrigated lands.

Chapter 124 of the Session Laws of 1915 provides that "No \* \* \* biennial report of any officer shall hereafter be printed at the expense of the state until the Governor has designated \* \* \* how much \* \* \* and how many copies thereof shall be printed." In preparing this biennial report the State Engineer submitted 742 pages of manuscript to the Governor for his approval. Shortly thereafter the State Auditing Board, having available only a lim-

ited amount of funds for printing biennial reports, ordered all work on biennial reports temporarily stopped pending the receipt of an opinion requested from the Attorney General interpreting Chapter 124, quoted above. The Attorney General held that Chapter 124 amended, but did not repeal, the existing statutes governing biennial reports, and that Section 4710 R. S. 1908 was still in full force and effect. This section provides, "that no report shall exceed three hundred printed pages." Accordingly, the biennial report was returned to the State Engineer, with instructions to cut the same to 300 printed pages. To comply with these instructions the original manuscript, as finally returned to the printer, consisted of 360 pages. On account of the cutting in the size of the report it has been necessary to omit the following chapters, which were originally submitted for publication:

Recommended Legislation.

Hydrographic Department.

Regulations for Filing Claims to Water Rights, and Plans and Specifications for Construction of Dams.

Data on Irrigation and Drainage Districts in Colorado.

Compromise Contract between United States Irrigating Company and Graham Ditch Company. Kansas-Colorado Interstate Litigation.

Reservoir Supervision—Construction and Failures.

Standley Lake Dam.

Administration of Water in Water District No. 23.

Losses of Sanchez Reservoir Water in Culebra River.

Drainage in Colorado.

Pumping Water for Irrigation.

All Discharge Measurements in connection with the Hydrographic Data.

These chapters are on file in the State Engineer's office, and can be consulted by those interested.

It is sincerely regretted that it was impossible to publish this biennial report in its entirety, and it is hoped that our Legislature will enact statutes and provide adequate means so that the next biennial report of the State Engineer can be published in its entirety, and be a report which will reflect credit to the State of Colorado. During the biennial period just passed some 15,000,000-acre feet of water was distributed by the State Engineer to the water users of the state, and the market value of this water is at least \$40,000,000. Considering this item alone, the State Engineer's biennial report should not be limited to any specified number of pages.

#### CHAPTER II

#### FINANCIAL

The Twentieth General Assembly made appropriations for the State Engineer's office as follows:

State Engineer, salary. Two Deputies, State Engineer, salaries Traveling and contingent expenses of Engineer and Deputies Draftsman, salary Chief Hydrographer, salary. Foul Hydrographers, salaries, at \$125.00 per month. Hydrographers' expenses Chief Hydrographer's expenses. Stenographic services File Clerk, salary. Clerk, salary, December, 1914. Incidental expenses.	5,400.00 2,800.00 3,000.00 3,600.00 12,000.00 4,000.00 2,600.00 2,400.00 100.00
Irrigation Division Engineers—  Division No. 1, salary	5,000.00 5,000.00 3,000.00 3,000.00 3,000.00
One automobile	750.00

From these funds balances were turned back to the General Fund as follows:

Deputies, salaries\$	852.00
Traveling and contingent expenses, Engineer and Deputies	47.64
Hydrographers, salaries	545.71
Chief Hydrographer, expenses	29.73
Hydrographers, expenses	796.82
Stenographic services	148.36
Incidental expenses	17.91
Division Engineers, expenses	151.30
<u> </u>	
Total\$	2,589.47

This leaves the amount expended by the State Engineer's office for the biennial period, \$68,260.53.

As a credit against this there has been transmitted to the State Treasurer for fees received in this office during 1915-1916, the sum of \$13,814.03, making the net cost of operating this office, \$54,-446.50.

In addition to the sums expended from funds appropriated for this office, the sum of \$8,275.68 has been spent from the Water Defense Fund for the salaries and expenses of two hydrographers. Of this amount \$3,275.68 was for traveling expenses.

As against this there was turned into the General Fund \$796.82 from the hydrographers' expense fund.

From this it will be seen that the amount appropriated for hydrographers' expenses is inadequate, and should be increased from \$4,000.00 to at least \$6,000.00 for the biennial period.

Following is a detailed statement of the expenditures and receipts of the various funds handled by this office:

#### STATE ENGINEER—SALARY.

Appropriated Jno, E. Field A. A. Weiland	.\$1,150.00 . 4,850.00	\$6,000.00
Total	\$6,000.00	\$6,000.00
DEPUTY STATE ENGINEER—SALARY	7.	•
Appropriated A. F. Hewitt R. I. Meeker Lyman E. Bishop Balance in fund	.\$ 834.00	<b>\$</b> 5,400.00
Total	\$5,400.00	\$5,400.00
TRAVELING AND CONTINGENT EXPENSES, STATE DEPUTIES.	ENGINE	ER AND
Appropriated R. I. Meeker. Jno. E. Field. A. A. Welland Lyman E. Bishop. Central Garage Pueblo Chieftain Rocky Mountain News. Denver Times Pueblo Star Journal Montrose Press South Park Merc. Co. Geo. M. Robinson Instr. Works. Balance in fund  Total  DRAUGHTSMAN—SALARY.  Appropriated O. L. Nelson. H. R. Harrison.	1,620.65387.28374.4025.2025.2025.2025.2025.2047.64\$2,800.90	\$2,800.00 \$2,800.00 \$3,000.00
C. C. Hezmalhalch	125.00	<b>33,000.00</b>
		<b>60,</b> 000.00
CHIEF HYDROGRAPHER—SALARY.  Appropriated	,	\$3,600.00
Total '		\$3,600.00
HYDROGRAPHERS—SALARY.	•	
Appropriated D. L. Bundy	500.00 1,750.00 302.42 700.00 875.00 67.74 225.80 1,300.00 645.83 1,525.00 812.50	\$12,000.00
Total	312,000.00	\$12,000.00

STENOGRAPHIC SERVICES.	•
Appropriated	\$2,600.00
Anna O. Finch	• • • • • • • • • • • • • • • • • • • •
Ruth Moore 51.64 Arah Shaw 1,846.67	
Arah Shaw 1,846.67	
Elsie B. Mellor	
Balance in fund	
Total	\$2,600.00
1 Ocai	<b>#</b> 2,000.00
CLERK—SALARY.	
Appropriated	\$ 100.00
Appropriated	•
	· ———
Total\$ 100.00	\$ 100.00
FILE CLERK—SALARY.	
Appropriated	\$2,400.00
Appropriated	, , , , , , , , , ,
· ·	
Total \$2,400.00	\$2,400.00
1	
INCIDENTAL EXPENSES.	
Annronristed	\$3,000.00
Appropriated         \$2,547.80           Gage readers' salaries         \$2,547.80           Norman Mills, for feeding state team         45.00           Chas. H. Yust, repairing gaging station         23.10           W. R. King, repairing gaging station         6.25           Kremmling Lumber & Supply Co., lumber for new gage         20.64           Lullon B. Erica A. Contraction         6.55	<b>#3,</b> 000.00
Norman Mills, for feeding state team 45.00	
Chas. H. Yust. repairing gaging station 23.10	
W. R. King, repairing gaging station 6.25	
Kremmling Lumber & Supply Co., lumber for new gage 20.64	
W. H. Kistler Stationery Co. 21.00	
Cardwell Blue Print & Supply Co., 18" level 135.85	
Cardwell Blue Print & Supply Co., repairs for current meter 25.20	
Cardwell Blue Print & Supply Co., level rod and tripod 24.50	
Lallie Surveying Instr. Co., water level gage	
Danie Bully Con Water Ic for Bage	
Cardwell Blue Print & Supply Co. architect's level and	
level rod	
Cardwell Blue Print & Supply Co., architect's level and level rod	•
Balance in fund	••• 000 00
Cardwell Blue Print & Supply Co., architect's level and level rod	\$3,000.00
Total\$3,000.00	\$3,000.00
Total \$3,000.00  TRAVELING EXPENSES FOR HYDROGRAPHERS.	\$3,000.00
Total \$3,000.00  TRAVELING EXPENSES FOR HYDROGRAPHERS.	\$3,000.00 \$4,000.00
Total \$3,000.00  TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated	
Total \$3,000.00  TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated	
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TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	
TOTAL \$3,000.00  TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated	
TOTAL \$3,000.00  TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated	
TOTAL \$3,000.00  TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated	
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	\$4,000.00
Total \$3,000.00  TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated	
Total \$3,000.00  TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated	\$4,000.00
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	\$4,000.00
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	\$4,000.00
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	\$4,000.00
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	\$4,000.00
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated  H. D. Amsley	\$4,000.00 \$4,000.00 \$1,200.00
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	\$4,000.00
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	\$4,000.00 \$4,000.00 \$1,200.00
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	\$4,000.00 \$4,000.00 \$1,200.00
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	\$4,000.00 \$4,000.00 \$1,200.00
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	\$4,000.00 \$4,000.00 \$1,200.00
TRAVELING EXPENSES FOR HYDROGRAPHERS.  Appropriated H. D. Amsley	\$4,000.00 \$4,000.00 \$1,200.00

IDDICATION DIVISION ENGINEED DIV NO 1 GALADY
IRRIGATION DIVISION ENGINEER, DIV. NO. 1—SALARY.  Appropriated
F. Cogswell\$5,000.00
IRRIGATION DIVISION ENGINEER, DIV. NO. 2-SALARY.
Appropriated
C. W. Beach
The legal appointee to this office is in litigation and a complete statement cannot be furnished at this time.
IRRIGATION DIVISION ENGINEER, DIV. NO. 3-SALARY.
Appropriated \$3,000.00
F. W. Swanson\$1,000.00 D. A. Norton2,000.00
Total\$3,000.00 \$3,000.00
IRRIGATION DIVISION ENGINEER, DIV. NO. 4—SALARY.
Appropriated \$3,000.00
H. C. Getty\$3,000,00
IRRIGATION DIVISION ENGINEER, DIV. NO. 5-SALARY.
Appropriated
Theodore Rosenberg \$1,951.62 A. J. Dickson 1,048.38
Total \$3,000.00 \$3,000.00
IRRIGATION DIVISION ENGINEER, DIV. NO. 1—TRAVELING EXPENSES
Appropriated \$1,000.00
Appropriated \$1,000.00 F. Cogswell \$961.64 Balance 38.36
Total :\$1,000.00 \$1,000.00
IRRIGATION DIVISION ENGINEER, DIV. NO. 2—TRAVELING EXPENSES
Appropriated
E. R. Chew \$ 815.91 C. W. Beach 90.12 The legal appointee to this office is in litigation and a complete statement
The legal appointee to this office is in litigation and a complete statement cannot be furnished at this time.
IRRIGATION DIVISION ENGINEER, DIV. NO. 3—TRAVELING EXPENSES
Appropriated \$1,000.00 F. W. Swanson \$129.21 D. A. Norton \$70.07
D. A. Norton
Total\$1,000.00 \$1,000.00
IRRIGATION DIVISION ENGINEER, DIV. NO. 4—TRAVELING EXPENSES
Appropriated \$1,000.00
H. C. Getty
IRRIGATION DIVISION ENGINEER, DIV. NO. 5—TRAVELING EXPENSES
Appropriated
A. J. Dickson
Balance in fund
Total\$1,000.00 \$1,000.00
DISTRIBUTION OF FEES RECEIVED IN THE STATE ENGINEER'S OFFICE DECEMBER 1, 1914, TO NOVEMBER 30, 1916, INCLUSIVE.
Filing claims to water rights
Postage 21.19
Certifications 425.00 Sale of "Irrigation Law" 40.00
Rating ditches
Examination of reservoir dams
Office labor
Filing of transfer decrees
Remitted to State Treasurer\$13,814.03 \$13,814.03

#### CHAPTER III

#### WATER RIGHT DECREES

During the past biennial period all of the water right decrees issued by the District Courts of this state and on file in this office, have been indexed by the present State Engineer.

The statutes of this state require that certified copies of all water right decrees entered by the District Courts be forwarded to the office of the State Engineer by the clerk of the District Court issuing such decrees. There is on file in the office of the State Engineer at this time some fourteen thousand decrees which have been entered by our District Courts. While the statute requires that as soon as a decree has been issued, a certified copy be filed in the office of the State Engineer, yet it is known that in numerous instances decrees have been entered and no copy of this decree is on file in this office.

Each separate decree on record in the office of the State Engineer has been indexed in two different ways. For one of these systems a card index has been made for each of the seventy water districts of the state. A separate card giving the pertinent and salient points of each decree has been made, and these cards are filed alphabetically in the proper water district. In compiling this card index, white cards 4 by 6 inches were prepared, having definite headings, and these cards were filled in on the typewriter, one card for each decree. The white cards are of two different kinds, one for ditch decrees and the other for reservoir decrees.

Plate I shows one of the ditch decree cards, and Plate II the reservoir decree cards.

These white cards represent a transaction by the District Courts of this state, whereby water is decreed or taken from one of the natural streams of this state, and credited to a specific ditch.

The statutes of this state authorize the transfer of water from the ditch to which it was originally decreed, to another ditch. To provide for this contingency, and to properly index all of the transfer decrees which are a matter of record in this office, cards similar to the ditch and reservoir cards shown in Plates I and II, were provided. Plate III shows one of the transfer cards in its original color, blue, which represents a transfer of water FROM the particular ditch in question. Similarly, Plate IV shows a transfer card in its original color, pink, which card is used in crediting a transfer of water TO the particular ditch in question.

By means of the white eards crediting a ditch with water from a stream, in question, the blue debit eards transferring water from the ditch, and a pink card crediting or transferring water to the ditch, it is now possible, after all of the indexing has been completed and all of these eards filed alphabetically in their proper district, to, by means of these cards, determine the present status of the water rights of any particular ditch. Plate V is a reproduction of the method adopted for the second system of indexing. Under this system the ditches in each district are arranged chronologically in the relative orders of their priorities. The original sheet from which Plate V was made is 14 to 16 inches, and these sheets are bound in a loose leaf ledger. The two systems of indexing adopted permit additions to them as new decrees are filed in the office.

The work of indexing these decrees was inaugurated in June, 1915, and completed during the fall of 1916. During this period a total of thirteen thousand nine hundred and fifteen (13,915) decrees were indexed. The distribution of these decrees is shown in Table I.

TABLE I

DECREES INDEXED AND ON RECORD IN THE OFFICE OF STATE ENGINEER.

DISTRICT	Ditch Decrees	Reservoir Decrees	Ditc Transf
	223	120	14
	80		14 24 74 56 2 22 72 6
	109	30 21 18 67 66	74
	110	18	56
	169	87	9
	122	66	ดูจื
	122	24	70
	212	34 25	(Z
		25	10
	31	9	10
	32 323		:::
	323	13	28
••••••	639	<u>-</u> 5	143
	549	5	14
	73	10	28 143 14 62 8
	217	6	8
***************************************	417	22	
	36	10	4
	29		
	167	··· <u>4</u>	78
	470		áñ
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	190	34	
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	90	6	••••
Total			

#### STATE ENGINEER OF COLORADO

DITCH DECREES DISTRICT NO. 7 DIVISION NO. 1 COUNTIES DERVER AND ADAMS.

			APPROPRIATIO	N			1.0	CATION		TRAXS	FERM	
 Page	Priority Number	NAME OF DITCH	Source	Date	April 1	Sec.			РЫ	15	3.	REMARKS
 59	,	Madaworth	Clear Creek	Feb 25/60	3.51	17	3 S	69 W	6 th	0.28		
60	2	Lees & Bough	Clear Creek	May 15/60	5.0	20	<b>3</b> 3	69 W	6th	0.21		
 63	8	South Side	Clear Creek	May 16/60	2.0	21	3 S	69 W	6 th	1.00		
61	4	Brown's Island	Clear Creek	May 19/60	0.9	21	<b>3</b> S	69 ¥	6th	0.90		
 62	5	Onelette	Clear Creek	May 31/60	15.0	21	3 5	69 W	6th	7.11		`
 62	6	Wannemaker	Clear Creek	Jun 1/60	8.0	27	3 5	70 W	6th			
 68	-7	Sherick	Clear Creek	Jun 14/60	1.12	20	3 S	69 ¥	6 th	1.12		
 63	-8	Lees Island	Clear Creek	Jun 30/60	0.5	20	3 3	69 W	6th			
 64	9	The Golden Canal Company's	Clear Creek	Jul 1/60	39 ,8			70 ¥	6 th			
 .89	.1	Manhart	Ralston Creek	Aug 31/60			_		6th	<u> </u>	_	
 90	2	Swadley & Longen	Rolston Creek	Apr 10/61				69 W	6th	_	_	
 65	10	Cort, Graves & Hughes	Clear Creek	Apr 30/61	-			69 W	6th			
 65	11	Kershaw	Clear Creek	May 2/61	16.0	7	3 S	68 W	6th	7.00		
 66	12	Claus & Couch	Clear Creek	May 13/61	9.9	_		69 ₩	6th	9.90		
 .66	13	Swadley	Clear Creek	May 14/61	6.0	20	3 3	69 7	6 th	4.47		
 90	-3	Hains #	Raleton Creek	May 30/61	1.51		_	70 W	6 th	-		<u> </u>
 67	16	<u>Ide</u>	Clear Creek	Jun 2/61				69 W		1.12		
 91	1	Piquette	Relaten Creek	Jun 6/61				70 W		0.68		
 68	15	Miles & Eskins	Clear Creek	Jen 11/61				69 W		0.39	-	
 -68	16	Pisher	Clear Creek	Jun 29/61		-8	3 5			5.00	_	
 69	17	Graves North	Clear Creek	Jun 30/61		-4		69 W			H	
 .70	18	Clear Creek & Platte River	Clear Creek	Hov 1/61		-5	3 8		6th			See Card
 71	19	Rooky Mountain	Clear Creek	May 1/62				70 W			_	
 . 91	-5-	Brainard Tucker	Relaton Creek	MATE 1/62			3 S		6th	-		<u> </u>
 . 72	20	Slater	Clear Creek	May 16/62				69 W	1	-		
 66	21	Swadley	Clear Creek	Jun 1/62		М		69 W	1	3.43		Add. Decree
 92	-6-	Burny & Ballinger	Ralaton Creek	Jun 6/62		-3		70 W	1	0.90		<b></b>
 72	32	Sayer & Loes	Clear Creek	Jun 14/62				69 W	1			
 89	7	Manhart	Rolaton Creek	Jun 20/62				69 W				Add. Decree
 73	23	Sanderson & Slater	Clear Creek	Jul 1/62				69 W	1			<b></b>
 74	.24	Wolff	Clear Creek	Jul 4/68				69 W		ļ		<del> </del>
 75	25	Wolff Horth	Clear Creek	Jal 5/62				69 W	6th	_	-	<del> </del>
 75	26	Wadsworth & Graves	Clear Creek	Jul 10/62			-	69 W	_		-	<del>  </del>
 76 147 155	27	Lee. Stewart & Eskins	Clear Creek	Apr 17/63				70 W			8-60	<del>                                     </del>
 	_	Boyles ·	Clear Creek	May 15/63				68 W	6th			<del></del>
 77	28	Graves South	Clear Creek	May 21/63			_	69 W		$\vdash$		<del> </del>
 78	29	Bluff	Clear Creek	May 26/63				69 W		<del> </del>		<del> </del>
 78	30	Juchens & Onelette	Clear Creek	May 28/63				69 ₩		1.61	-	<del>                                     </del>
 78	31	Senderson	Clear Creek	May 31/63				69 W		<del> </del>	-	<del></del>
 80	32	Slater & Moody	Clear Crack	Jun 20/63	4.0	20	3 S	69 #	6 th	2.75	-	
 		•			ļ	Н	_	ļ	1-	<u> </u>	<del> </del>	<del> </del>

Until this index of the water right decrees was compiled, the office of State Engineer was badly crippled by not having this information in usuable form. It is now possible to answer personal inquiries and correspondence relative to the particular status of any ditch with considerable satisfaction. The only weakness existing is due to the incompleteness of the files of the decrees on record in the office of the State Engineer. Every attempt has been made to obtain from the clerks of the District Courts copies of all decrees not on file in this office. In some instances, requests for copies of these decrees have brought the desired results, but in the majority of instances it has not been possible to obtain copies of the decrees which are lacking.

It is believed that the chronological indexing of water right decrees should be published by districts, and that these published decrees should be available for sale by districts at a nominal sum to the public. Our Legislature will be requested to loan this office two thousand five hundred dollars (\$2,500.00) for the purpose of publishing these decrees, this loan to be repaid by receipts from the sale of the published decrees. It is believed this loan could be repaid in three or four years at the most, for water users, attorneys and engineers interested in the use and administration of the waters of this state would undoubtedly be anxious to secure copies of the districts in which they were interested.

#### CHAPTER IV

#### CLAIMS FOR APPROPRIATIONS OF WATER

During the biennial period there have been filed in this office 826 maps claiming water for 724 ditches and 173 reservoirs. The total claimed for ditches is 6,120.28 cubic feet per second. The total amount claimed for reservoirs is 72,280-acre feet.

The estimated cost of ditches for which claims have been filed during 1915 and 1916 is \$1,865,599, and the estimated cost of reservoirs is \$1,576,126. These estimates are as stated on maps filed. In most cases the estimates thus given are too low.

The following tables show for each district for each irrigation division and for the entire state, the number of claims filed for ditches and reservoirs, the amount of water claimed for them and the estimated cost of construction:

## DIVISION NO. I

			DIVIDION NO. 1	1 .O. I		
		Total amount claimed	•	Total amount claimed	Estimated cost of	Estimated cost of
District	No. of	for Ditches,	No. of	for Reservoirs,	Construction of	Construction of
Number	Ditches	Cubic feet per second	Reservoirs	Cubic feet	Ditches	Reservoirs
1	14	73.37	13	215,226,169	\$ 8,835.00	\$ 15,342.00
2	7	54.00	က	1,480,841	4,500.00	850.00
3	7	53.76	ιĢ	23,126,715	5,450.00	7,950.00
*	9	23.87	63	4,872,530	8,650.00	1,300.00
	•	21.37	1	755,038,226	5,650.00	450,000.00
9	20	233.01	ıo	153,345,225	372,600.00	265,231.00
<i>L</i>	10	181.48	7	161,501,269	17,775.00	42,500.00
80	7	28.73	63	17,458,789	2,200.00	18,600.00
6	9	2.50	-	70,253,000	17,300.00	30,500.00
23	9	111.00	-	62,025,000	17,700.00	2,500.00
97	က	33.50	F	6,696,800	1,700.00	200.00
	10	151.51	1	283,462,000	20,725.00	12,000.00
87	ro	215.00	0	•	11,400.00	. 0
64	21	264.48	<b>9</b>	51,122,067	9,595.00	12,950.00
	63	6.00	0	0	200.00	0
Total	132	1,451.58	84	1,805,608,631	\$ 564,280.00	\$ 860,223.00

# DIVISION NO. II

		Total amount claimed		Total amount claimed	Estimated cost of	Estimated cost of
District	No. of	for Ditches,	No. of	for Reservoirs,	Construction of	Construction of
Number	Ditches	Cubic feet per second	Reservoirs	Cubic feet	Ditches	Reservoirs
10	8	16.78	9	68,648,936	\$ 26,600.00	\$ 138,650.00
11	14	85.63	0.	0	45,348.00	0
12	13	61.32	• •	0	8,000.00	0
13	4	26.30	0	0	1,715.00	0
14	29	419.70	7	18,037,527	33,160.00	14,600.00
15	9	23.00		20,598,014	2,156.00	6,826.00
16	24	281.99	14	• 76,797,982	10,955.00	15,650.00
17	11	83.00	4	148,199,505	3,650.00	85,400.00
18	4	69.15	F	3,892,500	2,700.00	. 250.00
19	34	529.68	īĊ	28,248,963	29,270.00	4,900.00
49	-	9.78	0	0	2,200.00	0
99	-	20.00	•	0	1,500.00	0
	20	276.71	မှ	92,461,474	12,478.00	43,550.00
Total	169	1,903.04	45	456,884,901	\$ 179,732.00	\$ 309,826.00
					-	

# DIVISION NO. III

		Total amount claimed		Total amount claimed	Estimated cost of	Estimated cost of
District	No. of	for Ditches,	No. of	for Reservoirs,	Construction of	Construction of
Number	Ditches	Cubic feet per second	Reservoirs	Cubic feet	Ditches	Reservoirs
20	4	100.00	69	112,452,816	\$ 2,657.00	\$ 20,500.00
21	1	19.50	1		1,500.00	
22	0	ó`	0	0	0	0
24	1	9.73	1	-	2,000.00	
25	10	159.64	ı		11,875.00	
26	<b>∞</b>	65.55	ı		4,500.00	
27	4	101.20			15,700.00	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
35	61	16.80	i		800.00	
Total	30	472.42	က	112,452,816	\$ 39,032.00	\$ 20,500.00

# DIVISION NO. IV

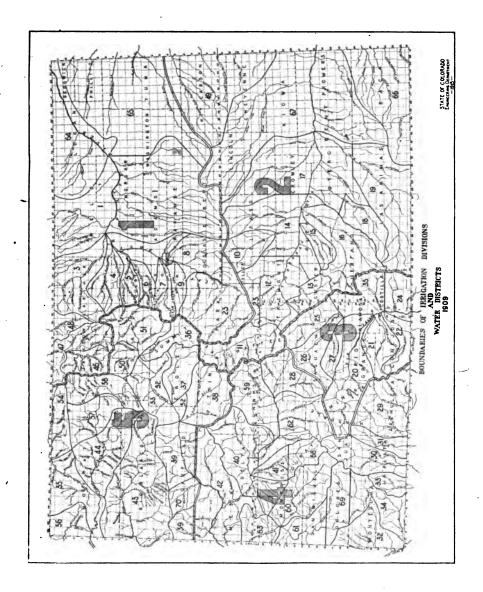
						•
		Total amount claimed		Total amount claimed	Estimated cost of	Estimated cost of
District	No. of	for Ditches,	No. of	for Reservoirs,	Construction of	Construction of
Number	Ditches	Cubic feet per second	Reservoirs	Cubic feet	Ditches	Reservoirs
28	21	168.30	0	0	\$ 17,700.00	0
62	es	5.60	0	0	825.00	0
30	ıo	13.00	, 0	0	1,250.00	0
31	<b>6</b> 0	5.50	0	0	400.00	0
32	11	29.50	က	33,647,676	1,525.00	\$ 4,630.00
33	10	20.00	0	0 ,	7,000.00	0.
34	6	178.50	•	0	453,650.00	0
40	14	96.45	Ħ	62,025,000	30,450.00	35,000.00
41	83	4.50	0		250.00	, 0
42	34	123.40	9	97,581,421	14,318.00	30,900.00
59	17	101.63	0	0	12,225.00	
	88	143.95	M	16,960,428	32,475.00	6,400.00
61	<b>.</b>	62.96	-	5,825,600	80,936.00	4,000.00
62	20	84.23	81	5,299,487	13,920.00	900.00
63	<b>∞</b>	31.21	0	. 0	2,825.00	0
89	7	54.50	-	6,731,146	2,300.00	5,000.00
69	•	0	•	0	. 0	0
Total	198	1,153.28	16	. 228,070,758	\$ 672,049.00	\$ 86,830.00

# DIVISION NO. V

mber	å			_		
ımber		for Ditches,	No. of	for Reservoirs,	Construction of	Construction of
	Ditches	Cubic feet per second	Reservoirs	Cubic feet	Ditches	Reservoirs
	12	102.75	4	90,498,218	\$ 11,387.00	\$ 121,250.00
•	10	29.02	80	7,527,310	22,389.00	8,190.00
	18	87.89	က	2,491,376	22,441.00	1,400.00
	6	55.23	10	100,035,523	5,285.00	41,758.00
43 28	28	110.59	. ବା	24,868,795	8,097.00	5,000.00
44	31	318.99	14	49,980,177	119,645.00	13,724.00
451	10	32.33	0	0	9,155.00	0
20	8	14.00	1	70,871,300	300.00	15,000.00
51	23	25.00	ıo.	7,433,925	3,150.00	6,900.00
52	_	2.70	0	0	150.00	0
53	4	. 60.71	H	661,450	8,130.00	600.00
541	4	68.02	က	17,098,911	13,975.00	50,800.00
55	9	27.94	Ħ	3,842,250	5,142.00	750.00
26	67	16.80	81	30,152,575	800.00	13,000.00
5710	10	51.18	6	42,074,946	8,500.00	14,325.00
58 11	18	127.86	es	97,968,606	174,800.00	6,050.00
02	<b>∞</b>	9.00	0	0	2,160.00	•
Total 195	96	1,140.01	61	545,505,362	\$ 410,506.00	\$ 298,747.00

### SUMMARY

		Total amount claimed		Total amount claimed	Estimated cost of	Estimated cost of
Division	No. of	for Ditches,	No. of	for Reservoirs,	Construction of	Construction of
Number	Ditches	Cubic feet per second	Reservoirs	Cubic feet	Ditches	Reservoirs
I	132	1,451.58	84	1,805,608,631	\$ 564,280.00	\$ 860,223.00
п	169	1,903.04	45	456,884,901	179,732.00	309,826.00
III	30	472.42	က	112,452,816	39,032.00	20,500.00
IV	198	1,153.23	16	228,070,758	672,049.00	86,830.00
Λ	195	1,140.01	61	545,505,362	410,506.00	298,747.00
Total	724	6,120.28	173	3,148,522,468	\$1,865,599.00	\$1,576,126.00



#### CHAPTER V

#### ANNUAL REPORTS OF DIVISION ENGINEERS

#### ANNUAL REPORT DIVISION ENGINEER DIVISION NO. 1, FOR 1915

November 30, 1915.

Mr. A. A. Weiland, State Engineer, Denver, Colorado.

Dear Sir: As provided for in Section 12, Chapter 125, page 287, Session Laws of 1903, I herewith submit a report of the work of this division during the past irrigation season. All the other provisions of the above section are more honored in the breach than in the observance. I would recommend that it be amended to read as follows:

"Section 12. Each irrigation division engineer shall file with the state engineer. on or before December 15th of each year, an annual report, which shall include a tabulated statement of the reports of the water commissioners, as hereinafter defined, and any other information which will tend to improve the distribution and use of water within his division.

"All acts or parts of acts in conflict herewith are hereby repealed."

The annual appeals of District No. 3 from orders of this office relative to the distribution of water, have not been conspicuous by their absence. Inasmuch as appeals have been taken from the same rulings and orders to former state engineers without success, it would appear as though they were simply trying to wipe the slate clean and start anew with fresh appeals.

They have even gone back to the much litigated question of the right to use the appropriation of the Mason and Hottel Mill Race,

nights, Sundays and holidays.

If their position in these repeated appeals is well taken, a decision of the District Court would protect their rights for all time, and relieve this office of several very annoying questions in the ad-

ministration of the irrigation laws of this state.

The right to run water in irrigation ditches for domestic use alone; the right to commence a second filling of reservoirs during any calendar year, when the water is needed for direct irrigation or for the first filling of reservoirs with appropriations of later date; the right to the full amount of a reservoir appropriation in addition to the amount of water in the reservoir on January 1st of each year, and the exclusive right to the use of the seepage water or leakage from ditches and reservoirs, are all questions that should be taken into the courts for a judicial determination of the intent of the law.

The Supreme Court of this state in January, 1915, handed down a decision in Case No. 7562, The Greeley & Loveland Irrigation Company et al. vs. The Farmers' Pawnee Ditch Company.

The majority opinion held that the right of a ditch to divert water for direct irrigation, is limited to a diversion for that purpose, and it is without right to divert and store such waters when by so doing other ditches would be deprived of water to which they were entitled for direct irrigation. The right to store water must be measured by the right to divert water for storage, and not by the physical condition of a ditch with a decreed appropriation for direct irrigation. It must, therefore, logically follow that whenever water is illegally stored in a reservoir, and the outlet conduit from said reservoir is such that the water can be returned to the stream, the division engineer not only has the authority, but it is his duty, to immediately order such illegally stored water discharged from the reservoir and run down the stream to the headgates of the ditches legally entitled to the same.

The dissenting opinion, comparing this case with the so-called "Seven Lakes Case," says:

"The cases are as much alike as two peas, and yet the majority opinion of the court, written by the same judge, never even mentions it."

No doubt the irrigation attorneys, "learned in the law," will also be divided as to whether this decision of the Supreme Court affirms or, indirectly, reverses the decision in the "Seven Lakes Case."

Whatever the ultimate effect of this decision may be upon the "Seven Lakes Case," we are of the opinion that this office has no authority to distribute any water under the latter, without an order from the court.

During the past seven years the ruling of this office has been that temporary storage of water in reservoirs to be used later in the same season for agricultural purposes, will not be permitted when there is objection on the part of other appropriators, until a decision has been rendered by the District Court on the merits of each particular case.

For the information of the water commissioners of this state, past, present and prospective, I would submit the following excerpt from a decision of our Supreme Court, handed down in July, 1915, in Case No. 7867 and Case No. 7874:

Charles W. Comstock, as State Engineer et al. vs. The Fort Morgan Reservoir & Irrigation Company.

"By virtue of these provisions we have ruled that the several decrees entered in the water districts embraced in an irrigation division, are to be treated as one, and the water distributed accordingly, and that it is the duty of the engineer of an irrigation division to make such distribution by direction to the water commissioners under his control. In other words,

the purpose of the statutory provisions, to which we have referred, is to have the waters of a stream included in two or more water districts, so distributed that the appropriations in the different districts will receive the water to which they are severally entitled in the order of their priority, as established by the decrees in such districts. To attain this end, the division engineer is vested with control over the commissioners in his division. It is his duty to make inter-district distribution of water in his division. This is accomplished by directions to the commissioners under his control, and it follows that when he directs a commissioner in his division to cease supplying water to priorities postdating a specified date, it is the duty of the commissioner receiving such order to obey it, otherwise the purpose of the statute would be defeated, and the waters of a stream included in several districts could not be distributed in accordance with the relative rights of the owners of priorities as established by the decrees in such districts. If, after a commissioner receives an order from the division engineer, there is a rise in the streams in his district, it is his duty to forthwith report that fact to the latter official, but until the order he has received is modified or changed, he is without authority to disregard it, merely because in his opinion it is not necessary. When, therefore, a commissioner refuses or neglects to obey the orders of his superior, in circumstances which indicate an intention to continue that course, he may be compelled in an action by those injured, to distribute the water in his district as directed by the division engineer of the irrigation division which includes his district."

In the above cases the water commissioner of District No. 3 had stated:

"That he always asserted the right to act with reference to the condition of the stream in connection with the orders of the division engineer, according to his best judgment; that he believed he had this right, but might be mistaken."

There has been no serious trouble over the distribution of water during the past season. After seven years' experience in this office, "appeals" from my rulings are not looked upon as "trouble." The ditches diverting water directly from the South Platte River have been well supplied. There was, however, a shortage on the tributaries, which was in part supplied by seasonable rains, the rainfall being about four inches above normal. The Highland Canal, in District No. 8, of date January 18, 1879, only used reservoir water ten days in July and ten days in September, at the rate of 250 second feet, all drawn directly from Lake Cheesman. This loan of water was partially repaid by a run of water in September and October from Antero Reservoir of 7,911-acre feet. A deduction of  $12\frac{1}{2}$ % of this amount was made for loss in transit.

On April 1, 1915, there was a break in the dam on the east side of the outlet of Sand Creek Reservoir in District No. 2, with a loss of about 1,500-acre feet of water.

The first use of water for irrigation was reported for the week ending Saturday, May 1st, except in District No. 8, where irrigation commenced about April 17th. There was a reported use of only 5,000-acre feet for irrigation in this division during April. The first use of reservoir water distributed via the river was reported by District No. 3, for week ending May 29th.

On September 28, 1915, the water commissioners in Districts Nos. 1 to 9, both inclusive, were notified that all ditches on the South Platte River proper were supplied. This notice left each water commissioner at liberty to distribute the waters to the ditches and reservoirs of his own district, without reference to the ditches and reservoirs in any other district.

On October 1st, permission was given to store in Lake Cheesman at the rate of 100 second feet, and on October 5th it was given unlimited storage. On October 21st, as soon as Lake Cheesman was reported full, storage was commenced in Antero Reservoir. These orders are still in force, and no doubt will not be modified before next April.

The wet and cold spring months caused crops to be rather late and reduced the first cutting of alfalfa one-half in some localities. Hail and grasshoppers also did a good-deal of damage. Taking the division as a whole, it is doubtful if the farmers have ever had any better crops than during the season of 1915.

Fine crops have grown, not only on the irrigated lands, but also on the non-irrigated.

I hereto attach the regular statutory tabulation of the Water Commissioners' annual reports.

Respectfully submitted,

(Signed) F. COGSWELL, Irrigation Division Engineer, Irrigation Division No. 1.

THE WEEKLY REPORTS OF THE WATER COMMISSIONER OF DISTRICT NO. 3 SHOW THE FOLLOWING AMOUNTS OF WATER BROUGHT OVER FROM DISTRICTS NOS. 47, 48 AND 51, INTO DISTRICT NO. 3, DURING 1915.

	From	From	From	
	Dist. No. 47	Dist. No. 48	Dist. No. 51	Total
·	In Acre Feet	ln Acre Feet	In Acre Feet	
April	0 .	0	0	0
May	28	2,116	2,008	4,152
June	880	8,066	5,092	14,038
July	1,402	7,290	4,422	13,114
August	224	2,618	686	3,528
September	0	1,078	0	1,078
October	0	0.	0	0
November	0	0	0 -	0
Totals	2,534	21,168	12,208	35,910
Stored in Dist.	0	2,976	0	2,976
No. 3, less 5%		In Chambers	•	
		Lake, Wor-		
	•	ster, Rich-		
		ards, Doug-		
1		las and No.		
		8 Reser-		,
		voirs		
Used for direct	2,534	18,192	12,208	32,934
irrigation, less	By North	By Poudre	By Larimer	`
5%	Poudre Val-	Valley, New	County	
	ley and Lar-	Mercer, Lar-	Diten	•
	imer County	imer County		
	Ditches	and Larimer		
		and Weld		
		Ditches		

NOTE.—In making this transfer of water 5 per cent. is deducted for loss in transit, except when stored in Chambers or Worster Reservoirs; 4,978 acre feet of the above were diverted from District No. 48 through the Greeley-Poudre Tunnel.

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING AMOUNTS OF RIVER WATER, IN ACRE FEET, HSED IN IRRIGATION DURING 1915.

District	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Totals
1	0	33,170	52,426	44,506	56,758	34,832	19,402	0	241,094
7	0	23,446	68,708	61,184	58,142	43,442	23,906	2,028	280,856
603	0	26,216	96,850	52,074	20,260	12,402	0	0	207,802
4	300.	11,910	37,688	35,950	22,612	10,852	2,140	0	121,462
2	•	5,862	31,720	30,310	15,592	9,494	3,138	0	96,116
9	2,400	10,470	39,920	31,350	13,928	6,204	•	0	104,272
	0	7,170	29,714	33,970	14,638	8,400	4,288	840	99,020
œ	2,390	13,558	31,482	20,330	14,704	10,952	8,872	180	102,468
6	0	2,140	10,160	8,490	3,100	3,252	174	0	27,916
64	No. Report	4,270	8,820	31,850	34,328	24,974	940	•	105,182
Totals	5,090	138,212	407,488	350,014	254,062	164,804	63,460	3,048	1,386,178

NOTE.—The annual reports of the water commissioners include many ditches not reported in the weekly reports, hence the While the quantities are totals in this table are less than the totals reported in Column 12 of the Tabulated Annual Reports. approximate, they are the only ones available for each month.

#### IRRIGATION DIVISION NO. 1

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1915.

District	Number of Reser- voirs Reported	Area of High Water Line Acres	Capacity in Acre Feet	Quantity of Water in Reservoirs May 1, 1915 Acre Feet	Quantity of Water in Reservoirs Nov. 1, 1915 Acre Feet	Quantity of Water Held Over from Nov. 1, 1914 Acre Feet
1	5	10,094	141,855	123,173	73,760	38,294
2(A)	20	6,978	134,799	79,249	41,321	812
3	58	9,855	158,860	113,344	58,632	49,816
4,	15	5,227	94,843	94,843	77,718	32,698
5	19	2,318	38,790	87,810	30,444	16,297
6	29	2,685	42,100	28,841	13,775	16,922
		Not re-				
7	39	ported	17,911	14,329	12,533	1,741
8	10	410	8,943	8,029	4,829	3,500
9	17	1,502	18,943	18,411	11,356	21,800
23(B)	3	5,910	141,267	101,649	96,330	105,618
46	No rese	rvoirs	reported			
47	No rese	rvoirs	reported			
48	3	93	175	138	115	69
64(C)	3	6,176	137,782	102,609	48,303	33,789
65	No wate	r comm	issioner	appointed		
Totals	221	51,248	936,268	722,425	469,116	321,769

<sup>(</sup>A) District No. 2 includes storage in Standley Lake.
(B) District No. 23, Antero Reservoir reported capacity at gage rod of 30 feet at high water line.

<sup>(</sup>C) District No. 64 includes storage in Point of Rocks and Prewitt Reservoirs.

#### IRRIGATION DIVISION NO. 1—Continued

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

(1)	(2)	(3)	(4)	(5)	(6)	
District	Amount of Appropria- tion in Second Feet	Capacity of Ditches in Second Feet	Length of Main Ditches in Miles	Length of Laterals in Miles	First I Wate Diver From Na Stream Irrigat	er ted tural s for
1	2,790	2,374	361	. 310	April	20
				Not		
2	3,376	2,640	243	Reported	May	13
3	3,893	3,451	363	1,294	May	7
4	2,477	2,608	226	131	May	1
5	- 2,376	1,764	. 268	247	May	1
6	2,652	2,403	366	103	April	1
7:	1,630	1,237	178	72	March	.13
8	1,889	950	350	500	April	1
9	396	401	73	49	April	14
23	The New	Water Com	missioner	took charg	e of the d	is-
·	trict on A	ngust 4th,	at the end	of the irrig	ation seas	son
	in this dis	trict.				
	'			. Not		
46	1,910	1,922	176	Reported	Apr.	12
47	The Water	Commissio	ner only re	ports relati	ve to 29	٠
	ditches ou	t of a total	of 371 decr	eed approp	riations.	
				Not		
	443	613	76	Reported	April	25
		Not		Not		
48	2,452	Reported	104	Reported	April	1
64	3,069	3,119	256	702	Мау	11
65	No Water	Commissio	ner appoin	ted.		
Totals	29,353	23,482	3,040	3,408	March	13

#### IRRIGATION DIVISION NO. 1—Continued

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

	(7)	(8)	(9)	(10)
District	Last Day Water Diverted from Natural Streams for Irrigation	Maximum No. of Days	Maximum No. of Days Water Carried from Reservoirs	Amount of Water Carried from Reservoirs in Acre Feet (See Note)
1	Oct. 28	192	153	(A) 111,411
2	Oct. 31	172	205	58,174
3	Sept. 30	147	Not Reported	97,480
4	Oct. 31	184	102	41,395
5	Oct. 10	163	84	10,664
6	Oct. 10	193	Not Reported	24,518
7	Oct. 31	233	68	5,756
8	Nov. 3	217	Castlewood	3,200
			Reservoir	
9	Nov. 18	219	Not Reported	15,107
3			Antero Res-	
	•		ervoir and	
	-		Cheesman	,
		'	Lake	19,000
6	July 25	105	No Reservoi	rs reported.
7	Nov. 1	190	No Reservoi	rs reported.
8	Nov. 10	224	Three small	
			reservoirs	•
4	Nov. 1	175	129	70,040
5	No Water Comm	issioner,appoi	nted.	·
Totals	Nov. 18	233	205	451,745

NOTE.—The quantities in column (10) represent the reported acre feet in the reservoirs on May 1, 1915, minus the acre feet reported in the reservoirs on Nov. 1, 1915, plus the acre feet diverted from the rivers for storage from May 1st to Nov. 1st.

District No. 2 includes storage in Standley Lake.

District No. 64 includes storage in Point of Rocks and Prewitt Reservoirs and in Julesburg Reservoir.

<sup>(</sup>a) During August and September 12,000 acre feet were wasted into the river from Jackson Lake in order to repair the riprap; 3,200 acre feet of this wasted water was diverted for storage in Empire Reservoir. The balance of 8,800 acre feet is not included in this amount.

#### IRRIGATION DIVISION NO. 1—Continued

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

		(11) Average Daily Amount of	(12)	(13)	(14)	(15)
District		Water Diverted	No. of Acre Feet Diverted by Ditches During Season from Natural Streams for Irrigation	Total No. of Acres That Can be Irrigated (See Note)	Crops Irrigated, Etc.	
		by Ditches During Season from Natural Streams for Irrigation, Second Feet				
					Alfalfa	Natural Grasses
1		1,027	255,538	146,300	34,147	8,950
2		945	276,576	96,865	22,972	2,490
3		. 1,188	282,316	391,690	67,115	6,810
4		609	155,614	117,300	29,875	710
5		480	106,219	102,142	28,014	8,186
6		571	94,128	100,387	32,052	12,176
7		480	171,678	112,190	30,885	2,520
8		548	154,721	126,880	16,549	920
9		124	42,358	23,974	7,980	275
23		·	•			***************************************
46		1,442	224,230	89,065	***************************************	50,744
47	····-	844	64,107	9,870	***************************************	6,520
48		276	42,459	10,976	6	5,313
64		1,115	144,715	174,455	35,569	19,870
65	·····	No Water Co	mmissioner ap	pointed.		
Tota	s	9,149	2,014,659	1,502,094	305,164	125,484

NOTE.—The quantities given in columns (13) to (25) represent the total acreage that can be irrigated or was irrigated, whether the ditches only used the natural flow of streams, or used river and reservoir water combined. The approximate amount of water used in any district, except in District No. 3, will be found by adding together the "No. of Acre Feet Diverted by Ditches During Season from Natural Streams," given in column (12), and the "Amount of Water Carried from Reservoirs in Acre Feet," as given in column (10).

In District No. 3, 32,934 acre feet additional were diverted from Districts Nos. 47, 48 and 51, and used for direct irrigation.

In District No. 7, no water was diverted from District No. 51 and used by the Golden City and Ralston Creek Ditch.

	CROPS	IRRIGAT	ED FROM	CANALS I	N ACRES.	(SEE NO	TE.)
	District	(16)	· (17)	(18) Market	(19)	(20) Sugar	(21) Other
		Cereals	Orchards	Gardens	Potatoes	Beets	Crops
1	•••••	29,525	115	133	806	19,003	2,614
2	•	31,941	267	6,733	3,002	15,770	4,572
3	,	88,861	2,396	1,633	32,580	43,375	3,730
4	•••••	58,510	1,670	115	2,570	16,435	2,600
5	••••••	36,984	883	1,291	1,347	13,376	3,124
6.		33,288	1,748	712	315	7,906	950
7	•••••	40,410	3,080	10,785	25	650	270
8		23,218	1,289	1,465			2,028
9	······	11,110	279	91	.1	. 40	2
23	•••••••	The Wat	er Commi	ssioner r	eports th	at the hay	crop was
		fair, abo	ut 1½ ton	s per acr	e, and qua	lity bette	r than in
		former y	ears.			,	
46		502		1			
47		80					
48					••••••		••••••
64		26,844	45	129	1,539	18,071	150
65		No Wate	r Commis	sioner ap	pointed.		
٠,1	otals	381,273	11,772	23,088	42,185	134,626	20,040

CR	OPS II	RRIGATE	D FROM	CANAL	S IN ACRES	COS	T—DOLI	LARS
Dis	strict	(22)	(23)	(24)	(25) Total Irrigated	(26) Superin- tendence	(27) Repairs	(28) Improve- ments
1					95,283	\$13,050	\$8,180	\$11,150
2					87,747	17,420	5,890	9,895
3					246,500	22,300	15,420	4,500
				Peas				
4				1,235	113,720	10,775	2,925	5,000
5					93,205	5,180	9,346	1,350
6					89,147	3,493	9,698	1,189
7	¥		:		88,625	3.500	310	2,810
8	•				45,469	20,553	58	10,044
			Timothy	l				
9			210		19,988	3,600	2,750	1,680
23								••••••
		Pasture						
46		37,818			89,065			
		Pasture						
47		3,245			9,845		2,100	
48					5,319	250	822	885
64					102,217	6,587	8,200	1,661
65		No Wa	ter Com .	missi	oner appoi	nted.		
т	otals	41,063	210	1,235	1,086,140	106,708	65,699	50,164

#### ANNUAL REPORT

#### DIVISION ENGINEER, DIVISION NO. 1

November 30, 1916.

Mr. A. A. Weiland, State Engineer, Denver, Colorado.

Dear Sir: I herewith submit my report of the work of Irrigation Division No. 1, during the fiscal year ending November 30th, 1916.

The efficiency of this office would be increased 50 per cent if it was located at Greeley. The Division Engineer would then be in close touch with the conditions in the upper end of District No. 1, and the lower ends of Districts Nos. 2, 3 and 4, the very storm center of nine-tenths of all the trouble over the distribution of water in this division.

In order to receive the full benefit of the removal of the office to Greeley, the present inadequate expense fund should be increased to one thousand dollars (\$1,000.00) per annum.

During the past year the "Dove of Peace" has been hovering over this division and "Watchful Waiting" has taken the place of appeals to the courts from rulings of this office. This office, therefore, has been charged with no more serious crimes than contempt of court and conspiracy to defraud a ditch of its decreed appropriations. It is not easy to decide which charge is the most contemptible.

In June, inquiry was made relative to storing water in reservoirs when ditches break and they cannot divert their decreed ditch appropriations. An order was issued that when for any reason a ditch cannot divert its decreed appropriation, that water goes to the general supply of the stream and cannot be stored except by order of the court. It was also ruled that water must not be stored under the so-called "Seven Lakes Case," except when ordered by the court.

In passing, it might be noted, that up in Districts Nos. 3 and 4 this celebrated case appears to be very much alive, and several ditches are now, by order of the District Court, allowed to store their ditch appropriations when not needed for direct irrigation.

The laws of the state require water to be distributed in accordance with measurements made by the State Engineer or the Division Engineer. It was found necessary during the past season to issue orders to the water commissioners not to use rating tables furnished by outside parties. All rating tables used must be approved by this office.

No new questions relative to the distribution of water, except a special case in District No. 4, have been presented to this office during the season just past.

In the case of the Greeley & Loveland Irrigation Company vs. Huppe et al., reported in 60 Colorado, page 541, our Supreme Court ruled that 23 small reservoirs in District No. 4 were not entitled to reservoir decrees.

These reservoirs "are small, natural depressions, or basins, lying along or near laterals from their ditches, through which they are filled, and in some instances the laterals pass through the reservoirs."

No water commissioner had ever distributed water to be stored in these reservoirs, nor had he ever been requested to do so. The reservoirs had never appropriated water from the river for storage purposes. The water stored in the past had been the excess water carried by the ditches for direct irrigation and not needed for immediate use. In 44 Colorado, page 233, reservoirs of a similar character are spoken of as "stock-filling reservoirs" and are not entitled to a priority. At the request of the Water Commissioner of District No. 4, this office on October 24th ruled that the present status of the above 23 reservoirs, is not that of undecreed storage reservoirs, but that of the so-called "stock-filling reservoirs" without any direct appropriations from the river for storage purposes, except in such cases where it has been ordered by the District Court.

The first order of the season to close junior ditches was issued on April 14th, directed to Districts Nos. 1 to 9 and 23, to cease all distribution of water to ditches and reservoirs of later date than January 1st, 1890, to supply a shortage of 350 second feet for direct irrigation under prior appropriations in District No. 1.

The false statement was made that the water was not to be used for direct irrigation, but was to be stored in the reservoirs and that the order was not warranted by conditions on the South Platte River. It was stated that on April 19th, 200 second feet was in the river above Sterling, in Logan County, in District No. 64. This water looked like the same kind of water that flows in the Cache la Poudre, therefore it must have come from that stream.

As a matter of fact, the above order was issued to supply ditches in District No. 1. The Bijou Canal, near Hardin in Weld County, the third county west of Logan County and 80 miles above Sterling, was demanding 250 second feet of 1888 water for direct irrigation. From April 13th to May 22nd, the Bijou was demanding 250 to 300 second feet. There was no storage in District No. 1 from April 4th to May 23rd, and then only for four days. The next storage was in October. The Water Commissioner of District No. 3 reports water used for irrigation under the Larimer and Weld Canal from and after April 2nd. We are of the opinion that irrigation is just as necessary under the Bijou Canal in April as under Larimer and Weld Canal.

From April 14th until October 9th, the supply of water for direct irrigation was inadequate to meet the demands of the decreed ditches. During June, July, August and September, the South Platte River was reported dry below Platteville, except during a few days in August.

Lake Cheesman discharged from storage during June and July, 14,881-acre feet to the credit of the Highline Canal in District No. 8. This water was repaid Lake Cheesman from Antero Reservoir during September and October.

On October 9th, at 7:00 P. M., the Water Commissioner of District No. 1 'phoned that the demands of his ditches for direct irrigation were supplied, including the 1907 appropriation of the Riverside Canal.

On October 10th, an order was sent to Districts Nos. 1, 2, 3, 4, 5 and 6 to store water in decreed reservoirs that have not been full once this calendar year, with appropriations of earlier date than January 1st, 1908. Also not to distribute water to any reservoir that has been full once this calendar year, nor to any undecreed ditch or reservoir, without my permission.

District No. 3 lived up to its reputation and the charge of

"Discrimination" was duly recorded.

We trust that our next Legislature will establish by statute the "year," in the phrase, "to fill said reservoir once each year," as used in decrees and by the Supreme Court.

Storage was not allowed in the other districts as there was a shortage in Districts Nos. 2 and 8 for direct irrigation under earlier

appropriations.

On October 17th, at 7:00 P. M., the Water Commissioner of District No. 1, 'phoned that, owing to the late heavy rains, his demands for direct irrigation were supplied and he had excess water for storage. He was instructed to store it in the reservoirs that have not been full once this calendar year. He reported that none of his reservoirs diverting water from the South Platte River had been full this year.

On October 18th, a general order was sent to Districts Nos. 1 to 9, as follows: "You are advised, that after you have supplied the demands of your reservoirs that have not been full once this calendar year, you are at liberty to distribute any excess water in your district to the reservoirs that have been full once this year, in accordance with the dates of their decreed appropriations."

Permission was given Lake Cheesman to store water on Octo-

ber 19th.

Up to the present time, Antero Reservoir has not been allowed to store any water as Lake Cheesman, from October 19th to November 13th, was storing on its prior appropriation. Since that date Lake Cheesman has been discharging about 20 second feet from storage, to supply the shortage in the river for the domestic use of Denver and for power purposes of the flour mill at Littleton.

Although the law of 1911 requires that each Division Engineer shall be provided with a suitable office, furniture and office equipment for the proper transaction of business, this office is still with-

out a permanent abiding place and a telephone.

I hereto attach the regular statutory tabulation of the Water Commissioners' annual report.

Respectfully submitted,

(Signed) F. COGSWELT. Irrigation Division Engineer, Irrigation Division No. 1.

#### IRRIGATION DIVISION NO. 1

THE WEEKLY REPORTS OF THE WATER COMMISSIONER OF DISTRICT NO. 3 SHOW THE FOLLOWING AMOUNTS OF WATER BROUGHT OVER FROM DISTRICTS NOS. 47, 48 AND 51, INTO DISTRICT NO. 3, DURING 1916.

	From	From	From	
	Dist. No. 47	Dist. No. 48	Dist. No. 51	Totals
	In Acre Feet	In Acre Feet	In Acre Feet	
April	0	0	0	0
May	0	2,156	1,220	3,376
June	2,336	12,202	6,740	21,278
July	2,410	7,902	4,886	15,198
August	1,146	3,956	1,630	6,732
September	520	1,254	. 42	1,816
October	84	0	0	' 84
November	0	0	0	0
Totals	6,496	27,470	14,518	48,484
Stored in Dist.	0	2,876	0	2,876
No. 3, less 5%	·	In Chambers		
. 1		Lake, Wor-		
		ster and		
		Douglas		
		Reservoirs		
Used for direct	6,496	24,594	14,518	45,608
Irrigation, less	By North	By Larimer	By Larimer	
5%	Poudre and	County and	County	
	Larimer	Poudre Val-	Ditch	
•	County	ley Ditches		
	Ditches			

NOTE.—In making this transfer of water 5 per cent. is deducted for loss in transit, except when stored in Chambers or Worster Reservoirs. 3.645 acre feet of the above were giverted from District No. 48 through the Greeley-Poudre Tunne

IRRIGATION DIVISION NO. 1—Continued

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING AMOUNTS OF RIVER WATER, IN ACRE FEET, USED IN IRRIGATION DURING 1916.

District	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Totals
1	36,120	30,836	24,964	20,910	32,378	32,790	38,970	6,600	223,568
87	17,750	47,798	54,130	47,462	55,619	36,899	22,712	4,820	287,190
8	7,556	63,412	108,790	54,828	31,514	16,482	2,240	.0	284,822
4	3,186	19,822	33,218	26,008	19,152	11,544	2,81	0	115,744
2	794	14,728	33,216	25,558	14,174	6,836	1,806	0	97,112
9	880	20,650	37,242	22,780	13,628	6,588	1,092	, 0	102,860
	4,196	21,650	34,270	23,242	16,220	7,238	5,020	0	111,836
00	6,568	14,636	8,128	7,938	24,690	7,598	7,732	360	77,650
6	734	3,392	5,590	3,524	5,950	3,576	1,700	116	24,582
64	17,600	21,644	22,940	18,454	26,268	21,500	10,500	0	138,906
Totals	95,384	258,568	362,488	250,704	239,593	151,051	94,586	11,896	1,464,270

NOTE.—The annual reports of the Water Commissioners include many ditches not reported in the weekly reports; hence the totals in this table are less than the totals reported in column (12) of the tabulated annual reports. While the quantities are approximate, they are the only ones available for each month.

IRRIGATION DIVISION NO. 1—Continued TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1916.

District	Number of Reser- voirs Reported	Area of High Water Line Acres	Capacity in Acre Feet	Quantity of Water in Reservoirs May 1, 1916 Acre Feet	Quantity of Water in Reservoirs Nov. 1, 1916 Acre Feet	Quantity of Water Held Over from Nov. 1, 1915 Acre Feet
1	5	10,094	139,606	92,840	30,971	73,760
2(A)	20	6,588	134,876	75,067	12,924	41,321
3	54	10,096	156,948	96,420	29,846	58,632
4	15	4,875	95,654	92,251	47,200	77,718
5	19	2,974	38,228	37,343	21,336	30,444
6	30	2,762	43,134	27,200	4,944	13,775
		Not re-		,	,	
7	89	ported	17,432	13,041	112	12,533
8	10	80	6,200	6,185	927	4,829
9	17	1,270	6,123	5,703	1,000	11,356
23(B)	3	5,086	138,435	98,628	76,976	96,330
46	No rese	rvoirs	reported			
47	No rese	rvoirs	reported			
48	1	52	149	149	149	115
64(C)	3	6,175	141,041	61,903	14,463	48,303
65	. 2	14	69	69	69	
Totals	. 218	50,066	917,895	606,799	240,917	469,116

These "Annual Reports" of the Water Commissioners include many small reservoirs not included in their weekly reports.

<sup>(</sup>A) District No. 2 includes storage in Standley Lake.
(B) District No. 23, Antero Reservoir reported capacity 58,601 acre feet at gage rod of 30 ft. as high water line.

<sup>(</sup>C) District No. 64 includes storage in Point of Rocks and Prewitt Reservoirs and Julesburg Reservoir.

# IRRIGATION DIVISION NO. 1—Continued TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

(1) District	(2) Amount of Appropria-	(3) Capacity of Ditches	(4) Length of Main	(5) Length of Laterals	(6) First D Wate Divert	r ed
,	tion in Second Feet	in Second Feet	Ditches in Miles	in Miles	from Nat Streams Irrigat	for
1	2,790	2,374	361	310	Mar.	18
2	3,361	3,650	384	336	April	3
8	3,892	3,400	857	1,300	April	1
4	2,478	2,764	242	153	April	3
5	2,445	1,764	269	248	April	1
6	3,496	1,871	340	182	April	6
7	1,611	1,238	188	88	April	4
8	1,914	1,167	334	300	March	13
9	395	345	54	46	Feb.	12
23	2,443	Not repor	ted		May	10
46	1,859	1,927	174		April	25
47	The Wate	r Commissi	oner only r	eports rela	tive to 42	
	ditches ou	t of a total	of 371 decr	eed approp	riations.	
	567	891	Not repor	ted	May	1
48	2,526	674	126		April	24
64	3,798	3,826	.292	764	April	1
65	171	249	Not repor	teđ	April	.15
Totals	33,746	26,140	3,121	3,727	Feb.	12

#### TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

	(7	)	(8)	(9)	(10)
District	Last Water D from N Strean Irriga	iverted atural as for	Maximum No. of Days Water Diverted from Natural Streams for Irrigation	Maximum No. of Days Water Carried from Reservoirs	Amount of Water Carried from Reservoirs in Acre Feet (See Note)
1	Ųct.	30	226	159	91,589
2	Oct.	31	213	171	64,435
3	Oct.	16	. 199	Not reported	121,379
4	Oct.	31	212	168	48,920
5	Oct.	20	203	142	21,455
6	Oct.	20	198	Not reported	27,132
7	Oct.	31	211	75	14,305
				Castlewood	
	•			Reservoir	-
, 8	Nov.	2	235	60	5,257
9	Nov.	30	293	118	8,599
23	Aug.	15	97	66	23,034
46	Aug.	15	113	No reservoirs	•
47	Oct.	25	178	No reservoirs	
48	Oct.	31	191	Not reported	
64	Oct.	31	214	150	61,020
65	Nov.	15	215	23	52
Totals	Nov.	30	293	171	487,177

NOTE.—The quantities in column (10) represent the reported acre feet in the reservoirs on May 1, 1916, minus the acre feet reported in the reservoirs on Nov. 1, 1916, plus the acre feet diverted from the rivers for storage from May 1 to Nov. 1, as given in the weekly reports of the Water Commissioners, except in Districts 2 and 3 which are given as reported by the Water Commissioners.

District No. 8 also used 20,226 acre feet of water from Cheesman Lake and Antero Reservoir.

The "Annual Reports" of the Water Commissioners include many small reservoirs not included in their weekly reports. These quantities are, therefore, only approximate, but they are the only ones available.

District No. 2 includes storage in Standley Lake.

District No. 64 includes storage in Point of Rocks and Prewitt Reservoirs and in Julesburg Reservoir.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

	District	(11) Average Daily Amount of Water Diverted by Ditches During	No. of Acre Feet Diverted by Ditches During Season	(13) Total No. of Acres That Can be	(14) Cro Irrigat	(15) ops ed, Etc.
		Season from Natural Streams for Irrigation	from Natural Streams for Irrigation	Irrigated (See Note)	Alfalfa	Natural Grasses
1		975	237,679	143,800	28,950	8,400
2		871	271,762	173,075	23,980	2,435
3		1,211	348,942	391,690	67,080	6,680
4		495	138,986	116,547	32,425	510
5		445	116,992	103,235	27,560	7,008
6		630	115,088	93,689	24,222	13,938
7		474	132,728	115,509	31,908	2,505
8		485	105,464	127,471	18,135	1,430
9		98	27,449	20,177	7,589	723
23		693	55,966	18,695		18,695
46		1,486	220,382	89,485		88,939
47		364	50,802	17,945		15,690
48		359	52,415	12,236		5,551
64	•	716	159,101	185,185	34,932	20,082
65		Not reported		3,015	942	580
7	Fotals	9,302	2,033,756	1,611,754	297,723	193,166

NOTE.—The quantities given in columns (13) to (25) represent the total acreage that can be irrigated or was irrigated, whether the ditches only used the natural flow of streams, or only used reservoir water, or used river and reservoir water combined.

The approximate amount of water used in any district, except in Districts 2, 3, 7 and 8, will be found by adding together the "No. of Acre Feet Diverted by Ditches During Season from Natural Streams," given in column (12) and the "Amount of Water Carried from Reservoirs in Acre Feet," given in column (10).

In District No. 2, 1983 acre feet were diverted from Districts Nos. 5, 7 and 23. In District No. 3, 45,608 acre feet additional were diverted from Districts Nos. 47, 48 and 51, and used for direct irrigation. In District No. 7, 924 acre feet were diverted from District No. 51 and used by the Golden City-and Raiston Creek Ditch. In District No. 8, 20,226 acre feet were diverted from District No. 23.

		CROPS II	RRIGATED	FROM CA	NALS IN	ACRES	,
	District	(16) Cereals	(17) Orchards	(18) Market Gardens	(19) Potatoes	(20) Sugar Beets	(21) Other Crops
1		25,375	233	185	695	18,025	6,595
2		39,890	352	7,884	4,293	22,991	2,630
3		83,171	2,403	1,636	34,225	45,220	6,430
4		56,890	1,879	117	1,335	20,795	1,411
5		39,356	747	187	578	14,102	8,177
6		26,551	1,508	623	125	8,540	6,885
7		42,344	3,150	18,960	25	735	295
8		22,991	1,243	1,590		600	1,708
9		7,310	264	109		218	377
23		Total N	o. of acre	s that can	be irrigat	ed was no	t re-
		ported.	The Distr	ict is here	given cre	dit for ac	reage
		that is ir	rigated.				
46		546	(36,795	Acres of t	he "Natu	ral Grass	es" are
			reported	as "Pastu	re,")		
		Oats					
47		40	(11,505	Acres of t	he "Natu	ral Grass	es" are
			reported	as "Wild	Hay.")		,
48		27			3		, 8
64		27,035	55	125	1,826	20,031	365
65		182	87	18	. 42		50
	Totals	371,708	11,871	31,434	43,147	151,257	29,931

ROPS II	RRIGATE	DFROM	CANALS.	IN ACRES	COST	-DOLLA	RS
	(22)	(23)	(24)	(25)	(26)	. (27)	(28) Im-
District	Corn		Beans	Total Irrigated	Superin- tendence	Repairs	prove ments
				88,458	\$15,575	\$12,884	\$8,88
		Celery					
	•••••	340	5,700	110,495	21,515	2,675	2,35
	······			246,845	22,245	14,045	3,000
		Peas					
		1,130`		116,492	12,850	4,225	2,85
				92,715	5,446	7,974	1,07
		Cucum-					
		bers					
·	40	50		82,482	3,535	9,839	5,76
		Onions	-				
'		66		99,988	4,330	550	1,23
·				47,697	23,947	75	78
				16,590	5,560	1,815	1,55
	•••••			18,695			
		·,		89,485			۸
·				15,730			•••••
3				5,589		756	78
		Beet					
		Seed					
ł	1,826	700	425	107,402	18,579	22,690	22,92
•		Cane					
5	142	84		2,077		1,081	3
Totals	2,008	2,370	6,125	1,140,740	\$133,582	\$78,609	\$51,23

# ANNUAL REPORT DIVISION ENGINEER DIVISION NO. 2, FOR 1915

Pueblo, Colo., November 30, 1915.

Mr. A. A. Weiland, State Engineer, Denver, Colorado.

Dear Sir: I herewith submit my annual report for the year ending November 30th, 1915, for Division No. 2, together with tabulation of the Water Commissioners' annual reports.

Rains began in March, continued throughout the entire season, in such volume as to diminish irrigation very materially. More rain fell in this division than ever known in the history of the valley. Numerous heavy downpours of as high as two and a half inches.

Many disastrous floods on tributaries, but none of consequence on the Arkansas River. The rainfall far exceeded the normal.

Reservoirs were hardly called upon for water during the season, and it is most remarkable that nearly all go into winter full, something never chronicled before, guaranteeing an abundance of water for next season.

The normal flow of the streams, increased with the unusual rainfall, was ample for all purposes. In fact, this resulted in overuse or abuse of water to such an extent as to injure many crops and increase seepage. It is remarked that seepage will be the next and most serious problem to confront irrigationists.

The vast resources of this valley make of it an empire within itself. To say this valley is one of the richest in the world is far from exaggeration.

We have approximately 700,000 acres that can be irrigated, 550,000 irrigated, and of this amount 187,000 acres are in alfalfa. Since excessive rain injured the crop to some extent, we will place the average yield at three tons per acre; 561,000 tons at a minimum of \$6.00 per ton, gives \$3,366,000; 65,000 acres of sugar beets at a minimum of 13 tons per acre, 845,000 tons, gives \$4,225,000. The beets were very high in sugar content, so that many brought \$7.00 per ton. Fifty-two thousand acres blue stem or wild hay at a minimum of one ton per acre, 52,000 tons at \$12.00 per ton, \$624,000. Beside the above, 12,000 acres of cereals, 15,000 acres in orchards, 5,000 acres of melons and 6,000 acres in market gardens, and the balance in bush fruit and diversified crops.

I shall use this in a primary way. Under consumers I will place the four sugar factories, condensed milk plants and canning factories, alfalfa meal mills, creameries and cheese factories. Each in its line consumes the products of the farm and enriches the valley by hundreds of thousands of dollars. Each of the above was taxed to fullest capacity during the past season.

Fremont is the banner apple county, with Otero, Pueblo and Crowley close seconds.

From the best information at hand, the value of apples, peaches, cherries, prunes, together with bush fruits, reach well into six figures.

Vegetables of many varieties are shipped into the surrounding states, and much to the far eastern market. There will be many cars of celery shipped, which is one of the best paying crops, often yielding as much as \$1,100 per acre.

Thousands of acres are planted for seed crop alone, such as cucumbers, squash, and melons.

I am reliably informed that over one-half million sheep will be fed in this valley the coming winter, besides thousands of cattle, at each sugar factory. The dairy industry is fast growing throughout the entire division. In District No. 67 it is becoming the leading industry.

The constant high water from so much rain has kept busy an expert hydrographer. The shifting current, carrying great quantities of sand into the ditches, changing the course of the river from one side to the other, has made the presence of this hydrographer a necessity; without his assistance it would have been difficult to administer the water of the division.

I do not recall a single complaint in any district in the division, or from any water commissioner, save one, and that was between the Holbrook and Meredith reservoirs, as to their priority to exchange stored water with the river.

Respectfully,

(Signed) E. R. CHEW, Irrigation Division Engineer, Division No. 2.

# IRRIGATION DIVISION NO. 2

Repor Roby Rountain V. Burdseil Burdsei	Source of Supply Capacity in Reservoirs Cubic Feet May 1, 1916, Cubic Feet Cubic Feet Cubic Feet Cubic Feet Cubic Feet	Co.   Fountain Creek   Fountain Creek
		Fountain Fountain Fountain Fountain Fountain Fountain Lake Cree Lake Cree Lake Fork Bast Fork Bast Fork Bast Fork Bast Fork Bast Fork Bast Fork Middle Be Middle Be Middle Be Middle Be Arkansas
8 t 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Name of Reservoi Bistrict Reported	

(A) Bradford Lake	Huerfano River		10 254 200	656,013,600	
	River		1.200.000		
	River		2,500,000		
Robinson	Muddy Creek	900000000000000000000000000000000000000	1,448,400		
Hayes	Cucharas River		251,000		
	Huerfano River		87,855,600		
	Huerfano River		7,741,300		
La Foya	Cucharas River	***************************************	91,160		
Sterns	Bear Creek		4,024,438		
	Bear Creek	-	1.045.000	Now Lindsley	Lake
	Huerfano River		3.696.000	Not in use	
Sharp's Orchard	Cucharas River		450,000		
			91.150		
			007 099	Not in no	***************************************
200	TO A L		000,400	TACE THE COO	
			73,024,020	008,226,22	
-	Kiver				
	Huerfano River				
	Huerfano River		171.543.960	126.367.400	
	Cucharas River				
			17.953.950		
			4.000.000	3.000.000	
walsenburg	Amonto Carel	,	200,000	20000	
Apache	Apache Creek		50,346,205		
	Santa Clara Creek	•		***************************************	***************************************
	Huerfano River	•			
Andsow Lake	Huerfano River				•
	Piver				
- Copeana		•		***************************************	
	PIVE	***************************************			
Holbrook No. 1	Arkansas River		326,700,000	324,260,640	294,117,120
Ove Lake	Arkansas River		186.020.000	209.000.880	124,593,796
	Timnes Creek		195 585 800		
THE LILE OF THE PARTY OF THE PA	- Contract C			***************************************	
•	Timbas Creak		19,120,000		
•	Mustang Creek	***************************************	26,136,000	***************************************	
	Mustang Creek		6.846.000		
	Mustang Creek		144,000,000		
	Anishana Rivar	Piver	1 798 158 800	999999999999999999999999999999999999999	87 120 000
***************************************	Aplanapa tivon		000000000000000000000000000000000000000		200000000000000000000000000000000000000
Swink No. 2	Kiver		94,020,200	***************************************	13,068,000
•	Apishapa River		304,920,000		34,848,000
	Horse Creek		152,000,000	87,120,000	87,120,000
-	Anishana River		10.750.044		522.502
Kete I. Cossum No. 9	•		2.204.186		
	Divor		, , , , , , ,		
	The Aminot Direct		000 000 000	259 636 000	979 988 000
		***************************************			2011

Quantity of Water in Reservoirs Nov. 1, 1915, Cubic Feet	38,00,000 7,000,000 1,334,000 1,334,000 Empty 800,000 10,000,000 1,001,88,000 1,001,88,000 1,156,000,000 5,298,577,040 5,298,577,040
Quantity of Water in Reservoirs May 1, 1915, Cubic Feet	38,000,000 1,334,000 1,334,000 1,334,000 1,500,000 1,000 1,000,000 12,000,000 1,100,000,000 3,620,228,040 3,620,228,040
Capacity in Cubic Feet	1,985,000 44,000,000 1,300,000 1,384,000 8,000,000 8,000,000 13,590,000 Not in use Not completed 1,171,163,000 4,094,640,000 1,782,395,000 8,058,600,000 3,484,480,000 7,955,580,000
Source of Supply	Las Animas River Las Animas River Chery and Whiskey Creeks North Lake Madrid No. 2 Madrid No. 2 Jansen Middle Fork and Whiskey Creek. Adobe Creek Two Buttes Creek Arkansas River
Name of Reservoirs Reported	(C) John Lake Morth Lake Monument Lake Madrid No. 2 Madrid No. 3 Jansen Maple Street Russell North Sherman Survant Horse Creek Adobe Great Plains Thurston Great Plains
District	00000000000000000000000000000000000000

(A) Stock Pond.

<sup>(</sup>B) Out of Commission.

<sup>(</sup>C) Not used for irrigation.

# IRRIGATION DIVISION NO. 2—Continued TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

(1)	(2)	(3)	(4),	(5)	(6) Mariana
District	Amount of Appropriation in Second Feet	Capacity of Ditches in Second Feet	Length of Main Ditches in Miles	Length of Laterals in Miles	Maximum No. of Days Water Di- verted from Natural Streams for Irrigation
10					
11	699	1,338	500	120	153
	938				346
12 13 14 15 16 17	422			208	177
14	2,058	2,143	634		338
15	214	255	100	73	173
16	906	*******	394	184	
17	4.635	7,165	404	1,071	327
18	133	215	44		
19	626	2,396	232	140	
18 19 49 66					*****
66					•••••
67	953	2,275	212	166	216
Totals	11,584	15,787	2,520	1,962	346

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

	District	(7) Average Daily Amt. of Water Diverted by Ditches During Season	(8)  Number of Acre Feet Diverted by Ditches During Season	Total Number of Acres that can be	(10) Crops Irri Canals	(11) gated fron in Acres
		from Natural Streams for Irrigation Second Feet	from Natural Streams for Irrigation	Irrigated	Alfalfa	Natural Grasses
10					4,874	5,841
11		699	202,820	29,917	6,102	7,126
12		485	204,063	32,483	7,247	1,186
13 14		293	61.356	19.143	1.741	13,417
£4		1,404	510,403	124,510	74,937	4,536
L 5		98	24,135	9,021	3,220	1,341
16		865	61,621	112,197	16,430	3,744
17		1.920	510,009	240,585	73,180	9,210
18		91		6,305	1,764	
19				43,641	11,856	11,129
19						
66 67		426	158,096	106,316	31,889	2,000
7	Cotals	6,281	1,732,503	724,118	233,240	59,530

		CRO	PS IRRIGA	TED FRO	M CAN.	ALS IN A	CRES.	
		(12)	(13)	(14)	(15)	(16)	(17)	(18)
D	istrict	Cereals	Orchards	Market Gardens	Pota- toes	Sugar Beets	Other Crops	
10		4,423	282	463	7		74	Corn 40 Peas and
11		6,055	123	78	203	2,080		Cabbage 1,368 Corn
12 13		3,826 3,937	9,304 16	367 17	2	95 15	674	Beans and
14 15 16		11,900 1,240 2,984	2,334 83 732	2,334 2 814	42	15,785 60 131	3,891 458	Corn 2,060  Melons and
17 18		43,960 547	1,838	472 653	30	26,270	14,510 1,014	Cucumber 1,690
19 49 66 67	:	3,175	250		7	57	2,512	Cattle 10,199
66 67		7,754	346	203	864	2,768	5,026	1,261
To	tals	89,801	15,308	5,403	1,155	47,261	28,159	16,883

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

		RRIGATEI LS IN AC		co	ST—DOLLA	RS .
		(19)	(20)	(21)	(22)	(23)
	District		Total Irrigated	Superin- tendence	Repairs	Improve- ments
10 11			16,004 23,135	\$	\$	\$
12		•••••	22,966	4.590	6,652 22,596	8,675
13	•••••	*******	19.143	4,000	508	8,019
10		Celery	. 10,140		308	<b>'</b>
14 15		630	118,449 5,946	20,935	9,831 1,080	6,662
16		Canta-	25,293	7,631	3,525	7,100
17 18		loupes 2,290	173,450 3,978	30,669	29,927	34,400
		Horses	, ,,,,,			
19 49		3,187	42,372	1,350	6,717	171,645
66						
	•••••	Beans	*********			
67		164	52,275	6,940	20,539	1,935
7	rotals	6,271	503,011	\$72,115	\$101,375	\$230,424

# ANNUAL REPORT DIVISION ENGINEER DIVISION NO. 2, FOR 1916

Pueblo, Colo., December 8, 1916.

Mr. A. A. Weiland, State Engineer, Denver, Colorado.

Dear Sir: I herewith submit my annual report.

The season opened extremely unfavorable, and continued so late into May, the ground being wet and cold, seed failed to germinate readily, and resulted in much replanting.

There was but little rainfall after May. This was one of the driest seasons ever known in the valley; in fact, there was but little rain until August, and that during the latter part of the month. The rainfall for May was 0.63 inches; June, 1.22 inches; July, 0.83 inches, and August, 3.12 inches.

However, the ditches drawing from the Arkansas River were sufficiently supplied, and splendid crops were produced thereunder. The tributaries did not fare so well. As they were very low, or dry, crops suffered, and many failed for lack of water.

There were no floods in either the Arkansas River or its tributaries, and very little above normal at any time during the season. The grazing lands suffered.

Dry farming showed varying results. For instance, in some sections fine crops, some very light, and in other sections a total failure. I attribute this not merely to lack of rain, but earth conditions.

There has not been sufficient water for storage at any time during the season.

I am often asked, "What is the duty of water?" The duty of water for irrigation is the amount of land a given amount of water will irrigate successfully in the growing and maturing of any particular crop.

There was never a better demonstration than this season, proving that in past years over-irrigation had been indulged in to the detriment of crops, and land injured and water-logged to a marked extent. In my long experience I have noted that the years when water was scarcest and had to be most economically used, better crops resulted.

There was planted to sugar beets 53,120 acres, yielding at a minimum 10 tons per acre, or 531,200 tons, at the minimum price of \$5.00 per ton, distributed to the growers \$2,656,000. In alfalfa 187,986 acres, at the lowest estimate three tons per acre. We have 563,958 tons, at the moderate price of \$10.00 per ton (now \$16.00), we find the farmers receiving the handsome sum of \$5,639,580. There were over 4,000 acres of melons. Some growers report

\$800.00 per acre, noticeably from the now famous "Honey Dew" melon.

Some 3,500 acres Mexican beans, yielding from 500 pounds to one ton per acre, worth a market value of six cents per pound, the great difference attributable to several causes,—want of irrigation at the proper time, and cultivation; and to the dry farmer, lack of rain and cultivation are the most prominent causes.

Besides the above there were 50,000 acres wild hay, or natural grasses, at one ton per acre, and now worth \$22.00, or \$1,100,000. Success in growing and producing, like everything else, depends upon the "man behind the gun," absolutely.

Fruit crop in general was not up to normal.

The market gardeners were successful. The high prices obtained made a banner year for all truck gardening.

The usual number of cattle and sheep are being fattened, not only in the feeding pens of the sugar factories, but throughout the valley.

I would recommend a general revision of the irrigation law, particularly all that relates to reservoirs and its relation to canals. The law is now a confusing tangle. To enter upon any particular part would take more space and time than is accorded me. But every lawyer and user of water for irrigation, I believe, will endorse the above.

The division engineer, being the head of a department, should be held as other officers of the state, having full and complete supervision over the affairs of his division, accountable to the state. His report each year should be made to the State Engineer, and included in his published report. His salary and bills of expense should go to the Auditing Board direct, or to the State Auditor, and under oath.

The water commissioners in each district should be appointed by the Governor, upon the recommendation of the division engineer of that division. They should receive a fixed sum per year, paid by the state, and the division engineer should be vested with authority to discharge any water commissioner at any time he may deem it necessary. All deputy water commissioners should be required to give a good and sufficient bond. They should receive \$3.00 per diem, for days actually worked. All salaries of water commissioners and deputies should be approved by the division engineer.

The division engineer should be empowered to send a water commissioner, or his deputy, into any district of his division for the performance of any duty he may deem necessary.

The time should be extended to December 1st for the water commissioners' reports, as they fail to get them in by the 15th of November, claiming they cannot procure the necessary data.

Appeal from the decision or ruling of the division engineer should be made direct to the courts, and not elsewhere.

A permanent office should be furnished the division engineer, equipped with everything needful or necessary for the maintenance of such office. The equipment would be incomplete without a competent stenographer. Not only is there ample work, but one is needed in the office at all times.

To administer the affairs of the office as they should be, the division engineer should be thoroughly acquainted with every stream, ditch and reservoir in his division, and in order that he may have this knowledge he must personally acquire same. This necessitates his absence from his office much of his time. There should be a competent hydrographer stationed in his office, as he is most valuable and necessary. His service is demanded constantly throughout the entire year. Every user of water will recognize both the above as necessary.

This has been a most strenuous year for the farmers and myself. We bow with reverence to our Supreme Maker for his watchful kindness in our needs, and heartily thank all those who assisted in our work.

Respectfully submitted,

(Signed) E. R. CHEW, Irrigation Division Engineer.

# IRRIGATION DIVISION NO. 2—Continued TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL

(1)	(2) Number	(8)	(4)	(5)	(6)
District	of Reser- voirs Re- ported	Area of High Water Line Acres	Capacity in Cubic Feet	Quantity of Water in Reservoirs May 1, 1916, Cubic Feet	Quantity of Water in Reservoirs Nov. 1, 1916, Cubic Feet
10	6			Empty	Empty
11	2		287,637,163	2,108,401,008	803,328,880
12	15		769,447,000	412,671,470	Empty
13	1		2,592,000	2,592,000	Empty
14	8		1,055,483,581	519,996,741	17,649,181
15	5		329,000,000	196,000,000	306,730,206
16	27		3,184,450,672	691,004,050	225,272,800
17	15	12,049	16,687,879,600	4,657,304,520	872,681,040
18	1		3,200,116,080		
19	13	20,150	965,046,220	66,576,300	68,798,296
67	2	. 14,736	9,669,161,600	6,540,076,440	4,023,050,560
Totals	95	46,935	36,150,813,916	15,194,622,529	6,317,510,963

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

	(1)	(2)	(3)	(4)	(5)	(6)
D	istrict	Amount of Appropria- tion in Second Feet	Capacity of Ditches in Second Feet	Length of Main Ditches in Miles	Length of Laterals in Miles	Maximum Number of Days Water Diverted from Natural Streams for Irrigation
LO			***************************************			140
11		702	1,349	489	125	153
12		833		136		330
13		528		174		212
14		2,045	2.129	213		358
L 5		214	254	99	728	183
16		905		394	184	235
17		4,859	7.048	408	104	358
8		262	224	47		190
9		639	2,428	248	147	
56 57		969	2,275	215	165	286
_						
T	otals	11,956	15,707	2,423	1,453	858

#### IRRIGATION DIVISION NO. 2

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

		(7) Average Daily	(8)	(9)	(10)	(11)
	District	Amount of Water Diverted by Ditches During Season from Natural	Number of Acre Feet Diverted by Ditches During Sea- son from Natural	Total Number of Acres That Can be Irrigated	Crop Irrigate	-
		Streams for Irrigation Second Feet	Streams for Irrigation		Alfalfa	Natural Grasses
)					6,823	6,115
L		702	214,654	28,192	6,215	8,528
2	•••••	437	155,915	33,629	7,453	900
3		· 195	55,529	18,861	1,697	13,084
ŧ	•••••	624	309,952	123,540	30,712	4,785
5	***************************************	72	35,292	6,361	2,940	1,505
6	•	680	483,041	114,877	13,848	2,720
7		1,580	5,880	251,685	75,300	9,110
3		56		4,259	1,964	522
9	•••••	<b>^</b>	•	26,875	11,664	12,376
9	••••••	***************************************			••••••	
6 7		339	164,900	106,913	31,067	2,883
T	otals	4,685	1,421,163	715,192	189,683	62,528

	(12)	(13)	(14) Market	(15)	(16) Sugar	(17) Other
District	Cereals	Orchards	Gardens	Potatoes	Beets	Crops
	3,945	410	490		325 ·	208
1	5,321	94	84	160		
2	3,944	8,810	392	2	50	611
3	3,507	8				
4	11.460	2.507	1,238	45	18.893	1.363
5	884	60	11		76	130
6	6,647	725	207	1	50	680
7	44,590	1,162	529	. 13	30.045	5.183
.8	598					
9	4,066	304	757	127	57	3,118
.9	***************************************					
6						
7	8,685	417	, 251	20	3,624	4,450
Totals	93,647	14,497	3,959	368	53,120	15.743

CRO	OPS IRRIGA IN	TED FROM ACRES	cos	T—DOLLA	RS	
District	(18)	(19)	(20) Total Irrigated	(21) Superin- tendence	(22) Repairs	(23) Improve- ments
	Beans	Corn .			<u>'</u>	
10	. ]	454	18,833	\$	\$	\$
	Peas	Timothy				
11	. 2,143	1,106	23,651		5,824	
	Corn					
12			23,183	14,637	9,234	4,231
13			18,296			
•	Corn	Melons				
14	. 900	1,692	73,595	1,910		
15			5,606	8,625		
16			24,878	6,360	2,130	. 100
		Cucum-			•	
	Melons	bers			•	
17	2,050	1,605	169,587	29,640	26,025	27,383
18			3,084			
	Cattle	Horses	0,002			
19		3,541	48,747	2.100	6,407	2,895
49		0,012	10,	2,200	0,10.	
66					••••	
• • • • • • • • • • • • • • • • • • • •	Corn	Beans				
67	2,936	314	54,647	13,999	10,283	988
Totals.	21,850	8,712	464,107	\$77,271	\$59,903	\$35,597

# ANNUAL REPORT DIVISION ENGINEER DIVISION NO. 3, FOR 1915.

Alamosa, Colo., November 30, 1915.

Hon. A. A. Weiland, State Engineer, Denver, Colorado.

Dear Sir: I have the pleasure of handing you herewith my annual report of ditches and reservoirs for the fiscal year ending November 30th, 1915, for Irrigation Division No. 3, comprising the eight districts in the San Luis Valley and covering the drainage basin of the Rio Grande Del Norte River and its tributaries.

As I did not assume the duties of office as Irrigation Division Engineer until the first of August last, the heavy irrigation was practically over, so that since that time there has been very little trouble in the distribution of water.

There has been no extreme high water during the season just closed in any of the districts, but a steady flow, which supplied all demands and assured good crops in the entire division. During two or three days in July it was necessary to close several of the late priorities; however, it did not last long, as heavy rains in the mountains soon increased the flow of the streams.

The valley has had a very prosperous season, with an abundance of water for all priorities and crops well matured. Thousands of cattle, sheep and hogs are being fed and wintered here, and many more shipped in from other sections. The acreage of crops increases each season as more land is being developed, and in some sections large sums of money are being spent in the reclamation of seeped areas, which in itself speaks for prosperity.

I have covered several districts thoroughly to ascertain the condition of headgates and measuring flumes for the purpose of bettering the system of distribution in the division, and find there are only sixty-two ditches rated in the entire division. Of these ratings thirty-three were made during the season just closed. This is due to the fact that in nearly all cases the owners may have constructed good headgates, but have failed to provide a suitable measuring flume for rating. This condition prevails for the reason that there has been an abundant supply of water most of the time for several seasons.

Notices of the laws relative to headgates and measuring flumes have been served in all districts, followed up with letters from the office of Irrigation Division Engineer, and especially to water users in Districts Nos. 21 and 26, with a result that during the fall there has been heavy expenditure in putting ditches in shape in those districts for the next season. The same procedure will be taken in the other districts next year, as it is advisable to get all ditches

rated, when new measuring flumes are installed, and establish good systems of distribution for those water users, thereby showing the good faith of the officers in charge of the distribution of water, to protect the rights of all water users who have complied with the law.

Water commissioners were appointed in all the districts this year, and assumed their duties a little late in the season, but have done exceptionally well for new men at the work. They have had very little trouble with the water users, and have kept good records of the amount of water distributed since assuming their duties; however, it has been very hard for them on account of the lack of proper measuring devices. It is impossible for them to keep accurate records and properly distribute the water to the water users who fail to comply with the law, especially in maintaining measuring flumes. Most of the controversies that arise cover the amount of water carried in ditches, and usually it is the water commissioner, and not the water user, who gets the blame. This condition will probably be eliminated in a year or two, as the majority of the water users are putting their ditches in the proper shape to receive the appropriations of water to which they are entitled.

I also find that the prevailing opinion among water users is to the effect that they may regulate their headgates whenever they so desire. No matter how hard a water commissioner may work for the best interests of all concerned, he cannot do his duty as such commissioner unless he knows what each ditch is carrying, and this can only be accomplished by complying strictly to that section of the laws covering the regulation of headgates. This is especially true where the waters of a stream have been over-appropriated, and a reservoir is located at the head of the stream. The water commissioners have experienced a great deal of difficulty over this question, and even have to provide their own locks to control the gates.

The reservoirs in the division have had a very good supply of water during the season, all of which was not demanded. With a few exceptions, all of the reservoirs are in good condition and storing at the present time. Others are being repaired, and storing as much water as possible. If these reservoirs do not fill before spring they will be able to do so at that time. At present there are sixteen reservoirs in the division, and one being constructed on the Costilla River.

In the districts where we have commenced our work of enforcing the laws relative to measuring flumes, it has been necessary for the water commissioners to spend extra time in regulating the water, serving notices, etc. The expense of such work has caused a large amount of protest from the county commissioners, who can see no reason for such expenditures. They are inclined to blame the water commissioners rather than the taxpayers themselves, who are the water users and the people responsible. Such expense will be unnecessary when a good system has been established.

I wish to mention the valuable assistance given this office by Mr. H. D. Amsley, Hydrographer from the State Engineer's office, who has spent the entire season in this division. Through him records have been kept on eight river stations, where measurements have been regularly made. Aside from this work he has made thirty-three complete ratings on ditches, half the entire number in this office at the present time. A large number of check measurements were also made. These stations are so located that his measurements and the station gages have been of great assistance to the several water commissioners in determining the amount of water in the streams for their distribution.

In conclusion, I desire to thank the State Engineer for his courteous treatment and advice on all matters pertaining to this office. Also, the several water commissioners in this division, as they have all been active and faithful in the discharge of their duties, giving at all times as accurate information as possible under existing conditions.

Respectfully submitted,

(Signed) D. A. NORTON, Irrigation Division Engineer, Division No. 3.

#### IRRIGATION DIVISION NO. 3

#### TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

(1)	(2)	(8)	(4)	(5)	(6) First Day
District	No. of Priorities Reported	Amount of Appropria- tion in Sec- ond Feet Reported	Length of Main Ditches in Miles	Length of Laterals in Miles	Water Diverted from Natural Streams for Irrigation
20	301	3,783	595	781	Mch. 15th
21	82	1,806	222	69	Apr. 1st
22	133	4,371	306		May 1st
24	72	353	. 92	21	Apr. 1st
25	235	946	199		Apr. 1st
26	172	552	121		Mch. 15th
27	59	109	42 .		Mch. 20th
35	77	901	141	213	Apr. 1st
Totals	1,131	12,821	1,718	1,084	

District	(7) Last Day Water Diverted from Natural Streams for Irrigation	(8) Maximum No. of Days Water Diverted from Natural Streams for Irrigation	(9) Maximum No. of Days Water Carried from Reservoirs	(10) Amount of Water Car- ried from Reservoirs in Acre Feet
20	Nov. 1st	230	112	42,113
21	Oct. 30th	213	143	16,440
22	Nov. 15th	199	No Report	2,800
24	Nov. 1st	214	107	20,636
25	Oct. 15th	198	None	None
26	Nov. 1st	230	None	None
27	Nov. 2nd	226	None	None
35	Nov. 1st	214	185	17,150
Totals		230	185	99,139

# IRRIGATION DIVISION NO. 3—Continued TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

District	Average Daily Amount of Water Diverted by Ditches Dur- ing Season	No. of Acre Feet Diverted by Ditches During Sea- son from Nat-	Total No. of Acres that can be		(15) gated from in Acres
	from Natural Streams for Irrigation Second Feet	ural Streams for Irrigation	Irrigated	Alfalfa	Natural Grasses
20	2,073 800 2,595 160 No Report 407 61 283	649,266 134,822 539,335 48,075 No Report 81,573 8,919 54,507	315,795 64,822 92,675 16,535 48,315 33,109 5,389 92,452	26,296 4,879 5,085 736 575 2,908 559 938	129,460 22,455 23,760 3,589 23,393 23,448 2,774 6,705
Totals	6,379	1,516,497	669,092	41,976	235,584

$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	62,326 9,956	46	148	7,223	Beets	Crops
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	9,956				36	1,47
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		32		140		
$egin{array}{cccccccccccccccccccccccccccccccccccc$					••••	13,37
$egin{array}{cccccccccccccccccccccccccccccccccccc$	24,238	102	40	2,275	•	32,86
$egin{array}{c ccccccccccccccccccccccccccccccccccc$	7,331	5	67	6		893
7	1.520	10		8		l
7	1.252		205	6		3,11
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		5		26	1	770
اوق ا ۱۰۰۰ ا ۱۰۰۰ ا ۱۰۰۰ ۱ س ۱ ۱ ۱ ۱ ۱ ۱ ۱ ۱ ۱ ۱ ۱ ۱ ۱ ۱ ۱	5,300	2	4	10		2,569
Totals		7,331 1,520 1,252 80	7,331 5 1,520 10 1,252	7,331 5 67 1,520 10 205 1,252 205 80 5 23 5,300 2 4	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	7,331 5 67 6 1,520 10 8 1,252 205 6 80 5 23 26 1 5,300 2 4 10

<sup>\*</sup>In Districts Nos. 21, 22, 24, 26 and 27, Peas are included in "Other Crops."

CROPS IRRIGATED, ETC.		COST—DOLLARS				
District	(22) Peas	(23) Total Irrigated	(24) Superin- tendence	(25) Repairs	(26) Improve- ments	
20	53,267	280,280 50,842	\$20,120.00 300.00	\$27,536.00 1,420.00	\$12,836.00	
21 22 24 25		88,365 12,627	No Report 1,076,00	No Report 1,290.00	No Report	
26	505	26,011 30,932	No Report No Report	No Report No Report	No Report	
27 35	4,532	4,244 20,060	No Report 2,000.00	No Report 12,946.00	No Report	
Totals	58,304	513,361	\$23,496.00	\$43,192.00	\$13,685.00	

IRRIGATION DIVISION NO. 3—Continued,

(1) District	(2) Name of Reservoirs Reported	(3) Area of High Water Line— Acres	Capacity in Acre Feet	(5) Quantity of Water in Reservoirs May 1, 1915	(6) Quantity of Water in Reservoirs Nov. 1, 1915
		ACIGS		Acre Feet	Acre Feet
20	Rio Grande		51,113	47,922	1,095
20	Santa Maria		48,239		
20	Upper and Lower			•	
	Lost Lakes		2,575	1,861	
20	Beaver Park	(Dam no	t safe and	water all d	rawn out
		during e	arly summ	er.)	
20	Road Canon	No report		No report	
21	Terrace	292	17,700	12,930	1,534
21	La Jara	1,241	14,052	4,470	27
22	Cove Lake	No report	No report	2,800	None
24	Sanchez	3,151	103,156	15,035	19,090
24	Eastdale No. 1	336	3,466	2,612	None
24 •	Eastdale No. 2	357	3,041	1,470	None
24	, Mesita	266	2,606	53	′ 17
24	Salazar	10	123	122	115
35	Mountain Home	640	19,147	11,621	8,706
35	Smith	710	5,336	4,887	2,266
Totals		7,003	270,554	105,783	32,850

		(7)	(8)	(9)	
District	Name of Reservoir	Ditch Supplied from Reservoir	First Day Water Was Used from Reservoir	Last Day Water Was Used from Reservoir	
20	Rio Grande	Farmers Union	July 10	Oct. 30	
20	Santa Maria	Rio Grande	No reports		
20	Upper and Lower				
	Lost Lakes	Midland	July 10	July 28	
20	Beaver Park				
20	Road Canon				
21	Terrace	Main Terrace, Jose			
		M. Valdez, Alamosa			
		Creek Canal	May 18	Oct. 8	
21	La Jara	Main Terrace, Jose			
		M. Valdez, Alamosa			
		Creek Canal	May 18	Oct. 8	
22	Cove Lake				
24	Sanchez	Culebra-Eastdale	June 22	Aug. 23	
24	Eastdale No. 1	Laterals Nos. 5 and 6	May 13	Aug. 27	
24	Eastdale No. 2	Lateral No. 4	May 13	Aug. 27	
24	Mesita	Laterals Nos. 7 and 8	July 6	July 16	
24	Salazar	· Direct from Outlet			
35	Mountain Home	Trinchera Highline,			
		Trinchera Canal,			
		Trinchera-Garland	May 20	Oct. 31	
35	Smith	Smith Reservoir			
		Outlet Canal	April 1	Oct. 31	
Totals	·				

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1915.

		(10)	(11)	(12)	(13)
District	Name of Reservoir	Number of Days Water Was Carried from Reservoir	Average Daily Amount of Water Carried from Reservoir During Season in Second Feet	Number of Acre Feet of Reservoir Water Carried During Season	Crops Irrigated Etc. Alfalfa
20	Rio Grande	76	265	40,314	
20	Santa Maria	No report			
20	Upper and Lower				
	Lost Lakes	19	798		
20	Beaver Park				
20	Road Canon		<b></b>		
21	Terrace	144	42	11,997	
21	La Jara	144	15	4,443	
22	Cove Lake			2,800	50
24	Sanchez	63	146	18,416	1,850
24	Eastdale No. 1,				
	Eastdale No. 2	107	10	2,140	100
24	Mesita	10	4	80	
24	Salazar		No report	No report	50
35	Mountain Home	145	40	11,600	<b></b>
35	Smith	185	15	5,550	
Totals		998	558	98,138	2,050

NOTE.—Reports of crops not given under this Reservoir Report are given in the Annual Ditch Reports as the reservoir water is used as an auxiliary to canals having direct rights from the rivers.

## TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1915.

#### CROPS IRRIGATED WITH RESERVOIR WATER.

District	Name of	(14) Natural	(15) Cereals	(16) Crops Other	(17) Peas
District	Reservoir	Grasses	Cereats	Other	reas
20	Rio Grande				
20	Santa Maria				
20	Upper and Lower				
	Lost Lakes		•••••		
- 20	Beaver Park		••		
20	Road Canon				
21	Terrace				
21	La Jara		***************************************		
22	Cove Lake	300	100	•••••	1,100
24	Sanchez	160	2,600	300	9,845
24	Eastdale No. 1,				
	Eastdale No. 2		250	50	500
24	Mesita				50
24	Salazar	150			75
35	Mountain Home				
35	Smith				
Totals		610	2,950	350	11,570

# IRRIGATION DIVISION NO. 3—Continued TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1915.

	1	(18)	CC	ST-DOLL	ARS
		Crops	(19)	(20)	(21)
District	Name of Reservoir	Irrigated, Etc. Total Irrigated	Superin- tendence	Repairs	Improve- ments
20	Rio Grande				
20	Santa Maria		••		
20	Upper and Lower				
	Lost Lakes				
20	Beaver Park				••••••
20	Road Canon				
21	Terrace				······
21	La Jara	••••		•	
22	Cove Lake	1,550			······
24	Sanchez	14,755			
24	Eastdale No. 1,				,
	Eastdale No. 2	900		••••••	<i></i>
24	Mesita	50			·
24	Salazar	275	\$365.00		
35	Mountain Home				
35	Smith				
Totals		17,530	\$365.00		

## ANNUAL REPORT DIVISION ENGINEER DIVISION NO. 3. FOR 1916.

Alamosa, Colo., November 30, 1916.

Hon. A. A. Weiland, State Engineer, Denver, Colorado.

Dear Sir: I have the pleasure of handing you herewith my annual report of ditches and reservoirs for the fiscal year ending November 30th, 1916, for Irrigation Division No. 3, comprising the eight districts in the San Luis Valley, and covering the drainage basin of the Rio Grande Del Norte River and its tributaries.

The supply of water during the season just closed has been very good for a greater part of the division, only a few of the smaller streams being short. The flow of water was steady throughout the season, regardless of the fact that the first rains did not commence until the middle of July. For the following six or eight weeks these rains continued throughout the division, both in the valley and in the mountains, supplying sufficient water for the irrigation of crops.

The division as a whole is in a very prosperous condition, with a substantial increase in acreage under cultivation, as well as a large increase in cattle, sheep and hogs, which are being wintered and fed for market. High prices for grains, hay and potatoes have been of great financial benefit to the division, especially the potato crop, which netted many of the farmers as high as \$200 per acre.

The development of drainage for the seeped lands has gained during the past season. The sections already drained have proven, beyond a doubt, the benefits to be derived from drainage. Lands that prior to being drained would not raise a crop of any kind are now raising excellent crops of small grains, alfalfa, potatoes and At the present time there are seven drainage districts formed, varying in size from 5,000 to 30,000 acres, which means that within a short time many thousand acres will be added to the present erop acreage. Of these seven districts, three have been drained and are working successfully. In two districts drainage is under way and will soon be completed, while the sixth district, comprising about 10,000 acres, has recently sold its bonds, and will commence the drainage of its lands next spring. The seventh district is preparing to dispose of its bonds. Two of these districts, of some 14,000 acres, are being drained by individuals, while the balance are bonded districts. The cost of drainage is varying from \$9.00 to \$12.00 per acre, depending on the length of outlet ditch and length of secondary lines to properly drain the district, but in no case has the cost exceeded \$12.00 per acre. Water developed by means of this drainage is being used, in some cases, on other lands in the irrigation of crops, while in other instances it goes directly to the streams for the benefit of the rights on that stream.

In going over the several water districts I find the condition of headgates and measuring flumes much better than last year, with a gain in the efficient regulation of the water. Some 225 measurements were made on ditches, and rating cards for these ditches were furnished the water commissioners and owners. In all cases where ditches were rated we found the condition of the ditch to be good; however, owing to the number of ditches to be rated we were unable to get them all. This work will continue as rapidly as possible for the purpose of getting a more efficient and beneficial distribution of water.

This office has continued and will continue to send out notices of the laws relative to headgates and measuring flumes, and in addition has taken up the changes of points of diversion which are necessary in the several districts. The officials have been quite successful in these matters, and a number of the districts are in much better shape than for several years. The most marked change is in District No. 21, where, by next year, every ditch will have a good headgate and measuring flume, and most of them will have a rating card for the ditch. Practically all measuring flumes were in the ditches this year, but this office was unable to take all the measurements necessary to get them rated.

The water commissioners have handled their districts in good shape during the season just closed. The supply of water was such that very few controversies arose; however, these commissioners were always at their work and giving good service to the water users. This being their second season, more efficient services were given and more accurate records kept than last year.

The reservoirs in the division have had an excellent supply of water during the season. Because of the steady run of water in several of the rivers, it was not necessary to use all of the stored water, so that these reservoirs will carry over a good supply of water for the irrigation season of 1917.

I wish to mention the valuable assistance of Mr. H. D. Amsley, Hydrographer from the State Engineer's office. He was in the division from the 1st of April until the 23rd of November, keeping records and making measurements.

In conclusion, I desire to thank the State Engineer for his advice and treatment of all matters which have come up in this division. Also, the several water commissioners, who have been faithful in the discharge of their duties, and have at all times rendered as accurate reports as possible.

Respectfully submitted,

(Signed) D. A. NORTON, Irrigation Division Engineer, Division No. 3.

### IRRIGATION DIVISION NO. 3

### TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

(1)	(2)	(8)	(4) .	(5)	(6)_
District	No. of Priorities Reported	Amount of Appropria- tion in Sec- ond Feet Reported	Length of Main Ditches in Miles	Length of Laterals in Miles	First Day Water Di- verted from Natural Streams for Irrigation
20	400	5,498	435	800	Mch. 20th
21	68	1.615	220	8	Mch. 16th
22	188	5.744	214	5	May 1st
4	84	1.682	92	19	Mch. 1st
25	193	877	179		Apr. 1st
6	177	550	95		Mch. 16th
27	62	83	58		Mch. 1st
35	50	597	126		Mch. 26th
Totals	1,222	16,646	1,419	832	Mch, 1st

## TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

	(7)	(8)	(9)	(10)
District	Last Day Water Diverted from Natural Streams for Irrigation	Maximum No. of Days Water Diverted from Natural Streams for Irrigation	Maximum No. of Days Water Carried from Reservoirs	Amount of Water Car- from Reservoirs in Acre Feet
20	Nov. 1st	225	31	16,764
21	Oct. 31st	229	192	19,600
22	Nov. 15th	199	No Report	No Report
24	Oct. 15th	229 '	188	47,544
25	Nov. 1st	214	None	None
26	Nov. 11th	240	None	None
27	Nov. 4th	249	None	None
35	Oct. 31st	219	150	8,561
Totals	Nov. 15th	249	192	92,469

### IRRIGATION DIVISION NO. 3—Continued

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

	(11)	(12)	(13)	(14)	(15)
District	Average Daily Amount of Water Diverted by Ditches During Season from Natural	No. of Acre Feet Diverted by Ditches During Sea-	Total No. of Acres that can be Irrigated		gated from in Acres
	Streams for Irrigation Second Feet	son from Nat- ural Streams for Irrigation		Alfalfa	Grasses Natural
20	1,947 753 1,081 145 No Report 331 74 234	708,772 158,352 359,180 54,549 No Report 64,517 22,421 55,954	309,308 62,353 99,320 16,855 40,930 31,579 6,263 68,244	37,222 4,714 6,729 736 709 2,726 727 1,001	125,160 25,099 22,958 4,133 18,591 19,742 2,537 4,338
Totals	4,565	1,423,745	634,852	54,564	222,558

## TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

	(16)	(17)	(18) Market	(19) Pota-	(20)	(21) *Other
District	Cereals	Orchards	Gardens	toes	Peas	Crops
20	61,871	33	107	9,029	60,623	10,226
2	10,477 32,144	17 22	66	304 2,669	24,964	14,525 9,208
4	7.111	<b>2</b> 5	67	2,003	24,504	893
5	1,838		2	5	*********	78
6	1,262		204	15	67	3,904
7	1	5	19	43		800
5	3,432	2	5	21	2,861	878
Totals	118,136	84	474	12,086	88,515	40,504

<sup>\*</sup>In Districts Nos. 21, 24, 25 and 27, Peas are included in report on "Other Crops."

# IRRIGATION DIVISION NO. 3—Continued TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

	CROPS IRRI	GATED, ETC.	COST-D	OLLARS
	(22)	(23)	(24)	(25)
District	Total Irrigated	Superin- tendence	Repairs	Improvo- ments
20	304,271	\$23,949.00	\$22,745.00	\$10,309.00
21	. 55,140	500.00	525.00	1,315.00
22,	98.760	No Report	No Report	No Report
24	12.945	No Report	15.00	No Report
25	21,218	No Report	No Report	No Report
26	27.920	No Report	No Report	745.00
27	4.132	No Report	No Report	No Report
35	12,535	1,800.00	3,560.00	6,367.00
Totals	536,921	\$26,249.00	\$26,845.00	\$18,736.00

## IRRIGATION DIVISION NO. 3—Continued TABULATED STATEMEN'T OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1916.

(1)	(2)	(3) Area of	(4)	(5) Quantity of Water	(6) Quantity of Water
District	Name of Reservoirs Reported	High Water Line—	Capacity in Acre Feet	in Reservoirs May 1,	in Reservoirs Nov.1,
		Acres	,	1916 Acre Feet	1916 Acre Feet
20	Rio Grande		51,113	None	11,385
20	Santa Maria		48,239	9,737	20,260
20.	Upper and Lower				
	Lost Lakes		2,575	No report	No report
20	(a) Beaver Park		••••••		
20	Road Canon			No report	No report
21	Terrace	410	17,700	8,096	7,980
21	La Jara	1,241	14,052	1,461	761
22	Cove Lake		•	No report	No report
24	Sanchez	3,151	103,156	17,314	9,001
24	Eastdale No. 1	336	3,466	2,860	291
24	Eastdale No. 2	357	3,041	2,754	135
24	Mesita	266	2,606	100	49
24	Salazar	10	123	121	None
35	Mountain Home	489	19,147	11,546	5,049
35	Smith	671	5,336	4,869	2,805
Totals		6,881	270,554	58,858	57,716

<sup>(</sup>a) Water all drawn before irrigation season.

### IRRIGATION DIVISION NO. 3—Continued

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1916.

		(7)	(8)		(9)	
District	Name of Reservoir	Ditch Supplied from Reservoir	First Da Water Wa Used from Reservoi	as m	Last I Water Used f Reserv	Was rom
20	Rio Grande	Farmers Union	July	8	Aug.	2
20	Santa Maria	Rio Grande	July	9	Aug.	2
20	Upper and Lower					
	Lost Lakes	Midland		<b>.</b>		······
20	Beaver Park	San Luis				·····
20	Road Canon	•				
21	Terrace	Main Terrace, Jose				
		M. Valdez, Alamosa				
		Creek Canal	May 1	.5	Oct.	6
21	La Jara	Main Terrace, Jose	•			
		M. Valdez, Alamosa				
		Creek Canal	May 2	5	July	31
22	Cove Lake	Taos				
24	Sanchez	Culebra-Eastdale	May	1	Oct.	15
24	Eastdale No. 1	Laterals Nos. 5 and 6	May	1	Sept.	25
24	Eastdale No. 2	Lateral No. 4	May	1	Sept.	25
24	Mesita	Laterals Nos. 7 and 8	Sept. 1	5	Sept.	25
24	Salazar	Direct from Outlet	April	1	Oct.	31 -
35	Mountain Home	Trinchera Highline,				
		Trinchera Canal,				
		Trinchera-Garland	June	1	Nov.	1
35	Smith	Smith Reservoir				
		Outlet Canal	June	1	Nov.	1
Totals			April	1	Nov.	1

# IRRIGATION DIVISION NO. 3—Continued TABULATED STATEMENT OF WATER COMMISSIONERS'. ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1916.

District	Name of Reservoir	Number of Days Water Was Carried from Reservoir	(11) Average Daily Amount of Water Carried from Reservoir During Season in Second Feet	Number of Acre Feet of Reservoir Water Carried During Season	Crops Irrigated, with Reservoir Water Alfalfa
20	Rio Grande	31	222	13,764	
20	Santa Maria	30	50	3,000	
20	Upper and Lower				
• .	Lost Lakes				
20	Beaver Park				
20	Road Canon				
21	Terrace	100	73	14,600	
21	La Jara	68	37	5,000	
22	Cove Lake				·
24	Sanchez	147	156	45,790	2,422
24	Eastdale No. 1,	,			
24	Eastdale No. 2	58	14	1,624	190
24	Mesita	10	6	130	
24	Salazar	188			60
35	Mountain Home	150	22	6,497	
35	Smith	150	7	2,064	
Totals	ĺ	990	587	92,469	· 2,672

### IRRIGATION DIVISION NO. 3—Continued

TABULATED STATEMENT OF WATER COMMISSIONERS ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1916.

	Name of	(14)	(15)	(16)	(17)
District	Reservoir	Natural Grasses	Cereals	Other Crops	Peas
20	Rio Grande				
20	Santa Maria	***************************************		••••••	
20	Upper and Lower				
	Lost Lakes		·		
20	Beaver Park				
20	Road Canon	•			
21	Terrace				
21	La Jara				
22	Cove Lake	•••••			
24	Sanchez		3,194	930	9,176
24	Eastdale No. 1,				
	Eastdale No. 2	<u></u>	322	91	428
24	Mesita			100	
24	Salazar	10	135	5	
35	Mountain Home	•••••		•••••	
35	Smith	•••••		•	
Totals		10	3,651	1,128	9,604

NOTE.—Reports of crops not given in this Reservoir Report are given in the Annual Ditch Report, as the reservoirs supply canals having direct rights from the rivers.

### IRRIGATION DIVISION NO. 3—Continued

### TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1916.

#### COST-DOLLARS (21) (19) (20) (18)Crops Irrigated, Etc. Superin-Repairs Improve-District Name of tendence ments Reservoir Total Irrigated 20 Rio Grande ...... 20 Santa Maria ...... ---<del>-</del>-----20 Upper and Lower Lost Lakes ..... 20 Beaver Park ...... 20 Road Canon ...... 21 Terrace ..... 21 La Jara ..... 22 Cove Lake ..... 24 Sanchez ..... 15,722 \$525.00 .................. ..... 24 Eastdale No. 1, Eastdale No. 2.. 1,031 \$ 10.00 \$4,143.00 24 Mesita ..... 100 Salazar ..... 24 210 35 Mountain Home.. ..... 35 Smith 832.00 ..... Totals 17.063 \$1,357.00 \$ 10.00 \$4,143.00

NOTE.—Cost of reservoirs not reported can be found in the reports on ditches.

## ANNUAL REPORT DIVISION ENGINEER DIVISION NO. 4, FOR 1915.

Montrose, Colo., November 29, 1915.

Mr. A. A. Weiland, State Engineer, Denver, Colorado.

Dear Sir: I herewith present my report of Irrigation Division No. 4 for the fiscal year ending November 30th, 1915.

The season was the dryest one we have had for several years. The snowfall in the mountains was very light, yet, owing to the cool spring, the streams held up later in the summer than was at first expected. There was no high water in the various streams, as the snow in the mountains melted very slowly. From July to November, inclusive, was one long, dry period. So low did the Gunnison River get above Delta, below the Gunnison Tunnel, and there was so little water left in the river after supplying the Gunnison Tunnel, that tons of fishes left the river bed and died in the irrigating ditches.

In Districts Nos. 40, 41 and 42, where new water commissioners were appointed rather late in the season, considerable difficulty was experienced by them in distributing the water. This was especially true in District No. 40, which is a very large district and one that is extremely difficult to handle. Before Mr. George Hider, the new commissioner, had time to qualify, they were demanding water in all parts of the district at the same time.

La Plata County had a greater amount of precipitation during the early part of the season than any other part of the division, and, as a result the commissioner of District No. 30 was not called out.

There has, in previous years, been more or less trouble in District No. 33 with incompetent water commissioners, but the present commissioner, Mr. O. J. Leggett, handles the water distribution in a very satisfactory manner.

The following order was issued to the water commissioner of this district:

Montrose, Colo., May 30, 1915.

Mr. O. J. Leggett, Kline, Colorado.

Dear Sir: About a year ago notices were served on the various ditches in District No. 33 to put in headgates and measuring boxes. A recent visit to your district reveals the fact that the law has not been complied with, and that the notices have been disregarded.

You are hereby directed to again notify the following ditches, and such others as have not complied with the law, that unless they immediately put in the necessary head-

gates and measuring flumes, the law will be strictly enforced, and you are instructed to shut off all water in those ditches which do not comply with the law, and to keep the same shut off until such times as they meet the requirements of the law. The following is a list of the ditches and requirements:

Pine Ridge Ditch, new flume; Hay Gulch, cleaned out below and in measuring flume; Fort Lewis Ditch, flume; H. H. Ditch, timber across flume; Short Line, new headgate and flume; Traynor, repair headgate and put in new flume; Slade, new headgate; Townsite, flume; Joe Freed, flume; Sooner Valley, headgate and flume; Morgan, flume; Dale, flume.

If the ditches do not comply within fifteen days from the date of notice, you are directed to shut off all water in those ditches not complying, and notify me.

Very respectfully,

(Signed) H. C. GETTY, Irrigation Division Engineer, Division No. 4.

Mr. Leggett informs me that the various ditches have complied with the above order, and, consequently, the distribution of water in this district will be less difficult than usual.

At the head waters of Surface Creek, in District No. 40, there are about 200 reservoirs, and, until recently, the distribution of the water from these reservoirs was a bone of contention to all water commissioners. The distribution of this reservoir water has been much simplified in recent years, by the organization of the Grand Mesa Water Users' Association. This association handles the water distribution of all the reservoirs in this locality, resulting in better service and less expense to water users, and a vast saving in water from evaporation, etc. The consolidation of all reservoir interests has been decidedly beneficial.

In District No. 41, which embraces all the Uncompangre Valley in Montrose and Delta Counties, the U. S. Reclamataion Service owned or controlled all the canals and important ditches except the Ironstone Canal. Prior to the year 1915, the U. S. Reclamation Service and the Uncompangre Valley Water Users' Association made repeated attempts to unify all the ditches under the Uncompangre project, but were unable to do so, owing to their inability to get control of the Ironstone Canal.

The lack of unification has in the past retarded the development of the valley to a very great extent. A contention between the Ironstone Canal on one side and the U. S. Reclamation Service and the Uncompandere Valley Water Users' Association on the other, over the return water resulting from the use of water brought into the valley from the Gunnison River through the Gunnison Tunnel, was the cause of a great amount of strife and ill-feeling, and threatened to bring on endless litigation in the State

and Federal Courts. This calamity has happily been averted by the purchase of the Ironstone Canal by the U. S. Reclamation Service, which is now engaged in enlarging and extending the • Ironstone system.

We think this unification will result very favorably for the valley, as it will unify the people as well as the canal system, will open up new lands to irrigation, cause new settlers to come in and help develop this vast empire, second to none in climate and productiveness, and increase the peace and happiness of water officials by removing the cause of their grief and vexation of spirit.

From Mr. Fred D. Pyle, Project Manager, we obtain the following facts relative to the progress made during the year on this

most important irrigation project:

### UNCOMPAHGRE VALLEY PROJECT—COLORADO

### GENERAL PROGRESS

During the past year a permanent wooden flume was constructed on the South canal to replace the old temporary flume near Tunnel 5. Collapsible shutters were placed on the Gunnison diversion weir. A permanent connection was made between the West canal and the South canal, so that in the future the water supply can be drawn directly from the South canal when desired. connection consisted of a concrete headgate and a semi-circular steel flume on steel girders, across the Uncompangre River. A wasteway and underdrain was constructed on the Montrose and Delta Canal to provide for the future floods in Big Sandy. feeder was constructed between Cedar Creek and the Loutsenhizer Canal. Construction work was commenced on a 20" wood stave siphon 1,800 feet long to irrigate the Boot Mesa from the Loutsenhizer Canal. The Selig Canal and lateral system was completed and seasoned, except for the Peach Valley lateral. The East canal lateral system was completed. Work was commenced on the enlargement and reconstruction of the Ironstone Canal and lateral The Garnet Canal system was taken over and reconstructed. Drainage investigations and irrigable land surveys were commenced. The Ironstone and Ironstone Extension Canal Companies were unified and the properties acquired by the Government. The Government now owns the Montrose and Delta, Chipeta, Loutsenhizer, Selig, Ironstone, Ironstone Extension and Garnet Canals. and has agreements to unify with the Boomer, Reservation, Highline, Logan, North Mesa, Homerun and Delta Chief Canals. It is expected that the canal and lateral systems will be practically completed by July 1, 1916.

### RESULTS

The following is a brief summary of the results accomplished from July 1, 1914, to June 30, 1915: Miles of canal constructed—112; structures costing over \$2,000 each—9; costing from \$500 to

\$2,000 each—7; costing from \$100 to \$500 each—33; costing less than \$100 each—638. Number of bridges built—86; number of culverts constructed—30; number of wooden pipe siphons laid—2; length—10,324 feet. There has been excavated 567,843 cubic yards of Class 1 material, 20,536 cubic yards of Class 2, and 2,377 cubic yards of Class 3; 716 cubic yards of concrete were placed.

The above work has made it possible to deliver water to about

30,000 acres more than a year ago.

### EXPENDITURES

The expenditures on the project from October 1, 1914, to October 1, 1915, amounted to \$422,657.05, of which \$288,561.32 was spent on construction work, \$60,613.02 on purchase of rights of way and unification, and \$73,482.71 on operation and maintenance. The receipts for rental of water amounted to \$60,628.37.

### OPERATION

During the season of 1915, the Government operated the Gunnison Tunnel, South, West, Montrose and Delta, Loutsenhizer, Selig, East and Garnet Canal systems. The season was a very dry one, with considerable wind during the spring. While the snowfall was not heavy, the run-off was much better than was expected. The Uncompander River reached a flood stage for only a few days. There was only one small flood due to rains. This was on the east side of the river, and did some damage to the lower portion of the Selig lateral system. The rainfall and mean temperatures at Montrose were as follows:

	Season of	1914-1915	Five-year	Average
1914	Precipitation	Mean	Precipitation	Mean
l	Inches	Temperature	Inches	Temperature
October	1.52	45	1.25	48
November	0.15	40	0.36	38
December	0.74	23	0.82	22
1915				
January	0.94	18	0.71	24
February	0.48	31	0.60	31
March	0.10	37	0.73	- 39
April	1.31	52	0.78	49
May	1.53	54	0.99	57
June	0.91	63	0.90	64
July	0.22	71	1.16	70
August	0.64	69	1.04	69
September	1.03	61	1,11	60
Total	9.43		10.45	
Average		47		48

But little trouble was encountered in the operation of the project, except for sliding banks above the Montrose and Delta, near Happy Canon, and leaks through the concrete lining in the South Canal. The slides have not moved for several months, and extensive repairs will be made this winter to the South Canal lining.

Some difficulty was encountered in seasoning the Selig Canal where it climbs North Mesa, but this was overcome by drainage and the puddling of the canal section.

During August, September and October the flow of the Uncompander River varied from 60 to 100 second feet, and the Gunnison from 650 to 1,000 second feet. The maximum discharge of the tunnel was 660 second feet. For several weeks the discharge of the river below the tunnel was less than 35 second feet, which, with the return water from Redrock Canon, Crystal Creek, Smith's Fork and the North Fork, furnished ample water for the older priorities near Delta.

#### **CROPS**

The season was a particularly favorable one for wheat, oats, onions, corn and potatoes, and splendid yields were secured by the farmers. A frost on May 2nd and 3rd did considerable damage to alfalfa and apples. Some fields of alfalfa did not recover from the effects of this frost until the third crop commenced growing. As a result, the alfalfa crop was light and the prices range from \$5.00 to \$7.00 per ton in the stack. The fruit crop was only about 60 per cent of normal. The sugar beet crop is somewhat below normal. The approximate acreage of crop is given in the table. In addition to the crop area of 39,335 acres shown in the table, approximately 3,000 acres were irrigated by canals which rented Gunnison water from the Government.

#### GENERAL CONDITIONS

The general financial condition of the project is becoming better and there is a tendency on the part of those holding large areas of undeveloped land to divide them up into farms and sell on such terms that new settlers will have an opportunity to make good. There has been a remarkable growth of interest in livestock. Many farmers who had only two or three hogs a year ago, now have 50 to 100, and hogs are beginning to leave the project for the Denver markets in car lots. Considerable attention is being given to dairy cattle, about twenty silos were constructed during the year.

The Department of Agriculture has recently placed a field man on the project to assist the farmers with their livestock.

A new flour mill was completed at Montrose, and the Western Colorado Power Company has extended its line to Delta, and is furnishing power and light to the town of Olathe, and to many of the farmers along its transmission line.

CROP AREA IN ACRES OF LANDS UNDER GOVERNMENT OPERATED CANALS—UNCOMPAHGRE VALLEY

PROJECT, COLORADO.

,								
Canal System	Alfalfa	Potatoes	Cereals	Orchard	Pastures	Sugar Beets	Other Crops	Total
South	1,800	250	1,550	35	110	125	10	3,880
West	1,000	200	2,000	150	. 100	10	20	3,780
Montrose & Delta	7,250	3,500	5,300	1,550	200	100	20	18,220
Loutsenhizer	2,200	350	1,600	. 150	100	200	10	4,610
Selig	1,000	200	1,500	100	20	200	10	3,060
East	1,200	200	1,900	25	. 20	400	10	3,785
Garnet	200	200	400	009	100	100	100	2,000
Total	14,950	5,200	14,250	2,610	1,010	1,135	180	39,335

In District No. 42 the Grand Valley Project is in course of construction by the U. S. Reclamation Service, under Mr. J. H. Miner, Project Engineer.

The Grand Valley Project provides for the delivery of water from the Grand River by a dam located about eight miles northeast of Palisade, Colo., into a canal system on the north side of the river, for the irrigation of lands lying north and west of Grand Junction, Fruita and Mack, Colorado About 42,750 acres will be supplied by gravity and 10,250 acres by electrically operated pumping plants to be located on the gravity canal.

The diversion dam is practically completed. It consists of a concrete weir with six movable roller crests, each ten feet high and seventy feet long in the river section, and one roller crest fifteen feet high and sixty feet long in the sluice-way. The nine intake gates each have openings seven feet by seven feet.

On the first six and one-half miles of the main canal, located in the canon of the Grand River, there are three tunnels, respectively 3,723, 1.655 and 7,292 feet long. The earth work on this six and one-half miles aggregates 370,000 vards of excavation, and 1.436,000 station vards of overhaul. This portion of the main canal is finished. The next thirty-eight miles of the main canal, extending to the East Salt Creek and involving 2,300,000 yards of excavation, was completed in September, 1915. The laterals to serve 15,000 acres east of Big Salt Wash were also constructed in 1915. The main canal and laterals east of Big Salt Wash have been primed to beginning the delivery of water for irrigation in the spring of 1916. On December 31, 1915, the project will be approximately sixty per cent com-The construction of the works for supplying water to the pumping areas will not be undertaken until the gravity area is supplied.

For several years there has been a vacancy in the office of Water Commissioner in District No. 59, and the County Commissioners of Gunnison County decline, or at least have neglected to recommend anyone for appointment to this position. During the past season this district was very much in need of a commissioner, and this office was handicapped by having to perform the duties of Water Commissioner at a time when other portions of the division were demanding our attention. What an improvement there would be in the water service of the State if the Division Engineers had in their several divisions a certain number of assignable, experienced water commissioners who could be kept constantly on duty during the irrigation season, and who, when their services were not required in one district, could be sent to another adjoining district where their services were in demand. Why not have water commissioners appointed by the State Engineer, on recommendation of the Division Engineer, instead of being appointed by the Governor, on recommendation of Boards of County Commissioners, when the appointment would be made on account of the appointee's ability, and not on account of his "political influence"? Water, the greatest asset the state possesses, is distributed under the most inefficient system imaginable. How long, O Lord, must the state be cursed by our present rotten, inefficient, political, cumbersome and expensive system? But recommendations are useless, "Ephriam is wedded to his idol."

In western Montrose County, District No. 61, the Paradox Valley Irrigation, Land and Development Co. has been rapidly pushing its projects towards completion. The feeder canal system, which takes the water from the LaSal Mountains in Utah to the Paradox Valley, has been practically completed. The storage capacity of the Buckeye Reservoir was doubled by increasing the height of the dam twelve feet, making the present storage capacity five thousand acre feet.

They are now installing the Broadhead valve in the reservoir outlet. This valve will enable the company to control the delivery of water from their reservoir with perfect ease, as it is the simplest, most efficient and easiest operated headgate on the market. The expenditures of the company for improvements during the past season were about \$25,000.00.

A controversy arose between this company and Mr. Sam Rowley, et al., over the right to the use of water brought into the state from Utah. The company has filings on various streams in Utah, among them being Two Mile Creek. They have been operating for several years, and have built an extensive canal system to divert the water into Colorado. A statement from Utah officials acknowledges their right to the water.

In District No. 62 a certain water user made us no end of trouble. He refused to comply with the law relative to putting in proper headgates and weirs or measuring flumes, and proceeded to take all the water his ditches would hold, regardless of the orders of water officials, and with absolute disregard of the rights of other appropriators on the stream. He even threatened to exterminate the water officials if they molested him in his attempt to make "dry farmers" of his neighbors. Our persuasive ability being no match for his pertinacity, we caused his arrest, and a vigorous prosecution by Deputy District Attorney George Hetherington, in the County Court of Gunnison County, resulted in his conviction, and a fine of \$100.00 and costs, amounting to about \$600.00, was the penalty be paid for his disregard of the statutes and of the orders of the water officials. This conviction may have some effect on many others who are disposed to question the authority of the water officials, and are inclined to disregard the rights of others. Our thanks are due to the State Engineer and his Deputy for the able assistance they gave us in upholding the dignity of the law.

The annual reports and field books turned into this office by the various Water Commissioners are discouraging, to say the least. Much of the information required, and to which the attention of the Water Commissioners was directed, is wanting. The field books have not been properly kept, and in all but two instances are absolutely valueless.

We are unable to understand how a Water Commissioner expects to be able to make out a proper annual report if he goes through the season, day after day, without taking daily data on the various ditches and reservoirs, or compelling his deputies to do so.

In closing this report I desire to heartily thank the State Engineer and his obliging deputy for their many acts of courtesy and for the loyal support they extended to this office.

Attached hereto is the regular statutory tabufation of the annual report of Water Commissioners.

Respectfully yours,

(Signed) H. C. GETTY, Irrigation Division Engineer, Division No. 4.

### IRRIGATION DIVISION NO. 4

## TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

(1)	(2)	(3)	(4)	(5)	(6)
District	No. of Ditches Reported	Amount of Appropria- tion in Sec- ond Feet	Capacity of Ditches in Second Feet	Length of Main Ditches in Miles	Length of Laterals in Miles
28	182	899	2,287		
34	35	178	203	89	56
	123	676	1,253	502	435
12	44	2.768	2,927	170	381
2	· 60	361		173	41
31	20 ·	12	44	9	
31 32	16	195		48	
8	112	509		231	

## TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

	(7)	(8)	(9)	(10)	(11)
District	First Day Water Diverted from Natural Streams for Irrigation	Last Day Water Diverted from Natural Streams for Irrigation	Maximum No. of Days Water Di- verted from Natu- ral Streams for Irrigation	Average Daily Amt. of Water Diverted by Ditches During Season from Natural Streams for Irrigation Second Feet	No. of Acre Feet Di- verted by Ditches During Sea- son from Natural Streams for Irrigation
28	Apr. 20	Sept. 25	97	380	63,140
34	Jun. 1	Aug. 31	92	146	17,762
4041	Apr. 10	Nov. 15	205 226	659	160,825
42	Apr. 1 Apr. 2	Nov. 10 Oct. 26	150	940	385,180
61	May 1	Oct. 29	175	190 12	26,303
62	Apr. 30	Oct. 1	123	12	4,355
68	Apr. 1	Nov. 15	210		-1
	alpi, 1	1 107. 10	210	)	••••••

### IRRIGATION DIVISION NO. 4—Continued

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

	CROPS IRR	IGATED FR	OM CANALS	IN ACRES	/
District	(12) Total No. of Acres that can be Irrigated	(13) Alfalfa	(14) Natural Grasses	(15) Cereals	(16) Orchards
28	21,550 9,153 109,506 132,991 13,789 1,875 1,826 29,108	31 3,264 19,680 20,363 13,030 637	18,954 595 2,111 2,233 1,650 195 1,515 2,530	178 952 8,133 19,959 2,679 313 89 3,265	76 12,805 3,194 719 12

## TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

	(17)	(18)	(19)	(20)	(21)
District	Market Gardens	Potatoes	Sugar Beets	Timothy	Other Crops
8		34 53	•••••	Í I	
4	8		••••••		
0	197	806	664	1	1,834
ll	126	7,881	1,969		1.022
2	22	369	4		20
		8			20
9		ğ		1	_
8	58	117	57	7,939	******

### TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1915.

CROPS IF	RIGATED, etc.		COST—DOLLAR	s
<del></del>	(22)	(23)	(24)	(25)
District	Total No. of Acres Irrigated	Superin- tendence	Repairs	Improve- ments
8	19,197 4,948 46,220 53,697 18,493 1,191 1,612 17,724	4,175 9,525 1,055	10,490 37,085 1,593 390 1,763	342 1,280 256,500 230 205 45 776

No reports from Districts Nos. 30, 31, 32, 33, 59, 60, 63 and 69. No commissioners in Districts Nos. 31, 32, 59, 63 and 69.

# IRRIGATION DIVISION NO. 4—Continued TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1915.

(1)	(2)	(3)	(4)	(5)
District	No. of Reservoirs Reported	Area of High Water Line in Acres	Capacity of Reservoir in Cubic Feet	Quantity of Water in Res- ervoirs May 1st, Cubic Feet
34	108 24 1	535 3,453 3,956 250	266,713,781 799,534,744 650,980,840 108,800,000	233,000,000 799,534,744 650,980,840 108,800,000
Totals	137	8,194	1,826,029,365	1,792,315,584

### TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1915.

District	Quantity of Water in Res- ervoirs Nov. 1, Cubic Feet	(7) First Day Water was Used from Reservoirs	(8) Last Day Water was Used from Reservoirs	(9) Maximum No. of Days Water was Used from Reservoirs
34	16,500,000 Empty	June 1 July 1	Sept. 1 Sept. 1	92
42	Empty	June 22	Sept. 16	71
61	Empty	May 8	Oct. 29	159
Totals	16,500,000	June 1	Oct. 29	159

### TABULATED STATEMENT OF WATER COMMISSIONERS ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1915.

		CC	OST-DOLLAR	S
District	(10) No. of Acre Feet Used from Reser- voirs Dur- ing Season	(11) Superintendence	(12) Repairs	(13) Improvements
34	20,016 9,219 7,814	\$1,000 600 500	\$3,620	\$ 1,035 24,000
Totals	37,049	\$2,100	\$3,620	\$25,035

## ANNUAL REPORT DIVISION ENGINEER, DIVISION NO. 4, FOR 1916.

Montrose, Colorado, November 29, 1916.

The State Engineer,
Denver, Colorado.

Dear Sir: I have the honor to present you my annual report of Irrigation Division No. 4, for the fiscal year ending November 30, 1916.

From the standpoint of the farmer this year was exceedingly prosperous. There was an abundance of snow in the mountains, which made an ample supply of water for irrigation purposes.

With the exception of the fruit crop and the first cutting of alfalfa, the crops were splendid. Late frosts did considerable damage to the fruit crop in some locations, also to the first cutting of alfalfa. In Mesa and Delta counties, where the fruit crop was fairly good, the fruit grower received excellent prices for his peaches. Grain, potatoes and sugar beet crops were never better, and the market was the highest. This was especially true in the Uncompahgre Valley, where the yield of potatoes was enormous and prices ranged from \$1.50 to \$2.25 per hundred pounds. The farmers in this locality were greatly handicapped by the shortage of cars.

Early in May two small reservoirs broke, but caused little damage. These were the Casement Reservoir on Unaweep Creek in Mesa County, and the Hanson Reservoir on Leroux Creek in Delta County.

The break in the Hanson Reservoir was caused by the owner's neglect to clear the spillway, causing the water to run over the dam. Fortunately the Bailey Extension Reservoir, which received the water, was empty, or much damage would have been done. As it was, much mud and silt was washed into the Bailey Extension Reservoir. The Hanson Reservoir should not be rebuilt unless a large outlet is constructed to take care of the surplus water in the spring.

By a strict enforcement of the law on the part of water officials, the flooding of the roads was reduced to a great extent. The water officials, co-operating with the County Commissioners and road overseers, prevented the excessive flooding of roads, as was the practice in the past.

The city attorney of Gunnison complained to this office and to the office of the State Engineer about the flooding of the cellars in the town of Gunnison, caused, as he thought, by the use of an excessive amount of water by the Hartman Ditch. During the irrigation season the cellars fill with water and cause considerable damage to property. On orders from your office a rating flume has been put in the Hartman Ditch so that the exact amount of water used by this ditch may be known.

A personal visit to the various clerks of the district court, and bringing the matter before the Board of County Commissioners, resulted in obtaining certified copies of some judicial decrees for this office and the office of the State Engineer, which had not heretofore been furnished.

This office is greatly indebted to Mr. Fred D. Pyle, Project Manager of the Uncompander Project, U. S. R. S., for daily reports sent to this office of the amounts of water in the various ditches taking water from the Uncompander River. A copy of the report is given below:

Date, July 22, 1916.

WATER DISTRIBUTION TABLE.

Uncompahgre River.

Place				Cir	Canal Stations		Return
Colons	Time	Gage	Discharge	Time	Gage	Discharge	Water
		90.0					ļ 
		9 6					!
•		06.2	326	:			:
Ouray	:	!	-	:	1.90	7.7	
West Canal Feeder	:	:	:	:::::::::::::::::::::::::::::::::::::::	3.70		-
				:::::	.75	G.	-
South Canal		6.65	518			-	:
High Line		:		:	1.36	42	-
Plymouth Rock		:	-	******	Dry	-	-
Montrose and Delta		:	-	:	4.10	372	-
Stark-Volkman		-	-	9:00	99. '	17	:
Ben Davis				8:50	.30	<b>6</b> .	-
Midland	-	!	-	8:40	.70	1.2	-
Woodgate-Calloway			-	8:50	02:	2.7	
Chipeta			-		06.	13	
		-		8:30	1.55	42	
				8:20	1.15	67	
Val Verde				0%.5	33	7 7	-
North Mesa		•		9.5	165		
West Montrose	:			20.5	9	i	
				9.	9		:
Total			845			637	107
Montrose	9:50	3.65	315				
Rice-Cain				7:30	.25	4.3	
Stitler-Williams				7:30	i oc	-	:
Hanny Canon Creek	9.95	1 31	( x x )	2	3.	:	:
Curries	9.	7:07	(6:6)	40.0	-	-	:
Sull lad				9.50	1.90	13	!
Codor (rook	2.90	9 50		7.7	6.	r 6	-
	•	20.5	-	7.15	-		:
Ross-Hull Private		!	!	00.2	1.0	9-	!
				20:-	2:1	4	
Total			386			121	2

HOOR S	7:00	3.4	270	,			
Spring Creek	7:00	.72	(21)				,
Frost				6:45	2.20	2	-
Ironstone					2.72	149	!
Satisfaction						er or	:
Home Run				08.9	200	. 4	!
Hand H	•	•			2.5	101	!
Delta Chief				6:20	08.	141	
Home Stake				6:20	4.2	10	
Foster	:	-		6:20	1.3	2.4	
East Side				6:10	1:1	4.2	1
Swanson	1	:	1	00:9	1.0	4.9	!
Total			270			312	.c.
Casner	6:00	2.48	43				
Garnet		-		5:50	1.70	89	
Chipeta-Beaudry	-	-		2:20	œ.	9.0	1
Boles-Manney				2:40	1.43	2.9	:
Uncompangre No. 3		:		5:25	1.00	5.4	1
Purdy-Vickers and Delta Town		:	:	5:10	1.00	ıe.	i
Total		•	43	į	•	51	73
Balance	5:10	1.25	65				

Total Return Water, 270. Total Available Return Water, 197. Proportion Available Return Water Gunnison, 126.

Gunnison Return Water, 715. Uncompahgre Return Water, 398. Last Priority filled by Water Commissioner, 30. Proportion Available Return Wataer Uncompahgre, 71.

Waste-Discharge of Casner, Less Last 5 Ditches, 8.

A very important decision was handed down by the Supreme Court in reference to the Greeley and Loveland Irrigation Company vs. The Farmers Pawnee Ditch Company. In this case the court interprets a direct irrigation right to have been granted for a specific use, and for a like period of time, and no enlarged use can be made of this right and the same applied to storage purposes. This decision provides us with definite information to solve similar problems as they come up from time to time.

Some apprehension arose on the part of the Rio Grande Railroad and others in regard to the safety of Trout Lake, which is owned by The Western Colorado Power Company and situated at

the headwaters of San Miguel River.

On September 11th the Deputy State Engineer and myself, in company with Mr. Clay, Manager of The Western Colorado Power Company, made an examination of Trout Lake. This examination did not result in any stop orders being issued against the reservoir, and it is believed there is no cause for alarm as to the safety of the structures incident to this reservoir.

In this division there are two important reclamation projects under the U. S. Reclamation Service, viz., the Highline or Grand Valley, and the Uncompander or Gunnison Tunnel. Mr. J. H. Miner and Mr. Fred D. Pyle, project managers, kindly furnished us with the following data relative to these important projects:

### GRAND VALLEY PROJECT—COLORADO.

U. S. Reclamation Service J. H. Miner, Project Manager

### PROGRESS DURING CALENDAR YEAR 1916.

The Grand River diversion dam will be practically complete at the end of the year. The work accomplished on this feature has consisted of the installation of the operating machinery and power plant, dismantling of the construction plant, and disposition of used equipment.

On the canal system, the first 55 miles of the main canal has been completed. During the current year 9 miles of canal were constructed, involving the excavation of about 200,000 cubic yards of earth and shale, the construction of a number of cross-drainage structures and flumes, and the erection of 4,000 linear feet of 60-inch wood stave pipe. Laterals have been completed to cover 14,500 acres in the first district and 10,000 acres in the second district. Laterals to serve the lands in the third district are now under construction.

During the season of 1916 water was supplied on demand to all lands in the first lateral district desiring to use it. About 2,000 acres were actually irrigated. It is expected that at the beginning of the season of 1917 facilities will be completed for supplying water to 35,000 acres. On December 31, 1916, the project will be about 67 per cent complete.

### UNCOMPAHGRE VALLEY PROJECT—COLORADO.

Fred D. Pyle, Project Manager

### United States Reclamation Service

October 1, 1916

#### GENERAL PROGRESS

During the past year a 20-inch wooden stave siphon 1,800 feet long was constructed to irrigate the Boot Mesa from the Loutsen-The Peach Valley portion of the Selig hizer lateral system. lateral system was completed. The Ironstone canal was enlarged from a capacity of one hundred second feet to a capacity of three hundred eighty second feet. The lateral system on Ash Mesa was completed and plans made for the reconstruction of the California Mesa lateral system. Drainage investigations and the irrigable area surveys were continued. The Government now owns the Montrose and Delta, Chipeta, Loutsenhizer, Selig, Ironstone, Ironstone Extension and Garnet canals. It has agreements to unify with the Boomer, Reservation, High Line, Logan, North Mesa Homerun, Colorow and Delta Chief canals. The construction of the distribution system is practically completed, except for the California Mesa lateral system, which will be reconstructed this winter.

### RESULTS

The following is a brief summary of results accomplished from July 1, 1915, to June 30, 1916:

Miles of canal constructed	21
Structures costing over \$2,000 each	
Structures costing from \$500 to \$2,000 each	17
Structures costing from \$100 to \$500 each	<b>52</b>
Structures costing less than \$100 each	685
Number of bridges built	81
Number of culverts built	
Number of wooden pipe siphons (1,727 feet long)	1

There has been excavated 345,757 cubic yards of Class 1 material; 10,392 yards of Class 2, and 1,735 cubic yards of Class 3, and 2,308 cubic yards of concrete have been placed. The above work has made it possible to deliver water to a total of 80,000 acres, of which amount 54,400 acres were in crop this year.

### EXPENDITURES

The expenditures on the project from October 1, 1915, to October 1, 1916, amounted to \$343,545.45, of which amount \$143,680.90 was spent on construction work, \$103,469.53 on purchase of rights of way and unification, and \$96,395.02 on operation and maintenance. The receipts for rental of water amounted to \$78,041.25.

#### OPERATION

The season was somewhat backward, the last frost occurring on May 15th and 16th, which did considerable damage to the fruit and alfalfa. The snowfall was not heavy, but the run-off was very good. There were no floods from melting snows. Rains commenced on July 25th and continued the remainder of the season. Several floods in the river and canal systems were caused by rains, but no damage was done. Project water was delivered on a rental basis of \$80 per second foot continuous flow for the season. This is a wasteful method of water delivery, and some change to a rotation system will be needed in the future.

But little trouble was encountered in operating the project, except for the sliding banks on the Montrose and Delta, Ironstone and Selig canals, and the settling of short portion of the concrete lining in the South canal. During August and September the flow of the Uncompander River was never less than one hundred second feet, and for considerable periods was greater than two hundred fifty second feet. The minimum flow of the Gunnison River was about six hundred fifty second feet during the latter part of September. During the time of heavy irrigation, it was always in excess of one thousand second feet. The maximum discharge of the Gunnison tunnel was seven hundred second feet. The water supply was ample during the entire irrigation season. It is estimated that six acre feet of water was delivered to the water users for each acre of land in crop.

### GENERAL CONDITIONS

The financial condition of the project farmers has been greatly improved during the past year by good yields and good prices, and the large increase in the livestock industry. Several carloads of Holstein cows have been brought in and arrangements are being made for several more cars. Excellent results have been obtained by the farmers engaged in growing and fattening hogs. About fifteen new silos were built during the summer. The farmers have been assisted in their livestock industry by Mr. Lindgreen, of the Department of Agriculture, who was assigned to this project about one year ago. The prospects are very bright for the construction of a sugar beet factory at Delta in time to handle the 1917 crop.

The reports of Water Commissioners are anything but encouraging. I had earnestly hoped and expected that the water commissioners would have excellent reports, complete in every detail. They were notified by your office, as well as by circular and personal letters and personal talks. Besides this, the following circular letter was sent to each:

"April 4, 1916.

"To All Water Commissioners, "State of Colorado.

### "Gentlemen:

"It is earnestly hoped that each and every water commissioner will seriously endeavor this coming season to efficiently administer his district to the very best of his ability. Complete, accurate and detailed annual reports are required from all Water Commissioners on November 15th each year, covering the administration of their district for the past season.

"Dependable annual reports cannot be submitted unless facilities exist for accurately determining the actual amounts of water diverted from the public streams by the various ditches and reservoirs in your district. The statutes provide for this exigency. You will note the law says—'Owners \* \* shall erect and maintain \* \* . If the owner \* \* shall fail or neglect to erect \* \* the Water Commissioner \* \* shall refuse to deliver any water \* \*.'

"Owners and all Water Commissioners must realize that an efficient water administration is demanded, and the provisions of the statutes must be strictly complied with by all.

"A. A. WEILAND,
"State Engineer."

District No. 28 made no report, the Water Commissioner making the foolish excuse that a letter to your office was unanswered, and that his report would not be complete. A personal letter from this office, dated July 17, 1916, gave him ample instructions.

District No. 30 made no report, the Water Commissioner claiming he had no blanks or field books.

The reports for Districts Nos. 40 and 41 are not finished, but will probably be at some later date.

There is no report from District No. 59, as the Water Commissioner was not called out.

The report from District No. 60 is very incomplete, as the Water Commissioner worked but little and had other business to attend to.

The report from District No. 62 is as good as is possible under the circumstances, as is also the report from District No. 68.

The manner of appointing and paying Water Commissioners should be immediately changed. Must the office of Water Commissioner remain forever a sinecure?

### RECOMMENDATIONS

That an appropriation be made by the next General Assembly to enable the Secretary of State to furnish Division Engineers' offices, as the statutes say he shall. That a hydrographer be furnished this division for at least three months each year, to assist in rating the ditches and canals in the division.

That the present law relative to appointing Water Commissioners be repealed by a statute giving the State Engineer power to appoint on recommendation of the Division Engineer. That if Water Commissioners cannot be paid by the state, then they be paid by the county in which the work is performed; and all vouchers for paying Water Commissioners should first be certified by the Division Engineer. That all Water Commissioners shall be assigned to their work by the Division Engineer, and may be sent into any water district in the division. That the Division Engineer shall have power to discharge, or at least to suspend, any Water Commissioner neglecting or failing to perform his duties.

If this recommendation were enacted into the statutes the results would be far reaching in this division. It would mean greater efficiency and less expense. It would mean that Water Commissioners would be appointed for their ability to distribute water, and not because of their "political pull." It would mean that a Water Commissioner would not be on the pension list, a parasite on the taxpayers, and occupying an office which he does not fill; and who knows nothing about the duties of Water Commissioners and cares less. It would mean that a system of records would be kept which would be of inestimable value to water users. Why not have a more efficient, less cumbersome and less expensive system? A change is greatly to be desired. Why not make it now?

Attached hereto is the tabulated statement of the Water Commissioners' reports.

In closing I desire to thank you for the many acts of courtesy, and for the excellent support you have always given this office.

Very respectfully,

(Signed) H. C. GETTY, Irrigation Division Engineer, Division No. 4.

### **IRRIGATION DIVISION NO. 4.**

### TABULATED STATEMENT OF WATER COMMISSIONERS ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

(1)	(2)	(3)	(4)	(5)	(6)
District	No. of Ditches Reported	Amount of Appropria- tion in Sec- ond Feet	Capacity of Ditches in Second Feet	Length of Main Ditches in Miles	Length of Laterals in Miles
3	30 56 120 33 174	98 202 648 622 3,182	256 202 1,277 1,317 3,779	86 86 446 133 532	112 419 360 370
1	16 27 75 103	18 249 423	81 249 794	46 216	37 119
Totals	634	5,442	7,955	1,545	1,417

## TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

	(7)	(8)	(9)	(10)	(11)
District	First Day Water Diverted from Natural Streams for Irrigation	Last Day Water Diverted from Natural Streams for Irrigation	Maximum No. of Days Water Di- verted from Natu- ral Streams for Irrigation	Average Daily Amt. of Water Diverted from Natu- ral Streams for Irrigation	No. of Acre Feet Di- verted by Ditches During Sea- son from Natural Streams for Irrigation
33	June 27	Sept. 3	64	68	8,640
34	May 1	Sept. 15	123	245	48,020
40 41	Apr. 1	Nov. 30	240	593	262,094
41	Apr. 17	Oct. 31	196	814	315,884
42 50	Mch. 1	Dec. 31	190	535	139,185
61	Apr. 14	Nov. 10	211	58	17.510
62	Apr. 1	Dec. 15	240		2.,020
68	Apr. 1	Nov. 15	210		
Totals	Mch. 1	Dec. 31	240	2,313	791,333

## IRRIGATION DIVISION NO. 4—Continued

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

	(12)	CROPS IRRIGATED FROM CANALS IN ACRES				
District	Total No. of Acres that can be Irrigated	(13) Alfalfa	(14) Natural Grasses	(15) Cereals	(16) Orchards	
33	10,243 9,466 96,784 74,349 152,478 662 5,460 8,736 26,589	2,721 3,625 28,879 23,270 21,070 1,711 13 3,850	690 993 2,526 2,144 2,729 48 264 4,902 2,590	2,409 1,993 11,110 17,524 18,120 39 1,566 601 2,725	67 72 10,256 2,194 11,372 33	
Totals .	384,767	85,683	16,886	56,087	24,073	

### TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

1	(17)	(18)	(19)	(20)	(21)
District	Market Gardens	Potatoes	Sugar Beets	Timothy	Other Crops
3	264	549			25
4	` 5	120			21
0	205	871	569	1 1	1,921
1	26	5,430	4,231		1,908
2	69	1,441	1,386	1	1,114
0	10	3	•	1	
1	2	21			82
2				2,890	
8	233	182	66	5.582	1,36

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1916.

	CROPS IRRIC	SATED, etc.	COST-DOLL	ARS
	(22)	(23)	(24)	(25)
District	Total No. of Acres Irrigated	Superin- tendence	Repairs	Improve- ments
33	6,725	\$ 375	\$ 1,045	\$
34	6,829	2.222	1,715	85
10	56,337	2,925	9,980	2,830
1	56,727	5,303	21,146	20,074
2	57,301	3.090	102	307
0•	650	-,		
31	. 3,679	406	235	681
2	8,406	δοο	3.022	
8	16,666	9.355	1.103	998
00	10,000	7,000	1,100	300
Totals	213,320	\$21,954	\$38,348	\$24,975

### IRRIGATION DIVISION NO. 4—Continued

## TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1916.

(1)	(2)	(3)	(4)	(5)
District	No. of Reservoirs Reported	Area of High Water Line in Acres	Capacity of Reservoir in Cubic Feet	Quantity of Water in Res- ervoirs May 1st, Cubic Feet
34 40 42	6 108 30	550 3,460	356,717,776 853,167,000 785,350,189	278,000,000 86,400,000 Empty
Totals	1 145	4,310	2,195,234,965	366,360,000

## TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1916.

٠.	(6)	(7)	(8)	(9) Maximum
District	Quantity of Water in Res- ervoirs Nov. 1, Cubic Feet	First Day Water was Used from Reservoirs	Last Day Water was Used from Reservoirs	Maximum No. of Days Water was Used from Reservoirs
34	113,000,000	May 15	Oct. 1	138
40	99,144,000	June 20	Sept. 10	100
42 61	Empty 1.840.300	July 3	Oct. 2 Nov. 10	92 179
01'	1,840,800	Apr. 14	100. 10	179
Totals	213,984,300	Apr. 14	Nov. 10	179

## TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1916.

	(10)	(11)	cos	T-DOLLARS	
District	Average No. of Acre Daily Amt. Feet Used Used from rom Reser- Reservoirs, voirs Dur- ing Season	(12)	(13)	(14)	
		voirs Dur-	Superin- tendence	Repairs	Improve- ments
34	21	5,796	\$ 100		
40	350 65	14,000 7.930	1,400		
61	, 8	2,864	406	***************************************	
Totals	444	30,590	\$1,906 ´		

## ANNUAL REPORT DIVISION ENGINEER, DIVISION NO. 5, FOR 1915.

Glenwood Springs, Colo., November 30, 1915.

Hon. A. A. Weiland, State Engineer.

Dear Sir: I herewith submit my report for the year 1915, Irrigation Division No. 5.

The irrigation season of 1915 set in with dry, cool winds and sporadic rains, varying locally with occasional showers, quickly followed by a premature heat. In one district, No. 37, in two valleys the low temperature at night foiled the attempt of the irrigators to profit by the abundant water supply during the day, and as a consequence the first hay crop was subnormal, and, in several instances, almost a failure.

As marked contrasts I mention the isolated case of four ranches on the Eagle River, their location affording protection from the cold winds and sudden changes of temperature, which produced a maximum hay crop—four tons of alfalfa per acre from the first cutting. On several ranches on Gypsum Creek, eleven miles west of the Eagle ranches, the first crop of alfalfa, chilled by early and night irrigation, and stunted by a few weeks of dry heat following, was left uncut.

Throughout the division the climatic changes during the months of April, May and part of June were sudden and not conducive, in general, to a healthy growth of crops. The total result is not as satisfactory as was expected, especially when compared with that of 1914. Many individual irrigators did not seem to take economic advantage of the water supply when it was most available, and, as a consequence, suffered as the season advanced.

This state of affairs gave, as is usual in such cases, rise to complaints and unpleasant differences among irrigators, and caused strictures upon the action of the Water Commissioners who endeavored to adjust matters.

The commissioner of District No. 37 came in for his share of just objections, as he, in a misapplied sentiment for what he conceived to be his discretionary authority, apportioned water to certain appropriators at a time when they were not entitled to it and when senior appropriators actually needed the water, but "when the former needed it worse," and it took some time to make him understand the difference between the dates of decrees and his personal judgment.

The subject of judicial apportionment of water to a given area is one of the greatest importance. While I can speak only within the scope of this report, I cannot refrain from suggesting a thorough investigation by the State Engineer, backed by the necessary legislative appropriation, for the purpose of modifying

the procedure of using unalterable proportions between water and area, just because that proportion has been applied in this division, say, as early as 1881.

More than a quarter-century of irrigation experience in this vicinity has conviced me that the majority of over-irrigated ranches become gradually leached and water-logged, to the detriment of quantity and quality of crops, and that it is not good practice to apportion water in a pre-determined ratio to all kinds of land, whether hilly or on flat ground, regardless of altitude, contour, remote from or adjoining gravelly creek beds with consequent sub-irrigation, on open or tight, "skinny" or deep soil, and, more especially, with respect to longer or shorter periods of previous application.

Argument on these points is barren of results. The irrigator wants his pound of flesh, or water, and would rather waste the priceless liquid than to let his neighbor have at least part of it. Many irrigators simply think that partial or total non-use of water, for even a portion of a single season, will be claimed as proof of abandonment of their priority. The exceptions in such cases merely prove the rule.

A reservoir decree on pages 320-322 of the book containing decrees for District No. 38, rendered prior to January 1, 1912, allows the petitioner, "A sufficient quantity of water to keep said reservoir filled to the capacity of one million, three hundred eighty-three thousand, four hundred four cubic feet of water for irrigation purposes," yet the quantity, about 31.8 acre feet, is seriously claimed to supply two hundred acres, which, as stated in the same decree, "are capable of being irrigated practically, and cultivated, by water from said reservoir."

Litigation threatened in this case. Attorney for the reservoir owners maintained that the 31.8 acre feet were meant to be subject to the wording of the above italic passage, i. e., that the reservoir could be filled and emptied and filled and emptied continuously from one end of the year to the other; he failed, however, to explain how the water was to be used at all if the reservoir was being kept filled, as distinctly stated in the decree. A settlement out of court was arrived at.

Another decree, in district No. 37, apportions all the surplus water in the creek over and above decreed rights existing at the time of its rendering to the first five priorities pro rata of their rights, thus virtually preventing any subsequent appropriator from enjoying irrigation privileges. I have in former reports referred to the uncertain results of jury trials in cases of unlawful appropriation of water, especially when locked headgates are raised, I should say certainty of acquittal. Two such cases were thus decided last season, although the offenses were clearly proven.

Again some poor victim of the consequences of literal application of the law suffers, when he is, humanely speaking, innocent of intent to do harm.

Cattle Creek was in this last season infected by beavers in its lower part and to take three cubic second feet down to the priorities, near the mouth of the creek, it was necessary to shoot out the beaver dams and channel the tortuous creek bed. This involved the labor of six men and two teams for nearly a week, and the creek then ran about fifteen cubic second feet. Subseuently a lone beaver couple returned and engaged industriously in restoring their home, and a rancher, fearing a repetition of the famine, killed one of them, forgetting or being ignorant of the necessity of first obtaining a permit from the game department. He was promptly arrested, tried, found guilty and fined \$25.00 and costs. I mention this fact because the victim in this case—the rancher, not the beaver—almost completely lost his crop on account of the beavers' activity, and is otherwise unable to procure the money to pay fine and costs.

There were no new projects or irrigation plants observable during 1915. Those contemplated previously received their share of local and other advertising, but without tangible results.

The Spring Park Reservoir owners in District No. 38 added considerable to their irrigated areas, and, having the advantage of a late beginning of season, could fill their reservoir to the 25-foot contour during the spring months, and furnish an ample supply throughout the season.

The Battlement Reservoirs, District No. 45, were also well supplied, and additional labor on dams and headworks was performed during 1915.

The Park Reservoir on West Elk Creek, District No. 39, has been successfully operated during the season, and the owners have added to the structure by better securing the sides of a spillway and widening the emergency ditch leading therefrom.

The sudden demise of the Water Commissioner of District No. 39, by a fatal accident while he was engaged in the performance of his duties, was followed by instructions to the deputy to assume charge of the office. The deputy has acted during the balance of the season, but, upon demanding field books and other property of the state of the administrator, for the purpose of making up his report, met with the objection that such property would only be turned over to the duly appointed successor of the deceased Water Commissioner. Up to this writing the books and other property belonging to the state are retained by the administrator, and I have been unable to obtain them. Under the law of 1903 I have assumed the office of Water Commissioner, and have made demand for this state's property now in the hands of the administrator; the probate judge has also supported this demand, and I hope to obtain the books, etc., in a few days, although too late for a complete report of District No. 39.

My recommendations with respect to a different method of appointing Water Commissioners are hereby repeated. The Water Commissioner is the judge of first jurisdiction, and, viewing the

importance of the irrigation industry in its proper light, the law should protect the actions of the commissioner to a greater extent than it does now, by giving his office more summary authority. To arrive at this point it is, however, necessary to select for this position men of known probity, skill and energy; to compensate them adequately and for a certain fixed period of the year, which should begin before and last after the real irrigation season, so as to give the commissioner time to examine his district before irrigation commences and to make his report after it ceases. The commissioner should be entirely freed from any kind of local influence, and should be paid from the state treasury direct. It is also conceivable that the deputy commissioners could do more effective work if their compensation was increased, even to the same figure which the Water Commissioner is paid, perhaps for a shorter period of the year. But both, commissioner and deputy, should be vested with the same authority and by special enact-The number of deputies in each district should be commensurate to the extent of the area supervised. All commissioners and deputies should be placed under the direct authority and control of the Division Engineer.

It is with sincere appreciation of the courtesy of your office that I mention the fact that during the past season all communications from your office to the Water Commissioners were transmitted through the Division Engineer's office, thus preserving the succession of instances and thereby strengthening the hand of the officer directly above the Water Commissioner.

The subject of delegated authority to Division Engineers and Water Commissioners by special provisions of judicial decrees to the effect of committing to their care, authority and supervision of the supply to laterals out of main ditches, or the adjustment of individual rights in associated ditches, etc., is one of great importance. A conflict is created by such provisions between the intent of the law which limits such authority to the main headgate of the ditch, and execution of the decree, and I recommend that your office issue instructions to the officers of irrigation service clearly setting forth the full compass and limit of their authority in this respect. The State Engineer subsequently ruled that, in accordance with the statutes, Water Commissioners had no jurisdiction over the distribution of water from a ditch to its consum-That decrees containing such provisions were not issued according to law, and that it was not incumbent upon Water Commissioners to obey such parts of these decrees.

Very respectfully,

(Signed) THEODORE ROSENBERG, Division Engineer, Irrigation Division No. 5.

#### IRRIGATION DIVISION NO. 5. ,

#### SUMMARY ANNUAL REPORTS OF WATER COMMISSIONERS.

1915 Water District N	o. 37
Appropriations to ditches in cubic second feet.  Capacity of ditches in cubic second feet.  Length of ditches in miles.  Length of laterals in miles.	579.84 175.70
Water used from May 1 to October 1.  Average number of days of use of water	114.00 294.00 67,032.00
Total irrigated area in acres  Total irrigable area in acres  Duty (acre feet per acre)	21,249.00

#### CROP REPORT

Alfalfa Natural Grasses Cereals Orchards Market Gardens Potatoes Other Crops	2,656 4,409 11 	acres acres acres
Total	19.167	acres

#### RESERVOIRS

There were three of these in operation in this district, as reported by the commissioners; the Welsh, Christianson and Johnson Reservoirs, with 60, 29 and 102.5 acre feet capacity, respectively, which contained on May 1, 14.5, 11.63 and 22.77 acre feet, and were practically emptied on November 1. The ditches supplied are in the order named, the Alkali, Christianson and Eby ditches, used from June 1 to July 1, from July 1 to August 10, and from August 1 to August 30 in the above order to irrigate 260 acres, 220 in alfalfa and 40 in natural grasses.

1915 Water District N	o. 45
Appropriations to ditches in cubic second feet	369.00 111.48
Average second feet of water during season in ditches.	79.00
Total acre feet of water used during season	65,096.00 22,793.33
Total acres susceptible to irrigation	

#### CROP REPORT

Alfalfa Natural Grasses Cereals Orchards Market Gardens Potatoes Sugar Beets Other Crops	624 4,379 940.83 92 774.5 111	acres acres acres acres acres acres acres
Total		

#### RESERVOIRS

The Battlement Reservoirs store the water of Battlement Creek near its head. They are owned by the Battlement Water Supply Company, and are used for irrigation of land on Battlement Mesa on the south side of the Grand River in Township 7 S., Ranges 95 and 96 W., 6th P. M.

The annual repair and maintenance assessment work on the reservoirs is done by the stockholders, generally during the fall, and, if the season is favorable, in the spring. There are six of the reservoirs.

No.	Area High Water Line Acres	Capacity Cubic Feet	Dam Length in Feet	Dam Height in Feet	Quantity of Water in Reservoirs May 1, 1915, Cubic Feet	Quantity of Water in Reservoirs Nov. 1, 1915, Cubic Feet
1	14.19	5,733,779	416	30	4,910,000	870,000
2	6.90	2,480,368	175	25	2,100,000	495,000
3	41.66	20,011,821	671	30	17,280,000	1,380,000
4	18.75	6,016,700	312	20	5,000,000	260,000
5	5.21	1,453,054	178	20	980,000	210,000
6	11.42	2,754,226	420	25	2,710,000	391,000

The dams of all these reservoirs are protected by riprap. The condition of all dams is satisfactory.

1915	Water District No. 58
Appropriation to ditches in second feet	691.50 183.75
Length of laterals in miles	
Average second feet of water during season in ditc. Total acre feet of water used during season	hes 527.71 69,657.70
Total irrigated area in acres.  Total irrigable area in acres.  Duty (acre feet per acre)	80,851.00

#### CROP REPORT.

Alfalfa Natural Grasses Cereals Market Gardens Potatoes	21,133.00 1,975.00 3.25 15.00	acres acres acres
Strawberries	227.50	acres
Total .	24.877.75	acres

1915	Water I	District No.	70
Appropriations to ditches in second feet			169.40
Capacity of ditches in second feet			273.00
Length of ditches in miles			109.00
Length of laterals in miles			11.00
Water used from April 1 to November 13		•	
Average number of days of use of water			
Average second feet of water during season in ditc	hes		85.08
Total acre feet of water		20	.316.00
Total irrigated area in acres			.126.00
Total irrigable area in acres			
Duty (acre feet per acre)			

#### CROP REPORT.

Alfalfa  Natural Grasses   Cereals    Orchards    Market Gardens    Potatoes    Sugar Beets    Other Crops    Corn    Pasture    Town of DeBeque	157 1,046 189 5 34 20 226 22	acres acres acres acres acres acres acres acres acres acres
Total	5,126	acres

#### RESERVOIRS.

	Name	Name of Owner	Location
1 2 3 4	McDowell Glen Beulah No. 1 Blair & McDowell Myers Conwell	Alfons Myers	
6 7 8 9	Boldt	H. W. Boldt David McKay	South side of Dry Fork

	Source of Supply	Name of Feeder	Area of High Water Line, Acres	Capacity in Cubic Feet
1	Roan Creek	Reservoir Ditch	2.00	522,720
2	Clear Creek	Newton Ditch	5.00	1,306,800
3	Gulch Creek	Gulch Ditch	12.00	Out of Commission
4	Roan Creek	Roan Cr. Ditch No. 1	1.00	130.680
5	Conn Creek	Conwell Ditch	5.00	261,360
6	Boldt Spring	Boldt Spring Ditch	.50	65.340
7	Flood Water	Dry Fork	5.00	1,689,308
8	Tom Creek	Parkes Ditch	.20	6.750
9	Kimball Creek	Eaton Ditch	3.00	522,720
Totals	1		33.70	4,505,678

	Quantity of Water in Reservoir May 1, Cubic Feet	Quantity of Water in Reservoir Nov. 1, Cubic Feet	Name of Ditch Supplied from Reservoir
1 2 3 4 5	522,720 Dry entire season Out of commission Dry entire season	522,720 261.360	Reservoir Ditch Newton Reservoir Ditch Roan Creek Ditch No. 1 Conwell Ditch
6 7	65,340	65,340	Boldt Spring and Gulch Ditch G. & G. R., De & G. and De La Matyr Ditches
8 9	Built during spri	ng of 1915	Parkes Ditch Eaton Ditch
Totals	588,060	849,420	

None of the above reservoirs were used this season. No. 8 received \$75.00 worth of improvements, and No. 9 \$100.00 worth. Source of information on all was from observation.

# ANNUAL REPORT DIVISION ENGINEER DIVISION NO. 5 FOR 1916.

Glenwood Springs, Colorado, Nov. 30, 1916. .

Hon. A. A. Weiland, State Engineer,

Denver, Colorado.

Dear Sir: I herewith present my annual report for Irrigation Division No. 5 for the year 1916.

I believe this is the largest division in the state and I venture to say that the industries are more varied than in any other like portion of the state. Certain portions of the division are very difficult of access, or rather have been in years past, but with the great demand for road building and the advent of the motor car distances have been greatly overcome during the past few years. I have not traveled over the division as extensively and completely as I had hoped to do, but have given attention to every inquiry and have personally responded to every call made upon me where there seemed to be a real demand for my services. I will make but one exception to this statement, and that was in the case of a call from the country north of Craig, in Moffat County. I think this call would not have been made had there been a Water Commissioner in District No. 57. For several years this district has been without a Water Commissioner. I believe the County Commissioners ought to be urged to recommend to the Governor some suitable person for appointment as Water Commissioner for District No. 57.

The past year has been most satisfactory to farmers and water officials, there being less difficulty and fewer lawsuits over water than in any year within my recollection, but is has not been altogether favorable for one in search of statistical irrigation information.

The unusual snowfall of last winter and the very favorable climatic conditions of the spring and early summer were very encouraging to the farmers, and made it seem that there would be less use than ever for the services of the Water Commissioners. With this prospect in view County Commissioners, desirous of avoiding needless expense, urged the Division Engineer to use all precaution possible along this line and to make the administration as economical as possible, intimating that Water Commissioners' bills against the counties would be checked up with greater care than usual, and that the County Commissioners very much hoped for a reduction in the expenses of the services. I have, therefore, endeavored to conduct the business with the greatest economy possible, consistent always with the best service that could be given, but with the view only of eliminating any unnecessary expense. This perhaps will account for the lack of

completeness which will be found in the reports of some of the Water Commissioners who did not feel authorized to go into the various portions of their district excepting as their services seemed to be in demand. I find that nearly all of them have furnished good crop reports, as I insisted on special effort along this line. Their answers to questions 5, 6, 7, 25, 26 and 27 of the Water Commissioners' annual ditch reports I find are rather meager, due, I think, to the large extent of some of the districts and the inhibition put upon the commissioner against any work which County Commissioners did not deem to be absolutely necessary.

The crop conditions throughout Division No. 5 during the past season have been most excellent, and farmers are in a very prosperous condition. The extremely favorable season as to the natural precipitation and irrigation water have rendered the production of large crops a comparatively easy matter, and this fact, coupled with the abnormal prices, have combined to bring the farmer into a degree of prosperity which perhaps he has always deserved, but which he has seldom, if ever, attained to the degree which he is enjoying at this time.

#### DISTRICT NO. 37

This is a very fertile district comprising lands irrigated from the Eagle River, Gypsum Creek, Brush Creek and their tributaries, the district being almost entirely situate in Eagle County. The production of alfalfa, grain and potatoes has been considerably above the average during the past year. I visited the district twice, at one time making a very careful visit with the Water Commissioner of several of the streams and ditches. I have had no complaints or grievances from the territory and there has been no litigation so far as I have learned.

#### DISTRICT NO. 38

This district, watered from the Roaring Fork, Frying Pan and Crystal Rivers and from Cattle Creek and their tributaries, is one of the choice sections of Colorado. The streams are fed from snow that falls at a high altitude and short water rights are almost unknown, especially is this true of the two main streams of the district.

The production during the past year in this district has been highly satisfactory, and, in some instances, has been almost phenomenal. It is not unusual this year to find potato fields which will average better than two hundred sacks of one hundred and fifteen pounds each to the acre, and on the Sweet ranch, irrigated from the Crystal River, a field of ninety-five acres of potatoes gave an average yield of five hundred and twenty-nine bushels per acre, which at the present prices gives a monetary yield of \$814.15 per acre, or a gross price of \$77,344.25 for the field.

Wheat yields in this district have been little better than fair this year. Fall wheat of the Turkey Red variety has yielded from twelve and one-half to thirty bushels per acre, while Defiance spring wheat has given a yield of from twenty-five to fifty bushels, a great many fields yielding better than forty bushels per acre.

#### DISTRICT NO. 39.

In this district there has been much litigation in the past, chiefly centered at Rifle Creek and in the Antlers country; but this year, due largely to the diplomatic conduct and energetic effort of the Water Commissioner, Mr. Isam W. Graham, there has been but little difficulty. I have been called out three or four times to assist Mr. Graham, and give advice on matters which came to his attention, but the difficulty was slight and was soon adjusted in each case.

#### DISTRICT NO. 43

This district comprises lands situate in the vicinity of Meeker and irrigated from White River and its tributaries. It is one of the best irrigated sections in the division, and the water officials have little or no trouble over the distribution of water. In fact, their services are so little in demand during ordinary seasons that it is usually very difficult to secure anything like an accurate statistical report from the Water Commissioners. I think Mr. Fisk has done remarkably well in that respect this year.

Stock growing is the chief industry in this district, and the people are in a very prosperous condition.

#### pro man and an analy prosperous community

#### DISTRICT NO. 44

This district is watered from the Yampa or Bear River and its tributaries between the town of Craig and the mouth of the Little Snake River, and the water supply is usually abundant. This is also a stock growing section, and but little attention is given to crops other than hay and grain. Mr. Collom, the Water Commissioner, has not furnished me with an annual report, although I have only recently urged him to do so.

#### DISTRICT NO. 45

This district comprises some of the most fertile lands in Garfield County, the best portion of the district being situate along Divide Creek and being irrigated from that stream. While it has never been considered a well irrigated section, the farmers usually close the year with crops well up to the average, and this year has been no exception in that respect. Mr. S. B. Potter, the Water Commissioner, has been assisted in his work by four deputies, and it has kept them all very busy. The largest ditch in this district is one of comparatively recent construction and adjudication, but one which has meant much to the farming interests of that territory.

#### DISTRICT NO. 52

This is a small district on the Grand River and one from which I have heard but little during the season, but Mr. Rundell, the commissioner, has made an excellent annual report.

#### DISTRICT NO. 53

Mr. Macfarlane of this district has failed to file his annual report, but I have kept in close touch with him and his work during the year, and he seems to have had but little difficulty.

#### DISTRICT NO. 57

. Included within the borders of District No. 57 are the towns of Hayden and Craig, and this district extends northward almost to the Wyoming state line. No Water Commissioner has been appointed in this district for many years, owing to the failure and refusal of the County Commissioners to make a recommendation to the Governor.

#### DISTRICT NO. 58

This is another high altitude section and stock growing in this district is very profitable. The seasons are short and only hardy and quick maturing crops are practical. Mr. Lansing, the Water Commissioner, submits a most excellent report.

#### DISTRICT NO. 70

This district is watered from Roan Creek and its tributaries, and lies in Garfield and Mesa Counties. Mr. Newton, the commissioner, has served in this capacity many years, and is thoroughly familiar with every phase of the work.

#### GENERAL OBSERVATIONS

I have stated elsewhere that there had been no litigation in the division this year. This is true so far as irrigation officials are concerned, and I believe I only recall one instance that has come to my notice of a person being arrested for appropriating water belonging to another. I find that heretofore Water Commissioners have yielded to requests to go down the ditches and settle disputes, and I have offended both consumers and commissioners because I refused to allow a continuance of this practice. I found the Attorney General's excellent opinion on this subject very helpful in the line of justifying my action.

In District No. 38 I had some trouble the past year, due, in part, I think, to the location of the district in relation to the Division Engineer's office, and the ease with which the water users could make their complaints to that official instead of depending on the Water Commissioner. In some instances the Division Engi-

neer was blamed for what the Water Commissioner did or failed to do, before the parties had even applied to the Water Commissioner for relief, the aggrieved coming to me before I had been made aware that there was any ground for complaint. However, the trouble did not assume serious proportions, and I mention it to show what difficulties may come to a Division Engineer through no fault of his own, where the water users and the Water Commissioner do not work harmoniously together.

#### SETTLEMENT OF NEW LANDS

While but little has been done in the way of ditch or reservoir construction in the division during the past year, much new land has been filed on and many people have come into the division to develop new homes, and I anticipate considerable irrigation construction during the coming year.

In the section contiguous to Craig, in Districts Nos. 57 and 44, this settlement of new lands has been especially noticeable the past year, but the most of this settlement is in what is known as the "Dry Land Belt," where irrigation will be extremely difficult and expensive, and can only be done in a practical way on a cooperative basis.

#### COMPLAINTS

I have had several complaints from parties in regard to reservoirs which were thought to be unsafe, the parties complaining in some instances believing their lives and property to be in jeopardy.

Upon investigating the matter I am satisfied that some small reservoirs have been constructed in this division that would not be in existence today had the laws requiring notice to the State Engineer and official inspection by him been complied with. However, I find that, whatever the conditions, the Division Engineer and the Water Commissioners are without power to interfere further than to report the conditions to the State Engineer.

#### RECOMMENDATIONS

I have heretofore made so many recommendations to your office that I think I will desist from that pastime this year, further than to reiterate my oft repeated statement that Water Commissioners should be appointed by the Governor or State Engineer, and paid for their services from state funds, and should be under more direct control and supervision of the Division Engineer than at present. I desire also to say that in these days of high cost of living the statutory maximum wage of \$2.50 per day for deputy Water Commissioners makes it a very difficult matter in some sections to secure suitable assistants for the water commissioners.

I desire also to refer to the recommendations of the Division Engineers adopted December 7, 1906, and found printed on pages 208 and 209 of the Thirteenth Annual Report issued from your office.

#### CONCLUSION

In conclusion I desire to acknowledge my thanks to your office for the many courtesies extended to me during the past year, and also to express my appreciation to the Water Commissioners for the loyalty and harmony with which they have co-operated with me in the service.

Yours very truly,

(Signed) A. J. DICKSON, Irrigation Division Engineer, Division No. 5.

#### IRRIGATION DIVISION NO. 5.

## REPORTS OF WATER COMMISSIONERS FOR THE IRRIGATION SEASON OF 1916.

#### Water District No. 37.

Appropriation to ditches (second feet)	
Length of ditches (miles)	233.55
Water used from April 1 to October 1, average number of days	102.75
Average amount of water during season (second feet)	
Total number of acre feet for season	78,632.52
Total number of acres irrigated	19,564.00
Total number of acres that can be irrigated	24,813.75

#### CROP REPORTS.

Alfalfa Natural Grasses Cereals Orchards Gardens Potatoes Other Crops	4,297 4,092 11 7 1,347	acres acres acres acres acres acres
Total	19,564	acres

#### Water District No. 39.

Total	number	οť	acres	irrigated			15,935
Total	number	οť	acres	that can	be	irrigated	29,376

#### CROP REPORT

Alfalfa Natural Grasses Cereals Orchards Gardens Potatoes Sugar Beets Other Crops	169 3,170 1,336 90 983 1,075	acres acres acres acres acres
Total		

#### Water District No. 43.

Appropriation to ditches (second feet)	100.12
Capacity of ditches (second feet)	133.50
Length of ditches (miles)	30.00
Length of laterals (miles)	
Average number of days water used	82.00
Average amount of water used during season (second feet)	38.43
Number acre feet used during season	6,302.52
Total number of acres irrigated	2,785.00
Additional that can be irrigated	1,402.00

#### CROP REPORT.

Natural Cereals Potatoes	Grasses	444.00 423.00 6.00	acres acres acres acres
Tota	1		

#### Water District No. 44.

Appropriation to ditches (second feet)	
Length of ditches (miles)	
Total number of acres irrigated	15.724.00
Total number of acres that can be irrigated	24,320.00

#### CROP REPORT.

Natural Grasses 5,950		
	acres	
10(2:008	acres	
Total 15,724	acres	
Water District No. 45.		
Appropriation to ditches (second feet)	•••••	677.91
Capacity of canals (second feet)	·····	275.00
Length of ditches (miles)	·······	232.75
Total number of acres irrigated		53.00
Total number of acres that can be irrigated.	·····	42,538.00
CROP REPORT.		
A1#01#0		1
Alfalfa	acres	
Cereals	acres	
Orchards 863	acres	
(lardens 29	DOLCS.	
Gardens 88 Potatoes 462	acres acres acres	
Sugar Beets	acres	
Beans 280	acres	
Beans 280 Other Crops 314	acres	
Total	acres	•
Length of ditches (miles)		67.00 57.30 77.00
Number acre feet used during season.  Total number of acres irrigated		8,824.20 2,696.00 4,160.00
Total number of acres trigated	······································	8,824.20 2,696.00 4,160.00
CROP REPORT	•	8,824.20 2,696.00 4,160.00
CROP REPORT Alfalfa641	acres	8,824.20 2,696.00 4,160.00
CROP REPORT  Alfalfa	acres	8,824.20 2,696.00 4,160.00
CROP REPORT  Alfalfa	acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT  Alfalfa	acres acres acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT           Alfalfa         641           Natural Grasses         988           Cereals         576           Gardens         20           Pasture         439	acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT           Alfalfa         641           Natural Grasses         988           Cereals         576           Gardens         20           Pasture         439           Other Crops         32	acres acres acres acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT           Alfalfa         641           Natural Grasses         988           Cereals         576           Gardens         20           Pasture         439	acres acres acres acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT           Alfalfa         641           Natural Grasses         988           Cereals         576           Gardens         20           Pasture         439           Other Crops         32	acres acres acres acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT  Alfalfa	acres acres acres acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT  Alfalfa	acres acres acres acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT  Alfalfa	acres acres acres acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT  Alfalfa	acres acres acres acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT  Alfalfa	acres acres acres acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT  Alfalfa	acres acres acres acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT  Alfalfa	acres acres acres acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT  Alfalfa	acres acres acres acres acres	8,824.20 2,696.00 4,160.00
CROP REPORT  Alfalfa 641 Natural Grasses 988 Cereals 576 Gardens 20 Pasture 439 Other Crops 32  Total 2,696  Water District No. 53.  Appropriation to ditches (second feet) Capacity of ditches (second feet) Length of ditches (miles) Water used May 1 to September 10, average number days Average amount of water used during season (second feet) Number acre feet used during season Total number of acres irrigated  CROP REPORT.	acres acres acres acres acres	8,824.20 2,696.00 4,160.00 183.90 303.00 74.00 87.40 169.96 29,709.00 7,980.50 8,518.00
CROP REPORT  Alfalfa	acres acres acres acres acres acres	8,824.20 2,696.00 4,160.00 183.90 303.00 74.00 87.40 87.40 29,709.00 7,980.50 8,518.00
CROP REPORT   641     Natural Grasses   988     Cereals   576     Gardens   20     Pasture   439     Other Crops   32     Total   2,696     Water District No. 53.     Appropriation to ditches (second feet)     Capacity of ditches (second feet)     Length of ditches (miles)     Water used May 1 to September 10, average number days     Average amount of water used during season (second feet)     Number acre feet used during season (second feet)     Total number of acres irrigated     Total number acres that can be irrigated     CROP REPORT.     Alfalfa   2,760.00     Natural Grasses   4,662.00     A662.00	acres acres acres acres acres acres	8,824.20 2,696.00 4,160.00 183.90 303.00 74.00 74.00 169.96 29,709.00 7,980.50 8,518.00
CROP REPORT	acres acres acres acres acres acres	8,824.20 2,696.00 4,160.00 183.90 303.00 74.00 87.40 169.96 29,709.00 7,980.50 8,518.00
CROP REPORT	acres acres acres acres acres acres	8,824.20 2,696.00 4,160.00 183.90 303.00 74.00 87.40 169.96 29,709.00 7,980.50 8,518.00

#### Water District No. 58.

Appropriation to ditches (second feet)	633.44
Capacity of ditches (second feet)	902.35
Length of ditches (miles)	210.65
Length of laterals (miles)	201.35
Water used from May 1 to September 15, average number days	
Average amount of water used during season (second feet)	
Total number of acre feet for season	
Total number of acres irrigated.	
Total number of acres that can be irrigated	45.415.00

#### CROP REPORT.

Natural Cereals Gardens	Grasses	22,121 2,122 205	acres
Tot	ale !	26 222	a area

#### Water District No. 70.

Appropriation to ditches (second feet)	
Length of ditches (miles)	
Length of laterals (miles)	
Water used from May 1 to November 10, average number days	
Total number of acre feet for season	
Total number of acres irrigated	
Total number of acres that can be irrigated	9,023.00

#### CROP REPORT

Alfalfa Natural Grasses Cereals Orchards Gardens Potatoes Sugar Beets Pasture Other Crops	134 1,464 219 5 43 4	acres acres acres acres acres acres acres acres	
Total			

#### CHAPTER VI

### EVAPORATION LOSSES FROM STREAM-BED RESERVOIRS.

The present State Engineer feels that the existing method of administering the rights of stream-bed reservoirs during the periods of non-storage is fundamentally wrong, and works an injustice on all ditches deriving their supply from this stream during this non-storage period.

At present a stream-bed reservoir is ordered not to store after a given date. From this time on, until the non-storage period ends, this reservoir is required to keep its gage height constant, except insofar as use of stored water is made from the reservoir in question. Undoubtedly this means that the reservoir, during its non-storage period, takes from the stream in question the quantity of water that is evaporated from its exposed surface. It is self-evident that all off-stream reservoirs must on account of their location, stand their evaporation losses during the non-storage period. When an off-stream reservoir is ordered not to store water, its inlet ditch is closed and no supply of water does or can go to offset the evaporation losses.

For the purpose of illustrating the question before us it may be well to give at this time the results of estimates which have been prepared to determine evaporation losses from Antero Reservoir and Prewitt Reservoir. The former is a stream-bed reservoir, located on the South Fork of the South Platte River, in Water District No. 23. The Prewitt Reservoir is not a stream-bed reservoir, and is located in Water District No. 64.

Since May, 1909, at which time the Antero Reservoir began storing the waters of the South Fork of the South Platte River, until January, 1917, a careful detailed estimate has been made of the evaporation losses sustained by this reservoir. This estimate shows that during this period a total of 56,000 acre feet of water was lost from the Antero Reservoir by evaporation.

An estimate prepared to determine the evaporation losses from the Prewitt Reservoir, covering the period from December, 1912, to October, 1915, shows that there was, during these thirty-five months, a total of 16,219 acre feet evaporated. These estimated losses in particular instances are only cited at this time to show that the problem is an important one, and should receive the serious consideration of the State Engineer in the administration of stream-bed reservoirs.

Assuming for the purpose of illustrating at this time that there is a stream-bed reservoir located on the headwaters of a stream which is fully appropriated during the growing season. This reservoir receives non-storage orders on May 1, and from that date until October 1 is not permitted to store any of the waters of

the stream in question. Assuming that this reservoir loses from its exposed water surface during a year 8,000 acre feet by evaporation, there would be, during the months of May to September, inclusive, five per cent of the total annual evaporation losses sustained, giving 5,200 acre feet as the evaporation loss during the growing season. During this period the direct right ditches deriving their supply from the stream in question have been deprived of 5,200 acre feet of water, assuming that there has not been at all time a sufficient quantity of water in the stream to supply the demands of the direct right ditches.

The present State Engineer feels that in justice to these direct right ditches, the stream-bed reservoirs should be charged with their evaporation losses during the period of non-storage, and that these reservoirs should be administered in such manner as to deduct evaporation losses during the non-storage period from the reservoir in question. It does not seem that it would be a very difficult matter to administer, for these stream-bed reservoirs could be required to lower their gage rods during the non-storage period a definite amount each week. This amount varies, of course, at different periods of the year, and on account of the variation which obtains in the rate of evaporation from a free water surface. due to local conditions and effecting factors, this amount would not be the same for the same month in different years. However, an average depth of evaporation for similar months could be adopted, and the variation from this average would in no instance work a hardship on either the reservoir or the direct right ditches.

With this problem in mind the present State Engineer undertook to compile and digest all of the available evaporation data which was a matter of published record. Compilation of all the existing data was undertaken and an attempt made to obtain a conservative figure for the annual depth of evaporation from a free water surface, which would be applicable to average conditions in Colorado.

In investigations of evaporation data quite a diversity of opinion is expressed by those conducting or reporting on the evaporation experiments. Many evaporation records vary to such an extent among themselves, even when the local conditions appear to be quite consistent and uniform, that one wonders just what data should be accepted and what discarded. It is axiomatic that the depth of evaporation from a water surface depends upon several different, definite factors. The relative temperature of the air and the water adjacent thereto is one of the important factors. The humidity of the air adjacent to the water surface affects materially the rate of evaporation. The dryer the air adjacent to the evaporating surface, the less will be the vapor pressure, and, consequently, an increased rate of evaporation will result. A most important factor affecting the rate of evaporation is the total wind movement across the evaporating surface. If the layer of air immediately adjacent to the water surface from which evaporation is taking place is changed continually, and a dryer air takes the place of the air which has in part received some of the moisture evaporated from the water surface, it is quite evident that a larger total loss by evaporation will be sustained from the water surface.

Two general plans have been followed in determining the loss from water surfaces by evaporation. The more common method has been what is known as the "land pan" observations, and the other and more desirable method the "floating pan" observations. The practical difficulty which must be contended with whenever the floating pan method is adopted probably accounts for the larger number of land pan evaporation records that are available.

Experiments have been conducted to determine the relation that exists between the loss in depth by evaporation from land pans and floating pans. At first thought it would seem probable that such experiments would indicate that the depth of evaporation from land pans would be greater than that from a floating pan in the same locality and under the same conditions. This does not seem to be the case, as has been found in digesting the available evaporation data. Some experiments have determined that the loss by evaporation from a floating pan was eighty per cent of the loss from a land pan. Others have arrived at results practically opposite.

Considering the various factors which affect the rate of evaporation, it does not seem probable that under the same and similar conditions the evaporation from a water surface, as that of a reservoir, can be greater than the evaporation from a land pan. layer of air in contact with the water surface of the land pan certainly changes more rapidly and dryer air comes in contact with the evaporating surface than is possible if this water surface is larger, as that of a reservoir. Again, the temperature of the water in a land pan, on account of its small volume, is higher during those seasons of the year when the rate of evaporation is greater. Since the relative temperatures of the water and layer of air adjacent thereto, the total amount of wind movement and the humidity of this air, are the important factors affecting the rate of evaporation, and, since these factors all tend towards an increased rate when considered with the land pan, it is logical and is believed that the amount of evaporation from a free water surface, as that of a lake, is less than the evaporation from a land pan under similar conditions.

The relative loss by evaporation from a free water surface and the loss as measured in a pan floating thereon, has been experimented upon and discussed by different observers. Here again a diversity of opinion exists. There are, of course, practical difficulties incident to the installation and measurement of evaporation loss from floating pans. If the floating pan is installed in a protected part of the reservoir, the difference in local conditions may result in the floating pan evaporation loss being materially different than that from the free water surface of the entire reservoir.

It is not believed that it is probable or possible for the depth of evaporation loss from a floating pan to be materially different than the loss from the reservoir surface on which this pan floats. Unless there is some particular local condition affecting the pan in question which does not affect the reservoir surface, the two depths should be substantially the same.

The relative location of mountain ranges and their relation with reference to a reservoir may reduce the total annual evaporation loss from a water surface, by reducing the total amount of wind movement. A lower mean annual temperature obtains at higher altitudes, and for this reason the evaporation loss from a reservoir at a higher altitude would be less than from a similar reservoir located at a lower altitude.

However, high altitudes tend to increase the rate of evaporation on account of a reduction in atmospheric pressure and a relatively dryer atmosphere. In some instances certain reservoirs at high altitudes have a larger total wind movement than many plains reservoirs. Considering all of these different points objections can in each instance be made to applying any particular set of evaporation records to any other conditions except those under which they were obtained.

It is realized that with the stream-bed reservoir problem before the State Engineer, it would be of considerable importance and of vast assistance if there were available the results of evaporation experiments conducted on reservoirs in the State of Colorado. It is hoped that some of these experiments will be inaugurated on several reservoirs in this state in the near future. However, the conditions existing at this time must be met, and such records as are available must be used, digested and applied until such time as additional data is available.

There is available in the State Engineer's office a compilation of all of the evaporation data which it was possible to obtain from published records. In each instance the source of the compiled information has been given, so that it is possible for those interested to consult the original source of the information.

Table I has been compiled, using available evaporation records. In this table the location of the experiment and the source of information is given, and the monthly percentage of the total annual evaporation is entered under the column heading of the observation, and opposite the respective month. At the bottom of this table additional information is given, the method of conducting the experiment, the total annual depth of evaporation in inches, and the approximate altitude of the station where the observation was conducted. Table I contains data from fifty-two different stations scattered throughout the United States. This table was compiled for the purpose of obtaining a safe average monthly percentage of the total annual evaporation loss.

TABLE I

Eng. 176. 100.00 Eng. Newell & Murphy, Page AT VARIOUS STATIONS THROUGHOUT THE UNITED STATES. Floating 4,100 Kalamath Falls 0.94 113.37 11.22.42 11.23.08 11.47.98 11.87 11.87 11.87 11.87 53.45 100.00 Oregon. Principles of Irr. Eng. Newell & Murphy, Page 176. Ground 2,739 Boise 1.90 2.85 5.06 5.06 11.4.00 1.2.83 1.2.83 1.90 1.90 79.00 100.00 idaho. Principles of irr. E. Newell & Murphy, Page 176. Principles of Irr. Eng. Ground 4,000 2.67 2.67 4.57 6.86 6.86 11.32 8.52 6.10 6.10 100.00 65.67 Eng. 116. ika. Principles of Irr. Newell & Murphy, Page Nebraska. Floating 4,000 6.79 6.04 6.04 8.36 8.36 8.11 116.18 116.18 116.18 116.18 117.62 117.42 66.26 Storage System. 1903-4° Queen Reservoir, Great Plains Floating Ground 1.67 2.26 2.26 5.65 1.50 1.3.66 1.3.64 2.3.2.4.2 2.3.4.6 4.3.3.4.6 4.3.2.4.2 49.11 Kingsburgh, Cal. Vol. 60, Page 163. Oct., 1885. Eng. News, Nov., 1881, -263 2.98 3.69 4.07 7.00 111.65 111.23 117.23 8.62 9.29 9.29 8.78 73.64 Salton Sea. Eng. News, Vol. 60, Page 163. 1907-08. MONTHLY PERCENTAGES OF EVAPORATION Floating Ground 6,769 1904-05. Santa Clara Valley, Cal. 901 Cal. 6,225 Eng. News, 1889-1907. Lake Tañoe, Cal. | Vol. 67, Page 380. 100 Yearly Evaporation, Inches October ..... May June July August September Total November December February Method Altitude March April

TABLE I—Continued.

MONTHLY FERCENTAGES	Š	EVAPORATION AT		VARIOUS ST.	STATIONS TE	тыкопеноит	HH	UNITED STATES	LEG.
Month	Nevada, Principles of Irr. Eng. Newell & Murphy, Page 176.	Washington. Principles of Irr. Eng. Newell & Murphy, Page 176.	New Mexico. Principles of Irr. Eng. Newell & Murphy, Page 176.	Arizona, Principles of Irr. Eng. Newell & Murphy, Page 176.	Ft. Blies, near El Paso, Tex. lith Annusl U. S. G. S., Page 34, 1889.	Arrowhead Reservoir, Little Bear Valley, Cal. Elev. 5,160 ft. North of San Diego. By H. B. Hedges, C.E. 1895-1897.	Sweetwater Reservoir, near San Diego, Cal. Elev. 220 ft. Bull. 45, Colo. State Agri. College. By H. N. Savage. 1889-92-97.	Chico, Cal. Bulletin 177, United States Department of Agriculture, 1904-05,	Berkley, Cal. Bulletin 177, United States Department of Agriculture, 1904-05,
January	3.26	2.67	80.4	3.99	2,37	0.84	4.01	0.56	2.50
February	3.26	89.68	9.10	4.12	2.37	1.35	2.87	2.11	
March	4.20	61.6	20.0	5.43	2.20	2.63	20.00	7.02	5.26
April	9.0	70.11	9.50	28.7	3.65	10.62	10.0	87.7	20.7
May	8.6	12.30	18.23	10.00	12.92	10.98	4.4	7 T	11.72
June	16.00	16.10	10.40	11.70	12.03	10.53	10.03	14.00	14.10
Auty	10.01	10.04	19.00	10.01	19.51	14.96	19.00	10.00	19.00
August	10.60	10.07	0.07	11.00	10.01	00.11	16.30	11.49	11.60
Ootober	9.0	7 63	9.0	0.50	80.03	0.00	0.82	78.6	00.11
Morrombon	0.00	9 6		70.0	9 4	2.0	1 0		9.00
December	3.73	2.21	3.45	4.03	3.44	2.38	4.03	30.30	3.07
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Yearly Evaporation, Inches	53.65 Floating	67.98	86.95	115.18	84.40	39.15 . Floating	59.07	64.00	40.10
Altitude	3,965	1,970	4,200	1,325	3.874	5.160	220	189	317

TABLE I-Continued.

MONTHLY PERCENTAGES OF		EVAPORATION AT	V TA NOI	SOC	SNO		THE	A !	STATES.
Month	Tulare, Cal. Bulletin 177 United States Department of Agriculture, 1903-04-05,	Pomona, Cal. Builetin 177 United States Department of Agriculture, 1903-04-05,	Calexico, Cal. Bulletin 177 United States Department of Agriculture. 1903-04-05,	Chestnut Hill Reservoir, Boston Water Works 10 yr. Publid Water Supplies, Turneaure &	Mt. Hooper Reservoir. Rochester, N. Y. Water Works 2 to 8 yrs. Public Water Supplies Turneaure & Russel.	California, O. Working Data For Irrigation Engineera, Mor- itz.	Birmingham, Ala. Working Data For Irrigation Engineers Moritz.	Birmingham, Ala. Working Data For Irrigation Engineers Moritz.	Minidoka Dam, Idaho. Working Data For Irrigation Engineers Moritz.
January Rehruary	2.07	3.63	3.85	2.45	1.51	2.18	2.92	2.8	2.33
March	4.75	5.71	7.19	4.34	3.86	5.44	4.38	4.32	4.14
April	5.64	6.99	7.72	7.58	7.59	8.97	8.67	10.27	7.25
May	10.45	9.61	10.42	11.38	11.37	11.02	11.50	12.20	11.62
July	16.50	14.02	13.47	15.26	15.83	15.65	14.34	13.35	15.54
August	15.10	14.24	11.62	14.02	15.35	15.78	14.30	14.03	13.98
September	11.32	10.77	9.62	10.50	12.01	12.24	11.69	10.73	11.40
Vetober	7.77	0.0	9.60	6.05 7.7	9.19	20.0	4 38	4.03	0.0 0.0 0.0
December	2.83	4.32	4.12	3.86	3.27	2.18	2.92	28.	3.63
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Yearly Evaporation, Inches	70.58	64.95	92.48	39.20	34.54	45.99	51.34	52.13	96.52
Attitude	287	861	0	124	200	492	600	600	4,225

TABLE I—Continued.

MONTHLY PERCENTAGES OF EVAPORATION AT VARIOUS STATIONS THROUGHOUT THE UNITED STATES.

Month	.ake Kachesa, Wash. Working Sata for Irrigation Engineers. Koritz.	Deer Flat, Idaho. Working Data for Irrigation Engineera. Moritz.	ake Tahoe, Cal. Working Sata for Irrigation Engineers. Moritz.	krlsbad, N. M., Reclamation Office, Working Data for Irri- stion Engineers, Moritz,	Zarlabad, W. M., Alfalfa Freld Gear. Working Data for Irri- fation Engineers. Moritz.	ake Avalon, V. M. Working Acta for Irrigation Engineera. Moritz.	Fort Bliss, Tex. 14th Annual Report U. S. G. S., Fart II, 2ge 154. 1889-93.	Destrut Hill Reservoir. Pro- sedings Inst. of C. E., Vol. LXXXIII, 1886-87, Part II.	Lakes Near Ft. Collins, Colo. Bulletin 45 Colo. State Agri- sultural College. 1889-90-96-97.
January February March April May June Juny Anger	1,52 3,852 7,852 11,68 18,91 1,691	23.55 3.55 7.75 10.20 13.38	4.15 4.15 4.74 7.11 10.06 14.66	4.67 5.13 8.33 10.90 11.98 11.56	5.30 5.57 9.48 11.76 11.60 11.21	4.75 4.75 5.82 7.87 10.68 11.66	33.32 6.54 9.17 123.30 123.4	22.58 3.75 6.11 13.65 11.3.65 11.3.65	2.55 3.36 5.88 8.41 10.93 113.44 12.96
September	13.46 4.49 1.529	11.94 6.98 7.13	6.53 8.53 8.53 8.53 4.54	9.10 7.07 6.12 4.67	6.23 6.23 8.75 8.75 8.00	10.02 7.38 6.07 4.75	10.70 7.92 4.83 3.43	112:22 8:84:2 3:73:73 5:53	10.93 7.57 2.52
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Yearly Evaporation, Inches Method Altitude	32.76	77.43 Raft 2,739 . Bolse	42.21	107.25 Ground 3,102	94.35 Ground 3,102	94.76 Floating	95.91 Floating 3,874	39.12 Floating 124	59.50 Floating 5,000

TABLE I-Continued.

MONTHLY PERCENTAGES OF	AGES OF 1	EVAPORATION AT VARIOUS STATIONS THROUGHOUT	ION AT V.	ARIOUS ST	TATIONS T	нкоисно	ot the u	THE UNITED STATES	TES.
Month	Salton Sea. 1,500 ft. Inland. Working Data for Irrigation Engineers, Moritz.	Salton Sea. 500 ft. at Sea. Working Data for Irrigation Engineers, Moritz.	Salton Sea. 7,500 ft. at Sea. Working Data for Irrigation Engineers. Moritz.	Indio, Cal. Working Data for Irrigation Engineers, Moritz.	Mecca, Cal. Working Data for Irrigation Engineers, Moritz.	Brawley, Cal. Working Data for Irrigation Engineers. Mor- itz.	Mammoth, Cal. Working Data for Irrigation Engineera, Mor- itz.	Hermiston, Ore. Working Data for Irrigation Engineers. Mor- itz.	Hermiston, Ore. Working Data for Irrigation Engineers. Mor- itz.
January	3.09	3.32	3.20	2.67	2.71	2.95	3.38	-	1.54
February	4.51	4.61	4.78	4.27	4.64	4.83	4.52	1.84	1.80
March	1.60	6.21	6.53	6.28	7.49	7.72	7.16	4.41	4.37
April	9.28	8.27	8.22	10.11	10.07	10.37	9.58	10.69	9.54
May	11.55	10.13	80.6	13.28	11.80	13.31	12.37	11.59	11.70
June	13.07	12.42	12.21	13.50	13.20	13.22	13.34	14.01	14.23
Anonst	11.24	13.00	11.10	11.54	12.21	10.00	14.33	16.26	17.36
September	9.43	11.41	11.34	10.35	9.55	9.81	89.6	10.80	10.37
October	8.02	8.47	8.68	7.46	7.58	6.75	7.56	5.71	6.25
November	4.55	5.72	2.60	4.34		3.95	4.19	2.94	3.08
December	3.90	4.30	4.94	2.51	2.76	2.57	2.95	2.21	1.80
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Yearly Evaporation, Inches Method	164.50 Ground 263	108.65 Floating 263	106.45 Floating 263	119.33 Ground 20	107.81 , Ground 185	103.55 Ground 105	125.53 Ground 257	68.05 Raft 451	97.29 Ground 451

TABLE I—Concluded

Month	Granite Reef, Ariz. Working Data for Irrigation Engineers. Moritz.	San Antonio, Tex. Robert Follannsbee, U. S. G. S. 6 Years.	Austin, Tex. Robert Follans- bee, U. S. G. S. I Year.	Phoenix, Ariz. Robert Follans- bee, U. S. G. S. 1 Year.	Dutch Flats, Neb. Pub. U. S. W. B. 1910.	North Platte Project, Neb. U. S. R. S. 1909-1914, Incl.	Ft. Collins, Colo. Agriculturs. College, 1887-1911,	adinoM laioT	Monthly Mean Percentage.	
January	4.35	4.06	70.95	2.69	2.32	2.73	3.18	153.77	2.96	•
, and a second s	5.87	6.98	5.15	6.08	4.05	3.99	7.04	290.47	6.59	
	7.17	7.93	6.03	8.74	6.95	8.72	10.42	432.58	8.32	
*	9.73	00 c		12.61	80.6	11.97	11.29	567.57	10.91	
	13.04	12.95	14.40	17.21	16.98	15.78	13.64	762.07	14.66	
August	12.78	14.00	16.84	9.98	14.66	13.78	12.23	718.67	13.82	
September	11.25	10.89	13.13	10.77	11.52	10.34	10.51	587.16	11.29	
November	6.71	474	20.0	0.5	20.0	2.00	3.12	252.4 C	4 86	
December	4.32	3.56	2.67	3.13	3.48	2.73	2.79	169.93	3.27	
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	5,200.00	160.00	
Yearly Evaporation, Inches Method	97.74 Floating	67.07 Ground	50.92 Floating	65.63	86.38	55.10 Ground	40.90 Ground			
Altitude	1,325	701	650	1,108	4.000	4.000	4.985			

While it is realized that numerous experiments have been included in Table I which were conducted at localities and under conditions not in any manner comparable with those existing at the sites of most reservoirs in Colorado, yet it is believed that the method used in compiling this table is reasonable, and that a safe and usable monthly percentage can be obtained by combining the data given in this table. It is felt that the method used is more-desirable than to obtain monthly percentages of loss from a few experiments conducted for shorter periods of time, even when such experiments or observations were made under local conditions which could be favorably compared with the particular reservoir under consideration. Each experiment, when considered by itself, with monthly percentages available, expresses relatively the variation which takes place in the rate of evaporation during the twelve month period. If the mean monthly percentage, obtained at the end of Table I is compared with the monthly percentages of each separate observation, it will be noted that in practically no case is there any considerable difference existing between the mean obtained and the particular monthly percentage of the individual experiment.

# TABLE II

# FLOATING-PAN EVAPORATION—INCHES.

Loocation	Year	Jan.	Feb.	Mar.	Apr.	May	June	July .	Aug.	Sept.	Oct.	Nov.	Dec.
C. F. & I. Res. No. 2	1908	*1.83	*2.13	*3.46	*5.15	*6.75	*8.15	8.06	8.04	8.75	4.91	8.24	1.38
C. F. & I. Res. No. 2	1909	1.87	1.13	3.22	4.27	5.43	7.52	9.73	5.62	7.20	5.48	*2.72	*1.83
C. F. & I. Res. No. 3	1908	•1.93	*2.24	*3.65	*5.43	*7.12	*8.61	7.59	8.05	10.27	4.96	3.24	•2.13
C. F. & I. Res. No. 3	1909	*1.79	*2.08	*3.38	*5.02	*6.58	8.01	9.77	8.02	7.67	4.65	1.44	*1.97
Queen Res. near Lamar	1903	*1.45	•1.68	•2.74	•4.07	4.25	3.00	9.75	7.00	7.00	. 5.05	2.15	0.82
Queen Res. near Lamar	1904	4.50	4.00	5.54	6.20	7.38	8.40	11.68	10.97	6.57	• 5.95	*3.77	•2.53
Warrens Lake, Colorado	1889	*1.78	*2.07	*3.37	•5.01	*6.57	*7.95	7.37	*8.32	7.25	197	*2.93	•1.97
Warrens Lake, Colorado	1890	*1.39	*1.62	*2.63	*3.92	*5.22	*6.22	•6.90	8.93	4.81	1.62	•2.29	•1.54
Lee Lake, Colorado	1896	*1.57	*1.82	*2.96	•4.40	•5.78	6.36	9.11	7.25	6.20	4.17	. *2.57	•1.73
Lee Lake, Colorado	1897	•1.82	*2.11	*3.44	•6.12	4.31	9.55	8.53	8.61	8.40	4.60	•2.99	•2.01
Loomis Lake, Colorado	1897	•2.04	*2.38	*3.86	*5.75	7.89	7.91	11.87	9.02	<b>47.79</b>	4.89	*3.36	•2.26
Claymore Lake, Colorado	1897	•1.39	*1.62	*2.63	*3.93	5.22	*6.22	•6.90	8.93	4.81	1.62	<b>*</b> 2.29	•1.54
Pathfinder, Wyoming	1914	*2.23	*2.59	•4.20	•6.26	6.55	10.28	12.01	10.95	8.76	4.44	4.50	•2.46
Pathfinder, Wyoming	1915	*1.44	*1.67	*2.71	6.77	6.02	8.28	9.87	8.94	6.38	5.47	*2.36	•1.59
Total		27.03	29.14	47.79	71.29	85.07	106.46	129.14	118.86	100.86	63.42	39.85	25.76
Mean		1.93	2.08	3.41	60.9	80.9	7.60	9.22	8.48	7.20	4.53	2.85	1.84
Monthly per cent		3.20	3.45	5.65	8.45	10.08	12.60	15.28	14.06	11.93	7.52	4.73	3.05
Total of Means, 60.31.		Total of Monthly per cent., 100.00	fonthly 1	per cent.,	100.00.		*Deduc	ed by ta	ble of m	*Deduced by table of monthly percentages	ercentag	res.	

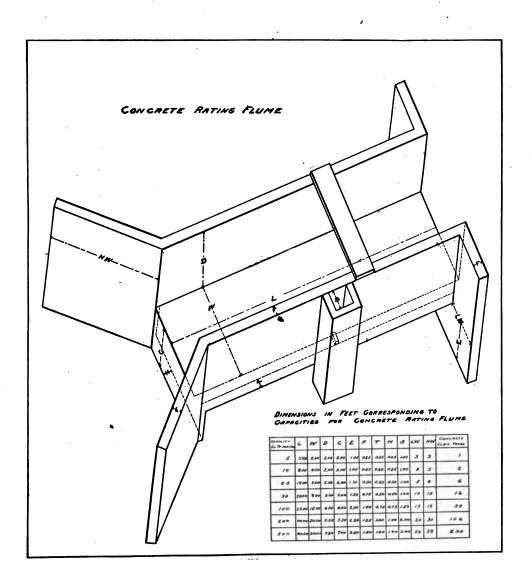
Table II is a compilation of available evaporation data, which it is believed can be consistently compared with Colorado conditions existing at the sites of the reservoirs in this state. The Colorado Fuel and Iron Company Reservoir experiments were conducted by Mr. A. A. Weiland, and these reservoirs are located in the Arkansas Valley near Pueblo. The Queen Reservoir is located in the lower Arkansas Valley, and no detailed information is available as to the particular methods adopted for the conduct of these The Warren, Lee, Loomis and Clayborn Lake exexperiments. periments were conducted by Prof. L. G. Carpenter, and all of these reservoirs are in the vicinity of Fort Collins. The Pathfinder experiments were conducted by the U. S. Reclamation Service. The broken records available have been completed by deducing the monthly loss in inches by applying the mean monthly percentage obtained from Table I. Table II gives a total mean annual evaporation loss of 60.31 inches, and, in view of the data available it is believed that this amount of gross evaporation loss is the best estimate which can be prepared at this time.

For all practical purposes it could be said that under average conditions a reservoir in the state of Colorado would lose a depth of sixty inches per annum; that of this sixty inches the depth lost in any particular month can be obtained by applying the percentages in Table I.

During these periods of the year when a stream-bed reservoir is not permitted to store, it is not entirely practicable and possible to administer this reservoir in such manner that its gage rod would be lowered a certain amount each week during the non-storage period? For example: If the annual evaporation loss is five feet per annum, during the month of July the gage rod of any stream-bed reservoir should be decreased 8.80 inches; and during any week of this month this gage rod would be lowered 2.2 inches, or at the rate of 0.284 inches per day.

It is believed that the direct right ditches on streams of this state should not be deprived of water to which they were entitled and had prior to the time of construction of a stream-bed reservoir, which reservoir now takes from the stream an amount of water sufficient to make up its evaporation losses.

This problem is becoming, and in some instances is already a vital one, and it is believed that the only equitable method of administering a stream-bed reservoir during the period of non-storage is to charge the reservoir in question its evaporation losses, and make weekly deductions from the gage rod to compensate for these losses.



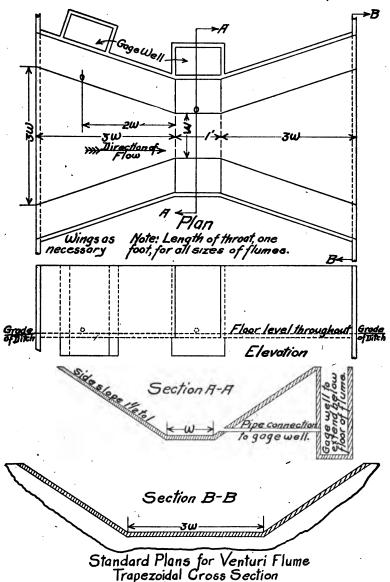
#### CHAPTER VII

#### THE VENTURI FLUME By V. M. Cone

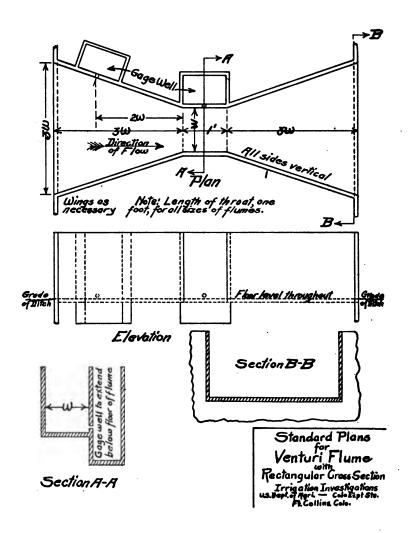
Although there are many devices for the measurement of irrigation water, none of them meets all field conditions equally well, The ideal measuring device would be (1) inexpensive to construct, (2) simple to operate, (3) require little maintenance, (4) free from working parts, (5) accurate in its measurement, (6) free from sand, silt or floating trash troubles, and (7) require little loss of head in the ditch. It is almost too much to expect that any one device will successfully meet all these conditions, especially for both large and small ditches, but it is believed that the Venturi Flume is an advance step in the right direction. It is the purpose of this article to present some of the fundamental plans and results of preliminary experiments on this new type of device for measuring the flow in open channels, in order that those in practical need of such a device may know of its existence. thermore, it is hoped that the construction of sizes of Venturi Flumes larger than were tested in the laboratory will be encouraged thereby and they can be calibrated.

The Venturi Flume was developed in the hydraulic laboratory at Fort Collins, Colorado, during the season of 1915, under a co-operative agreement between the Colorado Experiment Station and the U. S. Department of Agriculture. As shown in the plans, Figures 1 and 2, it consists essentially of a flume with a converging and a diverging section and a short "throat" section between them. The floor is level and placed at the elevation of the bottom of the channel in which it is set. The standards shown in the plans were chosen after many experiments had been made, and were adopted as most nearly meeting practical requirements.

As the water flows through the flume there is a slight surface slope in the converging section, a rather sudden depression in the "throat" section, and a rise in the diverging section. The actual loss of head is small. The determination of the flow is obtained from readings of two gages, one of which has been placed in the middle of the throat section and the other has been arbitrarily located upstream from the start of the throat a distance equal to two-thirds the length of the converging section. The zero of these gages must be at the elevation of the floor of the flume, and it is especially important that the zero of the two gages be at exactly the same elevation. An error in placing the gages will make all discharge measurements in error, and it is especially serious in the difference in heads. H<sub>d</sub>, which is a more important factor in determining the flow than the depths of water in the channel, H<sub>a</sub> or H<sub>b</sub>.



Standard Plans for Venturi Flume
Trapezoidal Cross Section
USDept.of Agri. — Irrigation Investigations — Colo Expt. Sta.
Ft. Gollins, Colo.

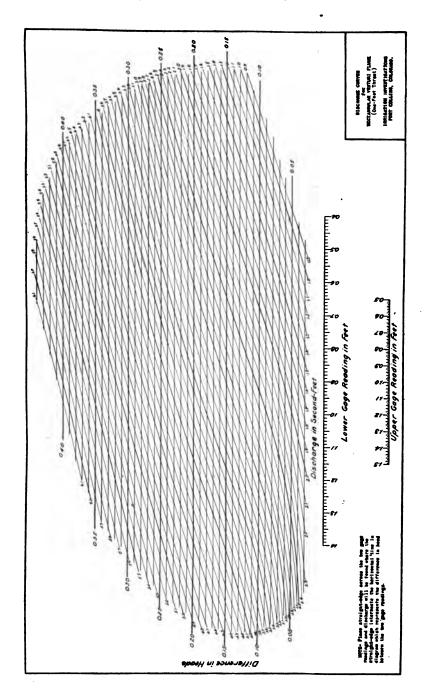


Still-boxes, or gage-wells, are necessary for accurate readings of the water level, and are recommended for general use. Field tests have shown that readings taken to the nearest one-hundredth of a foot on staff gages placed inside the flume at the proper locations, but with the face of the gages countersunk flush with the surface of the side of the flume, will give results close enough for general purposes, but additional tests in the laboratory have shown that such staff gage readings do not agree with the readings taken in the still-wells when there is enough fall in the ditch to make a comparatively high velocity of flow through the flume. Until more is known about this point, it will be safest to use still-wells.

Instrument makers are at work on an automatic register to give a continuous record of the two gage heights on a single sheet.

The effect of velocity of approach seems to be automatically taken care of in the Venturi Flume, and all field tests indicate that it will be free from changes in indicated discharge due to weed growth, accumulations of sand or silt in the ditch, or other changes in the ditch section. Such changes make the ordinary rating flume unreliable, but results only in changing the relative gage readings of the Venturi Flume without altering the rating of the device. The increased velocity of the water in the flume makes it self-cleaning of sand, silt and floating trash. It must be remembered, however, that the floor of the flume must not be placed below canal grade, which might allow sand and silt to accumulate especially at low velocities, and the standing water in the structure would alter the calibration. It is also important that the size of Venturi Flume be not considerably smaller than the size of the ditch, as this gives an opportunity for silt banks to form at the side of the entrance to the flume.

The Venturi Flume is not an exact measuring device, but it is accurate enough for most irrigation needs. Although only the smaller sizes have been experimented with, it is believed that larger sizes built according to the general plans will be applicable to use in main canals, and when properly constructed it does not require rating. It is simple to build of lumber or concrete, makes a good connection with concrete canal living, does not obstruct the flow in the ditch, has a comparatively low cost, has no working parts, and is simple to operate.



The discharges through Venturi Flumes may be taken from curves as shown in figure 3, which is the flow through the rectangular Venturi Flume with a throat width of 1 foot. Curves have also been prepared to give the discharge through rectangular Venturi Flumes with throat widths of 1½ and 2 feet, but lack of space prevents their being shown here. A special type called the V-Notch Venturi Flume has been devised to measure flows of from 0.1 second-foot to a maximum of 2 or 3 second-feet under practical ditch conditions, and another type having trapezoidal cross-section with side slopes of 1 to 1 and a bottom throat width of 0.5 foot will measure flows of less than 1 second-foot to a maximum of approximately 10 second-feet. The plans and discharge curves for these special types are not shown here.

A public patent has been applied for on the Venturi Flume to insure its use by any one who may want it without payment of royalties. Further experiments and calibrations of larger sizes will be undertaken in the near future and this information will be supplied to those interested upon application to Irrigation Investigations, Experiment Station, Fort Collins, Colorado.

# COMPARISON VERTICAL INTEGRATION TWO POINT, AND ONE POINT MEAN VERTICAL VELOCITY METHODS

	7.5	True Vol*	COMP	ADATIVE		/ELOC		DATA	METHO	DS COM	DADED	MEAN	DEPTH	DIST
CA	NAL	in Feet								A ERROR		VELOCITY	OF	FROM
		per Sec	Fire	*Error		bne		ird	First	Second		DEPTH	WATER	SIDE
-	Α.						Method	*Error	First	Second	Third			
0	A	7.76	.6	8.0	7-8	9.3	-			3.4	1	.80	2.70	.21
0	A	2,37	.78	3.8	.6	7.2	-	-	V. L.	.78	.6	.69	7.60 7.30	.47
_	A	4.08	V. 1.	-1.0	.6	7.0	7-8	34				.63	7.30	.37
0	В	2.71 2.98	.2-,8 .2-,8	0.8	.6	5.7			1-8	.6		.73	7,40	,30
0	В			- 2.7	6	5.4		-					2.40	.41
_	C	274	V. I.	0.0	2-8	2.2	.6	9.0	V. L	2-8	.6	.72	2.50	.12
	C		V. 1.	1.8		6.3	.6	11,5	1.11.0			67	4,7.0	.75
	D	2,97	.6	1.7	7-8	4.4	Y.L	5.7	.6	7-8	IVI	.63	1,90	.35
	E	3.71	V. 1.	4.1	2-8	5.9	6	10.9	V. 1.	7-8	6	.84	1.60	.79
0	F	4.10	.2-8	5.9	6	59			200			:71	3,50	.50
0	F	3.4 8	2-8	2.3	.6	121			2-8	V. L	6	.77	3.50	.20
	F	4.00	2-8	0.3	V. L.	0.5	.6	3.0	4.00		123	.64	3.45	.40
	6	2.77	1.V.	2.5	.5	3.3	7-8	5.4				.70	2.35	.33
	6	3.00	V. I.	2.3	2-8	4.3	6	4.7	V. I.	.6	2-8	77	7.65	44
	6	1.90	VI	2.1	.6	3.7	2-8	6.3	, re 11		- "	.77	1.70	.41
_	н	767	VI	0.8	7-8	27	.6	7.6	VI	2-8	.6	.85	1,60	42
_	1	7.83	V.L	1.1	2-8	4.6	6	8.1	V. I.	Z-8	6	.83	2.10	.25
_	.1	337	7-8	0.0	V-L	39	6	5.6	2-8	VI	.6	.80	1.00	.78
0	К	7.07	6	0.5	7-8	140	-0	3.0		-		.60	1.40	48
_	K	754	VI	1.6	2-8	- 8.0	.5	15.7	V. L.	à	Z-8	.67	260	37
0	L	3.37	6	7.4	2-8	7.7	.0	1 3-1			-	.84	290	.24
0	1			4.0	7-8	6.1	-	-			0	83	2.60	.48
	-	3.7.9	.6	4.0			-	-			1	.73		44
0	-	230	2-8		.6	12.2	-	10	VI	7-8	.6	.15	1,50	
-	-	3,93	V L	1,3	2-8		.6	48	100		1 2	.70	200	,40
-	L	3.39	.6	5.0	2-8	6.Z	V.L	- 9.2			1	.81	2.70	.40
_	_	3.00	.6	0.0	V. 1.	0.7	7-8	7.3			_	.60	7.60	.20
	M	2.43	V. L	-1.2	.2.8	7.8	.6	7.0	V-1.	.6	7-8	.70	7.35	.38
	M	1.97	6	3,1	1.V	8,3	7-8	9.9	711. 19	1.5	(00, 10	.75	1.60.	.44
	N	3,10	.6	- 7.6	V.L	9,0	7-8	10.9	.6	I V. I.	7-8	.74	2.70	.50
	0	7.84	7-8	0.7	V. I.	8.5	.6	11,9	2-8	V. T	.6	.78	0.90	.38
	0	3.06	2-8	1.3	.5	2.0	I.V.	3.3		W. W.	.0	63	1.08	.50
7	P	1.79	Б	1.7	7-8	3.9	V. L	6.1	Z-B	6	VL	.64	1.95	33
	P	7.03	Z-B	3.9	6	7.A	VI	8.4	T-B	.0	A. P.	.78	1.35	.48
0	Q	7.19	2-8	2.3	.6	3.2				0.0		67	300	.36
	Q	2.02	V. I.	- 1.0	7-B	1.0	.6	3.0	V. I.	7-8	.5	.87	3.00	.45
	Q	7.7.1	VI	- 7.3	2-8	36	.6	4.5		100		.71	310	.27
	R	2.03	6	7.5	1VI	10.3	7-8	11.3	. 5	VI	7-8	.83	1.80	31
0	5	2:15	- 6	0.9	2-8	6.4	1	1	- 6	7-8	-	60	1.60	.43
-	T	2.40	7-8	2.9	.6	3.3	V. I.	5.0		1		.68	3.00	.46
	T	3.18	6	1,9	V. I.	3.1	2-8	5.7			1000	80	300	39
	T	1.80	.6	3.3	7-8	61	V.L	10.0	7-8	.6	V. L	65	2.50	15
	Ť	7.54	7-8	- 7.8	V. L	-4.7	.6	11.4		1		71	1.55	.23
-	Ü	2.77	VI	-1.1	7-8	3.2	.6	9.1				.75	295	.39
-	Ŭ	7.63	6	3.4	7-B	5.7	V. I.	11.0	Z-8	V. L	6	.68	1.85	.39
-	Ü	797	7-8	-1.7	V-1	- 5.5	.6	8.2	1	10.00		.75	275	48
_	V	2.03	V.I.	0.5	7-18	1,0	.6	4.4	-	-	-	.80	260	.76
-	V	7.07	6	0.5	V.1.	44	2-8	5.3	V. I.	6	2-3	.60	7.45	.26
_		4.09	2-8	0.5		3.7	7-9	5,5	2-8	.6	-	.50	1.50	7.4
0	W				6			-	27	d,	-			
0	X	3,20	2-8	0.9	Б	7.5		-	1			.73	2.40	.25
0	X	377	7-8	- 7,2	6	11.2			7-8	V. L	.6	.67	2.40	.50
	X	3.00	I.B	1.9	.6	10.6	V. I.	12.1	1	100	-	.77	1.10	.37
	X			1.3	7-B	3.0	.6	13,3			1	.85	2.25	.17
	Y	1.60	3,	0.0	V. I.	3.7	17-8	8.6	.6	IXI	1.7 - 8	.60	2.15	AT
	Z	304	.28	0,7	V.L	1.3	.6	4.6	78	1 V. L.	17-6	.69	1.30	45

Determined from vertical velocity curve.
 Vertical Integration method not used.

Gross Mean Error\* 4.12 4.33 5.95 Net 2.78 3.69 5.84

					. `					
ABCOE	Amity Canal Baca - Bessemer - C.C.H.& L - C.C.&QC	F 6 H   J	Cat in Canal Colorado - De Wesse Dye - Dye Lake - Fremont -	KLMNOD	Ft. Bent Canal Ft. Lyon Holbrook Lamar	Q S T U	Las A. Con. Canal - Town - Manyel - Ofero - Ox. Farmers' -	¥X	Park Center ( Pulaski Rocky Ford So. Canon Union	anal :

# CHAPTER VIII.

# VERTICAL VELOCITY DETERMINATIONS.

During the irrigation season of 1915 this office made a number of velocity measurements in the various canal rating flumes in the Arkansas Valley to determine the relative accuracy of the three most commonly used methods of determining the mean velocity in a vertical; that is, the Vertical Integration, the Two Point or 0.2—0.8 depth method, and the One Point or 0.6 depth method. These measurements were made under a wide range of conditions, including minimum and maximum depths and velocities.

At the outset, it was assumed that the vertical velocity curve, for the purpose of this determination, gives the correct mean velocity in a vertical and the accuracy of the other three methods was measured by the vertical velocity curve. This curve was determined by making velocity measurements at six point in each vertical; that is, at the surface and bottom and at the 0.2, 0.4, 0.6 and 0.8 depths.

These measurements were made with a Price current meter, the surface measurement being taken at such depth that no ripples existed over the head of the meter. This depth, for the meter in question, is about 0.2 feet. The bottom measurement was taken as near the bottom as is possible with the Price meter and is about 0.1 foot from the floor.

It was found that out of the total of 54 curves, the six points, of 22 of this number, fell at such locations that it was impossible to pass a smooth curve through them without at some point inserting a reverse curve.

In using the Vertical Integration method, the meter was moved slowly from surface to bottom and back again, care being taken to move the meter uniformly throughout the operation.

All measurements were timed for at least 20 seconds.

At the conclusion of these field tests, a curve was platted, as the mean of the 54 individual vertical velocity curves. This curve shows an error of 2.78 per cent for the Vertical Integration method, 3.69 per cent for the 0.2—0.8 method, and 5.84 per cent for the 0.6 method. The mean velocity as shown by this curve is found at 0.735 depth and the maximum velocity at 0.28 depth.

In addition to this eight curves were platted, each one being a mean of individual curves taken under similar conditions. Following is a description of these curves and results obtained from them:

First. A mean of 8 curves, taken at depths of 1.5 feet or less, was platted. This curve shows an error of 3.06 per cent for the 0.2—0.8 method, 6.25 per cent for the Vertical Integration method, and 6.5 per cent for the 0.6 method. The mean velocity was found to be at 0.76 depth and the maximum velocity at 0.37 depth.

Second. A mean of 9 curves, taken at depths of 3 feet and greater, was platted. This curve shows an error of 1.18 per cent for the Vertical Integration method, 3.36 per cent for the 0.2—0.8 method, and 5.43 per cent for the 0.6 method. The mean velocity was found to be at 0.68 depth, and the maximum velocity at 0.3 depth.

Third: A mean of 21 curves, whose mean velocity was 2½ feet per second or less, was platted. This curve shows an error of 3.74 per cent for the Vertical Integration method, 4.57 per cent for the 0.6 method, and 5.74 per cent for the 0.2—0.8 method. The mean velocity was found to be at 0.69 depth, and the maximum velocity at 0.28.

Fourth. A mean of 15 curves, whose mean velocity was 3 feet per second or greater, was platted. This curve shows an error of 1.98 per cent for the Vertical Integration method, 3.67 per cent for the 0.2—0.8 method, and 5.84 per cent for the 0.6 method. The mean velocity was found to be at 0.695 depth, and the maximum velocity at 0.31 depth.

Fifth. A mean of 12 curves taken at a distance from the side of the flume, equal to or less than 25 per cent of the total width of the flume, was platted. This curve shows an error of 1.46 per cent for the Vertical Integration method, 3.55 per cent for the 0.2—0.8 method, and 7.95 per cent for the 0.6 method. The mean velocity was found to be at 0.735 depth, and the maximum velocity at 0.33 depth.

Sixth. A mean of 23 curves, taken near the center of the rating flume, was platted. This curve shows an error of 2.02 per cent for the Vertical Integration method, 4.23 per cent for the 0.2—0.8 method, and 4.55 per cent for the 0.6 method. The mean velocity was found to be 0.74 depth and the maximum velocity at 0.25 depth.

Seventh. A mean of 32 curves, in which no reverse curves were included, was platted. This curve shows an error of 2.65 per cent for the 0.2—0.8 method, 3.27 per cent for the Vertical Integration method, and 6.88 per cent for the 0.6 method. The mean velocity appears at 0.755 depth, and the maximum velocity at 0.28 depth.

Eighth. A mean of 22 reverse curves was platted. This curve shows an error of 2.15 per cent for the Vertical Integration method, 4.3 per cent for the 0.6 method, and 5.2 per cent for the 0.2—0.8 method. The mean velocity was found to be at 0.72 depth, and the maximum velocity at 0.27 depth.

In addition to the results shown by these curves, it was determined that for depths of 1.5 feet or greater, the Vertical Integration method is the most accurate.

On page 144 is given a tabulation which shows a comparison of the three methods, for each canal measured.

Columns 3 to 8, inclusive, show the comparative accuracy of these methods in per cents for each measurement made, arranged in the order of their accuracy.

Columns 9 to 11, inclusive, show the relative accuracy of the three methods in per cents for each canal measured, arranged in the order of their accuracy. The results in these columns were obtained by taking the mean of results indicated in the preceding columns.

By "Gross Mean Error," indicated at the bottom of the tabulation, is meant the arithmetical mean error, and by "Net Mean Error" is meant the algebraical mean error; that is, in the former, no consideration was given to the sign of the result.

Conclusions to be drawn from these tests are:

First. That in general, the Vertical Integration method is most accurate under all conditions, except when the depth is 1.5 foot or less, and that this accuracy increases with the depth. The exception is likely due to the fact that the 0.2 foot at the surface and the 0.1 foot at the floor, of slow water, through which it is impossible to move the meter, make up such a large per cent of the total depth, that this method must give way to the 0.2—0.8 method in point of accuracy.

Second. That under ideal conditions the 0.2—0.8 method is the most accurate, as shown by the seventh curve, wherein all reverse curves have been eliminated.

Third. That if a One Point measurement is to be used as the mean velocity in the vertical, it should be taken a little below the 0.7 depth.

Fourth. That the maximum velocity is found near the 0.3 depth.

Fifth. That the surface velocity is about 75 per cent of the mean velocity.

Sixth. That the tendency of all these methods is to show an exaggerated velocity, as the tabulation shows only 14 instances, out of a possible 147, in which the resulting velocity is less than the mean.

# Hydrographic Department

During the biennial period this department has made 330 canal ratings and 900 stream measurements.

In addition to the above, some special investigations have been made on seepage and return water, and loss of water in transit from reservoirs.

To accomplish the work in an efficient and economic manner, hydrographers have been stationed in various districts throughout the

state, viz.: Alamosa, Pueblo, Denver, and Steamboat Springs.

The district in the vicinity of Steamboat Springs has been covered by automobile instead of by team, as heretofore. An examination of this country will show that good roads cannot be expected to be general; however, a glance at the summary of the cost of operating an automobile in this section, as shown below, would indicate that the other districts could be covered in a more efficient and economical manner by the same means.

# COST OF OPERATING FORD RUNABOUT IN HYDROGRAPHIC WORK, APRIL TO OCTOBER, 1916, INCLUSIVE

Gasoline (33c to 45c per gallon)\$	95.68
Oil and grease	14.50
Tires	57.85
Equipment	18.25
Storage	30.80
Repairs	20.05
Miscellaneous supplies	9.75
Total cost of operation\$	246.88
Total miles run	5,523
Cost per mile	0.045

Depreciation is not included in the above, and would increase the cost considerably, owing to the reduction in the cost of Ford cars since this one was purchased. The car, however, is in good condition, and valued at \$275.00.

There has been maintained during the biennial period about sixty permanent stream gaging stations. The number of stations should be increased, but unless more funds are allowed for traveling expenses and for gage readers' salaries, this cannot be done in a satisfactory manner.

The following pages contain estimates of daily discharge on the

various gaging stations in the state.

The altitudes shown may be in error a few hundred feet—the altitude of the nearest town usually being given.

Later editions of maps have also made revision of drainage areas

necessary at some stations.

Owing to lack of space in this report the actual discharge measurements have been omitted. These are on file in the State Engineer's office, and can be consulted at any time.

# ARKANSAS DRAINAGE

#### TENNESSEE FORK NEAR LEADVILLE

Location.—At highway bridge in Sec. 16, T. 9 S., R. 80 W., a few hundred yards above the mouth of the stream and about three miles northwest of Leadville.

Records Available.—May 10 to October 31, 1890; June 18 to October 16, 1903; February 8, 1911, to November 11, 1916.

Drainage Area. 45 square miles.

Gage.—Vertical staff.

Channel.—Rough, put practically permanent.

Discharge Measurements.—Made from bridge during high water and by wading at-ordinary stages.

Winter Flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 24 secondfeet above the station. There is also a decree for diversion of 18.5 secondfeet from the headwaters of Eagle River to Tennessee Fork above the station.

Co-operation.—Station maintained by the United States Geological Survey in co-operation with the United States Forest Service. Records were furnished by the United States Geological Survey.

#### EAST FORK OF ARKANSAS RIVER NEAR LEADVILLE

Localtion.—At highway bridge in Sec. 16, T. 9 S., R. 80 W., about 200 yards above mouth of Tennessee Fork, three miles northwest of Leadville.

Records Available.—April 25 to August 31, 1890; June 18 to September 29, 1903; June 5, 1911, to November 9, 1916.

Drainage Area.—52 square miles.

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge Measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter Flow.—Ice causes backwater during the winter months.

Diversions.—There is a court decree for a diversion of 2 second-feet from the East Fork above the station by the Leadville Water Company.

Accuracy.—Results considered fair.

Co-operation.—Station maintained by the United States Geological Survey in co-operation with the United States Forest Service. Records furnished by the United States Geological Survey.

## Discharge of East Fork Arkansas River near Leadville for 1915. Drainage Area, 52 Square Miles. Altitude, 10,000 Feet Above Sea Level.

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Da:	v	Jan.	Feb.	Mar.	April	Mav	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	<b>,</b>	•					113	94	35	15	23	20	
	•				•						25	22	
2	••••••	••			•••••	•	118	106	. 30	14	20		
3	•			•••••		••••••	55	94	34	12	25	28	
4			•••••	•••••	•••••		99	94	35	19	25	27	
5			•••••	•••••	•	•	118	71	30	19	28	23	
6	<b>-</b>					•••••	123	94	29	19	27	28	
7	••••••	•					132	76	28	18	23	32	
8				•••••			118	67	69	23	22	34	
9	•••••	•				9	99	61	99	23	21		
10						. 9	167	71	61	22	20		
11						12	203	61	33	17	18		
12						23	197	67	30	21	17		
13					•••••	89	167	63	28	15	17		
14					•	167	145	69	28	15	18	*****	
15						55	145	67	30	15	16		*******
16						76	145	61	28	15	15	·	
17						76	118	49	28	14	18		
18						197	167	43	23	14	22		********
19						151	197	35	23	15	25		
20						140	173	41	22	12	28		******
21					••••••	48	167	34	20	12	32		
22			•	••••••	9	48	145	41	23	12	32		•
99					12		159	45			3 Z 2 8		•••••
23 24	•••••	•••••		•••••	12	76 82	145	35	$\frac{21}{21}$	10 10	28 28		
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25		•••••	•••••	•••••	12	76	209	55	21	29	25		•
26	••••••		••••••		12	89	167	55	21	29	20		•
27			•••••	······	12	71	173	45	21	29	22		
28		•••••		•••••	. 9	51	151	48	19	25	18	•	•••••
29	•••••	•••••			35	51.	113	48	19	23	14		
30	•••••				35	106	106	37	15	23	16		
31						140		35	15	•	18		
7	otal				148	1842	4334	1862	939	539	686	214	
	an				16.4	80.1	144	60.1	30.3	18	22.1	26.8	
Ma	x				35	197	209	106	99	29	32	34	
Mi					9	1,9	55	34	15	10	14	20	
A 01	re-ft.				293	3650	8570	3700	1860	1070	1360	425	•••••
AU	e-it.	•	•		233	3030	0010	3100	1000	1010	1300	420	
							•						
							rkansas						
	Dr	ainage	Area,	, 52 S	quare :	Miles.	Altitud	e, 10,0	00 Pec	t Abov	re Bea	Level	,
Da		_					_						
	v	Jan.	Feb.	Mar.	April	Mav	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	У	Jan.	Feb.	mar.	April	May 35	June 191	July 82	Aug.	Sept.	Oct.	Nov.	Dec.
1	<b></b>			mar.	April	35	191	82	75	82	25	49	
1 2	•					35	191 212	82 82	75 99	82 82	25 21	49 49	
1	•		·		7	35 23	191 212 251	82 82 55	75 99 91	82 82 79	25 21 20	49 49 48	
1 2 3 4			·		7	35 23 23	191 212 251 274	82 82 55 43	75 99 91 72	82 82 79 75	25 21 20 19	49 49 48 45	
1 2 3 4 5			·		7	35 23 23 25	191 212 251 274 225	82 82 55 43 62	75 99 91 72 84	82 82 79 75 59	25 21 20 19 25	49 49 48 45 41	
1 2 3 4 5 6			·		7	35 23 23 25 32	191 212 251 274 225 153	82 82 55 43 62 49	75 99 91 72 84 91	82 82 79 75 59	25 21 20 19 25 20	49 49 48 45 41 37	
1 2 3 4 5 6 7			·		7	35 23 23 25 32 82	191 212 251 274 225 153 191	82 55 43 62 49 34	75 99 91 72 84 91 104	82 82 79 75 59 53	25 21 20 19 25 20 17	49 49 48 45 41 37 34	
1 2 3 4 5 6 7 8					7	35 23 23 25 32 82 172	191 212 251 274 225 153 191 216	82 82 55 43 62 49 34 35	75 99 91 72 84 91 104 88	82 82 79 75 59 53 55 49	25 21 20 19 25 20 17	49 48 45 41 37 34 25	
1 2 3 4 5 6 7 8 9			·		7	35 23 25 32 82 172 183	191 212 251 274 225 153 191 216 256	82 82 55 43 62 49 34 35	75 99 91 72 84 91 104 88	82 82 79 75 59 53 55 49	25 21 20 19 25 20 17 19	49 49 48 45 41 37 34	
1 2 3 4 5 6 7 8 9					7	35 23 25 32 82 172 183 199	191 212 251 274 225 153 191 216 256 274	82 82 55 43 62 49 34 35 82	75 99 91 72 84 91 104 88 99	82 82 79 75 59 53 55 49 38	25 21 20 19 25 20 17 19 20	49 48 45 41 37 34 25	
1 2 3 4 5 6 7 8 9					7	35 23 25 32 82 172 183 199 172	191 212 251 274 225 153 191 216 256 274 279	82 82 55 43 62 49 34 35 59 82	75 99 91 72 84 91 104 88 99 91	82 82 79 75 55 55 49 48 49	25 21 20 19 25 20 17 19 20 17	49 48 45 41 37 34 25 27	
1 2 3 4 5 6 7 8 9					7	35 23 25 32 82 172 183 199	191 212 251 274 225 153 191 216 256 274	82 82 55 43 62 49 34 35 82	75 99 91 72 84 91 104 88 99	82 82 79 75 59 53 55 49 38	25 21 20 19 25 20 17 19 20	49 48 45 41 37 34 25 27	
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1 2 3 4 5 6 6 7 8 9 9 10 11 12 13 14 15 6 17 18 19 20 22 12 22 23 4 25 6 27 28					7 10 222 35	35 23 25 32 172 189 172 161 146 146 146 161 111 88 662 662 75 914	191 212 274 225 191 216 274 278 274 242 251 191 191 146 127 107 99 75	82 82 43 49 34 59 99 110 98 89 110 98 97 75 75 75 75 75 75	7599179489110889991526666550993566665579188199666657752	8229759355984493882818229557884493884882848828488284888488848884888488848	25 210 195 220 179 207 177 197 2225 225 227 330 332 377 348 348 345	49 49 48 45 41 37 34 227	
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1234566789910112331456678199201222324526278930					77	35 23 25 32 172 182 172 161 161 146 146 146 161 111 111 111 111	191 212 274 2245 153 191 256 274 279 328 251 225 251 225 191 146 147 127 127 127 127 127 127 127 127 127 12	82 82 82 83 83 89 1199 84 97 57 57 57 57 57 59 99 99	7599124899110889975266665501899975266666550189997526666655018996287782665	822 829 7759 5549 849 438 449 448 449 448 449 448 449 448 449 448 448	25 210 195 220 179 220 177 177 122 225 233 227 330 332 348 348 343 443	49 49 48 45 41 137 34 25 27	
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1 2 3 4 4 5 6 7 8 9 10 11 2 3 14 4 5 10 11 2 2 2 3 4 2 5 6 2 7 8 9 2 2 1 2 2 2 3 4 2 5 6 2 7 8 9 3 1 7 6 6 7 8 9 10 11 2 2 2 3 4 2 5 6 7 8 9 10 11 2 2 2 3 4 2 5 6 7 8 9 10 11 2 2 2 3 4 2 5 6 7 8 9 10 11 2 2 2 3 4 5 6 7 8 9 10 11 2 2 2 3 4 5 6 7 8 9 10 11 2 3 10 10 10 10 10 10 10 10 10 10 10 10 10					7	35 23 25 32 172 172 161 161 161 146 161 114 88 66 62 75 919 127 127 168 3440	191 212 274 224 153 191 256 276 279 328 270 274 242 251 225 241 225 191 146 127 107 995 70 70 70 70 70	82 82 82 49 34 59 99 1170 1170 98 84 97 57 57 57 57 59 93 93 24 70.7	7599972891108899917248999176266999376066655791881899622508899655656550188189962250889962508996250896086666655089625089608000000000000000000000000000000000	82 829 759 553 5549 388 498 498 498 498 498 498 498 498 498 4	25 210 195 220 177 120 177 177 192 225 228 227 330 327 388 438 434 433 816.2	49 49 48 45 41 37 34 227	
1 2 3 4 4 5 6 7 8 9 10 11 2 13 4 4 5 10 11 2 13 2 2 2 3 2 2 5 6 2 7 8 2 9 0 3 1 7 Max	Cotal				77	35 23 25 32 172 182 172 161 161 146 146 146 146 146 146 146 146	191 212 274 2245 153 1916 2564 279 328 274 242 225 179 191 146 127 127 107 99 70 70 70 70 70 70 70 70 70 70 70 70 70	82 82 82 49 34 59 117 119 84 93 75 55 759 99 99 240 77.7	75 991 724 91 1048 991 1048 991 666 550 91 881 996 675 879 250.84 104	822 829 7759 5559 554 338 449 448 328 449 448 3305 348 449 448 449 448 449 449 449 449 449 4	25 210 195 220 179 207 1177 122 225 227 330 332 348 343 343 343 343 264 287	49 49 48 45 41 137 34 25 27	
1 2 3 4 4 5 6 6 7 8 9 10 112 13 14 5 16 6 17 8 19 9 2 2 1 2 2 2 2 2 4 2 5 6 2 6 7 2 8 8 3 0 3 1 7 6 Man Mi	Cotal				77 10 222 35	35 23 25 32 32 32 32 32 172 161 161 161 146 161 114 88 62 62 62 62 127 140 140 127 140 140 127 140 140 127 140 140 140 140 140 140 140 140 140 140	191 212 274 225 153 1916 256 279 328 270 274 242 242 255 179 191 191 146 140 75 70 70 70 70 70 70 70 70 70 70 70 70 70	82 825 434 345 829 1109 9170 9170 998 9757 753 755 755 993 2409 2409 277.7 1134	75 991 724 91104 991 762 665 793 760 665 775 886 775 886 760 881 105	82 82 879 755 553 555 488 488 322 384 416 682 595 418 300 223 419 429 411 820 249 782 823 824 824 824 849 849 849 849 849 849 849 849 849 84	25 210 195 220 179 220 179 177 192 225 223 287 302 377 388 438 438 438 438 438 438 438 438 438	49 49 48 45 41 37 34 25 27	
1 2 3 4 4 5 6 6 7 8 9 10 112 13 14 5 16 6 17 8 19 9 2 2 1 2 2 2 2 2 4 2 5 6 2 6 7 2 8 8 3 0 3 1 7 6 Man Mi	Cotal aan X. X. Tro-ft.				77	35 23 223 225 322 172 172 161 161 164 661 161 114 88 662 75 914 127 168 3440 129 23 582	191 212 274 225 153 1916 256 274 242 251 1225 172 242 251 191 191 191 146 140 127 70 70 	82 82 82 49 34 59 110 117 117 199 849 88 97 57 57 57 59 99 93 24 70 71 117 71 117 72 84 94 94 94 94 94 94 94 94 94 94 94 94 94	75 991 72 91 1048 991 1048 991 975 626 993 975 606 665 70 918 91 826 75 826 81 104 4970	82 829 759 553 5549 388 449 438 448 325 45 492 492 492 492 492 492 492 492 492 492	25 210 199 250 177 199 207 177 177 199 225 213 288 270 300 327 388 434 433 816.2 487 1610	49 49 48 45 41 37 34 227	
1 2 3 4 4 5 6 6 7 8 9 10 112 13 14 5 16 6 17 8 19 9 2 2 1 2 2 2 2 2 4 2 5 6 2 6 7 2 8 8 3 0 3 1 7 6 Man Mi	Cotal aan X. X. Tro-ft.				77	35 23 223 225 322 172 172 161 161 164 661 161 114 88 662 75 914 127 168 3440 129 23 582	191 212 274 225 153 1916 256 279 328 270 274 242 242 255 179 191 191 146 140 75 70 70 70 70 70 70 70 70 70 70 70 70 70	82 82 82 49 34 59 110 117 117 199 849 88 97 57 57 57 59 99 93 24 70 71 117 71 117 72 84 94 94 94 94 94 94 94 94 94 94 94 94 94	75 991 72 91 1048 991 1048 991 975 626 993 975 606 665 70 918 91 826 75 826 81 104 4970	82 829 759 553 5549 388 449 438 448 325 45 492 492 492 492 492 492 492 492 492 492	25 210 199 250 177 199 207 177 177 199 225 213 288 270 300 327 388 434 433 816.2 487 1610	49 49 48 45 41 37 34 227	

	_					nnessee	Fork at	Lead	ville f	or 1915.			
	Dra	inage	Area,	45 <b>S</b> Q	uare	Miles.	<b>Altitude</b>	, 10,00	M Lee		Bea	Teast.	
Day	,	Jan.	Feb.	Mar.	April	May	June .	July	Aug.	Sept. (	Oct.	Nov.	Dec.
1							161	90	12	10	10	7	
2			2				177	78	9	8	10	7	
3				1			95	58	12	7	11	10	
4							90	33	10	7	10	10	
5							36	27	12	7	10	10	
6		••••	3	2	*********		78	40	10	7	10	11	
7		••••	•	_	•		67	36	-ğ	7	-ğ	1ī	
Ŕ	••••••	••••••			•		58	33	65	1İ	8	12	
9		••••••		••••••	•••••	27	45	33	58	12	7	16	•••••
10	•			3	••••••	36	85	27	20	12	6	14	•••••
11	••••••		2	•	•	36	130	31	14	14	5	14	•••••
12				3	••••••	90	130	34	10	14	4	•••••	•
			••	-	••••••	122	95	34	10	13	8		
13	·····		1	•	••••••					13	10		•••••
14	••	1.3				52	78	31	10				•••••
15			2		•••••	23	78	31	11	12	8	•••••	
16			• • • • • • • • • • • • • • • • • • • •			111	72	26	10	12	8		
17				2		139	90	16	10	11	8		•••••
18				3		45	111	19	8	11	8		•••••
19	<b>-</b>				48	23	151	16	12	10	7	•••••	•••••
20					48	19	103	12	12	10	8		• • • • • • • • • • • • • • • • • • • •
21					53	58	116	14	10	10	10		
22					58	45	171	9	12	10	10		*******
23				3	40	52	122	7	12	8	11		
24			1		46	72	116	7	12	7	11		
25			-	4	52	63	90	26	12	11	10		
26				. *	58	111	103	16	îī	10	ĩŏ		
27			2	5	48	111	95	21	10	īŏ	9		
28			-	v	58	52	90	19	ĩŏ	- š	9		
29			•		72	52	95	16	10	ğ	9		••••••
30		3			72	78	72	12	18	š	8		•••••
		_	•••••			95	14	11	10	•	8		•••••
31		• • • • • • • • • • • • • • • • • • • •	•••••	5						299	270	108	
	otal					1512	3000	863	441				•••••
	an	1.5	1.5	3.0	54.4	65.7	100	27.8	14.2	10.0	8.71	10.8	•••••
Max			•	••	72	139	177	90	65	14	11	16	•••••
Min			•		40	23	36	7	8	7	4	7	•••••
Acr	·e-ft.	92	83	184	1290	3000	5950	1710	873	595	536	214	•••••

	Discharge of Tenness	ee Fork at Leady	ville for 1916.
Drainage	Area, 45 Square Miles.	Altitude, 10,000	Feet Above Sea Level.

Da	ıy	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	<b>-</b>					166	194	52	65	22	. 9	13	
2						88	200	52	80	25	10	13	
3					32	93	166	71	80	26	8	10	· · · · · · ·
4			<b>-</b>			90	160	71	71	31	8	12	
5						117	144	88	63	30	9	11	
6				••••		125	149	80	65	27	9	10	•••••
7						160	117	93	63	22	8	10	
8						155	133	90	58	17	7	9	
ğ				**********		144	144	84	46	18	8	9	
10			*******	••••••		149	180	71	42	18	15	11	********
îì		•	9	••••••		180	172	65	27	21	16	10	•••••
12			-			172	172	71	35	17	13		*
13		6	••			152	172	65	43	22	12		
14	••••••	v	••••••		32	125	155	52	52	21	15		
15	••••••					133	$\begin{array}{c} 155 \\ 152 \end{array}$	56	45	17	15	•	•
16		••••••	• • • • • • • • • • • • • • • • • • • •						32	17	15		
		•••••		••••••	•••••	133	117	56				•••••	•
17		•••••	•			100	133	42	34	27	10	•••••	
18		•••••	•••••		• • • • • • • • • • • • • • • • • • • •	102	133	46	21	42	10	•••••	
19		••••				102	125	35	30	42	. 11	******	•
20		•••••			· · · · •	58	107	34€	25	38	15		12
21		<b>-</b>				58	71	34	25	46	13	••	
22					48	50	52	18	18	38	15		
23	<b>-</b>					<b>52</b>	35	16	18	30	13		
24						71	35	19	27	25	10		
25					194	88	30	35	22	18	13		
26						110	22	19	19	15	13		
27					224	141	17	30	20	14	15	*******	
28						155	$\bar{2}\dot{2}$	35	22	$\bar{1}\bar{2}$	īĭ		••••••
29						158	32	38	19	- 8	10		
30						172	35	93	18	š	14		••••••
31				••••••		188	00	71	18	U	17	•••••	
	Total			********		3787	3376	1682	1203	714	367	118	•
		•••••••		•		122	113	54.3	38.8	23.8	11.8		
	X		•		•••••	188	200	93	30.0 80	46 46	16	••••••	•••••
Mi	n		••	•••••		50	17	16		4n 8		•	•••••
		••••••	••••••	· · · · · · · · ·	••••••				18		7	•••••	•••••
AC	re-ft.	•••••		•••••	•••••	7500	6720	3340	2390	1420	726	•••••	•••••
	Unle	ess ot	herwis	e note	d, all d	ischarg	ges are	in cubi	c feet	per sec	cond.		

#### ARKANSAS RIVER AT GRANITE.

Location.—At Granite, in sec. 31, T. 11 S., R. 79 W., below the mouth of Lake Creek and above Lost Canyon and Clear Creeks.

Records Available.—May 1, 1897, to September 10, 1899; April 6, 1910, to November 30, 1914.

Drainage Area.—425 square miles.

Gage.—Automatic recording gage established in 1910; datum of recording gage bears no determined relation to that of the vertical staff gage which was used from 1897 to 1899, and which was located at the highway bridge near the railroad station. During 1916 the automatic gage was out of order and estimates are based on readings of the staff gage.

Channel.—Practically permanent.

Discharge Measurements.—Made from car and cable.

Winter Flow.—Ice causes backwater during the winter months and the records are discontinued.

Artificial Control.—The discharge is affected by the operation of the Twin Lakes reservoir.

Diversions.—There are court decrees for diversions of 76 second-feet from the Arkansas between this station and the junction of Tennessee and East Forks, and diversions of 22 second-feet from the intervening tributaries.

Co-operation.—Station has been maintained in co-operation with the United States Geological Survey since 1913.

#### ARKANSAS RIVER AT SALIDA.

Location.—At Salida, Colorado, some distance above the mouth of the South Fork of Arkansas River, the nearest tributary of importance.

Records available.—April 11, 1895, to October 31, 1903; November 3, 1909, to December 31, 1916.

Drainage Area.—1,160 square miles.

Gage.—Automatic recording gage; no determined relation between automatic gage and the gage used from 1895 to 1903.

Channel.—Slightly shifting.

Winter Flow.—Springs keep the river open during the winter months.

Diversions.—There are court decrees for diversions of 199 second-feet from the Arkansas between this station and Granite, and diversions of 380 second-feet from intervening tributaries.

Co-operation.—This station has been maintained in co-operation with the U. S. Geological Survey.

			Die	charg	e of A	rkansas	<b>Biver</b>	at Gra	mite f	or 1915	•		
	Dı	ainag	o Area	., <b>42</b> 5 8	eran pë	Miles.	Altitu	ıde, 8,98	30 Feet	Above	Son.	Level	
Day	y	Jan.	Feb.	Mar.	April	-	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1 2		······		*******	85 104	167 139	1040 1190	770 770	290 269	139 153	115 104	85 7 <b>6</b>	•
3			********		115	127	1140	730	232	167	94	85	
4 5		•••••	•••••	••••••	104 104	115	1040 900	690	232	182	85	76	
6		*******	********	*******	104	127 153	770	690 730	215 250	182 182	94 94	85 85	********
7			•	•	104	153	730	690	269	167	85	94	
8 9			•••••	*******	104 115	139 115	650 7 <b>3</b> 0	690 650	• 428 • 400	182 198	85 85	85 85	•
10					115	104	900	580	. 378	182	85	-85	
11 12		••••••	•••••	•	115 115	167 290	1190 1410	548 548	250	167 153	85	76	•••••
13					115	455	1140	615	250 250	139	85 94	85 85	`
14			•••••		127	428	945	580	215	139	94	85	•••••
15 16		······			$\frac{139}{127}$	455 455	900 900	580 548	215 232	127 115	104 127	85 85	•
17			•		139	485	990	485	232	115	115	85	
18 19				•	139 139	548 515	1090 1090	378 355	232 198	269 232	104 94	85	•••••
20			••••••	76	167	485	1190	455	153	215	94	85 85	
$\begin{array}{c} 21 \\ 22 \end{array}$		•••••		68	167	455	1240	485	167	232	94	85	
23			<b>:</b>	76 85	167 153	$\frac{378}{332}$	1140 1240	485 485	/ 167 153	182 115	115 115	85 85	
24			•	85	139	355	1240	515	198	127	104	86	
25 26				85 94	$\frac{127}{127}$	428 428	1300 1140	615 515	167 167	139 198	94	86	•
.27				104	139	378	1040	548	167	115	94 94	86 86	•
$\frac{28}{29}$	•			85 85	139	310	900	378	167	115	85	86	
				85	167 215	400 428	810 770	310 332	153 139	104 115	94 104	86 86	•
31				76		690		310	127		94		••••••
Mes	otal an	•••••		1004 83.7	3916 131	10204 329	30755 1030	17060 550	6962 225	4847	3009	2539	
Max	x			104	215	690	1410	770	428	162 269	97.1 127	84.6 94	
Mir	ı		•	68	85	104	650	310	127	104	85	76	*******
ACI	·e-ft.	• '	•	1990	7800	20200	61300	33800	13800	9640	5970	5030	
			1	Discha	rge of	Arkat	lasa st	Granif	te for	1016			
	Dr	ainage				Arkan Miles.					a Res	T.evel	
Day		ainage Jan.		, <b>42</b> 5 8	<b>quare</b> April	Miles. May	Altitu June	Granit ide, 8,9: July			e Sea Oct.		
1	y 	Jan.	Feb.	<b>425 8</b> Mar.	April 148	Miles. May 490	Altitu June 910	July 1460	30 Fee Aug. 1560	Sept. 280	Oct. 130	Nov. 165	Dec. 130
	y 	Jan.	Feb.	Mar.	<b>quare</b> April	Miles. May	Altitu June 910 910	July 1460 1460	Aug. 1560 1560	Sept. 280 240	Oct. 130 130	Nov. 165 165	Dec. 130 100
1 2 3 4	y 	Jan.	Feb.	<b>425 8</b> Mar.	April 148 148 148 148 148	May 490 490 490 490	June 910 910 910 910 1360	July 1460	Aug. 1560 1560 1560	Sept. 280	Oct. 130	Nov. 165	Dec. 130
1 2 3 4 5	y  	Jan.	Feb.	Mar.	April 148 148 148 148 148 148	May 490 490 490 490 490	Altitu June 910 910 910 1360 1460	July 1460 1460 1460 1460 1460	Aug. 1560 1560 1560 1170 1170	Sept. 280 240 240 240 240 240	Oct. 130 130 130 130 130	Nov. 165 165 165 130 130	Dec. 130 100
1 2 3 4	y  	Jan.	Feb.	Mar.	April 148 148 148 148 148	May 490 490 490 490	June 910 910 910 1360 1460 1460	July 1460 1460 1460 1460 1460 1460	Aug. 1560 1560 1560 1170 1170	**Sept. 280 240 240 240 240 240 240	Oct. 130 130 130 130 130 165	Nov. 165 165 165 130 130	Dec. 130 100
1 2 3 4 5 6 7	y   	Jan.	Feb.	, 425 g	April 148 148 148 148 148 130 130	May 490 490 490 490 490 402 430 430 615	June 910 910 910 1360 1460 1460 1460	July 1460 1460 1460 1460 1460 1460 1460 1460	Aug. 1560 1560 1560 1170 1170 1170 1170	Sept. 280 240 240 240 240 165 165	Oct. 130 130 130 130 165 165	Nov. 165 165 165 130 130 130	Dec. 130 100
1 2 3 4 5 6 7 8 9	y  	Jan.	Feb.	425 g	April 148 148 148 148 148 130 130 130	May 490 490 490 490 490 490 402 430 430 615 755	June 910 910 910 1360 1460 1460 1460 1460	July 1460 1460 1460 1460 1460 1460 1460 1460	Aug. 1560 1560 1560 1170 1170 1170 1170 1170	Sept. 280 240 240 240 240 165 165	Oct. 130 130 130 130 165 165 165	Nov. 165 165 165 130 130 130 130	Dec. 130 100 
1 2 3 4 5 6 7 8 9 10 11	y 	Jan.	Feb.	, 425 g	April 148 148 148 148 148 130 130	May 490 490 490 490 490 402 430 430 615	June 910 910 910 1360 1460 1460 1460	July 1460 1460 1460 1460 1460 1460 1460 1460	Aug. 1560 1560 1560 1170 1170 1170 1170	Sept. 280 240 240 240 240 165 165 200	Oct. 130 130 130 130 165 165 165 165	Nov. 165 165 165 130 130 130 130 165	Dec. 130 100 
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1 2 3 4 5 6 7 8 9 10 11 12 13	y	Jan.	Feb.	425 8 Mar	April 148 148 148 148 130 130 130 135 1220 220	May 490 490 490 490 402 430 615 755 830 990 1260	June 910 910 1360 1460 1460 1560 1660 1560	July 1460 1460 1460 1460 1460 1460 1460 1560 1560 1560 1560 1560 1560 1560	Aug. 1560 1560 1560 1170 1170 1170 1170 1170 1170 1170 11	Sept. 280 240 240 240 240 165 165 200 240 200 200	Oct. 130 130 130 130 165 165 165 165 200 200	Nov. 165 165 130 130 130 165 165 130	Dec. 180 100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	y	Jan.	Feb.	200 430 490 430 460	April 148 148 148 148 148 130 130 130 115 220 220 220 220	May 490 490 490 490 402 430 615 755 830 990 1080 1360 1360	June 910 910 1360 1460 1460 1560 1660 1660 1660	July 1460 1460 1460 1460 1460 1460 1460 1560 1560 1560 1360 1360 1360 1360 1360	Aug. 1560 1560 1560 1170 1170 1170 1170 1170 1170 1170 11	Sept. 280 240 240 240 240 165 165 165 200 240 200	Oct. 130 130 130 130 165 165 165 165 165 200	Nov. 165 165 130 130 130 130 165 165	Dec. 180 100
12 34 56 78 90 112 113 115 116	y	Jan.	Feb.	200 430 490 430 460 460	April 148 148 148 148 148 130 130 135 130 220 220 220 220 - 200 -	May 490 490 490 490 490 402 430 430 615 830 990 1260 1360 910	June 910 910 1360 1460 1460 1560 1660 1660 1660	July 1460 1460 1460 1460 1460 1460 1460 1460	Aug. 1560 1560 1560 1560 1170 1170 1170 1170 1170 1170 1170 11	\$\begin{align*} \textbf{Abov} \\ 280 \\ 240 \\ 240 \\ 240 \\ 165 \\ 165 \\ 165 \\ 200 \\ 240 \\ 200 \\ 200 \\ 165	Oct. 130 130 130 130 165 165 165 165 200 200 200 200	Nov. 165 165 165 130 130 130 165 165 130 130 130 130	Dec. 180 100
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12 84 56 78 90 112 113 14 115 116 118 119 119	y	Jan.	Feb.	200 430 490 490 490 520 490	April 148 148 148 130 130 115 130 220 220 220 220 302 100 182	May 490 490 490 402 430 615 755 755 756 990 1260 910 910 685	June 910 910 1460 1460 1460 1660 1660 1560 1560 1560 1560 1560 15	July 1460 1460 1460 1460 1460 1560 1560 1360 1360 1360 1360 1360 1360 1360 13	Aug. 1560 1560 1560 1560 1170 1170 1170 1170 1170 1170 1170 11	**E Abov Sept. 280 240 240 240 165 165 200 200 165 165 165 165 165 165 165 165 165 165	Oct. 130 130 130 130 165 165 165 200 200 200 200 200 200 200	Nov. 165 165 130 130 130 130 130 130 130 130	Dec. 130 100 100 100 100 100 100 100 100 100
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1 2 3 4 5 6 7 8 9 9 10 11 23 11 11 11 11 11 11 11 11 11 11 11 11 11	y	Jan.	Feb.	200 430 490 490 490 490 490 490 260 115	April 148 148 148 148 130 130 130 130 1220 220 220 220 220 302 220 302 302 302	May 490 490 490 400 400 400 400 400 400 400	June 910 910 1460 1460 1560 1660 1560 1560 1460 1560 1560 1560 1560 1560 1560 1560 15	July 1460 1460 1460 1460 1460 1460 1460 1460	Aug. 1560 1560 1560 1170 1170 1170 1170 1170 1170 1170 11	**Example 1.5	Oct. 130 130 130 165 165 165 200 200 200 200 200 200 200 200 200 20	Nov. 165 165 130 130 130 130 130 130 130 130 130 130	Dec. 180 100 
1 2 3 4 5 6 7 8 9 9 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1	y	Jan.	Feb.	425 8 Mar.	April 148 148 148 148 130 130 135 130 135 130 220 220 220 220 220 302 240 240 240 240 240 240 240 240 240 2	May 490 490 490 402 430 615 755 755 755 615	June 910 910 1460 1460 1560 1560 1560 1560 1560 1560 1560 15	July 1460 1460 1460 1460 1460 1460 1560 1560 1560 1360 1360 1360 1360 1360 1360 1560 1560 1560 1560 1560 1560 1560 15	Aug. 1560 1560 1170 1170 1170 1170 1170 1170 1170 11	**Example 1.5	Oct. 130 130 130 165 165 165 165 200 200 200 200 200 200 200 200 200 20	Nov. 165 165 130 130 130 130 130 130 130 130	Dec. 180 100 100 100 100 100 100 100 100 100
1 2 3 4 5 6 7 8 9 9 10 11 23 11 11 11 11 11 11 11 11 11 11 11 11 11	y	Jan.	Feb.	200 430 490 490 490 490 490 490 260 115	April 148 148 148 148 130 130 130 130 1220 220 220 220 220 302 220 302 2400 375 402 490	May 490 490 490 400 400 400 400 400 400 400	June 910 910 1460 1460 1560 1660 1560 1560 1460 1560 1560 1560 1560 1560 1560 1560 15	July 1460 1460 1460 1460 1460 1560 1560 1560 1360 1360 1360 1360 1360 1560 1560 1560 1560 1560 1560 1560 15	Aug. 1560 1560 15760 1170 1170 1170 1170 1170 1170 1170 1	** Abov Sept. 280 240 240 240 240 240 240 200 200 165 165 165 165 165 165 165 165 120 200 200 200 200 200 200 200 200 200	Oct. 130 130 130 165 165 165 200 200 200 200 200 200 200 200 200 20	Nov. 165 165 130 130 130 130 130 130 130 130 130 130	Dec. 180 100
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12345678901123145678901123222233111123222223331T	y y	Jan.	Feb.	425 8 Mar.	April 148 148 148 148 1300 1300 1300 1300 1300 1300 1300 1200 2200 2	May 490 490 490 490 490 402 430 615 755 755 755 755 755 755 755 615 685 910 23577	June 910 910 910 1460 1460 1660 1660 1560 1560 1360 1360 1360 1460 1360 1460 1360 1460 1360 1460 1360 1460 1360 1460 1360 1460 1460 1460 1460 1460 1460 1460 14	July 1460 1460 1460 1460 1460 1560 1560 1560 1360 1360 1360 1360 1560 550 550 550 615 685 1260 36100	Aug. 1560 1560 1560 1170 1170 1170 1170 1170 1170 1170 11	** Abov Sept. 280 240 240 240 240 240 240 200 200 165 165 165 165 165 130 200 200 130 5655	Oct. 1300 1300 1300 1655 1655 2000 2000 2000 2000 2000 2000 2000 2	Nov. 165 165 130 130 130 130 130 165 130 130 130 130 130 130 130 130 130 130	Dec. 180 100
1234567899111234156789911123422233111232222331 Temma	y	Jan.	Feb.	425 8 Mar.	April 148 148 148 148 130 130 130 130 130 120 220 220 220 220 220 302 240 260 375 402 440 430 430 430	May 490 490 490 490 490 402 430 615 755 830 990 1360 1360 1360 755 755 755 615 615 615 615 615 615 615 615 615 6	June 910 910 1460 1460 1460 1560 1560 1560 1460 1460 1560 1560 1560 1560 1460 1360 1360 1360 1360 1360 1360 1360 13	### ### ##############################	Aug. 1560 1560 1170 1170 1170 1170 1170 1170 1170 11	\$\begin{align*} \textbf{Abov} \\ \text{Sept.} & \text{240} \\ \text{240} & \text{240} & \text{240} \\ \text{240} & 2	Oct. 1300 1300 1300 1300 1655 1655 1655 2000 2000 2000 2000 2000 2000 2400 24	Nov. 165 165 130 130 130 130 130 130 130 130	Dec. 130 100 100 100 100 100 100 100 100 100
1 2 3 4 4 5 6 7 8 9 10 1 12 3 4 4 15 6 7 8 9 10 1 12 13 4 15 16 7 18 19 22 12 22 32 4 22 5 6 27 8 20 1 10 10 10 10 10 10 10 10 10 10 10 10	y	Jan.	Feb.	200 430 490 490 490 490 490 490 490 490 490 49	April 148 148 148 148 148 130 130 135 130 135 130 1220 220 220 220 220 220 220 220 220 2	May 490 490 490 490 402 430 615 830 910 910 685 755 755 755 755 615 685 937 761 1360 23577 661 1360 402	June 910 910 1460 1460 1460 1560 1560 1560 1560 1460 1360 1360 1360 1360 1360 1360 1360 13	### ### ##############################	Aug. 1560 1560 1170 1170 1170 1170 1170 1170 1170 11	** Abov Sept. 280 240 240 240 240 240 240 200 200 165 165 165 165 165 130 200 200 130 5655	Oct. 1300 1300 1300 1655 1655 1655 1655 1650 2000 2000 2000 2000 2000 2000 2400 24	Nov. 165 165 130 130 130 130 130 165 130 130 130 130 130 130 130 130 130 130	Dec. 180 100 100 100 100 100 100 100 100 100

Discharge	A.F	Awkenses	Biver	-+	Golda.	for	1015
DIROURLES	UI	ALKAHSAS	HAVER	26		IUT	Tato.

	Dra	inage	Area,	1,160	Square	Miles	. Altit	ude; 7,0	38 Fee	t Abo	Te Sea	Level	
Day		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
		230	196	218	230	385	1060	1480	540	385	368	300	270
		230	198	230	230	315	1520	1420	520	368	350	300	270
		230	200	205	255	300	1420	1420	500	385	332	300	285
		242	202	205	270	285	1420	1310	460	402	315	300	270
		242	204	218	255	285	1240	1240	420	402	315	300	270
		218	205	205	285	300	1120	1280	420	420	315	300	270
7.		230	206	205	270	285	1090	1150	<b>500</b>	402	285	315	242
		230	208	218	255	285	970	1090	680	368	332	285	242
		218	210	205	285	285	970	1090	885	368	350	300	255
		230	212	205	285	270	1150	1060	755	385	385	300	270 -
		230	214	218	270	270	1790	1000	655	368	350	255	255
		230	216	205	285	800	2400	970	608	402	350	242	255
		230	218	205	300	402	2120	1000	655	402	368	270	270
		230	205	218	285	585	1710	1060	608	402	350	242	285
		230	205	218	300	608	1560	1090	540	385	332	270	300
	·	205	205	218	315	655	1590	1060	562	368	350	285	270
	••••	205	230	218	300	755	1790	940	540	332	385	270	285
		218	230	230	285	780	1870	858	630	402	385	255	255
		218	230	230	270	705	1990	730	562	440	402	270	242
~ -	<b>-</b>	218	242	218	300	630	2260	780	460	420	368	285	230
21 .	7	218	230	218	300	608	2440	805	420	420	350	300	242
		218	218	218	315	520	2440	830	420	400	332	285	270
		205	218	218	300	500	2580	830	420	332	350	270	285
		170	218	230	285	500	2530	830	520	300	332	300	242 242
	····	180	205	242	300	585	2480	912	480	350	350 332	285 285	255
	•••••	180	218	255	315	630	2350	912	460	460	315	285 285	200 218
~ ~	•••••	170 155	230 218	242 270	368 385	562 500	2260 2080	1030	460	385 350	300	-230	242
	•••••	192	218	242	402	540	1670	940 705	440 420	368	300	255	285
		192	••••••	218	460	540	1480	630	420	385	315	. 300	285
		194		230	400	705		562	402	909	315		300
	tal	6588	5991	6875	9960	14875	53350	31014		11576		8439	8157
	n		214	222	299	480	1780	1000	528	386	341	281	263
		242	242	270		780	2580	1480	885	460	402	315	300
		155	196	205		270	970	562	402	300	285	230	218
					17800						21000		

# Discharge of Arkansas at Salida for 1916. Drainage Area, 1,160 Square Miles. Altitude, 7,038 Feet Above Sea Level.

Day	.,	Jan.	Feb.	Mon	April	More	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
•	,				-	-		-					
1		282	192	238	264	679	1510	2590	2500	520	391	407	286
2	•••••	240	203	226	264	708	1550	2540	2320	545	373	407	338
3		264	226	203	264	651	1510	2540	2110	496	373	399	335
4	•	294	251	214	264	651	1830	2410	2110	496	355	391	348
5		291	251	278	264	708	2070	2360	2030	496	355	384	298
6		291	238	251	251	767	2190	2150	1950	496	373	384	274
7		245	251	214	251	925	2190	2110	1910	496	430	384	250
8		245	251	226	264	1100	2110	2110	1790	473	410	377	225
9	•	288	238	264	251	1350	2190	2280	1710	452	410	342	201
10	•	285	238	292	251	1510	2320	2590	1590	473	430	377	203
11	•	270	251	292	264	1630	2540	2500	1130	<b>596</b>	410	373	219
12			238	596	292	1910	2720	2460	1100	623	410	355	275
13		228	203	651	292	1990	2860	2360	1310	596	430	338	292
14		240	203	623	307	1950	2900	2190	1550	570	430	322	295
15		267	214	545	322	1830	2770	2030	1630	570	430	348	270
16		264	214	570	307	1590	2820	1750	1630	570	452	355	270
17		238	226	570	322	1130	2860	1750	1350	545	452	362	254
18		264	238	596	338	990	2860	1750	1200	496	452	37 <b>3</b>	259
19		278	238	651	373	925	2900	1590	1130	496	452	352	270
20		264	238	651	355	860	2860	1430	1060	473	430	355	270
21		251	238	679	452	892	2770	1350	958	452	452	322	270
22		226	238	623	545	892	2590	1310	892	410	452	355	292
23		264	238	679	520	860	2360	1130	737	430	473	384	292
24		264	226	623	570	737	2190	1060	828	430	496	355	292
25		264	214	520	623	651	2070	990	797	430	410	322	288
26		251	214	520	651	679	2070	958	767	430	410	322	285
27		238	238	307	708	737	2150	958	737	452	460	292	28:
28		251	238	307	828	797	2230	990	708	430	456	322	278
29		226	238	307	860	892	2320	990	651	430	443	233	274
30		226	•	278	767	958	2460	1558	596	430	422	259	270
31		214	*******	278		1240		2190	570		418		272
	otal	7931	6684	13272	12284	33189	70770	56966	41351	14809	13140	10551	8526
	an	256	230	428	409	1070	2360	1840	1330	493	424	352	275
	x	. 294	251	679	860	1990	2900	2590	2500	623	496	407	348
	1	214	192	203	251	651	1510	958	570	410	355	233	201
Acr	e-ft.	15700	13200	26300	24300	65800	140000	113000	81800	29300	26100	20900	16900
							arges aı						

#### ARKANSAS RIVER AT CANON CITY.

Location.—Just below Hot Springs Hotel, at the mouth of the canyon, and  $1\frac{1}{2}$  miles above Canon City. Nearest important tributary is Grape Creek, which enters above.

Records Available.—May 1, 1888, to November 30, 1916.

Drainage Area.—3,060 square miles.

Gage.—Automatic recording gage established by the State Engineer in September, 1909.

Channel.—The channel shifts to such an extent during high water that at times it is necessary to move the gage in order to read the gage heights.

Discharge Measurements.—Made from car and cable.

Winter Flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 131 second-feet from the Arkansas between the stations at Canon City and Salida, and diversions of 2,286 second-feet from intervening tributaries.

#### ARKANSAS RIVER AT PUEBLO.

Location.—At Main Street Bridge in Pueblo, 2 miles above the mouth of Fountain Creek, the nearest tributary.

Records Available.—September 19, 1894, to November 30, 1916. From May 1, 1885, to September 30, 1886, a station was maintained at Pueblo by the State Engineer; from June 1, 1887, to September 30, 1887, a station was maintained at a point 9 miles above Pueblo; from May 1, 1889, to August 31, 1889, the United States Geological Survey maintained the station 9 miles above Pueblo.

Drainage Area.—4,600 square miles.

Gage.—An automatic gage located 150 feet below Main Street Bridge has been used since March 22, 1911.

Channel.—Shifting.

Discharge Measurements.—Made from Main Street Bridge.

Winter Flow.—Ice causes some slight backwater during the winter months.

Diversions.—There are court decrees for diversions of 637 second-feet from Arkansas River, between the station at Canon City and Pueblo, and diversions of 372 second-feet from intervening tributaries.

Co-operation.—This station is maintained in co-operation with the Arkansas Valley Ditch Association.

			Disch	arge o	f Ark	ansas	River a	t Cano	n City	for	1915.		
	Dr	inage	Area,	3,060	Square	Miles	s. Altit	nde, 5,8	163 Pe	ot Abo	ve Sea	Level	
Day	,	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		480	385	340	385	725	1220	1880	830	460	445	385	390
2		400	385	385	385	595	1940	1720	725	460	400	370	340
3		480	385	340	408	480	2000	1720	725	460	400	870	320
4		480	385	340	430	430	1880	1620	628	465	385	330	340
5		480	310	340	455	430	1560	1620	565	520	400	330	360
6		430	280	310	480	480	1510	1620	535	525	400	810	370
7		385	280	340	660	480	1460	1560	565	500	400	340	360
8		385	340	840	692	535	1320	1410	692	465	420	340	320
9		385	340	340	535	480	1320	1320	1170	460	445	840	340
10		430	385	340	628	430	1410	1270	1120	435	445	840	340
11		430	340	340	535	430	1880	1220	870	405	420	865	320
12		385	340	340	480	455	2530	1220	770	440	445	335	320
13		385	310	340	480	480	2470	1220	775	480	420	835	340
14		<b>3</b> 85	310	340	480	870	2000	1220	745	450	420	355	355
15		385	310	340	508	1120	1780	1170	750	465	440	385	355
16.		385	310	340	692	1080	1720	1120	685	410	440	405	35 <b>5</b>
17		340	310	340	<b>6</b> 60	1220	1940	1080	690	380	440	405	355
18		340	340	340	910	1320	2060	910	760	360	420	405	355
19		340	385	430	692	1360	2230	760	1000	475	420	480	355
20		385	385	362	565	1270	2530	910	730	450	420	430	315
21		385	385	325	535	1220	2660	1080	580	450	390	430	355
	••••••	385	385	340	535	1035	2780	1040	525	- 450	370	425	400
28		310	385	340	595	795	2910	910	590	405	890	420	425
24		295	385	408	595	725	2980	1080	620	315	390	400	400 335
25		280	340	508	535	725	2910	1270	685	340	390	400 <b>360</b>	355
26	••••••	280	340	480	508	832	2840	1360	600	525	390 385	420	355
27		385	340	455	480	910	2590	1880	540 545	525 450	385	355	315
28		310	340	430	480 480	760 725	2350	1940 1510	520	400	370	355	425
29	••••••	340	•••••	430			2110 2000	1220	555	460	385	390	450
30	•••••	430		430	628	725 795	4000	910	560	400	385	930	425
		385	9715	385 11458	16431	23917	62890	40770	21650	13385	12655	11260	11145
	otai in	11960 386	347	370	548	772	2100	1320	698	446	408	375	360
	tn (	480	385	508	910	1360	2980	1940	1170	525	445	430	450
Min		280	280	810	385	430	1220	760	520	315	370	310	315
		23700			32600	47500	125000	81200			25100	22300	
ACI	e-11.	60100	19900	240VV	04000	21900	120000	01200	14300	20000	20100	22300	

Discharge of Arkansas River at Canon City for 1916.													
	Drai	nago	Area,	3,060	Square	Miles	. Alti	ude, 5,8	363 Pec	at Abo	ve Sea	Level	
Day		an.	Feb.		April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		442	230	354	397	780	1380	2480	2410	630	397	490	
2		354	260	312	442	845	1460	2410	2540	572	375	490	
3		442	333	312	420	845	1460	2480	2220	545	397	490	•••••
4		397	420	312	490	845	1660	2340	2100	518	397	518	
5		397	397	397	572	845	1930	2340	1930	518	397	442	•••••
6		397	397	420	490	910	1980	2100	1820	518	397	442	••••
7	•••••	397	420	333	442	945	1980	2100	1710	545	442	466	•••••
8		354	397	<b>3</b> 75	420	1130	1880	2100	1560	466	466	490	
. 9	•••••	354	397	420	420	1380	2100	2160	1560	442	466	490	•••••
10		397	354	466	376	1460	2220	2540	1420	442	490	490	•
11		354	354	518	354	1610	2610	2410	1370	545	490	466	•••••
12	•••••	354	354	750	466	1760	2680	2410	1130	600	466	545	•
13		246	354	780	442	1880	2900	2280	1380	600	518	490	
14	•	312	333	750	466	1820	3050	2220	1660	600	518	442	•••••
15	••••••	354	333	690	490	1660	2900	2040	1660	572	490	442	•
16	•••••	397	354	660	490	1460	2900	2100	1510	545	490 490	490 572	•••••
17		354	354	660	630	1170	2900	1760	1420	545			••••
18		354	354	690	660	1060	2900	1660	1380	518	490	572	
19	•••••	397	333	720	490	1020	2980	1460	1250	518	490 466	545 572	•
20		397	354	720	442	945	2980	1380	1090	518	490	572	
21		354	354	750	490	910	2750	1290 1250	1060 945	490 466	518	545	•
22	•••••	354	333	750	572	910	2610			442	545	572	•••••
23		354	333	690	545	878 812	2280 2220	1200 1130	910	442	545	572	•
24 25	•••••	397	333 312	660 660	545 600	750.		1020	845 810	442	570	545	•••••
		397 354	312	660	660	720	1980	945	780	442	545	518	•••••
26 27		354	333	518	690	750	2100	910	810	442	570	545	
28		312	354	397	780	750	2220	910	780	442	518	518	
29		354	354	420	720	845	2280	945	720	442	518	490	•
30	•••••	312		420	780	945	2410	1710	690	442	490	466	•
31	•••••	312	•	397	100	1130	2410	2340	690	774	490	700	•
Tot	al 11		10100	16961	15781	33770	69740	56420	42160	15249		15287	•••••
	an	365	348	547	526	1090	2320	1820	1360	508	482	509	•••••
	X	442	420	780	780	1880	3050	2540	2540	630	570	572	••••••
	1	246	230	312	354	720	1380	910	690	442	375	442	
	re-ft.22			33600			138000	112000	83600	30200	29600	30300	
-10	-											50500	******
	Outes	aro a	erwise	note	a, all a	ischar	ges are	ın cubi	c reet	per se	con <b>a.</b>		

Discharge of Arkansas River at Pueblo for 1915.  Drainage Area, 4,600 Square Miles. Altitude, 4,665 Feet Above Sea Level.													
	Drai	wwge	Area,	2,000	aguar	TIO:	. Altit	uae, 2,	MD Le	R ADO	ve sea	TeAe1	•
Day	J	an.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
1.	<b>-</b>	590	402	358	425	955	1170	1820	875	398	560	345	450
2 .		590	402	380	402	955	1980	1820	780	330	530	342	400
8 :		590	425	380	402	838	2260	1600	595	295	530	340	425
4.	<b></b>	590	380	402	402	660	2080	1600	628	420	470	337	425
5.		590	402	380	450	695	1860	1490	695	420	515	330	440
6.		590	358	335	475	875	1760	1490	628	420	515	332	430
7.		530	358	335	590	875	1650	1440	800	420	485	335	430
8.	······	560	380	380	655	998	1450	1290	765	415	510	350	890
		530	425	402	790	955	1310	1150	1040	380	530	355	360
10 .		530	380	380	655	800	1310	1230	1040	395	530	360	360
		530	380	380	530	695	· 1500	1230	875	340	495	337	358
			402	380	<b>53</b> 0	595	2490	1130	1080	330	490	337	328
	•••••	530	425	380	530	628	3020	1,130	765	325	490	340	380
		475	380	335	<b>5</b> 30	838	2140	1210	6 <b>6</b> 0	348	550	340	332
		475	335	335	580	1120	1810	1790	595	348	570	430	370
		475	335	335	755	1120	1650	1150	628	370	570	430	368
17 .		425	335	335	1150	1120	1650	1150	2430	370	535	490	419
18 .		425	335	335	1620	1220	1920	1050	1760	802	535	463	420
19 .		402	358	358	1220	1360	2030	1000	1550	348	538	490	417
20 .		335	335	425	915	1310	2370	920	1220	420	540	530	415
		530	335	385	800	1260	2620	1080	890	895	542	530	413
		530	380	295	838	1080	2750	990	720	395	478	505	410
		475	358	335	1120	915	3240	860	960	370	480	420	490
		425	295	402	1220	800	3370	1380	1050	348	482	420	438
		450	358	<b>59</b> 0	1120	800	3190	1150	890	1080	460	420	435
	<b>-</b>	425	335	622	915	800	3110	1600	785	670	440	395	432
		475	335	655	730	875	2970	1400	682	<b>65</b> 0	442	370	460
		530	335	590	800	838	2510	2950	530	<b>5</b> 30	390	370	380
		450	*******	622	<b>73</b> 0	765	2260	1760	470	510	392	370	405
		502	•	560	875	730	2040	1120	445	520	395	410	458
<b>31</b> .		425	•••••	475		875		955	420		370		455
	tal 1		10263	12811	22704		65470	41935	27201	12862		11825	
Mea		500	367	413	757	915	2180	1350	877	429	495	394	408
Max		590	425	655	1620	1360	3370	2950	2430	1080	570	530	490
Min.		335	295	295	402	595	1170	860	420	302	370	330	328
Acre	e-ft.3(	0700	20400	25400	45000	<b>563</b> 00	130000	83000	53900	25500	30400	23400	25100
										-			

	Dra	inage						at Pue				Level	
Dan		_			_			July		Sept.	Oct.	Nov.	Dec.
Day	,	Jan.	Feb.		April	May	June		Aug.	_			Dec.
1	•••••	465	170	220	360	1070	1300	2130	2120	310	370	495	•••••
2		430	272	245	360	1070	1490	2220	2120	310	310	495	******
3		465	430	195	395	980	1540	2270	2060	250	280	495	
	•••••	500	465	245	430	1120	1740	2210	1920	250	280	462	
5		500	465	300	430	1200	1790	2100	1980	225	310	430	
6	••••	500	465	360	465	1200	1790	1940	1830	200	310	400	
7		500	465	330	430	1200	1840	1830	1760	178	280	430	
		465	500	300	395	1120	1890	1980	1670	200	310	400	•••••
. 9	•••••	465	465	330	360	1200	1940	2080	1560	370	430	400	•••••
10		500	465	330	330	1440	2140	2340	1410	340	495	400	
11	•••••	465	360	395	300	1590	2250	2390	1140	340	495	400	•••••
12		360	360	465	300	1590	2520	2240	1190	462	495	430	
13		300	330	735	330	1690	2640	2100	1550	430	495	560	
14		360	300	815	395	1790	2640	2200	1460	430	495	528	
15		430	300	735	430	1640	2640	1990	1690	462	495	495	******
16		395	300	655	395	1490	2520	1830	1460	462	528	495	
17		395	330	655	430	1200	2640	1630	1280	430	430	528	
18		430	360	655	535	1120	2640	1620	1100	430	430	460	
19		465	300	695	430	1120	2640	1480	1010	430	430	528	
20	•••••	430	300	695	430	1070	2580	1280	890	400	430	560	
21		430	272	735	395	1020	<b>2520</b>	1230	850	<b>3</b> 70	430	560	
22		395	272	735	<b>39</b> 5	980	2270	1230	810	370	462	528	
23		<b>3</b> 30	272	695	430	980	2170	1230	560	370	<b>528</b>	495	
24		330	272	695	465	855	2010	1100	595	370	595	528	
25		330	195	655	500	735	1850	925	560	370	595	495	
26	<b>-</b>	330	195	655	615	695	1800	840	665	370	560	462	
27	· · · · · · · · ·	330	220	615	615	655	1790	800	735	340	560	430	
28		830	195	395	695	695	1880	840	528	340	528	400	•
29		300	220	300	895	775	1930	840	430	340	495	400	•
30	•••••	<b>3</b> 30	•••••	330	1070	855	2020	1070	370	370	528	370	
31		330		395		938	******	2120	340		528		
Tota		12585	9515	15560	14005	35083	63410	52085	37643	10519	13907	14059	
Mea	ın	406	828	502	467	1130	2110	1680	1210	351	449	469	
Max	c	` 500	500	815	1070	1790	2640	2390	2120	462	595	560	
Min		330	170	195	300	655	1300	800	340	178	280	370	
Acr	e-ft. :	25000	18900	30900	27800	69500	126000	103000	74400	20900	27600	27900	*******
	Unle	ss otl	herwis	e note	d, all d	ischar	ges are	in cubi	c feet	per se	cond.		

# ARKANSAS RIVER NEAR BOONE.

Location.—Located at the Rocky Ford High Line Canal dam near Boone.

Records Available.—July 1 to October 27, 1916. Station used only as a substitute for the station near Nepesta while a temporary brush dam was being used at that point.

Discharge Measurements.—Made from highway bridge above or by wading.

Diversions.—There are no diversions between this station and the one near Nepesta.

Accuracy.—Results are fair.

#### ARKANSAS RIVER NEAR NEPESTA.

Location.—At the dam of the Oxford Farmers' Canal Co., in sec. 31, T. 21 S., R. 60 W. 1½ miles above Nepesta; about 6 miles below the mouth of Huerfano River, the nearest important tributary.

Records Available.—September 8, 1897, to October 31, 1903; July 14, 1909, to November 30, 1912; January 1, 1914, to November 30, 1916.

Drainage Area.—9,130 square miles.

Gage.—An automatic recording gage with its zero coinciding with the lowest point of the diversion dam has been in use since 1910. There is no known relation between the present gage and that used in 1903.

Channel.—The diversion dam is the control point, and as the results show shifting conditions it is evident that the dam is not permanent.

Discharge Measurements.—Made from the bridge at Nepesta except during low water, when measurements are made by wading.

Winter Flow.—Ice causes backwater during a portion of the winter months.

Diversions.—There are court decrees for diversions of 1,552 second-feet from the Arkansas between Pueblo and Nepesta, and approximately 1,600 second-feet from intervening tributaries. The discharge records given in this report do not include the flow of the canal.

Accuracy.—Results fair.

Co-operation.—Maintained in co-operation with the Arkansas Valley Ditch Association.

# Discharge of Arkansas River near Boone for 1916.

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	•••••	•••••		*******		•••••		2470	4320	140	265	•	•
2	•••••	•••••	•••••		•••••	•••••	********	2790	1690	180	265		
3 4	•••••	•		••	•••••	*******		2320	1800	105	310	•••••	•
- <del>1</del>	•		•					2320	1800	70	365		•
6					•••••	•		2960 2620	1690 1930	70 35	365	*******	
7		********						2060	2060	35	365 310		••••••
8						•		1800	2060	70	310		******
9			•••••	*******				2060	1690	310	420		*******
10		•••••	•••••	•••••				2320	1470	605	420		
11 12		•••••	•••••		•			2790	1170	605	605		
13		•	•••••••			•	•••••	2320	980	540	605		
14		•••••	••••••	•	*******	•••••	•	2320 2060	8570 8070	605	605 605		••••••
15			•••••		•••••	•••••		1930	2060	670 605	605		
16		•••••			•			2060	5820	605	540		
17		•••••			•	•••••		1800	1800	605	605	*******	*******
18		•••••						1470	1580	480	605		
19 20		•••••	•		•••••	•	•••••	2060	1260	540	420		•••••
21			•••••	*******	•••••	•••••	•••••	1800	1170	480	420		•••••
22		•	••••••		********		*******	1580 1360	365 7820	420 420	420		•••••
23			*******					1360	670	420	540 605	••••••	
24	*******		*******		•			1260	420	420	605	******	******
25	•••••	•	********		•••••	•••••		1170	265	420	745		
26	•••••				•••••	•••••		1080	670	310	605		*******
27 28	•					•••••		900	980	310	605	•••••	
28 29					••••••	•	•	820	980	310	••		
30		•	*******		••••••	••••••	*******	820 <b>82</b> 0	670 <b>54</b> 0	365 310			••••••
					••••			2060	310	310		• •••••	******
7	Cotal	•••••						57560		11060	13135		
Μe	an							1860	2150	369	486		
Ma	x	•••••			•	••		2960	8570	670	•••••		•••••
Mi	n	•			•••••	••		820	265	35	00000		•••••
AU	1 <del>C-</del> 1 t.	•••••	•	••••••	•	•	1	14000 .	132000	22000	26000	•	
			Disc	harre	of Arl	CANEAR !	River r	LOST NO	pesta	for 19	15.		
		-											
<b>D</b> -	Dra	inage	Area,	9,130	Square	Miles.	. Altit	ude, 4,3	396 Fe	et Abo	ve Sea		
Da.	У	Jan.	Area, Feb.	<b>9,130</b> Mar.	<b>Squar</b> e April	Miles. May	June	ude, 4,3 July	Aug.	st Abo Sept.	ve Sea Oct.	Nov.	Dec.
Da. 1	<b>Dra</b> y 	Jan. 450	Feb: 400	<b>9,130</b> Mar. 205	Square April 195	May 2590	June 2200	<b>ude, 4,</b> 3 July 1500	<b>396 Fe</b> Aug. 595	sept. 580	<b>ve Sea</b> Oct. 460	Nov. 210	Dec. 580
Da. 1 2 3	У	Jan.	Feb: 400 400	9,130 Mar. 205 170	April 195 195	May 2590 2800	June 2200 3220	ude, 4,3 July 1500 1330	<b>Aug.</b> 595 735	Sept. 580 580	<b>ve Sea</b> Oct. 460 520	Nov. 210 345	Dec. 580 580
1 2 3 4	у 	Jan. 450 500 500 500	Feb: 400	<b>9,130</b> Mar. 205	Square April 195	May 2590	June 2200 3220 4010 4010	ude, 4,3 July 1500 1330 1430	<b>396 Fe</b> Aug. 595	sept. 580	<b>ve Sea</b> Oct. 460	Nov. 210	Dec. 580
1 2 3 4 5	y  	Jan. 450 500 500 500 500	Feb: 400 400 400 400 400 400	9,130 Mar. 205 170 230 225 155	April 195 195 238 195 238	May 2590 2800 2390 2000 2200	June 2200 3220 4010 4010 4010	ude, 4,3 July 1500 1330 1430 1260 940	596 Fe Aug. 595 735 813 735 665	580 580 580 580 650 520 520	Ve Sea Oct. 460 520 580 580 580	Nov. 210 345 520 460 460	Dec. 580 580 650 650 345
1 2 3 4 5 6	y  	Jan. 450 500 500 500 500	Feb: 400 400 400 400 400 400 450	9,130 Mar. 205 170 230 225 155 180	April 195 195 238 195 238 238	May 2590 2800 2390 2000 2200 2590	June 2200 3220 4010 4010 4010 3550	ude, 4,3 July 1500 1330 1430 1260 940	Aug. 595 735 813 735 665 890	Sept. 580 580 580 650 520 520 580	Ve Sea Oct. 460 520 580 580 580 650	Nov. 210 345 520 460 460 345	Dec. 580 580 650 650 345 520
1 2 3 4 5 6 7	y  	Jan. 450 500 500 500 500 500 500	Feb: 400 400 400 400 400 450 400	9,130 Mar. 205 170 230 225 155 180 175	April 195 195 238 195 238 238 542	May 2590 2800 2390 2000 2200 2590 2390	June 2200 3220 4010 4010 4010 3550 3550	ude, 4,3 July 1500 1330 1430 1260 940 1030 1200	Aug. 595 735 813 735 665 890 1320	Sept. 580 580 650 520 520 580 402	Ve Sea Oct. 460 520 580 580 650 580	Nov. 210 345 520 460 460 345 345	Dec. 580 580 650 650 345 520 580
1 2 3 4 5 6 7 8 9	y  	Jan. 450 500 500 500 500 500 500 500	Feb: 400 400 400 400 400 450 400 400	9,130 Mar. 205 170 230 225 155 180 175 205	April 195 195 238 195 238 238 480	May 2590 2890 2390 2000 2200 2290 2390 2390	June 2200 3220 4010 4010 4010 3550 3550 3000	1500 1500 1330 1430 1260 940 1030 1200 1220	Aug. 595 735 813 735 665 890 1320 1780	Sept. 580 580 650 520 520 580 402 345	Ve Sea Oct. 460 520 580 580 580 650 580 460	Nov. 210 345 520 460 460 345 345 402	Dec. 580 580 650 650 345 520 580 520
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		of Arkansas R			
Drainage	Area, 9,130	Square Miles.	Altitude, 4,396	Feet Above	Sea Level.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		600	210	390	730	760					680	
2	. <b>60</b> 0	500	210	<b>39</b> 0	670	960			*******	•••••	680	
8		500	210	350	670	1330	•		******	•	680	
4	. 600	480	210	440	<b>62</b> 0	1120					635	
5	650	480	210	490	670	960					580	•••••
6		600	300	490	670	900			*******		510	
7	. 650	600	270	310	670	1120					525	
8		600	335	250	730	1200		******	******		490	•
9		600	335	350	790	1200				******	490	
10		600	400	<b>35</b> 0	870	1370					370	
11	. 525	600	400	280	940	1370		•••••			510	
12	. 600	600	510	280	940	1450					525	
13		480	470	310	940	1620	•••••				525	
14		325	470	390	1410	1710		•		•	· <b>52</b> 5	
15		325	560	350	1180	1800				••••	525	
16		260	390	350	1000	1710					525	
17		165	810	310	790	2000		•			525	
18		110	280	390	525	1900	•••••	*******		•••••	580	•••••
19		270	280	440	480	1710	•••••	•••••			680	•••••
20		440	310	280	760	1710	•••••		•••••	•	510	•••••
21		400	310	200	700	1800	•••••		•••••	•••••	525	
22		400	850	150	1020	2000	•••••				525	•••••
23		400	310	250	960	2000		•			510	
24		335	280	250	820	1900	•••••			•	300	
25		870	250	390	700	1710			*******	• • • • • • • • • • • • • • • • • • • •	270	•••••
26		335	200	435	610	1620		•••••	• • • • • • • • • • • • • • • • • • • •		125	******
27		400	180	525	610	1620		•••••			210	
28		300	280	480	660	1710				580	400.	
29		180	310	525	760	1900			·	510	300	
30		•••••	310	870	760	2000		••••••		635	210	
31			390		760				•••••	680		
	18015	12255	9840	11265	24415	46160	•••••		•••••	······································		•••••
Mean		423	317	376	788	1540		•••••	•••••	•••••	482	
Max		600	560	870	1410	2000	••••••		•••••	•••••	680	•••••
Min		110	180	150	480	760	•••••		•		125	•
Acre-ft	.85700	24300	19500	22400	48500	91600					<b>28700</b>	

#### ARKANSAS RIVER AT LA JUNTA.

Location.—Half a mile below the east bridge at La Junta; no important tributary within several miles.

Records Available.—April 11, 1912, to November 30, 1916. From December 5, 1893, to December 31, 1895, a station was maintained near the city pumping plant. During 1899 and 1901 a station was maintained at the head of the Fort Lyon Canal by the Great Plains Water Co. From April 7, 1903, to October 31, 1903, a station was maintained one mile east of La Junta and a number of discharge measurements were made during 1904. From August 27, 1908, to November 30, 1908, a station was maintained half a mile northwest of La Junta, just below the mouth of Crooked Arroyo.

Drainage Area.—12,200 square miles.

Gage.—Automatic recording gage.

Channel.—Shifting.

Discharge Measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter Flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 2,735 second-feet from the Arkansas between Nepesta and La Junta, and 511 second-feet from intervening tributaries.

Co-operation.—Station maintained in co-operation with the Arkansas Valley Ditch Association.

#### ARKANSAS RIVER AT LAMAR.

Location.—Located at highway bridge, one mile north of Lamar.

Records Available.—May 11, 1913, to November 30, 1916.

Gage.—Bristol automatic gage and standard chain gage.

Channel.—Shifting.

Diversions.—With the exception of a few small ditches, below all diversions on the river.

Accuracy.—Results are considered fair.

Co-operation.—Maintained in co-operation with the Arkansas Valley Ditch Association.

55.5

31 ...... 90 Total.. 1720

Mean....

28.6 120

Discharge of Arkansas River at La Junta for 1915.													
	Dra	inage	Area,	12,200	Squar	o Miles	. Altit	ude. 4.0	)52 <b>T</b> e	et Abor	re' Sea	Level	
Day		Jan.	Feb.		April	May	June	July			Oct.	Nov.	Dec.
1		90	20	55	285	165	1170	340	370	880	240	200	55
2		100	30	40	370	90	2080	170	360	560	240	155	70
3		100	50	40	285	145	5060	210	480	280	235	100	70
4		70	50	40	135	145	6940	190	465	255	205	100	115
5		60	5	40	110	90	5580	220	450	280	205	135	40
6		60	5	55	140	360	3670	175	435	130	230	155	20
7	•••••	90	30	85	235	325	2630	180	365	150	230	135	10
8	••	50	30	100	80	60	2570	180	310	70	235	135	20
9	••	50	5	100	170	125	2680	350	180	30	210	85	10
10	•••••	50	5	160	240	90	1850	440	220	30	165	40	iŏ
11	•	40	10							35	165	55	10
12				230	145	165	2460	405	. 230		200	85	10
		40	. 5	85	50	110	2620	410	260	30		115	10
13	•	40	10	55	70	190	3260	415	210	30	170	115	55
14	•	15	10	70	100	5	2480	460	690	25	145	100	10
15	•		. 5	160	100	165	895	285	470	110	145		
16	•		15	160	85	295	550	430	150	. 5	170	100	10
17	•••••	135	15	30	100	430	360	320	305	10	200	135	10
18	•••••	100	10	15	200	395	190	615	1770	95	190	135	30
19			10	5	105	745	530	455	700	80	225	115	30
20			85	0	420	470	360	210	760	160	200	85	30
21			100	0	140	810	225	380	360	180	200	85	30 30
22	<del>-</del>		30		140	560	830	335	430	120	200	100	30 30
23			10	. 5	420	560	610	410	680	50	200	85	30
24			10	40	160	560	740	500	3680	55	225	55	
25	•		10	100	680	360	3520	530	1760	100	200	100	30
26	•		15	180	1600	125	1330	170	1950	220	200	100	30
27	•••••	55	100	260	1080	295	515	205	1790	270	175	100	50
28	•		120	420	295	1430	· 520	370	1130	250	225	100	30
29		15		465	165	2800	775	1040	1040	275	200	100	30
30	•	65		305	145	2740	580	280	960	240	200	85	30
31		90		305		4500		440	870	2222	200	8100	30

1900

440 870 11120 23830 359 769

167 880

201

145

200

31.4

10

 
 Max.....
 135
 120
 465
 1600
 4500
 6940
 1040
 3680
 880
 240

 Min......
 0
 5
 0
 50
 5
 190
 170
 150
 5
 145

 Acre-ft.
 3410
 1590
 7130
 16400
 38300
 113000
 22100
 47300
 9940
 12400
 Unless otherwise noted, all discharges are in cubic feet per second.

1600

8250 19305

			Disc	charge	of Ar	kansas	Biver :	at La :	Junta 1	or 1916	3.		
	Dra	inage	Area,	12,200	Squar	e Miles	. Altit	ude, 4,	052 <b>T</b> e	et Abor	re Sea	Level	•
Day	,	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov	Dec.
1		50	225	55	80	320	225	400	480	30	58	55	
1 2		48	190	70	140	280	300	400	420	30	58	55	
3		48	110	48	140	260	515	375	450	22	50	55	
4		160	120	15	170	225	515	470	450	20	50	55	
5		90	190	20	260	240	360	470	420	18	50	55	•••••
6		110	305	25	280	390	115	470	515	20	50	65	
7		400	425	22	270	460	160	390	550	18	50	65	
8	<b>-</b>	400	425	18	240	370	590	390	450	22	58	65	•
9		350	425	18	220	360	560	440	410	18	58	165	•
10		300	400	20	210	450	700	440	340	5	50	180	
11		208	380	15	180	460	490	490	430	45	58	180	
12		130	<b>3</b> 05	20	140	430	250	490	340	50	85	65	
13		80	208	20	130	420	150	520	330	50	95	65	
14		90	190	22	165	460	390	515	340	50	105	55	
15		100	145	18	260	560	320	480	530	50	125	55	
16	•	100	100	130	280	490	300	515	490	50	138	55	•••••
17		90	130	90	300	500	285	240	500	45	138	55	
18		110	130	35	280	460	630	480	480	45	138	65	•••••
19			90	55	260	460	560	370	290	65	138	.45	•
20		190	62	90	260	420	405	240	420	58	138	45	
21		175	48	80	240	450	560	515	2080	58	138	40	
22			48	110	210	480	380	480	3930	58	150	45	
23			25	120	195	320	420	450	420	58	150	50	
24		260	22	120	165	280	450	420	30	58	138	45	•••••
25	•••••		28	140	120	240	400	420	30	58	138	55	••
26			35	150	102	165	420	320	30	75	115	55	•••••
27	*		80	100	165	110	360	210	30	65	105	55	••••••
	•••••		100	50	210	150	390	240	100	50	105	55	•••••
29		305	80	30	210	195	380	195	30	50	58	55	
30			•••••	65	300	180	305	240	30	50	58	55	•
31_		305		60		180	4:005	260	30	1001	58	0010	•••••
		6049	5021	1831	6182	10765	11885	12335	15375	1291	2903	2010	•••••
	n	195	173	59.1	206	347	396	398	496	43.0	93.6	67.0	
	<b>c</b>	400	425	150	300	560	700	520	3930	75	150	180	•••••
		19000	22	15	80	110	115	195	30	95.60	50	40	•••••
ACT	e-1t.	12000	9950	3630	12300	21300	23600_	24500	30500	2560	5760	3990	•••••

		Di	scharg	re of A	rkansa	s River	at La	nar fo	r 1915.			
Dr	inage	Area,		Square	Miles	. Altit	ude, 3,6	10 Fe	et Abor	re Sea		
Day	Jan.	Feb.		April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	290	130	160	10	890	4200	640	470	520	30	20	110
2	260	140	170	10	940	4090	400 290	740 690	520 440	15 10	10 10	110 125
3	245	120	130 120	10 5	890 750	4470 5740	290 260	310	375	10	10	115
4	220 180	120 190	130	5	710	5070	850	240	340	īŏ	. 10	100
5 6	170	130	140	30	840	4370	300	165	230	15	10	85
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#### ARKANSAS RIVER AT HOLLY.

Location.—At highway bridge half a mile southeast of Holly, on line between secs. 14 and 15, T. 23 S., R. 42 W., 1 mile below the mouth of Wild Horse Creek, an intermittent stream.

Records Available.—October 15, 1907, to November 30, 1916.

Drainage Area.—Approximately 25,000 square miles.

Gage.—A number of gages have been used at the station, but all readings have been referred to the same datum except those from October 25 to December 31, 1911, when a different datum was used.

Channel.—Very shifting.

Discharge Measurements.—Made from bridge during high water and by wading at low stages.

Winter Flow.—Ice causes backwater during a portion of the winter months.

Diversions.—There are court decrees for diversions of 1,072 second-feet from Arkansas River between the stations at La Junta and Holly, and diversions of 1,253 second-feet from intervening tributaries. There are many diversions from Arkansas River below Holly, in Kansas.

Co-operation.—Station maintained in co-operation with the Arkansas Valley Ditch Association.

#### COTTONWOOD CREEK BELOW HOT SPRINGS, NEAR BUENA VISTA.

Location.—In the Leadville National Forest, at bridge in sec. 22, T. 14 S., R. 79 W., half a mile below Hot Springs Hotel and 6 miles west of Buena Vista; 2 miles below mouth of South Fork, the nearest tributary.

Records Available.—April 7, 1911, to December 31, 1916. From September 23, 1910, to September 13, 1911, a station was maintained in section 21, 1 mile above the present station.

Drainage Area.—72 square miles.

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge Measurements.—Made from bridge or by wading.

Winter Flow.—The river is open during the winter months on account of hot springs above.

Diversions.—There are court decrees for diversions of 148 second-feet from Cottonwood Creek, of which 28 second-feet are above the station.

Accuracy.—Records good.

Co-operation.—Station maintained by the United States Geological Survey in co-operation with the United States Forest Service. Records furnished by the United States Geological Survey.

Discharge of Arkansas River at Holly for 1915. Drainage Area, 25,000 Square Miles. Altitude, 3,387 Feet Above Sea Level.													
Don		Jan.	Feb.	•	_							Nov.	
Day	·				April	-	June	July	Aug.	Sept.	Oct.		Dec
1	•••••	250	230	240	138	985	4300	1220	460	360	138	110	175
2		250	240	285	105	1180	4850	560	1300	330	120	125	195
3	•••••	250	220	283	90	985	6450	360	1160	340	120	125	175
4	•••••	250	220	280	80	900	8850	690	750	550	120	125	195
5	••••••••••••••••••••••••••••••••••••••	240	290	240	80	700	7500	280	560	490	120	98	175
6	••••••	220	350	290	70	900	6100	420	310	420	85	90	240
7	•••••	220	490	310	. 90	1070	5450	800	160	320	120	65	218
8		220	415	375	80	1180	4850	320	165	340	120	50	155
9	•••••	220	345	370	90	900	3820	175	170	300	120	50	138
10		220	200	300	370	640	3370	158	160	275	120	60	175
11		220	200	355	340	450	2120	95	140	200	120	120	155
12		175	230	380	310	280	1790	72		200	120	90	.70
13	<b>-</b>	175	185	490	225	178	1520	65	165	200	52	105	155
14	•••••	175	.150	485	310	120	1790	65	210	200	70	70	155
15		175	155	330	590	90	1520	110	1020	155	50	95	155
16	••••	175	150	325	985	70	760	110	1860	85	50	220	218
17		175	135	385	1280	70	450	95	950	225	50	260	155
18		175	105	460	3370	138	370	80	560	178	50	190	
19		175	100	340	1960	700	200	72	1780	138	50	195	140
20		175	100	410	2480	830	70	125	2859	120	110	155	165
21		175	100	120	1960	900	40	1060	1380	120	110	70	200
22		175	100	155	1070	1180	25	340	1630	102	98	50	225
23		200	95	120	985	1180	25	220	1500	85	110	95	225
24		240	130	120	1280	700	60	198	2250		125	120	225
25		240	125	90	1790	450	450	260	<b>13</b> 300	102	125	108	210
26		290	140	90	3600	450	1280	920	5150	102	110	120	225
27		265	155	80	4850	2300	900	600	4300	120	70	155	225
28		240	270	70	3370	8200	450	310	2250	102	70	138	250
29		- 290		90	2120	4300	540	690	1310	120	110	155	275
30		290		120	1180	3140	3600	1030	960	138	110	195	275
31	·	290		120		4850		850	650		125		300
	otal	6830	5625	8103	35248	40016	73500	11850	49560	6519	3068	3604	6044
	an	220	201	262	1170	1290		382	1600	217	99.0	120	195
	r	290	490	490	4850	8200	8850	1220	13300	550	138	260	300
Min		175	95	70	70	70	25	65	140	85	50	50	70
Acr						79300			98400		6090	7140	12000
	Disc	harge	estim	ated J	an. 1-	22; Feb	. 1-5, 9	-25; De	c. 18-3	1.			

	Dra	inage					s Biver . Altit				7 <b>0 S</b> 02	Level	
Da		Jan.	Feb.	-	April	May	June	July		Sept.	Oct.	Nov.	Dec.
1		160	225	120	68	30	2	68	5	900	40	65	
2		375	250	120	55	30	2	22	5	570	40	65	••••••••••••••••••••••••••••••••••••••
3		275	230	80	55	30	3	8	5	460	40	65	
4		300	225	220	55	30	3	8	5	370	25	65	
5		300	270	160	55	22	22	15	5	270	40	48	
6		325	300	140	55	22	190	8	5	208	25	40	
7		300	300	100	80	22	100	5	5	170	25	48	
8		275	300	100	120	15	68	5	5	170	25	48	
9		300	300	80	100	8	55	8	5	150	40	40	
10		350	550	80	120	5	30	15	5	150	65	48	
11		-850	750	100	120	5	80	15	5	120	65	48	
12		500	850	80	100	5	570	15	5	120	65	48	
13		500	850	80	80	5	220	22	5	120	32	75	
14		200	1600	80	80	5	160	15	5	105	40	150	
15		150	800	100	100	3	140	15	8	105	40	150	
16		150	1100	80	80	2	140	15	120	65	65	150	
17		150	1050	80	80	3	120	1 15	220	40	90	225	
18		125	750	80	80	5	100	15	140	32	65	250	
19		150	700	80	100	5	80	15	140	40	65	275	•
20		150	500	80	80	5	570	15	120	40	65	250	
21		175	500	68	80	5	220	8	2460	40	65	225	
22	••••••	200	350	80	80	3	80	15	8560	40	65	150	
23	•	200	280	80	68	5	68	8	7360	40	65	190	
24	•	300	315	80	55	3	100	8	2160	40	120	150	
25	•••••	375	280	80	30	2	68	5	695	40	120	225	•
26	•	500	220	68	15	2	42	5	315	40	120	315	•
27	•••••	450	160	68	15	- Z.	30	5	248	40	120	315	
28	•••••	350	55	55	30	3	15	5	170	25	90	270	
29		225	120	68	30	3	120	5	170	40	90	225	
30		225	••••••	68	30	2	190	5	460	40	65	170	
31_		225		68	*****	2		. 5	900		65		
	otal		14180	2823	2096	289	3588	393	24316	4590	1942	4388	
	an	294	489	91.1	69.9	9.3	120	12.7	784	153	62.6	146	
	x	850	1600	220	120	30	570	68	8560	900	120	315	
Min		125	55	55	15	2	2	_ 5	5	32	25	40	•••••
ACI		18100	28100	5600	4160	572	7140	781	48200	9100	3850	- 8690	<b>-</b>
	- Aui	ess ot	nerwis	e note	a, ali c	uschar	ges are	in cut	nc feet	per s	econd.		
	ונע	cnarg	e estir	nated	Jan. 1-	-Feb. 2	2, acc't	1C <b>0.</b>			-		

Discharge of	f Cottonwood	Below	Hot Springs	near Buena	Vista for 1915.
Drainage A	res. 72 Samer	a Miles.	. Altitude. R	.000 Feet Ab	ove Sea Level.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	22	22	22	22	44	238	279	46	41	46	31	29
2	22	22	22	22	30	264	264	42	40	45	30	27
3	22	22	22	22	29	172	248	40	45	42	30	27
4	22	21	21	22	29	124	229	39	46	39	30	26
5	22	21	22	22	29	134	238	38	45	38	29	26
6	22	21	21	22	29	117	248	39	41	38	29	27
7	22	21	21	22	27	94	172	47	40	39	30	27
8	22	22	21	22	30	117	184	117	40	38	30	27
9	22	22	21	22	34	184	152	84	39	38	30	26
10	22	22	21	22	34	215	145	66	38	38	29	26
11	22	22	22	22	42	345	124	60	38	39	26	26
12	22	22	. 21	22	64	405	111	66	40	40	22	26
13	22	22	21	22	88	238	111	58	38	39	23	26
14	22	21	22	24	102	192	111	52	40	38	2 <b>2</b>	26
15	22	21	22	27	88	215	102	58	40	40	24	26
16	22	21	22	23	111	264	94	54	40	40	24	26
17	22	21	21	24	117	317	84	50	40	40	24	26
18	22	21	21	23	152	289	78	46	39	39	26	26
19	22	22	21	23	111	375	71	47	38	40	29	26
20	22	22	20	29	67	405	67	50	36	40	30	26
21	22	22	20	29	5 <b>5</b>	405	67	47	35	40	29	26
22	22	21	20	29	55	438	67	45	34	39	29	26
23	22	21	20'	27	64	470	64	64	33	39	29	26
24	22	20	21	24	84	438	60	61	33	39	29	26
25	22	21	21	23	124	405	60	58	46	- 38	20	· 26
26	22	. 22	21	24	111	375	52	5 <b>2</b>	55	36	29	26
27	22	22	22	29	84	375	64	51	54	36	29	24
28	21	22	22	39	78	317	55	47	45	34	26	. 26
29	22	•	22	47	111	289	52	46	4,5	34	27	26
30	22		22	54	117	289	50	47	50	34	29	26
31	22		22		160		46	46	•••••	33		26
Total	681	602	660	784	2300	8505	3749	1663	1234	1198	833	812
Mean	22.0	21.5	21.3	26.1	74.2	284	121	53.6	41.1	38.6	27.8	26.2
Max	22	22	22	54	160	470	279	117	55	46	31	29
Min	21	20	20	22	27	94	46	38	33	33	22	24
Acre-ft.	1350	1190	1310	1550	4560	16900	7440	3300	2450	2370	1650	1610

# Discharge of Cottonwood Below Hot Springs near Buena Vista for 1916. Drainage Area, 72 Square Miles. Altitude, 8,000 Feet Above Sea Level.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	24	22	22	22	42	215	256	184	58	40	38	30
2		24	22	22	48	215	248	134	55	45	38	30
3	0.0	23	22	23	35	229	248	124	55	44	36	30
4	0.5	23	21	22	42	264	229	145	52	45	36	30
5	25	23	22	22	46	229	201	117	52	41	32	30
6	24	23	21	22	60	215	201	111	52	48	30	30
7	0.0	23	21	21	78	192	184	111	52	52	35	25
8		23	22	22	111	184	192	102	52	50	32	23
9	0.4	23	22	22	134	238	192	102	50	50	30	29
10	0.5	23	22	22	172	317	201	94	47	50	38	29
11	0.5	22	22	23	172	375	172	88	64	50	36	29
12		22	22	22	152	405	145	-88	55	50	32	29
13		22	23	25	117	470	160	88	55	50	27	29
14	0.0	22	23	24	īīi	470	145	117	55	47	26	29
15	23	22	22	23	84	470	134	102	52	46	30	29
16		22	22	23	60	470	145	102	50	45	32	29
17		22	22	27	71	540	134	94	48	44	32	29
18		22	22	29	60	540	134	88	47	40	32	28
19	22	22	24	29	67	540	124	84	47	40	32	27
20	. 22	22	24	26	71	540	117	78	46	38	34	27
21		22	26	24	64	540	102	73	45	32	32	27
22		22	24	29	64	470	94	67	44	40	32	27
23		22	26	35	55	317	88	61	45	40	32	28
24		22	24	37	55	264	84	67	46	42	32	27
25	23	22	22	40	67	289	78	67	46	38	30	27
26		21	22	45	71	264	84	67	45	41	32	26
27		22	23	50	71	264	88	66	42	40	32	26
28	24	22	23	55	78	289	88	61	42	40	32	· 26
29	23	22	23	64	84	289	84	61	40	38	30	26
30	24		23	50	111	264	152	67	40	38-	. 30	26
31	22		24		145		134	61		36		26
Total	l 728	647	703	900	2598	10368	4638	2871	1479	1340	972	863
Mean	23.5	22.3	22.7	30.0	83.8	346	150	92.6	49.3	43.2	32.4	27.8
Max		24	26	64	172	540	256	184	64	52	88	80
Min	22	21	21	21	35	184	78	61	40	32	26	23
Acre-ft	. 1440	1280	1400	1790	5150	20600	9220	5690	2930	2660	1930	1710
Un	less of	herwis	e note	d, all d	lischar	ges are	in cubi	c feet	per se	cond.		

#### CHALK CREEK AT UPPER STATION NEAR ST. ELMO.

Location.—In sec. 27, T. 15 S., R. 80 W., in the Leadville National Forest, one-quarter mile below the power plant of the Tin Cup Gold Dredging Company, and one and one-quarter miles below St. Elmo. The nearest tributary is Coal Creek, which enters a quarter mile below.

Records Available.—November 15, 1913, to November 12, 1916.

Drainage Area.—48 square miles (measured from Forest atlas).

Gage.—Friez recording gage owned by the Tin Cup Gold Dredging Company.

Channel.—Apparently permanent.

Discharge Measurements.—Made from foot bridge and by wading.

Winter Flow.—Affected very little by ice.

Diversions.—There are no court decrees for diversions from Chalk Creek, the water of which is not returned to the stream above the station.

Regulated Flow.—Low-water flow regulated to a certain extent by a small reservoir at St. Elmo formed by the diversion dam for the Tin Cup Gold Dredging power house.

Accuracy.—Conditions are favorable for accurate results and the estimates are considered excellent.

Co-operation.—Records furnished by the United States Geological Survey.

# CHALK CREEK NEAR ST. ELMO. (Lower Station.)

Location.—In the Leadville National Forest at highway bridge in sec. 28, T. 15 S., R. 79 W., just below the cascades of Chalk Creek and 6 miles east of St. Elmo. Nearest tributary is a small intermittent stream entering from the north just below.

Records Available.—March 10, 1911, to March 31, 1916. From September 6 to December 28, 1910, a station was maintained in sec. 24, T. 15 S., R. 79 W. Station discontinued March 31, 1916.

Drainage Area.—75 square miles.

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge Measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter Flow.—Ice causes only slight backwater.

Diversions.—There are no court decrees for diversions from Chalk Creek above the station, but below there are decrees for 132 second-feet.

Accuracy.—Results fair.

Co-operation.—Records furnished by the United States Geological Survey.

ìУ		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	De
					9	32	159	152	34	19	26	13	
					10	21	148	148	32	18	23	16	
					9	20	123	136	29	20	22	15	
					12	18	99	134	28	20	19	17	
					10	18	93	143	27	20	17	18	
					9	18	86	148	33	20	18	23	
					8	18	84	123	52	18	17	20	
					9	18	105	113	60	18	18	13	
					8	21	150	107	50	18	16	11	
					9	27	176	105	41	16	17	11	
					Š	53	220	103	42	15	15	10	
					10	68	210	97	45	15	14	10	
			8		13	92	171	95	40	14	15	10	
					13	115	161	92	41	15	16	9	
			7	8	13	88	190	88	52	16	16	9	
			Ż	ž	ii	119	195	79	45	16	16	9	
•			ż	ġ	îî	134	195	67	35	16	14	Š.	
			ż	8	14	105	222	59	30	16	15	9	
••••			ż	Ř	17	77	235	52	28	16	14	10	
••••	••••		ż	_	20	60	225	49	25	16	16	10	
••••		•••••	ė	8	22	53	228	46	24	15	14	ĩŏ	
••••				8	19	54	235	19	24	14	13	10	
		••		8	18	74	232	20	40	14	15	10	
••••		•		8	16	97	222	47	41	14	18	10	
		•	8	7	/ 18	105	228	46	40	23	18	10	
••••			٥	ŕ	17	79	220	47	28	27	14	10	
		•••••		á	23	70	190	65	25	22	13	10	
		·····•		8	34	86	176	53	20 22	21	12	9	
			•••••	8								9	
			•	8	47	99	164	46	21	22 `	13 12	9	
•	••••		•••••		52	99	161	41	22	24		9	
				8	400	130		38	21		13		
Tota		•	•••••		490	2068	5303	2558	1077	538	499	349	1
an.			7.0	8.0	16.3	66.7	177	82.5	34.7	17.9	16.1	11.6	1
ıx		•••••		•••••	52	134	235	152	60	27	26	23	
n		•••••			8	18	84	19	21	14	12	9	
re-f	t.		389	492	970	4100	10500	5070	2130	1070	990	690	(

		iarge o				pper sts Altitud						
	_			_								<b>.</b>
Day	Jan.			April	May	June	July	Aug.	Sept.	Oct.	Nov	Dec.
1	10	7	8	12	58	175	175	99	32	17	19	
2		7	8	12	53	175	168	109	30	22	18	
3	9	8	7	12	47	182	162	90	30	22	15	••
4	9	8	7	12	53	185	150	79	29	18	15	
5		8	7		70	170	143	74	27	16	15	•
<u>6</u>	9	8	8	11	101	178	134	79	30	27	15	
7	9	8	8	12	131	175	136	84	32	27	12	
8	8	8	8	12	145	182	143	70	32	32	13	
9		8	8	10	162	219	150	67	46	27	13	•••••
10		8	9	13	165	243	148	67	53	27	13	
11	8	7	9	16	152	246	131	60	36	31	12	
12	8	7	9	17	162	255	140	58	45	28	14	
13		7	9	19	165	273	122	86	40	24		
14	10	• 7	18	18	127	267	116	101	32	26		
15	12	7	18	19	101	252	109	80	32	26		
16	11	7	11	19	86	255	114	79	37	26		
17	12	8	10	19	80	258	105	74	36	30		
18	11	8	10	26	80	261	95	62	34	29		
19	10	8	10	26	87	255	88	58	33	25		
20		8	ĨŎ.	25	87	237	84	56	32	23		
21		Ř	12	25	79	222	79	53	30	23		
22	•	š	- 5	29	75	201	82	47	28	23		•••••
23	0	Ř	11	42	70	190	77	47	26	22	•••••	•••••
24	•	š	îî	50	72	190	żò	47	24	23		
0.5	•	ě	10	54	82	192	67	46	22	20	••••••	•••••
0.0		8	10	62	90	192	65	41	20	23	•••••	
0.5		8	10	75	101	195	68	38	19	24	••	
28	8	8	11	88	118	192	65	36	17	23	••••••	
	_	8	11	88	131	190	82	35	18	24		•••••
0.0		•	12	60	152	185	129	35	16	22		
0.4	_		11	90		199			10		••••••	
					172	4000	103	36		20	154	•
Total		224	310	895	3254	6392	3500	1993	918	750	174	
Mean	8.90	7.72	10.0	29.8	105	213	113	64.3	30.6	24.2		•
Max		8	18	88	172	273	175	109	53	32		•••••
Min		7	- 7	10	147	170	65	35	16	16		•••••
Acre-ft	. 547	444	615	1770	6460	12700	6950	3950	1820	1490	•••••	•••••
IIn	less of	herwise	e note	fla ħ	discha	røes are	in cul	hic fee	t ner s	econd.	-	

Discharge of Chalk Creek near	St. Elmo (Lower Station) for 1915.
	Altitude, 10,000 Peet Above Sea Level.

Da.	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					20	58	198	230	65	43	48	28	26
2					23	50	198	178	56	37	48	25	27
3				••••••	20	42	173	178	56	37	45	25	28
ă					22	42	152	178	56	37	42		
5		•			23	36	152	178	56			25	25
6		•••••	•••••	••••••	20	42	133			37	36	28	25
9	•••••	•••••		•••••				178	60	37	32	30	25
ĭ			•	••••••	20	42	114	169	56	37	32	31	25
8	•••••	`	•••••		20	36	114	169	74	37	36	32	25
. 9	• • • • • • • • • • • • • • • • • • • •	•••••	•		20	36	198	148	93	37	86	32	28
10	•••••	•	•••••		28	36	254	148	56	37	35	32	28
11	•••••	•••••	•••••		22	42	318	148	56	37	34	32	25
12	•			•••••	22	68	382	148	56	37	34	31	25
13	••••••				. 24	114	290	148	56	37	34	30	25
14				•	25	198	198	128	60	37	32	30	25
15			15		36	132	254	121	58	37	36	2 š	22
16		21			28	142	285	140	56	37	32	28	26
17					28	152	382	103	56	37	33	28	26
18					28	173	350	96	56	33	34	27	26
īğ					28	173	350	88	56	33	34	26	26
20			••••••		28	96	360	88	47	33	33	26	
21			••••••		32	82	. 370	74	41	29	32		26
22					32	82	304		44	29		27	25
23	•				32	99	337				32	28	25
24					28			74	47	26	32	25	25
			•••••			114	337	74	56	26	31	25	25
25	•		•••••	••••••	28	152	370	74	47	34	30	25	25
26	•••••	•••••			28	132	370	74	41	38	30	25	25
27				•••••	32	114	337	79	41	43	30	25	25
28	•••••	•••••			42	114	304	68	41	43	26	26	25
29	•••••	•••••		16	48	114	261	74	41	43	25	26	25
30			• • • • • • • • • • • • • • • • • • • •	18	48 -	- 123	261	74	41	43	26	26	25
31				16		132		74	41		27		25
	'otal				830	2968	8106	3775	1666	1088	1047	833	789
Me	an				27.7	95.7	270	122	53.7	36.3	33.8	27.8	25.5
Ma	x				48	198	382	230	93	43	48	32	28
Mi	n				20	36	114	68	41	26	25	25	22
						5880	16100	7500	3300	2160	2080	1650	
			********		1000	. 0000	70700		0000	2100	4000	TOOU	1570

Discharge of Chalk Creek near St. Elmo (Lower Station) for 1916.

Drainage Area, 75 Square Miles. Altitude, 10,000 Feet Above Sea Level.

Av Jan Feb Mar April May June July Aug Sent Oct Nov.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	25	22	22								•	
2	25	22	22									
3	25	22	23				•••••					
4	25	22	24	•	•••••		•	•••••		•••••	*******	
5	25	22	26		•		••••••				*******	
6	25 25	22 22	28		•••••		•			••••	•••••	•••••
7 8	25 22	22 22	28 25		•••••		• • • • • • • • • • • • • • • • • • • •		••••••		•	•••••
	24	22	25 25		•	•••••	•	•••••		•••••	•••••	
4.0	25	20	22	••••••		•	••	•••••	•			
10	22	20	22		••••••	••••••			•••••	•••••	•	•••••
12	23	20	22	••••••	••••••	•••••			•••••	· · · · · · · ·		•
13	25	26	22						•••••			~
14	25	32	20		********	*******		••••••	•••••		•••••	
15	24	26	ŽŎ									•
16	23	24	24								••••••	•••••
17	22	22	21				*******				••••••	
18	22	20	22							*******		
19	22	42	22									
20	22	34	22									
21	22	25	22									
22	22	22	21									
23	22	20	25	••••••		•		·			••	
24	22	20	-25	•••••		•••••						
25	22	20	25		•••••		••••	••••••	•		•••••	•••••
26	22	20	25	•	•	••				•	•	•••••
27	22	21	25	•		•	•••••					
28	22 22	22	25	•••••			••••••	••••••	••••••	•	•••••	•
29 30	22	22	25	••••••	••••••	•	•••••					
0.1	22	•••••	25 25	•••••	•••••				•		•••••	•••••
Total	718	676	730	••••••	•••••		•••••		•••••		•	•••••
Mean	23.2	23.3	23.5	•••••				•••••			•	
Max		42	28						•	•••••	••••••	•••••
Min	22	20	20					•••••		•		
Acre-ft.	1430	1340	1440				<b></b>	•		•	•••••	
	~ ~ ~ ·				diacha		-	hia <b>d</b> a		 heanan	•••••	•••••••

#### SOUTH FORK OF ARKANSAS RIVER AT PONCHA.

Location.—At highway bridge about half a mile from Poncha, in sec. 10, T. 49 N., R. 8 E. Nearest tributary, Poncha Creek, enters one-fourth mile below.

Records Available.—January 14, 1911, to November 9, 1916.

Drainage Area.—140 square miles.

Gage.—Vertical staff.

Channel.—Slightly shifting.

Discharge Measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter Flow.—Springs keep this stream open during the winter months.

Diversions.—There are court decrees for diversions of 114 second-feet from the South Fork above the station, and 77 second-feet below. There are also decrees for diversions of 85 second-feet from the North Fork which enters above.

Accuracy.—Results good.

Co-operation.—Records furnished by the United States Geological Survey.

#### PONCHA CREEK AT PONCHA.

Location.—At highway bridge in sec. 10, T. 49 N., R. 8 E., near Poncha, about one-fourth mile above the mouth of creek.

Records Available.—January 14, 1911, to December 31, 1916.

Drainage Area.—89 square miles.

Gage.—Vertical staff.

Channel.—Slightly shifting.

Discharge Measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter Flow.—Springs prevent the creek from freezing to any considerable extent.

Diversions.—There are court decrees for diversions of 7 second-feet above the station, but none below.

Accuracy.—Results good.

Co-operation.—Records furnished by the United States Geological Survey.

		Dre					ork Ar Miles.	kansas Altitu	River					
1	)a;		Jan.	Feb.		_	May	June	July	Aug.				Dec.
Ī	1			32	30	27	128	89	151	41	33	32	17	48
	2	•	33	33	30	26	120	205	130	32	24	24	17	49
	3 4		35 33	33 33	32 33	26 30	120 100	205 113	117 103	26 28	22 22	21 26	17 13	50 52
	5		33	33	33	37	87	109	116	20	25	26	13	43
	6 7	•••••	~~	33 35	33 33	41 41	76 60	93 81	135 76	14 13	22 20	22 25	15	60
	8			37	33	41	37	85	68	30	20	2 5 2 4	25 21	48 46
	9		33	37	33	41	30	113	87	35	22	24	16	46
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1	2		33	35	33	33	65	335	57	20	16	22	30	52
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i			32	32	37	26	135	168	50	15	14 16	26 27	. <b>62</b>	46 43
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2 2			26 26	33 33	33 33	26 26	116 102	335 265	8 6	13	7 7	26	57	50
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														2330
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Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 24 22 24 25 26 27 28 29 30	Jan	Feb. 888888888888888888888888888888888888	Mar. 88 8 8 100 99 6 6 100 112 113 111 110 112 114 114 114 114 114 114 114 114 114	April 7 9 15 19 14 14 10 10 11 14 16 16 16 16 17 22 25 18 22 22 25 38 42 42 55 5	Poncha 2110s.  May 37 38 39 63 78 63 78 114 131 131 131 131 131 131 78 80 76 77 80 64 88 83 83 83 83 83 81 81	June 114 116 922 120 116 92 83 83 86 85 83 80 97 72 74 64 51 51 51 52 47	de, 7,47 July 34 34 31 31 31 30 29 29 29 23 25 24 29 21 20 18 18 16 16 16	Aug. 344 400 326 352 299 221 220 226 222 221 210 199 116 177 178 188 177 176 224	Sept.  13 10 111 18 17 16 16 15 14 111 10 10 9 9 8 8 7 7 7 7 7	Oct. 766667777799777799991012212212017777881066667799999999999	Nov. 8 100 97 76 67 77 75 66 99 88 63 33 66 77 88 88 89 110 112 113 113 112 112 112 112 112 112 112	12 12 11 12 12 12 12 12 10 97 7 9 10 10 10 10 10 10 8 8 8 8 9 11
Day  1	Jan. 888888888888888888888888888888888888	Feb. 888888888888888888888888888888888888	Mar. 89 8 100 122 123 133 131 110 102 122 124 146 144 144 144 144 144 144 144 144 14	April 7 9 15 19 15 19 14 14 10 11 11 16 16 16 16 16 16 18 22 25 55 38 42 42 42 45 55 60 60 689	Poncha 26108.  May 37 38 27 35 53 78 100 114 131 131 120 104 85 80 106 80 76 80 76 80 80 80 80 80 80 80 80 80 80 80 80 80	June 114 116 922 120 116 927 83 83 90 72 74 76 65 51 51 51 52 47 47 47 47 47 47 47 47 47 47 47 47 47	de, 7,47  July 34 34 31 31 34 30 29 29 29 22 21 20 20 20 20 18 18 18 16 16 17 16 17 18 80	Aug. 344 400 300 226 352 229 221 226 225 221 199 119 1177 118 118 118 127 177 177 177 177 177 177 177 177 177	Sept.  13 10 111 118 17 16 16 16 15 14 111 110 10 9 9 8 8 7 7 7 7 322	Oct. 76 66 66 77 77 79 99 100 1122 1120 1122 120 77 77 8 99 99 99 252	Nov. 8 10 9 7 7 6 6 9 8 6 6 3 3 3 6 6 7 8 8 8 8 9 9 11 1 12 12 12 12 12 12 12 12	12 12 11 12 12 12 12 12 10 10 10 10 10 10 10 10 10 10 10 10 10
Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 24 22 24 25 26 27 28 29 30 31 Mean	Jan	Feb. 888888888888888888888888888888888888	Mar.  8 8 8 10 9 122 133 131 110 100 122 114 112 112 112 114 114 114 114 114	April 7 9 15 19 14 14 16 16 16 16 16 12 22 55 18 22 22 55 59 6 18 23 3 8 2 3 3 6 3 9 9 6 3 9 9 9 9	Poncha 37 38 37 38 39 63 78 63 78 63 78 63 78 64 85 83 83 83 83 81 31 2618 84.5	June 114 116 92 120 116 92 83 83 86 83 90 97 83 80 72 74 64 51 51 51 52 47 42 81	de, 7,47  July 34 331 331 331 330 329 229 233 225 24 229 200 188 186 166 166 166 167 166 388 801 255.8	Aug. 344 400 300 326 352 229 221 226 225 221 226 225 221 226 225 221 220 229 177 188 187 177 162 214 722 3.5	Sept.  13 10 11 18 17 16 16 15 14 11 11 10 10 9 8 8 7 7 7 7 322 10.7	Oct. 766667777799991021122112017777881066667999928.13	Nov. 8 10 9 7 6 7 7 7 7 5 6 6 9 8 8 6 6 7 7 8 8 8 8 8 9 11 112 112 112 112 112 12 12 12 15 5 5 6 6 9	12 12 11 12 12 12 12 10 9 9 10 10 10 10 10 10 10 10 10 11 8 8 8 8 9 11 11 12 12 12 12 12 12 12 12 12 12 12
Day  1 2 3 4 5 6 7 8 9 11 12 13 14 15 16 17 18 19 20 21 22 22 23 24 25 27 28 29 30 Mean Max	Jan. 888888888888888888888888888888888888	Feb. 888888888888888888888888888888888888	Mar. 89 8 100 122 123 133 131 110 102 122 124 146 144 144 144 144 144 144 144 144 14	April 7 9 15 19 15 19 14 14 10 11 11 16 16 16 16 16 16 18 22 25 55 38 42 42 42 45 55 60 60 689	Poncha 26108.  May 37 38 27 35 53 78 100 114 131 131 120 104 85 80 106 80 76 80 76 80 80 80 80 80 80 80 80 80 80 80 80 80	June 114 116 922 120 116 927 83 83 90 72 74 76 65 51 51 51 52 47 47 47 47 47 47 47 47 47 47 47 47 47	de, 7,47  July 34 34 31 31 34 30 29 29 29 22 21 20 20 20 20 18 18 18 16 16 17 16 17 18 80	Aug. 344 400 300 226 352 229 221 226 225 221 199 119 1177 118 118 118 127 177 177 177 177 177 177 177 177 177	Sept.  13 10 111 118 17 166 165 14 111 110 10 9 9 8 8 7 7 7 7 322 10.7 18 7	Oct. 766667777799777799101122112211077778810666677999928.1326126	Nov. 8 10 9 7 6 6 7 7 7 5 6 6 9 8 8 6 6 3 3 3 6 6 7 7 8 8 8 8 8 9 10 11 12 12 12 12 12 12 12 12 12 13 13 13 13 13 13 13 13 13 13 13 13 13	12 12 11 12 12 12 12 12 10 9 9 7 9 10 10 10 10 10 10 10 10 11 11 11 11 11
Day  1	Jan. 888888888888888888888888888888888888	Feb. 888888888888888888888888888888888888	Mar. 88 8 10 19 122 133 131 110 102 124 144 144 144 144 144 146 716 719	April 7 9 14 10 10 11 14 16 16 16 16 17 22 25 18 22 25 59 60 60 7 7 13 70 13 7	Poncha 26108.  May 37 387 389 633 780 114 1311 1311 1310 1204 104 85 80 106 76 728 78 83 83 118 84.5 131 2618 84.5 131 2520	June 114 116 12 120 22 83 86 83 86 83 86 85 85 85 85 85 85 85 85 85 85 85 85 85	de, 7,47  July 34 331 331 331 330 329 229 233 225 24 229 20 188 166 166 167 166 25,48 801 25,48 1560	Aug. 344 400 3306 352 229 221 226 225 221 220 177 118 118 117 126 23.54 1440	Sept.  13 10 11 18 17 16 16 16 15 14 11 11 10 10 9 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Oct. 766667777799910212212212017777880666679992528.126500	Nov. 8 10 9 77 75 66 9 86 33 36 77 78 88 88 89 91 10 112 123 122 122 128 85 85 85 86 86 87 87 88 88 88 88 88 88 88 88	12 12 11 12 12 12 12 12 10 10 10 10 10 10 10 10 10 10 10 10 10

### PURGATOIRE RIVER AT TRINIDAD.

Location.—About 200 feet above the Commercial Street bridge at Trinidad.

Records Available.—April 1, 1916, to November 11, 1916. From 1897 to 1899 and 1905 to 1912 a station was maintained about 1,000 feet above the present location.

Drainage Area.—742 square miles.

Channel.—Shifting.

Gage.—Painted on sloping concrete facing on north bank of river.

Discharge Measurements.—Made by wading at low stages and from Animas Street bridge during high water.

Winter Flow.—Observations discontinued during the winter months. Diversions.—There are decrees for diversions of 186 second-feet

from the Purgatoire River above this station.

Accuracy.—Results for 1916 cannot be considered better than fair.

Discharge of Purgatoire Eiver at Trinidad for 1916.

Drainage Area, 742 Square Miles. Altitude, 5,990 Feet Above Sea Level.

Day	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					15	148	45	30	5	5	10	5	
2					15	280	45	20	5	5	15	5.	
3					15	280	45	15	5	5	15	5	
4					15	280	1900	15	42	5	15	5	
5					38	320	280	15	5	5	15	5	
6					45	360	280	30	450	5	15	5	
7					30	410	280	30	910	5	15	5	
8					30	460	280	30	460	5	15	5	
9					30	460	280	30	360	5	42	5	
10					30	560	280	30	42	5	5	5	
11					38	510	300	22	95	5	5	5	
12					45	410	320	15	5	5	5		
13			••••••		38	460	360	320	20	5	5		
14					15	320	360	82	42	5	5		
15		ι	•••••		30	320	410	15	270	5	5		*******
16					15	320	360	20	270	5	5		
17	• • • • • • • • • • • • • • • • • • • •	<b></b>			15	280	410	30	270	5	5		•••••
18		•••••	•••••	•	15	125	345	22	5	5	5	•••••	
19					15	125	280	125	5	5	5		
20	•••••	•••••	•••••	•	15	280	280	15	20	5	5	•	
21	-:		••••	•••••	15	160	280	15	42	5	5	•••••	••••••
22	••••	•	•••••	••••••	15	45	125	22	270	5	5	•••••	
23		•••••		•••••	15	125	125	22	42	5	5		•••••
24		·	·····•		15	280	45	22	5	5	5	•••••	
$\frac{25}{26}$		•••••	•••••	•	15 15	$\frac{280}{125}$	45 45	$\begin{array}{c} 110 \\ 22 \end{array}$	5	5	5		•
20 27		•	••••••	•••••	38	125	360	30	5 5	5 5	5	•••••	•••••
28		•••••	••••••		38	85	280	30	5	5	5	•	•••••
29		•••••			30	45	. 38	30	5	5	5 5	•••••	
30				•••••	90	45	38	360	42	5	5		
31					•	45		270	42		5	••••••	•••••
					700	8068				150	-	•••••	• • • • • • • • • • • • • • • • • • • •
		••••••	•••••		790		8521	1844.		150	267		
Mea	an				26.3	260	284	59.5	121	5.0	8.6		
Max	<b></b>				90	560	1900	360	910	5	42		
Min					15	45	38	15	5	5	5		
	e-ft.				<b>1560</b>	16000	16900	3660	_	_	-	•••••	•••••
ACI	e-1 t.			•••••	- 1900	10000	10900	3000	7440	298	529	•	•••••

#### GRAND DRAINAGE.

## NORTH FORK OF GRAND RIVER NEAR GRAND LAKE.

Location.—Three miles southwest of Grand Lake, in sec. 13, T. 3 N., R. 76 W. Nearest tributary, Grand Lake outlet, enters some distance below; no tributaries for several miles above the station.

Records Available.—July 29, 1904, to September 30, 1909; September 20, 1910, to December 31, 1916.

Gage.—Vertical staff.

Drainage Area.—107 square miles.

Channel.—Practically permanent.

Discharge Measurements.—Made from highway bridge at the gage.

Winter Flow.—Ice forms along the edges, but springs keep the river open.

Diversions and Storage.—There are court decrees for diversions of 699 second-feet from the headwaters above the station. Of this amount 525 second-feet are for diversion across the divide into the headwaters of the Cache la Poudre. There is also a reservoir decree for 19,000 acrefeet from the flood water.

Accuracy.—Results considered good.

Co-operation.—Station maintained in co-operation with the United States Geological Survey.

# GRAND RIVER AT SULPHUR SPRINGS.

Location.—At the bridge connecting the Denver, Northwestern & Pacific Railway station with the town of Sulphur Springs, in sec. 2, T. 1 N., R. 78 W. Nearest tributary, Beaver Creek, enters the river 2 miles below the station.

Records Available.—July 22, 1904, to September 30, 1909, a station was maintained at this point by the United States Geological Survey; September 23, 1910, to November 11, 1916.

Drainage Area.—946 square miles.

Gage.—Chain gage.

Channel.—Somewhat shifting.

Discharge Measurements.—Made from bridge during high and ordinary stages and by wading during low water.

Winter Flow.—The river is frozen over during the winter months and discharge measurements are made to determine the winter flow.

Diversions.—Between this station and the mouth of North Fork there are court decrees for diversions of 96 second-feet from Grand River, and there is also a reservoir decree for 31,300 acre-feet from the flood waters of Grand River.

Accuracy.—Results considered good.

Co-operation.—Records furnished by the United States Geological Survey.

## Discharge of North Fork of Grand River near Grand Lake for 1915. Drainage Area, 107 Square Miles. Altitude, 8,153 Feet Above Sea Level.

Da	У	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					22	228	380	332	85	58	61	48	41
2	••••••	•••••	•	•••••	22	160	405	310	85	56	59	46	39
3	•	••••••		•••••	23	140	270	290	82	56	66	45	37
4	••••••	•••••	•••••	•••••	24	100	252	270	74	58	64	45	38
5	•••••			•••••	24	91	235	290	71	58	62	43	39
6	•••••	•••••	•••••	•••••	. 24	85	221	310	79	56	61	43	38
7	•••••	•••••	•••••	21	29	91	200	252	85	, 56	57		37
8	•••••	•	•	20	31	94	200	252	91	85	57	45	36
9	••••••	•••••	•••••	20	33	94	235	235	100	71	55	46	36
10	•••••	*******	• • • • • • • • • • • • • • • • • • • •	20	35	108	332	235	94	66	55	48	37
11	•••••	•••••	•••••	20	94	108	405	235	85	61	55	48	36
12	•••••	•••••	•••••	20	150	182	510	235	79	61	55	49	37
13	•••••	•••••	••••••	20	170	235	355	235	77	63	49	49	37
14	•••••	•••••	•	20	182	310	290	207	71	61	55	49	38
15	•••••		•	20	235	270	290	200	71	61	55	49	38
16	••••••	•••••		20	235	270	270	176	71	61	55	48	38
17	•••••	•••••	••	20	252	270	355	160	71	56	55	48	37
18	•••••	••••		20	270	290	430	150	66	53	55	46	36
19			••••••	20	176	235	565	145	120	46	54	45	36
20	•••••	•	•••••	20	228	221	510	140	100	48	54	45	36
21			•••••	20	155	214	405	135	88	40	54	45	35
22		•••••	•••••	20	160	200	455	125	79	42	52	46	· 35
23	•••••		•••••	20	140	207	430	116	77	39	52	46	35
24	•••••	•••••		20	120	214	405	112	74	39	52	45	35
25	·	•••••	•••••	20	112	207	405	100	74	44	51	42	35
26		••••	*******	20	104	207	405	100	71	77	51	46	36
27		•••••		20	94	214	310	100	68	77	49	49	36
28			••••	20	120	242	310	97-	66	68	48	48	37
29				21	176	270,	310	94	66	68	48	45	38
30		•••••		21	252	310	355	94	63	66	48	43	37
31			,	21	•••••	332	******	88	61		48		36
7	Cotal			504	3692	6199	10500	5820	2444	1751	1692	1383	1142
	an			20.2	123	200	350	188	78.8	58.4	54.6	46.1	36.8
	x			21	252	332	565	332	120	85	66	49	41
	n			20	22	85	200	88	61	39	48	42	35
Acı	re-ft.	•••••		1000	7320	12300	20800	11600	4850	3480	3360	2740	2260

#### Discharge of Morth Fork of Grand River near Grand Lake for 1916. Drainage Area, 107 Square Miles. Altitude, 8,153 Feet Above Sea Level.

		Po —	,	md ame a			, -,-					
Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	36	36	34	52	225	420	322	107	56	69	55	40
2	36	36	34	52	172	395	322	90	63	72	55	40
3	36	35	34	54	135	370	300	128	60	72	55	40
4	36		34	55	155	420	280	197	6ž	$7\overline{2}$	56	41
5	36		34	48	190	560	260	152	74	69	53	41
6	36		34	41	260	472	242	128	69	65	55	43
7	37	34	34	42	345	420	214	152	72	67	56	43
8	38		34	45	345	370	181	142	74	65	58	43
9	36		34	48	445	420	214	128	76	63	60	43
10	36		34		560	560	225	111	78	63	55	41
11	37			62								
		34	34		445	472	242	107	78	63	55	41
12	38		34	69	445	420	181	94	102	65	55	40
13	38		34		395	472	152	. 88	107	67	55	40
14		34	34	80	370	530	128	107	102	69	55	40
15	36		34	82	300	590	152	98	84	72	55	40
16	36		34	80	260	652	169	88	74	76	55	40
17			34		242	530	169	84	74	80	55	41
18	36		34	113	225	590	152	88	74	80	55	40
19	36		37	109	197	530	148	74	74	63	55	40
20		34	37	105	225	500	128	69	69	62	55	40
21		34	38	109 <sup>.</sup>	242	420	107	69	67	60	. 47	40
22	36		41	109	242	500	102	65	63	58	47	40
23	36	34	53	131	260	395	102	65	63	63	46	40
24			51	155	190	322	94	65	88	74	46	40
25	35	34	51	260	260	322	88	65	78	63	44	41
26	36	34	51	242	242	322	88	65	74	63	43	41
27	35	34	50	345	260	345	88	74	74	62	40	41
28	36	34	50	300	260	322	96	65	74	60	38	41
29	36	34	50	345	260	322	102	63	74	58	41	41
30	38		51	300	322	322	115	63	72	56	41	41
31	38		51		370		128	55		55		41
Tota	1. 1127		1223	3657	8844	13285	5291	2946	2247	2046	1541	1264
Mean		34.3	39.5	122	285	443	171	95.0	74.9	66.0	51.4	40.8
Max			53	345	560	652	322	197	107	80	60	43
Min	35		34	41	135	322	88	55	56	55	38	40
Acre-f			2430		17500	26400	10500	5840	4460	4060	3060	2510
												2010
Ų	<b>6</b> 66 0	CITOL M 15	ווטנו סק	ou, all	uischai	ges are	in cu	DIG 166	t per i	second	•	

Discharge of Grand River	at Sulphur Springs for 1915.
Drainage Area, 946 Square Miles.	Altitude, 7,665 Peet Above Sea Level

Da	y	Jan.	Feb.	Mar.		May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		• • • • • • • • • • • • • • • • • • • •			300	1060	1930	<b>25</b> 50	447	230	337	176	125
2	•				520	725	2550	2550	472	215	317	174	130
3				•••••	725	665	2050	2170	447	246	817	174	135
4	•••••			•••••	1280	578	1820	2050	424	263	317	176	141
5	•				898	550	1600	1930	400	280	357	176	146
6			•••••		497	497	1490	2290	378	263	280	176	153
7					378	400	1380	2050	378	263	263	180	153
8		•••••	•••••		357	636	1190	1930	492	280	230	184	146
9		•••••	• • • • • • • • • • • • • • • • • • • •		400	542	1490	1700	606	337	246	174	138
10			· · · · · · · · · · · · · · · · · · ·		424	447	1930	1820	578	317	238	176	134
17					298	497	2680	1820	472	317	<b>23</b> 0	174	138
12			<b>-</b>		337	695	3380	1820	447	280	230	162	142
13					357	975	2780	1820	424	280	246	15 <b>3</b>	146
14		• • • • • • • • • • • • • • • • • • • •		••••	400	1380	2170	1700	400	263	215	146	148
15			••••••	••••••	472	1490	1930	1600	400	263	215	138	150
16			•	•••••	447	1490	1820	1380	400	263	230	141	138
17				••••••	550	1490	2420	1190	378	246	230	150	<b>125</b>
18			••••	•••••	497	1600	2420	1020	337	215	230	156	116
19			••••••	••••	606	1490	3530	935	317	215	215	167	108
20			•		578	1190	3980	860	357	215	215	170	105
21					636	1020	3830	825	337	201	215	180	125
22		•••••	*******		60 <b>6</b>	860	3830	790	327	187	215	190	153
23			•••••	•••••	606	935	3680	790	317	187	212	190	146
24	••••		•		550	975	3830	695	298	187	198	184	135
25					524	1100	3830	650	298	174	184	167	123
26		•			497	1280	3680	606	298	246	192	162	110
27			•••••	· · · · · · · ·	497	1280	3680	665	280	317	208	153.	105
28			•••••	••••	578	1060	3680	578	263	337	200	138	110
29					758	1020	3530	578	263	357	192	132	120
30		· · · · · · · ·		•••••	1190	1190	2420	550	263	337	188	125	125
31_				••		1380		497	230		172		130
						30497	80530	42409	11728	7781	7334	4944	4099
					559	984	2680	1370	378	259	237	165	132
					1280	1600	3980	2550	606	357	357	190	153
					298	400	1190	497	230	174	172	125	105
Ac	re-ft.			•••••	33300	60500	159000	84200	23200	15400	14600	9820	8120

# Discharge of Grand River at Sulphur Springs for 1916. Drainage Area, 946 Square Miles. Altitude, 7,865 Feet Above Sea Level.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	138	120	110	190	1060	2740	1820	735	317	260	246	
2	153	125	105	215	975	2880	1700	665	300	253	280	
3	146	132	105	357	850	2600	1580	605	265	263	253	
4	138	138	120	215	772	2740	1360	735	263	269	253	•••••
5	130	141	135	210	1160	3160	1360	735	280	249	215	•
6	125	144	132	198	1160	2740	1160	665	357	246	246	•••••
-	129	141	118	190	1820	2460	1060	735	357	249	180	•••••
	142	134	116	165	2330	2330	1060	605	298	263	202	
•	153	128	116	202	2880	2460	975	578	298	266	221	
- ^	156	123	125	215	3460	3020	1360	605	337	263	202	••••
4.4	150	120	138	337	3160	3020	1360	497	447	260	195	•••••
	130	120	162	378	2880	3020	1210	472	447	260		••
4.0	130	117	246	424	2600	3160	975	550	472	253	•	•••••
	141	114	215	357	2600	3160	890	550	424	260	•	193
4 =	142	112	270	424	2070	3160	810	524	424	349	•	193
		110	180	436	1700	2880	850				•••••	•
16	140		215	447				498	400	325		•••••
17	135	110			1580 1260	3160	810	472	337	357	•••••	
18	132	109	280	550		3310	735	378	317	400	•••••	•••••
19	134	109	357	578	1160	3160	735	357	298	409	• • • • • • • • • • • • • • • • • • • •	•••••
20	135	112	735	472	1360	3310	665	357	280	357	•••••	•••••
21	132	114	447	378	1580	3020	605	378	263	325	•	•••••
22	132	114	280	472	1580	2880	605	357	246	310	********	
23	132	110	280	497	1580	2330	550	317	246	366		
24	130	105	246	700	1360	2070	497	317	317	357	•	•••••
25	129	104	215	810	1700	1940	497	317	337	337		
26	128	103	317	1020	2070	2070	497	317	357	298		
27	125	107	400	932	1940	2070	524	317	298	298		•
28	124	112	424	1260	1940	2200	524	317	280	294		
29	125	112	298	1580	1820	2200	550	298	263	280		
30	123		230	1700	1820	1940	810	298	263	277		•••••
31	122		180		2460	•	700	420		263		
Total	4181	3440	7197	15909	56687	81190	28834	14971	9788	9216	2493	
Mean	135	119	232	530	1830	2710	930	483	326	297		
Max	156	144	735	1700	3460	3310	1820	735	472	409	*******	
Min	122	103	105	165	772	1940	497	298	246	246		******
Acre-ft.	8300	6840	14300	31500	113000	161000	57200	29700	19400	18300		

#### GRAND RIVER NEAR KREMMLING.

Location.—At the entrance to Gore Canyon, 3 miles southwest of Kremmling, in sec. 23, T 1 N., R. 81 W. Nearest tributary, Blue River, enters a mile below Kremmling.

Records Available.—July 24, 1904, to November 30, 1916.

Drainage Area.—2,380 square miles. Gage.—Automatic recording gage.

Channel.—Somewhat shifting.

Winter Flow.—Rapids below the station remain open and thus prevent backwater except for short periods when ice jams on the rapids.

Diversions.—Between this station and that at Sulphur Springs there are court decrees for diversions of 34 second-feet from Grand River and 2,315 second-feet from intervening tributaries exclusive of diversions for placer mining in the Blue River drainage.

Accuracy.—Although the channel is somewhat shifting, sufficient discharge measurements have been made to form a basis for fairly re-

liable estimates of flow.

Co-operation.—Station maintained in co-operation with the United States Geological Survey.

#### GRAND RIVER AT GLENWOOD SPRINGS.

Location.—At Glenwood Springs, at the point where the discharge from the hot springs enters the river. No Name Creek enters Grand River about 2 miles above the station and Roaring Fork enters one-half mile below.

Records Available.—May 12, 1899, to December 31, 1916.

Drainage Area.—4,520 square miles.

Gage.—Chain gage originally installed at the railroad bridge just above the Roaring Fork, but in 1900 a staff gage was installed at the present location. Since 1902 a number of automatic gages referred to the staff gage datum have been used, the present one being a Friez gage.

Channel.—Slightly shifting.

Discharge Measurements.—Made from a car and cable stretched beneath the State Street Bridge, which crosses the river one-third mile below the gage.

Winter Flow.—Ice never forms at the station, as the hot water from

the springs keeps the water above the freezing point.

Artificial Control.—The Shoshone power plant of the Central Colorado Power Company, 6 miles above Glenwood Springs, has sufficient pondage to withhold the flow of the river for a portion of the day during low-water periods.

Diversions.—Between this station and the one near Kremmling there are court decrees for a diversion of 13 second-feet from Grand River for irrigation, 1,250 second-feet absolute for power and 14,400 second-feet conditional for power.

Accuracy.—Conditions are favorable for accurate results and the estimates are considered reliable.

Co-operation.—Records furnished by the United States Geological Survey.

. 101	ainace				and Riv		r Kremı ude, 7,3				T-awai	
Day	Jan.	Feb.	•	April		June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.45	330	305	650	2820	4060	4990	1120	650	858	545	325
2	256	305	305	770	2270	5620	4990	1080	650	822	515	260
3 4		292	305	945	1970 1820	4900	4540	1050	650	822 822	515 515	328 365
5	~	280 268	280 268	1200 1050	1560	4380 3980	4220 4060	1020 945	710 680	788	500	405
6	242	242	318	1030	1480	3680	4380	945	710	770	515	435
7 8		218 218	318 330	1030 962	1360 1280	3540 3330	4060 3680	945 1160	710 710	740 710	545 560	435
9		242	280	1300	1280	3610	3400	1680	770	680	530	365
10	205	268	318	892	1320	4460	3400	1480	740	680	545	325
11 12	040	268 268	342 305	945 1160	1520 1870	5440 6630	3400 3540	1280 1160	710 710	650 680	530 410	305 328
13		280	305	1320	2580	6220	3400	1050	710	680	356	365
14	~~~	292	305	1360	3610	4990	3190	1020	680	650	302	378
15 16		268 242	330 355	1640 1600	3610 3540	4460 4630	3000 2760	980 980	680 680	650 680	328 315	390 350
17	010	280	342	1680	3820	5350	2520	945	680	680	328	305
18		292	342	1640	3900	5820	2320	910	680	680	378	260
19 20		305 292	342 330	1680 1720	3540 3190	6520 7750	2120 2020	875 840	605 575	650 650	420 495	225 205
21		318	330	1770	2700	8110	1770	840	545	635	480	300
22		292	368	1870	2470	7630	1680	840	530	635	510	450
23 24		292 318	380 380	1820 1720	2370 2580	7750 7630	1680 1640	805 770	515 500	635 620	510 495	350 350
25		305	395	1600	3190	7400	1600	770	515	605	405	300
26		280	455	1680	3610	7290	1480	770	605	575	450	250
27 28	~	280 280	500 545	1480 1640	3470 2940	6850 6320	1480 1480	770 740	620 875	575 575	405 288	200 260
29			620	1520	2880	5440	1400	710	910	560	250	270
30	255		635	2820	3120	5350	1320	710	875	545	230	325
31 Total		7815	605 11538	42494	3540 81210	169140	1240 86760	680 29870	20180	545 20847	13170	370 10184
Mean	241	279	372	1420	2620		2800	964	673	672	439	329
Max		330	635	2820	3900	8110	4990	1680	910 500	858 545	560 230	450 200
Min Acre-ft.		218 15500	268 22900	650 84500	1280 161000	3330 336000	1240 172000	680 59300		41300		
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		o Area	., 2,380	:aupa	e Miles	. Altit	ude, 7,32	10 Peet	<b>▼</b> poac	Sea I	Nov.	Dec.
Day 1	Jan.	Feb.	<b>, 2,380</b> Mar.	<b>Squa</b> : April	May	. Altit June	ude, 7,32 July	O Feet Aug.	or 1910 Above Sept. 1090	Sea I Oct.		Dec.
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Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 17 18 19 20 21 22 23 24 25 27 28 29 30 31	Jan. 425 452 390 352 300 3415 4605 3352 3460 328 328 328 328 328 328 328 328 328 328	Feb. 3158 3158 328 3400 3400 3400 3400 3400 3400 3400 340	, <b>2,380</b> Mar. 365340 3280 3280 33755 3775 4955 5785 9785 1055 97730 7300 7300 7650 6630	April 630 660 765 695 660 630 600 570 600 8355 1050 1130 1130 11490 11490 11490 1210 1450 1450 2080 2080 2080 3570 3270	May 27550 22550 22550 22550 25570 35770 4760 57780 6180 4960 3650 3490 3138 3570 4310 4310 4310 4310 4310 4310 4310 431	June 59210 6100 6100 6100 6100 6100 6100 6100 6	ude, 7,32  July  4490 3970 3180 32990 32990 3200 33410 3130 22550 22430 2430 2430 2130 1630 11580 1680 1880 12880 22610	Aug. 2430 2080 24300 2550 2310 25500 2190 2080 1880 1880 1680 1580 1170 1050 1050 1050 1050 1050 1050 105	Sept. 1090 975 905 920 940 1050 905 870 1330 1330 1330 1210 975 870 885 730 800 870 870 870 870 870	Oct. 6756 6958 6958 6958 6455 6455 6455 6455 6156 6370 87705 9700 8355 7650 7730 7700	Nov. 678 6678 6678 6690 630 630 630 630 4450 424 4950 420 4450 378 378 379 390	385
Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 Total	Jan. 425 4520 4390 3522 3300 3415 328 328 328 3455 3340 328 345 328 340 340 340 340 340 340 340 340 340 340	Feb. 3158 3528 3400 3400 3400 3400 3400 3400 3400 340	, 2,380 Mar. 365 349 329 4378 365 3765 4975 660 600 765 8775 1330 1975 870 730 730 765 630 2001	April 630 660 765 696 630 600 570 600 835 1050 1130 1170 1130 1170 1210 1270 1270 2080 2430 2730 3060	May 27350 2250 2130 2250 2250 24760 57760 4760 57760 3130 2850 3140 3130 2850 3490 33570 4400 44100 44100 44100 426620 126620	June 5990 6100 6100 6100 6500 5460 5700 6800 7500 7500 7600 77400 77480 7600 77480 77500 4960 4960 4960 4960 4960	ude, 7,32  July  4490 3970 3730 32990 32990 32100 32100 32100 32100 22370 2430 22370 2430 2130 1730 1630 1730 1630 1730 1630 1880 1880 1880 1880 1880 2250 28100	Aug 2430 2080 2430 2550 2550 2190, 2030 2030 2030 2030 1680 1680 1680 1680 1250 1250 1250 1250 1250 1250 1250 125	Sept. 1090 975 905 905 920 940 1050 1050 1370 1050 1370 1210 10975 905 870 805 730 806 765 730 806 765 730 806 765 730 806 765 730 806 870 825 825 835	Oct. 678 695 695 678 6645 645 645 645 645 615 637 870 975 1090 835 765 730 835 765 730 25 328	Nov. 678 6678 6678 6690 6390 6390 435 5490 465 340 465 340 460 465 340 460 460 460 460 460 46	385
Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 27 28 29 30 31 Total Mean Max.	Jan. 425 452 390 352 300 362 300 3152 3652 340 3155 328 328 328 328 328 328 328 328 328 328	Feb. 300 3158 3528 3528 3400 3400 3400 3400 3400 3400 3400 340	, <b>2,380</b> Mar. 365 3490 4353 365 378 365 378 405 495 660 600 6600 7655 975 1330 730 730 730 7565 20014 6466 6330	April 630 765 696 630 630 630 630 630 1090 1130 1130 11370 11370 1210 1450 1210 1450 1210 1450 1210 1450 1370 1450 1370 1450 1370 1450 1370 1450 1370 1450 1370 1450 1370 1450 1370 1450 1370 1450 1370 1450 1370 1450 1370 1450 1370 1370 1370	May 2730 2250 2130 2250 2130 2250 2670 4760 57760 5780 4960 4960 3130 2920 3490 33570 4400 4360 426620 4080 7120 7020	June 5990 6100 6100 6100 6500 6450 65700 6880 7500 7500 7000 72480 7600 7720 7720 7720 7720 7720 5770 5760 4960 4960 4960 4960 4960 4960 4960 49	ude, 7,32  July  4490 43970 33730 32990 32130 32130 2250 23730 2430 2430 1830 1730 1830 17580 1980 1980 2250 2260 2260 2260 24490	Aug	Sept. 1090 975 905 905 905 905 905 1050 905 1050 1330 1330 1330 1330 1230 1090 975 870 8350 765 730 695 695 28505 950	Oct. 675 695 695 695 695 695 645 645 645 615 630 870 975 1090 835 765 730 835 765 730 25 828 1090	Nov. 678 6678 660 630 630 630 630 4355 5480 4350 4455 5480 4358 4455 6478 378 378 378 378 378 378 4774 492678	385
Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 Total Mean Max. Min.	Jan. 425 456 390 352 360 415 465 352 3652 3452 3452 3452 3452 3452 3452 3452 34	Feb. 3128 3528 3400 3400 3400 3400 3400 3400 3400 340	, 2,380 Mar. 3653440 3283 3490 4378 3785 40660 600 6600 6600 7658 8359 7785 870 7730 7730 870 7730 870 870 870 870 870 870 870 870 870 87	April 630 6660 6765 696 630 670 630 8357 1050 1130 1170 11490 11370 11490 1170 12490 12730 22730 2430 22730 2430 2430 2430 2430 2430 2430 2430 24	May 27350 22550 22550 22550 22550 22550 25570 4760 57700 6100 56600 40550 3650 3650 3490 3130 3340 4310 4400 4310 4400 4310 4400 42130 7120 2130	June 5990 6100 6100 6100 6100 6500 5460 5700 68800 75000 7240 7480 7600 77480 7720 6540 4960 4960 4960 4960 4960 4960 4960 49	ude, 7,32  July 4490 4130 3970 3970 3130 32990 3220 32430 2730 2430 2430 2430 2430 1930 1630 1730 1680 1680 1880 2660 2660 4490 4580	Aug	Sept. 1090 975 905 905 920 940 1050 1050 1050 1330 1330 1330 1210 1090 975 8705 8705 8705 8705 8705 8705 8705 87	Oct. 678 695 695 695 6678 6645 645 645 645 615 615 615 755 765 7730 975 775 975 975 975 975 975 975 975 975	Nov. 678 6678 6678 6690 6390 6690 6390 4355 3490 465 4295 4295 4295 4295 4295 4295 4295 429	385
Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 30 31 Total Mean Max. Min. Acre-ft.	Jan. 425 452 390 352 360 415 460 300 352 360 415 328 328 328 328 328 328 328 328 328 328	Feb. 3158 3528 3528 340 340 340 340 340 340 340 340 340 340	, 2,380 Mar. 3653440 3280 33953495 3785 3785 4956 6000 6660 7655 13300 10556 8770 7305 7650 200146 13308 39700	April 630 660 765 695 660 630 670 600 1130 1130 1130 1130 1137 1430 1210 1450 1780 2430 2730 3570 3570 8990	May 27350 22550 22550 22550 2570 3570 3570 3570 3570 3570 3570 3570 3	June 5990 6100 6100 6100 6100 6100 6100 6100 6	ude, 7,32  July  4490 43970 33730 32990 32130 32130 2250 23730 2430 2430 1830 1730 1830 17580 1980 1980 2250 2260 2260 2260 24490	Aug	Sept. 1090 975 905 905 920 940 1050 905 870 1330 1330 1330 1210 1090 975 870 870 870 870 870 870 870 870 870 870	Oct. 678 695 695 6678 6645 645 645 645 615 615 615 615 615 765 765 765 765 765 765 765 765 765 76	Nov. 678 6678 660 630 630 630 630 4355 5480 4350 4455 5480 4358 4455 6478 378 378 378 378 378 378 4774 492678	385

			Discha	rge of	Grand	River	at Gler	wood 8	prings	for 1	915.		
		_	-		Square								
Day	Ja	n.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	5	94	652	763	994	4940	7160	7890	1910	945	1430	1000	525
		40	626	749	994	4360	9720	7590	1760	1000	1430	875	785
8.	<u>.</u> 5	88	692	679	1170	3430	9720	7300	1710	828	1370	860	672
		06	689	652	1540	3060	8040	6740	1630	905	1320	838	713
		77	613	777	1760	2730	7160	6470	1590	985	1280	830	755
		35	587	632	1760	2500	6740	6470	1500	961	1260	830	838
		00	606	696	1760	2350	6470	6740	1510	985	1200	748	800
_		20	639	672	1820	2210	6200	5940	1550	1010	1140	969	792
		06	619	665	2010	2080	6340	5560	2210	1030	1140	945	800
		97	669	721	1940	2080	7440	5300	2570	1080	1110	898	770
		26	642	646	1700	2210	9360	5180	2270	1180	1150	905	755
		06	664	735	1760	2980	11200	5300	2090	1090	1110	845	748
		94 20	691 654	639 777	2010 2210	4140 5810	11200 9360	5430 5060	1910	1050	1040	706	762
		20 20	594	728	2420	6600	8040	4820	1680 1600	1100 1120	1060 1040	574	770
4.0	_	02	672	652	2500	6470	8200	4580	1550	1100	1100	620 762	785 808
4.77		20	673	632	2730	6740	8850	4360	1590	1070	1110	713	699
		13	712	700	2730	7020	10300	3720	1510	1020	1110	734	581
4.0		20	679	770	2730	6360	10300	3340	1430	945	1120	785	562
9.0	, .	20	695	652	2890	5690	11800	3150	1390	1030	1130	868	519
~ 4		86	742	707	2890	5020		2980	1350	913	1120	822	495
~~		39	686	686	3060	4360	12600	2810	1290	860	1080	945	6.85
~~		06	660	658	2980	4250	12200	2730	1280	868	1100	969	727
		88	714	791	2810	4820	12200	2570	1240	800	937	921	827
~= .		76	658	692	2650	5560	11800	2420	1210	822	1180	890	741
~ ~		26	770	957	2500	6070	11400	2420	1190	890	1110	755	672
27 .	6	26	770	865	2420	6340	11000	2210	1210	1020	945	699	607
28 .		26	652	745	2650	5680	10300	2210	1160	1340	945	741	490
<b>29</b> .	7	07	******	1010	3150	5300	9190	2210	1040	1380	937	594	588
30 .		65		1020	4140	5680	8520	2140	1060	1390	945	543	594
31 .		96		1010		6340		2010	1020		898		659
	otal194							437650		30717		24184	
		27	668	744	2290	4620	9530	4440	1550	1020	1120	806	694
		91	770	1020	4140	7020	13000	7890	2570	1390	1430	1000	838
Min.		40	582	632	994	2080	6200	2010	1020	800	898	543	490
Acre	e-ft386	00	37100	45700	136000	284000	567000	273000	95300	60700	68900	48000	42700

Discharge of Grand River at Glenwood Springs for 1916.  Drainage Area, 4,520 Sqaure Miles. Altitude, 5,747 Feet Above Sea Level.												
		_		_								Dee
Day	Jan.		Mar.	-	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		584	706	1240	5360	10400	8300	4440	1750	1360	1340	778
2		566	685	1200	4700	11100	7950	4090	1820	1430	1340	870
3		590	633	1280	4320	11100	7300	3660	1640	1450	1340	870
4		706	672	1390	3870	11100	7000	3870	1510	1460	1340	950
5		792	822	1290	4090	11800	6550	3980	1530	1430	1280	1030
<u>6</u>		755	934	1250	4960	12200	6100	4090	1630	1400	1270	1040
7		720	862	1200	6400	11100	5800	4090	1730	1410	1260	1020
8		778	830	1190	8650	10000	5650	4090	1870	1490	1240	713
9		734	815	1140	10000	10800	5650	3660	1730	1500	910	608
10		713	854	1100	11800	12200	6100	3660	1880	1490	1220	560
11		699	934	1220	12600	13400	6250	3550	2360	1500	1340	692
12		723	1040	1570	11800	14200	5650	3140	2600	1500	1230	646
13			1170	1940	11100	14200	5220	3240	2600	1470	950	762
14		694	1280	2010	10400	14600	4700	3870	2600	1450	626	846
15	~~~	647	1230	1940	9350	14200	4320	3870	2440	1630	633	640
16		668	1200	2010	7950	13800	4200	3340	2080	1880	659	830
17		673	1230	2080	6700	13800	4320	3040	1880	1750	894	727
18			1340	2220	6100	14200	4200	2860	1780	1820	1060	720
19			1510	2520	5500	14200	4090	2440	1690	1880	1100	838
20			1630	2520	5220	14200	3760	2360	1590	1940	1140	854
21		716	1880	2290	5800	13400	3550	2290	1520	1820	1090	846
22			2290	2150	6400	12200	3240	2150	1450	1690	958	822
23			1940	2290	6100	11100	3140	2010	1360	1630	878	902
24	~~~	713	1880	2770	5800	10000	2950	1820	1450	1630	918	755
25	50F	700	1630	3340	6100	9700	2950	1750	1530	1690	886	770 699
26	700	770	1390	3980	7000	9350	2950	1750	1570	1630	906 928	685
27		594	1390	4570	7600	9350	3140	1820	1500	1510 1510	950	668
28	<b>500</b>	664	1390 1450	5360 6250	7600 7950	9350 9000	3550 3760	1750 1690	1410 1380	1450	910	650
29	= 0.0		1570	6550	7950 8650	9000			1360	1450	862	632
30		•••••	1450			9000	3980 4570	1610 1690		1450		614
31		10000		71860	9350 229220	355050		91670	53240	48700	31458	24037
	22383				7390	11800			1770	1570	1050	775
	722	686	1250 2290	2400 6550	12600	14600	4870 8300	2960	2600	1940	1340	1040
	837	792 566	633	1100	3870	9000	2950	4440 1610	1360	1360	626	560
Min Acre-ft.	602											47700
											04000	41100
Unl	ess oth	erwise	noted,	all dis	charges	are in	cubic	feet per	secon	a.	•	

#### GRAND RIVER NEAR PALISADES.

Location.—At the State bridge 2 miles above Palisades, in sec. 2, T. 11 S., R. 98 W. Nearest important tributary, Plateau Creek, enters about 6 miles above the station.

Records Available.—April 9, 1902, to November 30, 1916.

Drainage Area.—8,550 square miles.

Gage.—Chain gage; location and datum unchanged.

Channel.—Practically permanent.

Discharge Measurements.—Made from bridge in Palisades.

Winter Flow.—The river usually freezes over a portion of the year, but except for slush and ice and an occasional thin ice cover the effect on the gage heights is slight.

Diversions.—There are court decrees for diversions of 1,828 second-feet from Grand River and 2,500 second-feet from intervening tributaries between Palisades and the Glenwood Springs station. The proposed high line canal of the United States Reclamation Service will divert 700 second-feet 7 miles above the Palisades station. Below the station the Grand Valley Irrigation Co. has a diversion of 400 second-feet.

Accuracy.—Conditions are favorable for accurate results, and the estimates should be reliable.

Co-operation.—Records furnished by the United States Geological Survey.

#### GRAND RIVER NEAR FRUITA.

Location.—At highway bridge,  $1\frac{1}{2}$  miles south of Fruita, in sec. 20, T. 1 N., R. 2 W., Ute principal meridian. Nearest important tributary, Little Salt Wash, enters a mile below the station; Gunnison River enters at Grand Junction, about 12 miles above.

Records Available.—Flood records during 1908, 1909, and 1910; April 1, 1911 (station established), to December 9, 1916.

Drainage Area.—16,800 square miles.

Gage.—Chain gage; datum was raised 0.05 foot May 3, 1911.

Channel.—Shifts at high water.

Discharge Measurements.—Made from the highway bridge.

Winter Flow.—The river is frozen over during a portion of the year and readings are discontinued.

Diversions.—Between the Palisades station and Fruita there are decrees for 788 second-feet from the Grand River.

Maximum Stage.—Since the establishment of the station the maximum stage has been 15.0 feet, which occurred June 9, 1909. The highest stage known was about 18.5 feet on July 4, 1884.

Accuracy.—Results considered good.

Co-operation.—Records furnished by the United States Geological Survey.

	<b>4</b>				Grand R					<b></b>		
_	_			_	are Miles							<b>n</b>
Day	Jan.	Feb.	Mar. 1370	April	May	June	July	Aug.	Sept.	Oct. 2250	Nov. 1420	Dec. 1230
			1420	1530 1420	8180 7440	11400 15600	13200 12700	2700 2460	1320 1230	2540	1420	1370
3			1420	1580	5960	17000	11900	2390	1230	2250	1370	1470
_			$\frac{1280}{1320}$	1880 1320	5030 4180	$14700 \\ 12700$	11400 10700	2250 2060	1150 1150	2180 2000	1470 1420	1470 1530
6			1320	2540	3780	11500	10600	2000	1230	2060	1580	1470
	••••••	•	1280	2620	3390	11200	10700	2000	1230 1230	2120 2060	1580 2320	1530 1420
•			$\frac{1280}{1230}$	2700 2780	3210 3030	10900 10900	9740 8950	2120 3030	1230	1880	1880	1420
10	•		1280	2780	2860	12700	8180	3680	1230	1530	2620	1420
			$1370 \\ 1280$	2780 2320	2940 3580	15800 19000	8180 8640	3580 2860	1190 1230	1640 1640	1820 1580	1420 1420
			1320	2620	5600	19400	8640	2860	1230	1760	1530	1420
		••••••	1370	3210	8950 11400	15800	8180 7740	2540 2460	1270 1370	1700 1700	1370 1320	1420 1420
			1480 1480	3680 3780	10600	14300 14300	7880	2390	1320	1640	1320	1470
17			1480	4080	11000	15600	6610	2250	1320	1760	1530	1420
10			1320 1370	4080 3980	11900 11700	17200 17600	6080 5600	2120 2060	1270 1320	1700 1640	1420 1370	$1370 \\ 1230$
			1370	4280	10700	19200	5030	1820	1230	1640	1470	1110
21			1150	4920	11000	20500	4810	1760	1230	1760	1530	1070
0.0			1190 1370	5250 5030	7880 7020	19700 19400	4390 4080	1640 1580	1150 1150	2000 1640	1580 1820	1190 1470
			1320	4700	7590	19700	3680	1580	1150	1640	1700	1420
25			1420	4390	8030	18400	3880	1700	1420	1580	1640	1470 1420
			1420 1580	3980 3780	10200 10700	17800 17400	3880 3300	1640 1700	1880 1820	1760 1640	1470 1420	1190
28			1640	3880	10400	16800	3210	1640	1820	1530	1420	1230
		•••••	1280 1530	4810 6740	8630 9000	14500 13600	3210 3120	1580 1230	2250 2060	1530 1530	1470 1320	1190 1190
			1580		10400		2860	1420		1530		1190
Total				103440	236280	474600	221070	67100	40870	55830	47180	42060
Mean	<del>-</del>		1370	3450	7620	15800	7130	2160	1360	1800	1570	1360
Max Min			1640 1150	6740 1320	$\frac{11900}{2860}$	20500 10900	13200 2860	3680 1230	2250 1110	2540 1530	2620 1320	1530 1070
Acre-ft.				205000	469000			.133000		111000	93400	
				_								
			Trinche	THE AT		WAY MAG	r Delle	inder fo	× 1018			
	Drai	nage A			Grand Ri are Miles		r Palis ude, 4,7				vel.	
Day	<b>Dra</b> i Jan.	inage A Feb.		550 Squ							<b>vel.</b> Nov.	Dec.
	Jan.	_	rea, 8,8		May 11000	June 18600	u <b>de, 4,7</b> July 16600	<b>Aug.</b> 8180	Above Sept. 2700	Oçt. 2460	Nov. 2860	Dec.
1	Jan.	Feb.	Mar. 1640 1580	April 2700 2540	May 11000 9260	June 18600 19200	ude, 4,7 July 16600 15600	30 Feet Aug. 8180 7590	<b>Above</b> Sept. 2700 2700	Oct. 2460 2540	Nov. 2860 2860	
1 2 3	Jan.	Feb.	Mar. 1640 1580 1420	April 2700 2540 2390	May 11000 9260 8480	June 18600 19200 19700	ude, 4,7 July 16600 15600 15000	Aug. 8180 7590 7880	Above Sept. 2700 2700 2700	Oçt. 2460	Nov. 2860 2860 2780	
1 2 3 4 5	Jan.	Feb.	Mar. 1640 1580 1420 1470 3030	April 2700 2540 2390 2780 2620	May 11000 9260 8480 7730 7730	June 18600 19200 19700 19900 21000	ude, 4,7 July 16600 15600 15000 14300 13600	Aug. 8180 7590 7880 8480 7590	Above Sept. 2700 2700 2700 2460 2320	Oçt. 2460 2540 2940 4180 2940	Nov. 2860 2860 2780 2700 2700	
1 2 3 4 5 6	Jan.	Feb.	Mar. 1640 1580 1420 1470 3030 2180	April 2700 2540 2390 2780 2620 2780	May 11000 9260 8480 7730 7730 9420	June 18600 19200 19700 19900 21000 21200	ude, 4,7 July 16600 15600 15000 14300 13600 12000	Aug. 8180 7590 7880 8480 7590 7300	<b>Above</b> Sept. 2700 2700 2700 2460 2320 2540	Oçt. 2460 2540 2940 4180 2940 2620	Nov. 2860 2860 2780 2700 2700 2700	
1 2 3 4 5 6	Jan.	Feb.	Mar. 1640 1580 1420 1470 3030 2180 1940 1880	April 2700 2540 2390 2780 2620 2780 2540 2540	May 11000 9260 8480 7730 7730 9420 13100 16000	June 18600 19200 19700 19700 21000 21200 20300 19000	July 16600 15600 15000 14300 13600 11700 11400	Aug. 8180 7590 7880 8480 7590 7300 7590 7160	<b>Above</b> Sept. 2700 2700 2700 2460 2320 2540 2460 2180	Oct. 2460 2540 2940 4180 2940 2620 5840 4390	Nov. 2860 2860 2780 2700 2700 2700 2620 2540	
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Dischars	e of Grand Bi	ver near Fruita	for 1915.	
Drainage Area, 16,800	Square Miles.	Altitude, 4.500	Peet Above Se	a Level.

Day	Jan.	Feb	. Mar	. April	Мау	June	July	Aug	. Sept	. Oct.	Nov	. Dec
	·			3140	15500	16400	16400	3770	1630	3290	2300	243
				3290	13800	21600	14600	. 3610	1540	8290	2430	270
	•			3290	11000	23900	14200	3290	1540	3290	2300	270
				3770	9200	19400	14200	2990	1730	3140	2430	256
5	• •			4110	8670	18400	13100	2990	1730	2990	2430	284
<u>6</u>	• •••••	•••••		5450	7910	17400	12800	2430	1940	2990	2430	299
		•••••	2430	5050	7200	17400	13500	2560	1730	2990	2560	299
			2430	5450	6740	16400	12400	2430	1630	2990	2990	299
	•		2430	5450	6300	15900	11400	3140	1540	2840	2840	.270
	•	••••••	2700	5660	6080	17400	10400	2990	1940	2700	3290	270
	• ••••••	•	2560	5450	5870	21600	10400	4470	1940	2300	3140	270
	•	•••••	2560	5050	6740	26300	10400	3940	1830	2430	2990	270
			2430	5660	10400	26300	10400	3290	1730	2430	2700	270
		******	2560	6740	16400	23900	10100	3290	1730	2430	2300	270
		•••••	2560	<b>72</b> 00	18900	19400	9200	2990	1730	2560	2170	270
	•		2700	7200	17400	20000	9200	2700	1730	2700	2300	270
			2700	7670	17400	20500	8670	2840	1730	2560	2300	233
	• ••••••	•••••	2700	7670	18400	22700	8160	2700	2050	2700	2560	233
	<b>-</b>	•	2700	7670	17900	23900	6970	2700	1940	2700	2700	233
	• ••••••	•••••	2700	8160	15500	24500	6300	2430	1730	2700	2700	233
		:	2560	9200	14600	<b>269</b> 00	6300	2170	1730	2560	2700	233
	•		2430	10400	13800	26300	5660	2170	1540	2700	2990	233
	• • • • • • • • • • • • • • • • • • • •	•••••	2700	10400	13100	25100		2430	1540	2560	3140	233
		•••••	2560	9200	13800	25100	4660	2300	1540	2700	2990	233
	•		2700	8670	15000	24500	4660	2170	2300	2560	2990	233
			2990	8160	16400	23900	4660	2170	2700	2560	2990	233
			3140	8160	16400	23300	4470	2170	3290	2560	2990	233
		•••••	3290	8160	15000	20000	4660	2430	3290	2560	2840	233
	• ••••••		3290	10400	13800	19400	4660	1940	3290	2430	2700	233
_	•	•	3610	13100	13800	17900	4470	1730	3290	2430	2430	233
	• •		3610		14600		4110	1730		2300		233
	••••		69040	208980		645700	276160	84960	59600	83940	80620	7878
[ean		······	2760	6970	12800	21500	8910	2740	1990	2710	2690	254
[ax			3610	13100	18900	26900	16400	4470	3290	3290	3140	
[in		•	2430	3140	5870	15900	4110	1730	1540	2300	2170	
cre-ft.		•••••	137000	415000	787000	1280000	548000	168000	118000	167000	160000	15600
	Drai	nage <i>i</i>	Disc Lrea, 16	harge of	Grand	l River : les. Alt	near Fr ltude, 4	uita for	r 1916. et Above	e Sea L	evel.	•

		20-144		,,	ooo byw	DLG WITH		uuo, z,	OO Lest	TOUR	Day The	A OT	
Day	y	Jan.	Feb.	Mar.	April	May	<b>Ju</b> ne	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				2990	5450	19200	28600	21400	11400	4110	3610	4850	3290
2				2700	4850	16500	30600	20400	11000	3940	4110	4660	3140
3				2700	5250	14800	29900	19200	12100	3610	4290	4660	3290
4				2560	5660	14000	31700	18700	12900	3290	5660	4660	3450
5				3290	5660	15600	33100	17600	12900	3290	4470	4470	3290
6				4470	5250	17300	33100	16700	11400	3290	429Ŏ	4290	3450
7		*******		3450	5660	22000	32400	16000	12100	3290	8000	4470	3290
8				3140	4660	27200	32000	15200	11000	3450	8270	4290	3450
9				3140	4660	31300	28600	15400	10700	3610	7270	3940	3610
10				3290	4850	34900	30600	15600	10700	4110	7470	3940	
īĭ				3940	5250	38100	34100	15400	10700	5450	14000	4110	
12				3940	6520	35900	37400	14200	10300	5870	9120	4290	
13				4110	7220	33800	38800	12900	10000	5870	7220	3770	
14				4660	7730	31700	39600	12100	11700	5450	6890	3610	
15				4660	7470	27900	39200	11400	12100	5250	7730	3290	
16				4290	7730	23600	37700	11000	11400	5050	6980	3450	
17				4290	8270	20400	37000	11000	9710	4850	6750	3610	
18				4660	9120	17600		11000	8830	4290	6980	3610	
19			2990	4850	10300	16900	38800	10300	8550	4110	6750	3770	
20			3290	5450	10000	18200	38800	9710	8270	3940	67E0	3940	
21			2990	6750	8830	20100	* 35900	8830	6750	3610	6750	3940	
22			2990	10000	8550	20100	32100	8000	6080	3610	6300	3610	
23			2990	8830	9710	20400	30600	7470	5450	3450	5870	3610	
24			2990	8270	11700	19400	26600	6750	4850	3450	5870	3450	
25			3140	7220	14000	18900	25600	6980	4470	3450	5870	3450	••••••
26			2700	6080	15200	20400	25000	6980	4290	3610	5870	3290	
27			2990	5450	16500	21700	24800	8000	4470	3610	5660	3290	••••••
28			3290	5660	18200	22200	24200	8550	4110	3450	5660	3290	•
29			3290	5870	21700	22800	23900	10000	3940	3450	5450	3610	A
30				6080	22200	23900	22800	9710	3940	3450	5250	3290	•
31				5870		26600		10300	3770		5050		
	otal			152660	278150	713400	962600		269880	121260		116510	30260
· Mea		2650	2850	4920	9270	23000	32100	12500	8710	4040	6460	3880	
Ma		2000		10000	22200	38100	39600	21400	12900	5870	14000	4850	•••••
Mir				2560	4660	14000	22800	6750	3770	3290	3610	3290	•••••••
		63000	164000				1910000		536000	240000	397000		•••••
AC.											001000	201000	
							are in cu	anic iee	t per se	econd.			
	rirs	St 18 (	iays Fe	bruary	estima	ted 2,720	<i>)</i> .						

#### FRASER RIVER NEAR ARROW.

Location.—In sec. 4, T. 2 S., R. 75 W.,  $\frac{1}{4}$  mile from Vasquez Siding;  $\frac{1}{2}$  miles southwest of Arrow.

Records Available.—September 23, 1910, to November 11, 1916.

Drainage Area.—28 square miles.

Gage.—Friez automatic gage on left bank. Prior to June 3, 1916, vertical staff gage located one mile upstream.

Discharge Measurements.—Made from log bridge and by wading.

Channel.—Probably permanent.

Diversions.—There is a court decree for the diversion of 53 second-feet from the headwaters of this stream across the divide to the Clear Creek basin.

Accuracy.—Records are considered good.

Co-operation.—Station maintained by the United States Geological Survey, by whom the records are furnished.

#### WILLIAMS FORK NEAR SCHOLL.

Location.—About 5 miles southeast of Scholl, Colo., in sec. 3, T. 2 S., R. 78 W., at the Horseshoe ranger station in the Arapahoe National Forest. Nearest important tributary, Keyser Creek, enters from the east three-quarter mile above the station.

Records Available.—September 22, 1910, to June 30, 1912; April 27, 1913, to November 30, 1916.

Drainage Area.—141 square miles.

Gage.—Vertical staff.

Channel.—Rough but practically permanent.

Discharge Measurements.—Made from car and cable 400 ft. above gage.

Winter Flow.—Ice causes very little backwater during the winter months.

Diversions.—There are court decrees for the diversion of 858 second-feet from Williams Fork above the station. Of this amount 700 second-feet are to be diverted to the eastern slope. This latter diversion has not yet been made.

Accuracy.—Results are considered good.

Co-operation.—Station maintained by the United States Geological Survey, by whom the records were furnished.

Discharge of	Fraser 1	River near	Arrow for	1915.
Drainage Area, 28 Square	Miles.	Altitude.	9.500 Feet	Above Set Level

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				<b>′</b> 5	7	48		275	62	25	16	16	14
$\bar{\mathbf{z}}$				ă.	Ġ	42		275	52	25	16	16	14
3				Ř	7	36		275	42	30	16	16	14
ĭ		********	4	Ä	8	25		245	42	25	16	16	13
Ē			•	ř	8	20	84	245	42	30	20	14	13
ě		•		ž	Š	16		245	42	28	16	18	13
7		•••••		3	10	8	••••••	216	62	25	16	13	13
Ŕ			•••••	7	10	30			81	36	16	15	13
ŝ		•••••	3	7	12	36		245	62	30	16	14	13
10		•••••	3	7	12		•••••	216	52	25		15	13
	•••••		4	7		42	•••••	189			16		
11				*	16	69	*******	164	42	25	16	16	12
12	•••••	•	· · · · · · · · · · · · · · · · · · ·	3	20	101	120	164	42	25	16	16	12
13	•••••	•••••		5	21	141	306	141	36	_ 20	16	16	12
14		• • • • • • • • • • • • • • • • • • • •		5	22	101	245	164	36	25	16	18	12
15	•••••	•••••	4	5	30	110	338	152	36	28	16	18	12
16				5	26	126	405	141	33	25	16	20	12
17			4	5	22	141	507	141	30	25	16	20	12
18				5	30	92	541	120	30	25	16	20	12
19				4	25	69	609	120	30	25	16	16	12
20				5	30	48	507	101	30	20	16	16	12
21				5	30	54	473	101	30	20	16	15	12
22				5	28	62	507	101	30	20	16	15	12
23		2	4	4	25	69	575	101	36	20	16	14	12
24				4	20	75	541	101	32	20	16	15	12
25				. 6	20	69	507	84	30	20	16	13	12
26			4	6	20	112	473	84	30	20	16	13	12
27			5	6	30	112	439	62	30	20	16	14	12
28				6	30	84	338	69	25	₹ 25	16	14	12
29		4		Š	69	69	306	69	25	20	16	13	12
30				Ř	62	101	306	62	25	20	16	14	12
31				š		130		62	25	- •	16		12
	otal		********	151	665	2238	8127	4730	1202	729	500	464	385
	an		4.0	4.87	22.2	72.2	406	153	38.8	24.3	16.1	15.5	12.4
	X		1.0	4.06	69	141	609	275	81	36	20	20	14
Mir			•	4	6	141	84	62	25	20	16	13	12
	e-ft.		222	299	1320	4440	16100	9410	2390	1450	- 990	922	762

## Discharge of Fraser River near Arrow for 1916. Drainage Area, 28 Square Miles. Altitude, 9,500 Feet Above Sea Level.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	. 12	9.5	8.5	8.5	74	202	122	50	26	20	20	
2	4.0	9.0	7.1	7.7	74	230	116	48	24	20	20	
3 '		9.0	9.5	8.0	76	158	109	50	23	19	18	
4	. 12	9.0	10.5	8.0	76	190	103	52	22	19	18	
5	. 12	9.0	7.1	7.7	76	260	96	50	21	18	19	
6	. 11	9.5	7.7	7.7	100	230	86	50	23	18	17	
7	. 11	9.5	8.0	8.0	140	200	83	46	20	19	38	
8	. 10	10	7.1	7.7	150	170	86	44	20	18	78	
9	. 10	10	6.8	9.5	210	215	86	43	18	18	125	
10		10	6.8	9.5	260	260	. 76	42	22	18	116	
11		10	7.1	10.5	190	254	70	41	25	17	98	
12		10	6.8	10.0	117	260	60	42	26	18		12
13		10	7.1	11	108	284	56	42	28	17	`	
14	. 10	10	6.8	12	100	272	52	41	26	17		
15		10	9.5	13	94	260	50	39	24	17	•••••	
16		10	6.8	14	93	260	52	41	23	19		
17		10	6.8	14	90	248	54	41	22	20		
18		9.	7.1	13	100	260	50	38	22	19		
19	. 11	9.	7.1	14	110	266	46	36	22	17		
20		9.	6.8	13	130	260	44	36	21	21		
21		9.	6.8	14	130	236	43	35	21	32		
22		9.5	7.1	14	130	215	43	32	21	36		
23	. 12	₽.	6.8	20	152	180	42	31	21	18		
24		10	6.8	27	130	171	42	31	21	17		
25		10	7.1	37	110	158	41	31	20	17		•
26		10	7.1	42	130	153	43	30	18	16	••••••	
27	. 9	11	7.4	50	152	153	43	29	18	18		
28		11	7.4	69	160	153	46	26	20	20	••••••	
29:		10	9.5		176	135	48	25	20	21	•••••	
30		·	9.5	69	202	125	49	30	19	20	•	
31	. 10		9.0	******	202	2777	54	29		20		•••••
Total		281	235.5	622.8	4042	6418	1991	1201	657	604	567	
Mean		9.69	7.59	20.8	130	214	64.2	38.7	21.9	19.5		
Max		11	10.5	74	260	284	122	52	28	36		
Min	9	- 9	6.8	7.7	74	125	41	25	18	17	•••••	
Acre-ft.		557	467	1240	7990	12700	3950	2380	1300	1200	•	
Un!	less ot	herwis	e note	d, all d	lischar	ges are	in cubi	c feet	per se	cond.		•

Discharge of Williams	Fork near Scholl for 1915.
Drainage Area, 141 Square Miles.	Altitude, 9,000 Feet Above Sea Level.

_			,				, 0,					
Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.			Dec.
1	. 20	22	22	19	190	400	770	89	84	83	52	•••••
2	ŽŎ	22	23	20	74	425	730	73	84	85	49	
		22	24	20	82	425	690	68	84	85	48	•
4									84	83	48	
· • · · · · · · · · · · · · · · · · · ·		22	24	20	82	480	650	68				
5		22	26	20	89	508	620	65	84	82	49	
<u>6</u>		22	26	21	93	590	590	60	84	82	46	•••••
7		22		21	97	<b>53</b> 5	562	54	81	77	48	•••••
8	. 20	26	26	20	115	562	508	68	81	75	49	
9	. 20	23	30	29	123	680	480	74	79	75	49	
10	20	22	27	38	125	770	480	84	78	72	50	
11	0.4	21	28	47	133	1030	480	84	78	70		
12		21	24	56	302	1100	480	84	78	69		•••••
13	22	23	28	65	350	1030	480	84	78	69		
	0.0							84	78	69	•••••	
14		22	19	74	350	1030	425			69	•••••	
15		22	19	74	375	1030	425	84	78		•••••	
16		25	19	73	375	1030	400	84	74	69	•••••	
17		23	20	97	375	1030	400	102	74	69	••••	
18		27	19	79	375	1100	375	102	74	69		· · · · · · · · ·
19	. 22	27	19	84	375	1030	350	102	73	69	•	
20	. 22	23.	19	93	350	1030	325	102	68	69		
21	23	24	19	93	350	1030	325	102	68	69		
22	0.0	25	19	98	350	1030	280	100	65	69		
23	0.0	25	19	112	350	1030	276	97	64	69	*******	
0.4	0.0	24	19	112	350	1030	268	95	54	66		••••••
0.5	0.0	22	20	123	350	1030	248	93	54	66	•	••••••
0.0	00	23	20	123	375	965	236	89	58	61		
												•
27	. 23	24	20	112	375	930	230	89	62	56		••••••
28		24	19	145	400	890	205	84	65	59	•	
29			19	190	400	850	205	84	71	55	•••••	
30			20	186	375	810	174	84	78	54		
31	22		20		375		102	84		54		
Total.	. 669	660	682	2264	8480	25410	12769	2616	2215	2168	488	
Mean		23.6	22.0	75.5	274	847	412	84.4	73.8	69.9	48.8	
Max		33	30	190	400	1100	770	102	84	85	52	
Min		21	19	19	74	400	102	54	54	. 54	46	
Acre-ft.	1330	1310	1350	4490	16800	50400	25300	5190	4390	4300	968	•
MCIE-IL.	1990	1910	1990	2450	10000	90400	20300	9190	7390	4900	309	,

# Discharge of Williams Fork near Scholl for 1916. Drainage Area, 141 Square Miles. Altitude, 9,000 Feet Above Sea Level.

		errae	A 271.000	171	ad mura	MALLOW.	202 02 00	ue, <i>5</i> ,0	~ 100	r troop	G 550	250 V U.	
Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.			Nov.	Dec.
1				40	48	136	440	469	266	122	72	82	
2		<b>-</b>		39	48	139	498	469	246	116	74	80	
3				40	45	146	498	469	246	111	72	77	
4				44	48	152	498	440	246	109	71	75	
5				43	48	152	498	412	246	109	82	77	
6				43	42	180	528	412	246	105	82	72	
7				44	54	200	528	412	239	105	82	69	
8				44	54	240	528	384	239	103	82	69	
ğ				45	. 50	310	528	384	235	103	82	69	
10			•••••	44	60	400	528	384	224	101	80	69	
11				45	70	370	528	384	224	199	79	68	
12		•	•	45	72	340	528	384	190	99	79	68	•
13		•••••	*******	45	74	300	528	384	190	98	79	65	
14	•••••			46	72	220	588	384	190	96	79	64	•
15				47	71	200	618	384	190	94	90	62	••••••
16		•		48	69	200	678	286	187	92	88	61	
17		••••••		49	72	260	709	266	184	90	92	61	•••••
		•••••			80	270 270		266	180	87	100	59	•••••
18			•	50			740					59 59	
19	•••••		•	49	86	180	772	266	160	85	94		•••••
20		•••••		50	71	180	804	266	155	80	89	59	
21	•••••	••••		49	71	180	678	266	149	77	80	58	••••••
22	•••••	•••••		50	82	185	709	266	146	77	74	58	
23	•••••	•		50	82	190	678	266	136	77	74	57	
24	•••••	•••••		50	92	200	678	266	136	77	75	56	
25	•••••			49	94	210	678	266	132	75	75	59	
26	•••••	••••		49	99	230	618	266	132	74	83	57	
27				50	103	266	588	266	129	74	83	57	
28				50	103	384	588	266	126	74	85	57	
29				50	118	384	588	266	124	72	85	56	
30			•••••	50	136	384	528	266	122	72	83	56	
31				49		412		266	120		83		
1	otal			1446	2214	7600	17896	10431	5735	2753	2528	1936	
Мe	an			46.6	73.8	245	597	336	185	91.8	81.5	64.5	
Ma	x			50	136	412	804	469	266	122	100	82	
Mi	n			39	42	136	440	266	120	72	71	56	
	re-ft.			2870	4390	15100	35500	20700	11400	5460	5010	3840	******
	IInle	age of		note	d all d	lischarg		in oubi	a foot	nor go	nond.		
	Cine	ווט ממ:	iei wise	11016	u, all t	inacinai g	cs are	in cubi	C Teer	her see	onu.		

#### WILLIAMS FORK NEAR PARSHALL.\*

Location.—On highway bridge at Field's ranch, 4 miles above the mouth of the river, about sec. 36, T. 1 N., R. 79 W. Nearest tributary is Battle Creek, which enters from the west 2 miles below the station.

Records Available.—July 25, 1904, to November 15, 1916.

Drainage Area.—185 square miles.

Gage.—Vertical staff; location and datum unchanged.

Channel.—Shifting after high water.

Discharge Measurements.—Made from bridge to which the gage is attached.

Winter Flow.—The main channel is kept open by springs, but ice forms along the edges and slush ice frequently forms. The morning readings are usually affected by backwater from ice, but the afternoon readings are practically unaffected.

Diversions.—There are court decrees for the diversion of 558 second-feet from Williams Fork between this station and the one near Scholl, and 25 second-feet from tributaries. There is also a storage decree for 80,700 and 1,420 acre-feet from Williams Fork.

Accuracy.—Conditions are favorable for accurate results, and the estimates should be reliable.

Co-operation.—Station maintained in co-operation with the United States Geological Survey.

#### BLUE RIVER AT DILLON.

Location.—At the cemetery bridge on the outskirts of Dillon, in sec. 18, T. 5 S., R. 77 W., on the edge of the Leadville National Forest, a short distance above the mouth of Snake River. Ten-Mile Creek also enters below the station.

Records Available.—October 15, 1910, to November 13, 1916.

Drainage Area.—110 square miles.

Gage.—Vertical staff; location and datum unchanged.

Channel.—Practically permanent.

Discharge Measurements.—Made by wading near by and from bridge.

Winter Flow.—Ice causes backwater during the winter and dis-

charge measurements are made to determine the flow.

Diversions.—There are court decrees for diversions of 2.3 second-feet from Blue River above the station and 63 second-feet below, exclusive of a decree for 350 second-feet for the Green Mountain Canal. There is an unadjudicated diversion from the headwaters of the Blue across Boreas Pass to Tarryall Creek. There are also decrees for diversions of 5 second-feet from tributaries entering above. In addition, there are decrees for placer mining, where practically all of the water used is returned to the river.

Accuracy.—Records considered reliable.

<sup>\*</sup>Formerly designated Williams Fork near Sulphur Springs.

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7		42	41	42	64	96	375	670	103	65	76	77	45
8		44	41	41	67	71	375	670	132	69	73	74	40
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	Dre	ulnage	Ares	Disch	arge of	Blue Miles.	River s	t Dillo	n for	1915.	ra Sag	T.evel	
Da		Jan.			_								
Da	.у	Jan.	Feb.			May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1 2		•••••	17		33 33	78 76	345 390	458 458	126 121	70 70	78 78	58 53	45 45
3					33	108	345	458	164	70	78	53	. 44
4			••••		34	96	345	325	185	70	78	53	44
5		•••••	••••••		36	96	390	285	134	70	78	· 48	43 43
7				********	37 38	96 96	390 345	285 345	108 134	70 <b>70</b>	78 70	48 48	43
8					39	96	345	305	208	96	70	48	42
. 9	•		14		40	86	325	305	208	86	64	48	41
10 11			•••••		40	86	345	245 208	179 179	86	70	48	40 39
12					40 40	83 78	325 305	345	143	8 <b>6</b> 70	70 70	48 48	39
13					43	78	345	305	108	ΫŎ	70	48	39
14					47	390	345	285	88	86	78	48	39
15 16			•••••		50	502	345	285	116	73	78	48	38
17					54 58	170 185	390 480	245 245	116 108	58 58	78 70	48 47	38 37
18					62	185	665	245	106	53	70	47	37
19					67	191	592	245	106	50	64	46	37
20	•••••			20	72	208	592	245	. 106	48	64	46	37
21 22			•••••	••••••	64 60	225 245	502 592	225 185	86 86	48	64 64	46	36
23		•••••		26	64	170	665	179	86	48 48	64	46 46	36 35
24					64	305	665	208	86	48	64	45	35
25	•••••			······	58	325	665	208	96	167	64	45	34
26 27			•	30	64 111	325 345	592	179	70	167	64	46	34
28					96	345	502 525	208 191	86 106	161 118	64 64	46 46	34 33
29				33	96	345	502	191	106	118	64	46	33
30			•		96	345	458	164	96	118	53	46	33
31		14				345		149	90	•••••	53	•	33
	Cotal				1669	6304	13617	8209	3737	2451	2136	1432	1186
	an				55.6 111	203 502	454 665	265 458	121 208	81.7 167	68 9 78	47.7 53	38.3 45
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Ac	re-ft.				3310	12500	27000	16300	7440	4860	4220	2840	2360
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	Dre	inage	Area				River a				re Ses	Level	
Da			-	, 110 £	erang	Miles.	Altiti	1 <b>de, 8,8</b>	15 Pec	t Abov			
Da 1		Jan.	Feb.	, 11 <b>0 £</b> Mar.	<b>April</b>	Miles. May	Altita June	July	15 Fee Aug.	t Abov Sept.	Oct.	Nov.	Dec.
1		Jan. . 33	Feb. 26	, 110 £	April 23	May 126	June 412	<b>1de, 8,8</b> July 368	15 Fee Aug. 285	Sept. 98	Oct. 60	Nov.	
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#### SNAKE RIVER AT DILLON.

Location.—At a highway bridge 200 yards above the mouth of the river in sec. 18, T. 5 S., R. 77 W. Nearest tributary is a small stream that enters from the north 1 mile above station.

Records Available.—October 15, 1910, to November 6, 1916.

Drainage Area.—92 square miles.

Gage.—Vertical staff; location and datum unchanged.

Channel.—Practically permanent.

Discharge Measurements.—Made from the bridge and by wading.

Winter Flow.—Ice gorging causes backwater of varying amount.

Diversions.—There are court decrees for diversions of 4.5 second-feet from Snake River above the station and 11 second-feet from tributaries entering above. The Summit County Power Company diverts about 30 second-feet around the station.

Accuracy.—Records reliable.

Co-operation.—Records furnished by the United States Geological Survey.

#### TEN-MILE CREEK AT DILLON.

Location.—At the highway bridge in Dillon, in sec. 18, T. 5 S., R. 77 W., 300 yards above the mouth of the creek. Nearest tributary, Canon Creek, enters from the west about 4 miles above the station.

Records Available.—October 15, 1910, to November 7, 1916.

Drainage Area.—113 square miles.

Gage.—Vertical staff; location and datum unchanged.

Channel.—Practically permanent.

Discharge Measurements.—Made by wading and from bridge.

Winter Flow.—Ice causes backwater during the winter months, and discharge measurements are made to determine the flow during that period.

Diversions.—There are court decrees for diversions of 11 second-feet from Ten-Mile Creek above the station and 14.5 second-feet from tributaries entering above.

Accuracy.—Records considered reliable.

Day Jan. Feb. Mar. April May June July Aug.	1915.	. See	T-evel	
		Oct.	Nov.	Dec.
1 14 22 26 195 165 380 57	23	285	14	12
2 27 55 165 240 56		285		12 12
3 28 55 148 240 50 4 30 55 134 240 47		14 14		12
5 32 55 98 200 47		14		
6 17 32 53 90 200 74		14		12
7 33 53 96 200 76 8 15 34 32 126 176 90		13 13		12 12
8 15 34 32 126 176 90 9 13 23 35 32 126 165 88		14		12
10 35 32 126 165 88		14	12	•••••
11 41 32 150 165 77		14		
12 14 47 32 150 156 76 13 11 27 47 32 165 179 76		14 13		•
13 11 27 47 32 165 179 76 14 46 32 258 176 60		13		
15 14 22 46 32 240 153 60	16	13		
16 45 13 240 105 60		13		••••••
17 14 45 13 330 90 57 18 45 14 330 90 45		14 14	•	
19 15 45 14 380 96 45		14		
20 14 45 14 380 103 45		13		
21 26 14 660 90 32		13	••••••	
22 13 14 53 485 92 32 23 13 19 14 45 485 85 32		13 13		•
24 15 14 45 512 79 32		13		
25 17 14 90 485 83 38	25	13		
26 17 45 94 458 76 32	25	13		•
27 20 .22 66 240 430 86 32 28 179 240 430 70 32	25 16	13 13		
29 25 172 240 405 66 32	16	14		
30 15 186 189 380 66 32	16	14		
31 63 32 Total 1494 2268 8627 4375 1626		14	370	
Total 1494 2268 8627 4375 1626 Mean 15.0 14.0 20.0 49.8 73.2 288 141 52.5	$\begin{array}{c} 512 \\ 17.1 \end{array}$	961 31.0	12.3	372 12.0
Max 186 240 660 380 90	25	285	12.0	
Min 14 13 90 63 32	12	13		
Acre-ft. 922 778 1230 2960 4500 17100 8670 3230 Nov. 14 to Nov. 31, estimated 12 sec. ft.	1020	1910	732	738
Dec. 9 to Dec. 31, estimated 12 sec. ft.				
· · · · · · · · · · · · · · · · · · ·	1010			
Discharge of Snake Eiver at Dillon for Drainage Area, 92 Square Miles. Altitude, 8,815 Fee	t Above	Ses	Level.	
Day Jan. Feb. Mar. April May June July Aug.	Sept.	Oct.	Nov.	Dec.
1 11 10 11 12 47 249 262 136	49	14		
2 11 10 11 12 44 240 244 128		1.4	17	
3 11 10 11 12 37 254 236 116	41	14	17 17	
	41	14 13	17 17 ·15	
4 11 11 11 12 45 280 228 121	41 33	14 13 13	17 17 15 15	
	41	14 13	17 17 15 15	
4      11     11     11     12     45     280     228     121       5      11     11     11     11     45     285     216     131       6      10     11     11     11     74     249     138     126       7      10     11     11     11     94     196     168     111	41 33 38 40 31	14 13 13 12 12 13	17 17 15 15 14 17	
4      11     11     11     12     45     280     228     121       5      11     11     11     14     45     285     216     131       6      10     11     11     11     74     249     193     126       7      10     11     11     11     94     196     168     111       8      10     11     11     11     126     216     168     121	41 33 38 40 31 28	14 13 13 12 12 13 12	17 17 15 15 14 17	
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4	41 33 38 40 31 28 27 33 42 42 45	14 13 13 12 12 13 12 12 12 12 12	17 17 -15 15 14 17	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	41 33 38 40 31 28 27 33 42 42 45 38	14 13 12 12 13 12 12 12 12 12 12	17 17 -15 15 14 17	
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$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	413880 31822733242583399654	14 13 12 12 12 12 12 12 12 12 14 16 17 21 21 21 21 21 21 21 21 21 21 21 21 21	17 17 15 15 14 17	
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$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	41 338 40 318 27 32 42 42 42 38 33 226 224 221	14 13 12 12 12 12 12 12 12 12 14 17 21 21 22 13 21 21 21 21 21 21 21 21 21 21 21 21 21	17 17 15 15 15 17 	
4          11         11         11         12         45         280         228         121           5          11         11         11         11         45         285         216         131           6          10         11         11         11         74         249         193         126           7          10         11         11         11         94         196         168         111           8          10         11         11         12         165         280         220         128           16          10         11         11         13         212         330         204         105           11          11         12         11         13         212         380         182         92           12          11         13         11         16         190         380         176         92           13          11         12         10         16         159         405         142         103           14 <t< td=""><td>41 33 340 318 227 332 42 45 33 226 225 221 219</td><td>14 13 12 12 12 12 12 12 12 12 14 17 21 22 13 17 17 17 17 17 17 17 17 17 17 17 17 17</td><td>17 17 15 15 14 17 </td><td></td></t<>	41 33 340 318 227 332 42 45 33 226 225 221 219	14 13 12 12 12 12 12 12 12 12 14 17 21 22 13 17 17 17 17 17 17 17 17 17 17 17 17 17	17 17 15 15 14 17 	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	41 338 40 318 27 32 42 42 42 38 33 226 224 221	14 13 12 12 12 12 12 12 12 12 14 17 21 21 22 13 21 21 21 21 21 21 21 21 21 21 21 21 21	17 17 15 15 15 17 	
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4          11         11         11         12         45         280         228         121           5          11         11         11         11         45         285         216         131           6          10         11         11         11         74         249         193         126           7          10         11         11         11         126         216         168         121           9          10         11         11         12         165         280         220         128           16          10         11         11         13         212         330         204         105           11          11         12         16         190         380         176         92           12          13         11         16         190         380         176         92           13          11         12         10         16         159         405         136         103           14          11	41 338 40 318 27 342 42 42 42 42 22 21 20 22 22 22 22 22 21 21 21 21 21 21 21 21	14 113 112 112 112 112 112 113 115 115 115 115 115 115 115 115 115	17 17 15 15 15 17 	
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4          11         11         11         12         45         280         228         121           5          11         11         11         11         45         285         216         131           6          10         11         11         11         74         249         193         126           7          10         11         11         11         126         216         168         121           9          10         11         11         12         165         280         220         128           16          10         11         11         13         212         330         204         105           11          11         12         16         190         380         176         92           12          13         11         16         190         380         176         92           13          11         12         10         16         159         405         136         103           14          11	41 338 40 328 427 342 445 383 296 221 209 228 1166 117	14 113 112 113 112 112 112 113 115 115 115 115 115 115 115 115 115	17 17 15 15 14 17 	
4          11         11         11         12         45         280         228         121           5          11         11         11         11         45         285         216         131           6          10         11         11         11         74         249         193         126           7          10         11         11         11         94         196         168         111           8          10         11         11         12         165         280         220         128           16          10         11         11         12         165         280         220         128           11          11         12         16         380         182         92           12          11         13         11         16         190         380         176         92           12          11         13         11         16         190         305         142         103           14          11 <t< td=""><td>41 338 40 227 342 425 383 296 242 210 221 221 221 221 232 221 221 221 221 221</td><td>143322332211221122122222116712052175550521156</td><td>17 17 15 15 14 17 </td><td></td></t<>	41 338 40 227 342 425 383 296 242 210 221 221 221 221 232 221 221 221 221 221	143322332211221122122222116712052175550521156	17 17 15 15 14 17 	
4         11         11         11         12         45         280         228         121           5         11         11         11         11         11         45         285         216         131           6         10         11         11         11         74         249         193         126           7         10         11         11         11         12         196         168         111           9         10         11         11         12         165         280         220         128           16         10         11         11         12         165         280         220         128           11         11         12         165         280         220         128           12         11         13         11         14         182         380         182         92           12         11         13         11         16         190         380         176         92           13         11         12         10         16         159         405         136         103           14         11 </td <td>41 338 40 318 27 342 42 42 42 42 42 22 12 20 12 22 22 16 16 16 17 14 14 14 14 14 14 14 14 14 14 14 14 14</td> <td>14 133 122 122 122 122 122 123 125 155 155 166 191 192 193 193 193 193 193 193 193 193 193 193</td> <td>17 17 15 15 14 17 </td> <td></td>	41 338 40 318 27 342 42 42 42 42 42 22 12 20 12 22 22 16 16 16 17 14 14 14 14 14 14 14 14 14 14 14 14 14	14 133 122 122 122 122 122 123 125 155 155 166 191 192 193 193 193 193 193 193 193 193 193 193	17 17 15 15 14 17 	
4         11         11         11         11         12         45         280         228         121           5         11         11         11         11         11         45         285         226         121           6         10         11         11         11         74         249         193         126           7         10         11         11         11         94         196         168         111           8         10         11         11         11         126         216         168         121           9         10         11         11         12         165         280         220         128           16         10         11         11         13         212         330         204         105           11         11         12         11         182         380         182         92           12         11         13         11         16         190         305         176         92           12         11         13         11         16         190         405         136         103 <t< td=""><td>41 338 40 328 27 342 445 383 29 25 24 21 21 22 21 21 21 21 21 21 21 21 21 21</td><td>14 113 112 113 112 112 114 115 115 115 115 115 115 115 115 115</td><td>17 17 17 15 15 14 14 17 </td><td></td></t<>	41 338 40 328 27 342 445 383 29 25 24 21 21 22 21 21 21 21 21 21 21 21 21 21	14 113 112 113 112 112 114 115 115 115 115 115 115 115 115 115	17 17 17 15 15 14 14 17 	
4 11 11 11 12 45 286 228 121 5 11 11 11 11 12 45 285 216 131 6 11 11 11 11 11 45 285 216 131 6 11 11 11 11 11 74 249 193 126 7 10 11 11 11 11 12 6 216 168 111 9 10 11 11 11 12 165 280 220 128 16 10 11 11 11 12 165 280 220 128 16 11 11 12 165 280 220 128 16 11 11 12 165 280 220 128 16 11 11 12 165 280 220 128 16 11 11 12 11 14 182 380 182 92 12 11 13 11 16 190 380 176 92 12 11 13 11 16 190 380 176 92 13 11 12 10 16 159 405 136 103 15 11 11 10 16 159 405 136 103 15 11 11 10 15 136 405 136 103 15 11 11 10 15 136 405 136 103 15 11 11 10 16 105 430 128 96 17 128 96 18	41 338 40 318 27 342 42 42 42 42 42 22 12 20 12 22 22 16 16 16 17 14 14 14 14 14 14 14 14 14 14 14 14 14	14 133 112 113 112 113 113 113 114 115 115 115 115 115 115 115 115 115	17 17 15 15 14 17 	
4         11         11         11         11         12         45         280         228         121           5         11         11         11         11         11         45         285         216         131           6         10         11         11         11         14         249         193         126           7         10         11         11         11         94         196         168         111           8         10         11         11         11         126         216         168         121           9         10         11         11         12         165         280         220         128           16         10         11         11         13         212         330         204         105           11         11         12         11         48         2380         182         92           12         11         13         11         16         190         380         176         92           12         11         12         10         16         190         405         142         103 <t< td=""><td>41 338 40 328 27 328 42 42 42 42 23 22 21 20 23 22 21 22 21 21 21 21 21 21 21 21 21 21</td><td>14 133 112 113 112 113 114 115 115 115 115 115 115 115 115 115</td><td>17 17 17 15 15 14 14 17 </td><td></td></t<>	41 338 40 328 27 328 42 42 42 42 23 22 21 20 23 22 21 22 21 21 21 21 21 21 21 21 21 21	14 133 112 113 112 113 114 115 115 115 115 115 115 115 115 115	17 17 17 15 15 14 14 17 	

-	Discharge of Ten-Mile	Creek at Dillon for 1915.
Drainage .	Area, 113 Square Miles.	Altitude, 8,815 Feet Above Sea Level.

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1			,			116	465	370	90	43	52	40	36
2						95	370	400	80	43	52	40	36
3						67	432	340	70	49	52	40	36
4						116	465	340	70	55	52	40	35
5						190	465	312	70	43	46	38	35
6	•••••			•••••		190	400	296	70	43	46	36	3,5
7	•	••••	•••••			235	329	285	90	43	46	36	35
8						212	312	226	340	45	42	36	34
9	•			•••••	•••••	190	465	212	190	55	4.0	36	34
10	•••••					212	465	212	116	55	40	36	33
11	•••••	•	•••••			190	465	116	116	55	40	36	33
12	•				•••••••	212	465	230	103	43	. 40	36	32
13	<b></b>	•			• • • • • • • • • • • • • • • • • • • •	260	465	226	80	43	40	36	32
14	•••••	•••••	•••••	•••••		285	465	212	80	49	46	36	31
15			•••••			340	432	212	74	55	46	36	31
16		•••••	•••••		•	190	465	182	. 58	43	46 40	36	31
17 18		•••••				$\frac{212}{212}$	782 670	170 190	90 55	43 38	40	35	31 30
19		••••••	•	•	•••••	212	670	182	55	38	36	35 35	30
20		••••••	•		80	235	820	170	70	38	36	36	
21		•••••	•	••••••	82	245	935	143	62	38	36	36	29 28
22		••			82	296	858	133	55	38	36	36	28 28
23		•••••	•••••		82	340	670	123	62	38	36	36	28
24			•••••		70	370	670	170	62	38	36	36	28
25					55	530	670	116	62	123	36	36	27
26					55	530	635	116	55	116	40	36	27
27				•	55	635	600	170	43	116	40	36	26
28					70	670	498	116	55	116	40	36	26
29				•••••	80	670	370	103	103	116	40	36	26
30					80	565	340	90	70	90	40	36	26
31						530		90	49		4 Ŏ		26
7	Cotal				791	9352	16113	6253	2645	1748	1298	1095	955
	an			********	71.9	302	537	202	85.3	58.3	41.9	36.5	30.8
	х				82	670	935	.400	340	123	52	40	36
Mi			********		55	67	312	90	43	38	36	35	26
Ac	re-ft.	••••••	•••••		1570	18600	32000	12400	5240	3470	2580	2170	1890

Discharge of Ten-Mile Greek at Dillon for 1916. Drainage Area, 113 Square Miles. Altitude, 8,815 Feet Above Sea Level.

Day	Jan.	Feb.	Mar.	Apri	l May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	25	23	24	31	137	715	540	170	64	41	36	
2	25	24	24	31	125	680	470	167	55	47	35	
3	25	24	24	31	110	680	400	159	55	45	42	
4	25	24	24	31	108	750	376	174	54	45	41	
5	25	24	24	31	119	645	352	192	54	42	42	
· 6	25	25	24	31	178	540	322	159	61	42	40	
7	25	25	24	30	202	505	280	151	55	44	24	
8	25	26	24	30	435	575	247	151	50	51		
9	25	27	24	33	540	715	292	167	52	46		•••••
10	25	28	24	36	575	820	292	134	67	45	•	•••••
11	25	29	24	39	575	820	304	122	75	44		
12	24	29	24	41	575	858	247	148	66	45		
13	24	28	24	41	540	820	230	148	82	45		
14	24	28	24	40	376	820	216	163	80	45		<u></u>
15	24	27	24	40	334	820	202	131	69	48		
16	24	26	25	44	264	858	206	113	62	54		
17	24	26	25	48	220	785	216	110	58	54		
18	24	25	26	51	206	715	216	96	55	60		•••••
19	24	25	26	52	202	750	197	91	55	52		•••••
20	24	24	26	50	211	715	174	86	54	36		
21	24	24	27	48	211	680	151	86	50	28		****
22	23	24	28	55	183	610	151	80	48	38		42
23	23	24	28	60	192	540	151	78	45	50	•••••	•••••
24	23	24	28	62	220	505	159	75	48	51		
25	23	24	28	84	292	540	131	75	47	51		•••••
26	23	24	28	119	394	470	131	73	45	40		
27 28	23	24	28	148	352	470	151 148	67	44	32		
	23	24	29	197	376	505		64	44	36	•••••	•••••
30	23	24	29	$\frac{225}{181}$	505 645	505 435	148	61	44	41		•••••
31	23 23	•	<b>3</b> 0 30	191	680	430	$\frac{274}{211}$	69	42	36	•••••	•••••
Total	745	732	801	1940	10082	19846	7585	66 3626	1680	$\begin{array}{c} 42 \\ 1376 \end{array}$		·
Mean	24.0	25.2	25.8	64.7	325	662	245	117	56.0		260	•
	25	29	30	225	680	- 858	540	192	82	44.4		•••••
Max Min	23	23	24	30	108	435	131	61	42	60		•••••
	1480~	1450	1590	3850	20000	39400	15100	7190	3330	28	••••••	******
										2730		•••••
Unle	ss oth	erwise	noted	, all d	uscharg	es are	in cubic	reet	per sec	ond.		

#### EAGLE RIVER AT RED CLIFF.

Location.—In sec. 29, T. 6 S., R. 80 W., in the town of Red Cliff, in the Holy Cross National Forest, 100 yards above mouth of Turkey Creek, and 1 mile above the mouth of Homestake Creek.

Records Available.—January 8, 1911, to November 2, 1916.

Drainage Area.—74 square miles.

Gage.—Chain gage; location and datum unchanged.

Channel.—Slightly shifting.

Discharge Measurements.—Made from highway bridge at 800 feet above during high water and by wading at ordinary stages.

Winter Flow.—Little, if any, ice forms at this station.

Diversions.—There are court decrees for diversions of 22 second-feet from Eagle River and tributaries above the station; 18.5 second-feet of this amount for diversion to the Arkansas Basin.

Accuracy.—Records considered good.

Co-operation.—Records furnished by the United States Geological Survey.

### EAGLE RIVER AT EAGLE.

Location.—At the highway bridge at Eagle, in Eagle County, three-fourths of a mile above the mouth of Brush Creek.

Records Available.—March 12, 1905, to February 10, 1907, at site a short distance below the mouth of Brush Creek; January 17, 1911, to November 13, 1916, at present site.

Drainage Area—630 square miles.

Gage.—Chain gage.

Channel.—Practically permanent.

Discharge Measurements.—Made from highway bridge at ordinary and high stages and by wading during low water.

Winter Flow.—Ice causes backwater during the winter. Discharge measurements are made to determine the winter flow.

Diversions.—Between Eagle and the station at Red Cliff there are court decrees for diversions of 380 second-feet from Eagle River, of which 300 second-feet is for power, and for diversions of 286 second-feet from intervening tributaries. Between Eagle and the mouth there are decrees for 22 second-feet from Eagle River.

Accuracy.—Records considered good.

		D	ischar	re of I	lagle H	iver at	Bed C	liff for	1915.			
Dr	ainag	e Ares	, 74 8	quare	Miles.	iver at Altitud	le, 8,59	8 Feet	Above	Sea	<b>L</b> evel	
Day	Jan.	Feb.		April	•	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4	6	10	15	97	336	78	34	19	21	13	13
2 3	5 4	6	10 9	16 20	85 67	280 191	81 79	33 35	17 18	20 20	$\frac{12}{12}$	14 14
4	4	5	9	20 20	68	167	86	32	18	21	12	13
5	5	9	9	20	65	191	78	30	18	20	12 13	13
6 7	3 7	.9	10 10	22 23	63 57	156 145	72 68	30 41	18 2	19 19	13	13 14
8	ż	9	īĭ	29	57	136	71	67	5	19	13	14
9	4	9	10	29	77	167 247	68	49	5 9	17	14	13
10 11	4	9	9 8	28 35	76 108	247 264	65 63	40 33	12	16 16	16 12	14 12
12	6	8	8	37	145	375	59	32	18	16 17	13	15
13	4	10	8	44	280	191	59	29	15		12	13
14 15	5 4	9	13 13	50 57	298 167	191 191	57 52	29 29	15 15	18 18	$^{12}_{12}$	13 14
16	5	9	13	51	179	204	49	29	15	20	12	13
17	5	9	15	49	232	218	46	28	16	20	11	12
18 19	6 6	9	14 14	· 51	232 167	191 218	41 40	27 27	17 17	20 20	10 10	12 13
20	ĕ	9	îî	65	145	218	40	26	16	20	îŏ	14
21	5	10	11	65	117	218	40	26	15	20	10	14
22 23	6 6	10 10	11 11	69 59	145 117	167 167	40 39	24 24	15 15	17 17	10 8	13 13
24	ž	. 10	îî	44	167	218	38	26	15	17	5	13
25	5	9	13	68	280	156	38	26	16	17	. 8	12
26 27	7 5	9 10	14 14	57 67	167 167	136 146	38 40	28 27	17 18	16 16	11 12	12 12
28	6	ii	14	117	156	126	40	25	20	16	12	12
29	6		14	156	191	108	39	25	22	15	13	. 12
30 31	8 8		14 15	145	156 191	93	38 36	24 23	23	15 14	15	15 12
Total	163	249	356	1554	4519	5811	1678	958	461	557	348	406
Mean	5.3	8.9	11.5	51.8	146	194	54.1	30.9	15.4	18.0	11.6	13.1
Max Min	8	11 5	15 8	156 15	· 298	375 93	86 36	67 23	23	21 14	16 5	15 12
Acre-ft	326	494	707	3080	8980	11500	3330	1900	916	1110	690	806
T)	ainem	D:	ischar	ge of I	iagle I	iver at	Red C	liff for	1916.	. Caa	T.ewal	,
	_	e Area	, 74 S	quare	Miles.	Altitud	<b>Le</b> , 8,59	8 Feet	<b>₩</b> po∧e			Dec
Dr Day 1	Jan.	• Area Feb.	<b>, 74 S</b> Mar.	quare :	May May	Altitud June	<b>le, 8,59</b> July	8 Feet Aug.	Above Sept.	Oct.	Nov.	/ Dec.
Day 1 2	Jan. 11 11	• Area Feb. 12 14	<b>, 74 S</b> Mar. 17 21	quare : April : 27 35	May 170 147	June 410 370	<b>le, 8,59</b> July 127 121	Aug. 64 53	Sept. 25	Oct. 22 22		Dec.
Day 1 2 3	Jan. 11 11 12	Feb. 12 14 17	<b>Mar.</b> 17 21 20	April 27 35 36	May 170 147 147	June 410 370 430	July 127 121 118	Aug. 64 53 51	Above Sept.  25 24 24	Oct. 22 22 22	Nov. 22 22	Dec.
Day 1 2	Jan. 11 11	• Area Feb. 12 14	<b>, 74 S</b> Mar. 17 21	quare : April : 27 35	May 170 147	June 410 370	July 127 121 118 115	Aug. 64 53	Sept. 25	Oct. 22 22 22 22 22	Nov. 22	Dec.
Day 1 2 3 4 5 6	Jan. 11 11 12 12 13 14	Feb. 12 14 17 20 18 22	Mar. 17 21 20 22 19 22	April 27 35 36 36 35 33	May 170 147 147 170 147 147	June 410 370 430 410 470 385	July 127 121 118 115 112 109	Aug. 64 53 51 51 50 48	Above Sept. 25 24 24 24 24 26	Oct. 22 22 22 22 23 24	Nov. 22 22	Dec.
Day 1 2 3 4 5 6 7	Jan. 11 11 12 12 13 14 12	Feb. 12 14 17 20 18 22 16	Mar. 17 21 20 22 19 22 20	April 27 35 36 36 35 33 32	170 147 147 147 170 147 147 147	June 410 370 430 410 470 385 300	July 127 121 118 115 112 109 106	Aug. 64 53 51 51 50 48 46	Above Sept. 25 24 24 24 24 26 24	Oct. 22 22 22 22 23 24 23	Nov. 22 22	Dec.
Day 1 2 3 4 5 6	Jan. 11 12 12 13 14 12 13	Feb. 12 14 17 20 18 22 16 19	Mar. 17 21 20 22 19 22 20 18	April 27 35 36 36 35 33 32 32	170 147 147 147 170 147 147 147 184 220	June 410 370 430 410 470 4385 300 265	July 127 121 118 115 119 106 92	Aug. 64 53 51 51 50 48 46 44	Above Sept. 25 24 24 24 26 24 29	Oct. 22 22 22 22 23 24 23 22	Nov. 22 22	Dec.
Day 1 2 3 4 5 6 7 8 9	Jan. 11 11 12 12 13 14 12 13 14 12 13 11	Feb. 12 14 17 20 18 22 16 19 17	Mar. 17 21 20 22 19 22 20 18 19 22	April 27 35 36 36 35 33 32 32 38	170 147 147 147 147 147 147 184 220 510	June 410 370 430 410 470 385 300 265 390 350	July 127 121 118 115 112 109 106 92 93 94	Aug. 64 53 51 51 50 48 46 44 40 38	Above Sept.  25 24 24 24 24 26 22 30	Oct. 22 22 22 23 24 23 22 21 22	Nov. 22 22	Dec.
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Day  1	Jan. 111 112 113 114 113 114 115 114 115 114 115 114 115 114 116 116 117 117 117 117 117 117 117 117	Feb. 12 14 17 20 18 22 16 19 17 16 18 20 12 17 18 20 12 17 18 20 25 22 20 17 21 37 25 22 21 24 24 570	74 5 Mar. 171 200 222 228 220 220 224 288 335 288 228 235 535 528 793	April 235 366 365 332 322 300 388 557 622 624 629 629 922 657 389 1044 889 170 170 170 170 170 170 170 170 170 170	May 147 147 147 147 120 510 550 450 450 470 368 265 182 175 175 175 176 250 220 231 362 37629	Altitud June 410 370 430 410 470 385 390 265 390 350 350 280 220 220 195 182 174 165 147 147 137	Le, 8,58  July 127 118 115 119 109 109 92 93 94 95 109 84 80 78 76 72 62 551 47 443 485 57 602 2462	8 Feet A	Above Sept. 254 224 224 226 229 229 230 338 238 237 244 277 223 223 223 223 223 223 223 223 223	Oct. 22 22 22 22 22 22 23 22 23 22 21 22 22 25 23 25 27 29 28 28 27 26 26 26 26 20 21 22 22 25 743	Nov. 22 22	Dec.
Day  1	Jan. 111 112 123 114 113 114 113 114 115 116 116 116 117 117 117 117 117 117 117	Feb. 12 14 17 20 18 22 16 19 17 18 20 29 17 18 20 29 25 22 21 21 21 31 31 31 31 31 31 31 31 31 31 31 31 31	74 5 Mar. 7100229 220 1220 222 225 1200 222 224 8 3 3 5 5 2 2 8 9 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	April 27 35 36 36 36 35 33 32 32 32 32 32 32 32 32 32 32 32 32	May 147 147 147 147 147 147 147 147 147 147	Altitud June 4100 4700 4300 4100 4700 3855 3000 2650 3300 3150 2800 2200 2200 1955 1862 1744 1656 1477 1477 1477	Le, 8,58  July 127 1218 1152 1096 92 934 95 1099 80 774 774 438 557 672 6762	8 Feet. 4408 643 655110 88 44408 3365 668 78 32 23 23 20 29 87 62 42 72 44 82 7	Above Sept. 254 224 224 224 229 220 338 330 227 224 227 223 223 223 223 223 223 223	Oct. 22 22 22 22 22 22 22 23 24 23 25 25 25 25 26 26 26 26 26 26 26 26 26 26 26 26 26	Nov. 22 22	Dec.
Day  1	Jan. 111 112 123 114 112 113 114 113 114 113 114 115 116 116 116 117 110 110 113 113 114 115 110 110 113 110 110	Feb.  12 14 17 20 18 22 16 19 17 18 20 12 17 21 18 20 17 21 18 21 17 25 22 18 21 13 57 19,7	74 5 Mar. 7120229 2208 1220 222 228 122 228 122 228 22 228 23 33 65 88 82 23 55 55 66 82 82 83 83 83 83 83 83 83 83 83 83 83 83 83	April 275 366 366 365 333 322 320 32 32 32 32 32 32 32 32 32 32 32 32 32	147 147 147 147 147 147 147 148 220 5100 450 450 450 470 368 265 182 22 178 165 165 165 165 165 165 250 220 235 250 250 250 250 250 250 250 250 250 25	Altitud June 410 470 470 485 300 470 385 300 350 350 350 260 220 220 195 185 174 165 147 147 137 137 8341 278	Le, 8,58  July 127 12118 1152 1096 92 934 955 1099 84 80 76 74 67 67 67 67 67 67 67 67 67 67 67 67 67	8 Feet A 643 551 510 486 444 408 336 336 338 338	Above Sept. 254 224 224 224 226 229 230 338 330 228 237 223 233 223 223 223 223 223 223 223	Oct. 22 22 22 22 22 22 23 24 23 24 22 22 22 25 26 26 26 26 26 26 26 26 26 26 26 26 27 43 22 22 22 22 27 43 2	Nov. 22 22	Dec.

	Dr	aineo	A A Tab	Discha	rge of	Eagle	Biver a	t Eag	le for	1915.	_		
Da	v	Jan.	Feb.				Altitu				_		_
1	-		reb.	118	April 126	May 982	June 2340	July	Aug.	Sept.	Oct.	Nov.	Dec.
2				119	129	705	2850	1860 1800	390 390	167	265 246	158 158	
3			•	119	147	570	2850	1740	445	167	246	158	
5			•	120 120	163 143	480 390	1740 1740	1740	505	190	227	158	•••••
6			••••••	121	163	364	1520	1740 1740	505 445	190 190	211 211	147 147	
7				122	153	338	1310	1420	570	190	195	158	
ĝ		••••••	*******	123 123	163 185	314 338	1360	1520	940	190	195	147	
10				126	174	390	1420 2100	1470 1420	635 635	167 167	170 182	152 158	
11		•••••	•	118	210	505	2850	1420	505	167	182	158	
12 13				123	245	860	2850	1420	338	167	195	158	
14		••••••		118 118	245 390	$\frac{1640}{2220}$	2980 3110	1210 1310	390	167	195	154	
15				114	364	1640	2980	1120	291 218	167 167	195 195	155 155	
16				114	364	1860	2720	860	190	147	195	156	
17 18		······		109 112	390	1980	2590	860	190	147	195	156	••
19				109	404 418	$\frac{2100}{1740}$	2460 2590	860 860	167 167	167 190	195	157	•
20			•	114	390	1310	2850	860	147	190	195 211	157 158	
21 22		••••••	•	114	364	1980	2850	860	147	167	211	158	
23				114 112	364	1740	3630	705	167	167	211	158	
24		••••••	*******	123	364 418	$\frac{1860}{1210}$	3760 3110	705 <b>635</b>	190 190	167 167	195 195	147 147	
25			118	123	418	1740	2980	570	218	167	195	147	
$\frac{26}{27}$		•••••	118	123	418	2100	2940	635	190	167	182	147	
28			118	123 120	364 475	1310 .780	$\begin{array}{c} 2910 \\ 2880 \end{array}$	570	190	252	170	147	•••••
20				118	705	1420	2850	445 505	190 190	338 252	170 158	147 147	
30 31		•••••	•	118	1160	1120	2100	445	190	218	158	147	
	otal	••	354	118 3666	10016	1740 37726	77220	338	167		158		
Mea	an		118	118	334	1220	2570	33643 1090	10092 326	5523 184	6104 197	4597 153	
Ma	x	····-	•	126	1160	2220	3760	1860	940	338	265	158	
	n re-ft.		702	109	126	314	1310	338	147	147	158	147	
1101	C-It.		102	1200	19900	75000	193000	67000	20000	10900	12100	9100	·····
	_	_	1	Discha	rge of	Eagle	River s	t Rec	-	1014			
	Di	ainag'	• Area	, 630	Square	Miles.	Altitu	40, 6,5	58 Pee	t Abov	e Bea	Level,	
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#### HOMESTAKE CREEK NEAR RED CLIFF.

Location.—In sec. 30, T. 6 S., R. 80 W., one-fourth mile above the mouth of the creek and three-fourths of a mile from Red Cliff; below all tributaries.

Records Available.—January 8, 1911, to December 20, 1916.

Drainage Area.—64 square miles.

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge Measurements.—Made by wading near by.

Winter Flow.—Ice causes backwater, and discharge measurements are made to determine the winter flow.

Diversions.—There are court decrees for diversions of 1.2 second-feet from Homestake Creek.

Accuracy.—Records considered good.

Co-operation.—Records furnished by the United States Geological Survey.

#### TURKEY CREEK AT RED CLIFF.

Location.—At highway bridge in Red Cliff, 800 feet above the mouth of the creek.

Records Available.—June 30, 1913, to October 11, 1916.

Drainage Area.—27 square miles.

Gage.—Vertical staff.

Discharge Measurements.—Made from single span bridge, and by wading.

Winter Flow.—Ice causes backwater during the winter months, and discharge measurements are made to determine the flow.

Accuracy.—Records considered good.

	Dı	rainās	Disol Are	arge d	of Mon	estake Miles.	Creek :	near Re de, 8,59	d Cliff 8 Poet	for 19	915. • Sea :	Level	
Da		Jan.	Feb.		April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	•		2 00.	MAI.	3	146	610	205	Aug. 44	10	17	7	
2					3	99	450	218	38	10	17	7	
3	•••••	•••••		•	3 3	79 153	257	205	44 30	10 15	17 19	7	•••••
5		••••••	••••••		3	76	215 257	225 205	28	20	24	7	
6					13	73	194	187	28	15	19	ġ.	•
7	•••••	•			16	68	142	174	76	10	15	8	
8	•		•	••••	28 33	56 62	161 230	182 174	161 84	8 21	14 14	8	
10					26	79	388	161	65	21	13	8	*******
11					38	128	432	153	50	20	13	9	
12 13		•••••			40	176	670	148	40	20	13	10	
14					57 58	485 415	257 244	142 138	36 35	20 19	13 13	10 7	*******
15					69	230	257	133	34	19	15	ż	
16		••••••			62	230	331	107	83	18	20	7	•••••
17 18	•••••	••••••	••••••	•	58 52	347 315	381 432	99 84	30 <b>27</b>	17 16	· 18	7 6	•
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24					76	285	381	70	21	ž	15	2	
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28					137	126	347	62	18	36	9	6	••••••
29					142	257	300	57	16	37	8	7	
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31,	Total	•••••			1689	6060	10553	49 3822	$\begin{array}{c} 12\\1134\end{array}$	558	452	192	
Μe	an				56.3	195	352	123	36.6	18.6	14.6	6.40	
Мa	ıx				176	485	670	218	161	50	24	10	
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AU	16-11.	•	••••••		3350	12000	20900	1900	2230	1110	898	381	•••••
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			Tiron	rarge	OT WOOD	TOREST	Creek:	near Re	og chiu	for 1	916.		
	Dr	ainag	e Area	, 64 g	drare	Miles.	Altitu	near Re de, 8,59	B Poot	Abov	916. <b>Sea</b>	Level.	
Da		<b>ainag</b> Jan.	o Ares	, 64 g	iquare April	Miles. May	Altitu June	near Re de, 8,59 July	8 Peet	Above Sept.	916. Bea Oct.	Level. Nov.	
Da 1		Jan.	e Area Feb.	Mar.	iquare April 45	Miles. May 129	Altitude June 350	<b>de, 8,59</b> July 347	8 Feet Aug. 118	Above Sept. 35	Sea.		Dec. 25
			Feb.	Mar.	April 45	May 129 112	June 350 347	<b>de, 8,59</b> July 347 325	Aug. 118 116	Sept.	Oct.	Nov.	
	 	Jan.	e Area Feb.	Mar.	April 45 44 42	May 129 112 102	Altitus June 350 347 400	de, 8,59 July 347 325 300	Aug. 118 116 114	Above Sept. 35 30 28	Oct.	Nov.	
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Dr	ainag	Disc Area	harge , 27 S	of Tr	rkey C Miles.	rook at Altitud	<b>Bed</b> e, 8,59	Cliff fo	Above	5. Sea :	Level.	
Day	Jan.	Feb.	Mar.	April	Mav	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4	4	5	10	58	151	110	20	10	8	6	4
2	4	4	6	11	50	135	102	18	ĩŏ	8	6	5
3	4	4	6	14	41	120	95	18	10	8	6	4
4 5	4	4	7 6	14 14	89 37	110 104	89 87	18 18	10 9	9	6	4
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8	4	4	6	14	81	101	67	23	12	8	7	5
9	4	4	7	15	47	185	58	18	10	8	7 5	4
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18	4	5	7	19	98	197	43	14	9	9	5	4
14	4	5	8	26	100	166	43	14	. 9	8	5	4
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17	3	5	8	29	115	205	35	14	19	ŝ	4	7
18	3	5	7	30	112	197	33	13	9	8	5	4
19	4	5	7	82	92	213	31	13	9	7	5	4
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22	4	5	ŕ	29	68	205	26	13	9	8	7	- 1
23	4	5	8	28	88	190	25	13	8	Š.	4	4
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25 26	· 3 3	5 7	8 9	14 14	112 127	174 166	25 25	13 12	11 10	8 10	4	4
27	3	5	10	29	102	151	25	11	10	9	1	7
28	8	Ž	īŏ	33	104	135	25	10	10	8	4	4
29	3		9	38	102	126	25	10	10	7	4	4
30 31	8 4	•••••	9	58	120 134	118	23	10	9	7	4	•
	116	135	-	700		4010	21	10		7	*******	4
Total Mean	3.74	4.82	229 7.39	702 23.4	2434 78.5	4816 161	1472 47.5	459 14.8	284 9.47	249 8.03	149 4.97	128 4.13
Max	5	7.02	10	53	134	213	110	23	12	10	7.51	5
Min	8	4	5	10	80	92	21	10	8	7	4	4
Acre-ft	230	268	454	1390	4830	9580	2920	910	564	494	296	254
		Disc	harge	of T	irkey (	rook at	: Red	OUE f	or 1916	3.		
Dr	ainag	Disc Area	harge , 27 S	of Tr	irkey ( Miles.	reek at Altitud	<b>Bed</b> le 8,59	Cliff for S	1916 Above	3. 308	Level.	
<b>Dr</b> Day	<b>ainag</b> Jan.	Disc Area Feb.	, 27 S	of Tu quare : April	Miles.	reek at Altitud June	le 8,59	8 Feet	<b>A</b> bove	3. Sea :		Dec.
		• Area	, 27 S	guare :	Miles.	Altitud	Red   le 8,59 July 94	Cliff fo 8 Feet Aug. 16	Above Sept. 11	Sea :	Nov.	Dec.
Day 1 2	Jan. 4 4	Feb.	, 27 S Mar. 4 4	quare : April 7 6	May 38 29	June 182 182	July 94 88	8 <b>Feet</b> Aug. 16 16	Sept.	Oct. 9 9		Dec.
Day 1 2 3		• Area Feb. 4 4 4	, 27 S	quare : April 7 6 7	May 38 29 25	June 182 182 166	July 94 88 82	Aug. 16 16 16 16	Above Sept. 11 13 12	Oct. 9 9	Nov.	Dec.
Day  1 2 3 4	Jan. 4 4	• Area Feb. 4 4 4 4	, <b>27 S</b> Mar. 4 4 4	quare : April 7 6 7 7	May 38 29 25 26	June 182 182 166 182	July 94 88 82 76	Aug. 16 16 16 16 17	Above Sept. 11 13 12 11	Oct. 9 9 9 9	Nov.	Dec.
Day 1 2 4 5 6	Jan. 4 4 4	• Area Feb. 4 4 4	, 27 S Mar. 4 4	quare : April 7 6 7 7 7 7	May 38 29 25	June 182 182 166	July 94 88 82	Aug. 16 16 16 16	Above Sept. 11 13 12	Oct. 9 9	Nov.	Dec.
Day 1 2 3 4 5	Jan. 4 4 4 4 4 5	Feb. 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	, 27 8 Mar. 4 4 4 4 6 4	quare : April	May 38 29 25 26 25 50 75	June 182 182 166 182 198 270 240	July 94 88 82 76 70 64 58	Aug. 16 16 16 16 17 16 15	Sept.  11 13 12 11 10 12 11	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Nov.	Dec.
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Day 1 2 3 5 6 7 9	Jan. 4 4 4 4 4 5	Feb. 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	, <b>27 8</b> Mar. 4 4 4 4 6 4 4 4	quare : April 7 6 7 7 6 7 7 7 7	May 38 29 25 26 25 50 75 100 111	June 182 182 166 182 198 270 240 222	July 94 88 82 76 64 58 45	Aug. 16 16 16 17 16 15 14 13	Above Sept. 11 13 12 11 10 12 11 11 11	9 99 99 99 99 99 99 99 99 99 99 99 99 9	Nov.	Dec.
Day  1 2 3 4 5 6 7 8 9 10 11	Jan. 4 4 4 4 4 4 4 4 4	• Area Feb. 4 4 4 4 4 4 4	, 27 8 Mar. 4 4 4 6 4 4	quare : April	May 38 29 25 26 25 50 75 100 111 174	June 182 182 166 182 198 270 240	July 94 88 82 76 70 64 58 45	Aug. 16 16 16 17 16 15 14 13	Above Sept. 11 13 12 11 10 12 11 11	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Nov.	Dec.
Day  1 2 4 5 6 7 8 9 10 11	Jan. 4 4 4 4 4 4 4 4 4 4 4 4 4	Feb. 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	, 27 5 Mar. 4 4 4 4 4 4 4 4 5 4 5 4 5 4	April 7 6 7 7 7 7 7 7 7 9 15	May 38 29 25 26 25 75 100 111 174 174	June 182 182 166 182 198 270 240 240 222 159 238 270 302	July 94 88 82 76 764 58 45 38 40 84	Aug. 16 16 16 17 16 15 14 13 13 13 13	Above Sept. 11 13 12 11 10 12 11 11 11 12 13 14 11	80a : Oct. 999999999999999999999999999999999999	Nov.	Dec.
Day  1 2 3 4 5 7 8 9 10 11 12 13	Jan. 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Feb. 4 4 4 4 4 4 4 4 4 4 4 5	, 27 8 Mar. 4444664444455457	April 7 6 7 7 6 7 7 7 9 15 11 11	May 38 29 25 26 50 75 100 111 174 152 144	June 182 182 166 182 198 270 240 222 159 238 270 238	July 94 888 82 76 70 648 45 38 40 39 4 35	Aug. 16 16 16 17 16 15 14 13 13 13 13 13 13	Above Sept. 113 123 111 100 122 111 112 133 144 111 122	Oct. 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Nov.	Dec.
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#### ROARING FORK AT ASPEN.

Location.—At the bridge near the old power plant at Aspen, above Castle, Maroon and Hunter Creeks.

Records Available.—January 1, 1911, to December 31, 1916.

Drainage Area.—109 square miles.

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge Measurements.—Made by wading, except during high water, when bridge is used.

Winter Flow.—Ice causes backwater during the winter; discharge measurements are made to determine the winter flow.

Diversions.—The Salvation ditch, which has a decree for 58 secondfeet, diverts water above the station usually from the middle of May to the middle of September.

Accuracy.—Results are reliable.

Co-operation.—Records furnished by the United States Geological Survey.

#### ROARING FORK BELOW ASPEN.

Location.—In sec. 1, T. 10 S., R. 85 W., two miles below Aspen at the first highway bridge. Nearest tributary above is Castle Creek, and below, Maroon Creek.

Records Available.—October 18, 1913, to December 28, 1916.

Drainage Area.—223 square miles.

Gage.—Vertical staff.

Control.—Shifts slightly at high water.

Discharge Measurements.—Made from two-span bridge.

Winter Flow.—Ice causes little or no backwater during the winter months, as shown by discharge measurements.

Diversions.—Between the station at Aspen and this one there are a number of small diversions, some of which return the water to the river above this station. The Roaring Fork Light and Power Company diverts water from Maroon Creek into Castle Creek, and thence into Roaring Fork above the station.

Accuracy.—Results considered reliable.

	Dr	ainag	D Ares	ischar	ge of	Roaring Miles.	Fork Altitu	at Asp	en for 31 Feet	1915. Above	Ses.	Level.	
Da		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	•	o am.	reb.	32	30	118	575	655	109	50pt.	65	35	39
2		•••••		32	33	120	485	600	107	55	64	30	40
3		•••••	22	32	36	112	400	530	92	61	. 63	31	40 41
5	••••••	•		32 32	40 40	92 77	339 311	508 575	92 70	55 59	62 61	31 32	42
6			23	32 32	41	112	297	575	84	59	60	32	43
7				28	41	104	283	432	195	53	58	33	44
8	•••••	••		23	40	65	290	498	152	51	55	34	45
9 10	••••••	•••••		23 23	40 39	104 95	376 615	472 432	112 107	43 48	53 54	36 39	45 45
11		•••••		25 25	39	131	805	557	105	43	55	37	45
12				27	43	175	1010	562	100	61	54	36	45
13			19	39	45	325	665	392	84	55	53	35	45
14		•••••		36	50	368	530	580	80	53	53	36 36	44 43
15 16		23		32 32	59 50	360 350	6 <b>50</b> 7 <b>7</b> 5	332 325	84 84	62 55	55 57	37	
17		23		32	32	428	875	353	80	49	57	37	43
18				32	32	512	875	325	76	55	56	38	45
19				33	65	311	875	252	65	55	56	39	43
20	•••••	•••••	22	33	59	262	1040	294 262	62 61	55 55	55	39 38	41 39
$\begin{array}{c} 21 \\ 22 \end{array}$	•	•		33 34	67 65	200 225	795 1140	240	62	49	55 55	38	39
23				34	63	220	1180	210	67	43	53	38	34
24			30	34	70	255	996	276	72	41	51	37	32
25		••••	30	35	59	440	1250	212	70	53	50 49	37 37	32 32
$\frac{26}{27}$	••••	••••••	$\frac{30}{32}$	36 34	63 74	350 283	996 886	166 161	67 61	65 67	48	37	32 32
28			32	34	92	249	840	148	53	61	46	38	32
29				33	112	318	800	142	57	55	44	38	32
30				32	146	294	655	127	57	74	43	39	32
31		•		32		360		102	55	1040	39	1080	$\begin{smallmatrix}&&32\\1227\end{smallmatrix}$
Ma	otal an	•		$981 \\ 31.6$	16 <b>6</b> 5 55.5	7415 239	21609 720	11245 363	2622 84.6	$1640 \\ 54.7$	1679 54.2	36.0	39.6
Ma	X			39	146	512	1250	655	195	74	65	39	45
Mil	n			23	30	65	283	102	53	41	39	30	32
Acı	e-ft.			1940	3300	14700	42800	22300	5200	3250	3330	2140	2430
			1	Discha	rge of	Boaring	r Fork	at Aso	en for	1916.			
	Dr	ainag	o Ares	Discha , 109	rge of Square	Roaring Miles.	Fork Altitu	at Asp de, 7,93	en for 31 Feet	1916, Above	Sea	Level,	
Da		ainag Jan.	e Ares Feb.	, 109	Square	Miles.	Fork Altitud	at Asp de, 7,93 July	31 Feet	Above	Sea Oct.	<b>Level.</b> Nov.	Dec.
Da;			e Ares	, 109	Square	Roaring Miles. May 164	Altitu	de, 7,93 July	en for 31 Feet Aug. 308	1916. Above Sept. 76		Nov. 77	Dec. 83
1 2		Jan. 32 32	Feb. 32 32	<b>Mar.</b> 27 26	April 40 51	May 164 137	June 675 675	<b>de, 7,9</b> 8 July 875 725	31 Feet Aug. 308 325	Sept. 76 72	Oct. 76 90	Nov. 77 79	83 55
1 2 3	у 	Jan. 32 32 32 32	Feb. 32 32 32	Mar. 27 26 28	April 40 51 62	May 164 137 123	Altitude 575 675 725	<b>de, 7,9</b> 3 July 875 725 675	Aug. 308 325 255	Sept. 76 72 72	Oct. 76 90 95	Nov. 77 79 80	83 55 62
1 2 3 4	y 	Jan. 32 32 32 32 32	Feb. 32 32 32 32 32	Mar. 27 26 28 30	April 40 51 62 54	May 164 137 123 112	Altitude 575 675 725 725	<b>de, 7,9</b> 3 July 875 725 675 638	Aug. 308 325 255 225	Sept. 76 72 72 66	Oct. 76 90 95 90	Nov. 77 79 80 77	83 55 62 61
1 2 3 4 5	y  	Jan. 32 32 32 32 32 32	Feb. 32 32 32 32 32 32	Mar. 27 26 28 30 30	April 40 51 62 54 49	May 164 137 123 112 200	Altitude 575 675 725	<b>de, 7,9</b> 3 July 875 725 675	Aug. 308 325 255	Sept. 76 72 72	Oct. 76 90 95	Nov. 77 79 80	83 55 62
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	y	Jan. 32 32 32 32 32 31 30 28 30 31 30 31 32 33 34	Feb. 32 32 32 34 34 32 34 33 32 32 32 32 34 33 33 32 32 32	Mar. 27 26 28 30 30 30 31 31 32 41 45 49	April 40 51 624 49 50 48 53 67 71 666	May 164 137 123 112 200 248 296 342 478 492 508 508	June 675 675 725 875 725 625 725 930 1150 1150 1320 1040	de, 7,93  July  875 675 675 638 600 575 625 575 600 485 462 462	Aug. 308 325 225 225 225 212 200 226 217 152 225 225 225 225 225 225 225 225 225	Sept. 76 72 72 66 63 63 60 55 142 152 144 123	Oct. 76 90 95 90 80 125 139 127 133 120 112 114	Nov. 77 79 80 77 68 80 97 56 66 558 48 70	83 55 61 55 44 43 41 55 55 50
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1 2 3 4 5 6 7 8 9 10 11 21 13 14 15 16 17 18 19 19 19 19 19 19 19 19 19 19 19 19 19	y	Jan. 32 32 32 32 32 32 32 32 31 31 32 33 34 31 28 30 32 34 31 32 33 34 31 32 33 34	Feb. 32 32 32 34 34 32 32 32 32 32 32 32 32 32 32 33 33 33	Mar. 27 266 288 300 300 310 32 322 324 445 49 48 32 48	April 40 511 62 54 49 458 533 657 771 656 67 68 82	May 1647 123 1112 200 248 342 4628 4678 4908 272 2400 2200 2200	June 675 675 725 725 725 875 725 625 725 625 720 1150 1150 1150 1150 1150 11040 1040	de, 7,9:  July  875 725 638 600 575 625 600 485 462 462 400 420 342 322	31 Feet Aug. 3085 2255 225 225 2200 2002 225 212 225 225 225 225 225 225 225 244 444 44	Sept. 76 72 66 63 60 55 142 152 1144 123 1105 105 86	Oct. 76 90 95 90 125 139 127 114 120 1123 137 105 105	Nov. 77 79 800 777 688 800 977 566 666 555 500 600 67	8352173343145554978808
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Dra	inage	Dis Area,	obargo 223 S	of B	oaring : Miles.	Fork be	low A:	spen fo	r 1915 Abov	• Sea	Level	
Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	99	98	98	92	815	905	1060	254	142	185	138	141
2	98	97	97	94	284	817	950	259	144	184	185	142
<b>§</b> ,	97	96 96	96	96 97	252 220	730 642	840 850	232 206	140 137	183 182	140 147	143 143
4 5	96 96	96	95 94	98	212	555	860	180	140	181	156	144
6	95	96	92	99	202	588	880	180	134	180	165	144
7	95	96	90	100	192	620	886	170	128	174	165	144
8	94	96	88	100	181	683	792	200	122 117	168 161	162 160	144 138
10	94 95	100 98	88 88	105 110	181 181	685 1020	777 762	400 330	117	.169	158	131
11	95	97	90	115	250	1855	830	259	117	177	158	131
12	96	96	92	120	318	1690	898	239	150	175	148	128
18	98	94	112	125	420	1548	965	219 199	140 140	173 175	141 184	126 126
14 15	100 100	95 96	104 96	180 140	520 620	1405 1262	700 600	192	159	181	132	124
16	100	98	94	150	785	1120	500	185	150	188	130	123
17	100	100	92	160	880	1690	490	178	140	158	181	120
18	100	96	92	170	838	1680	490	172	130 135	158 157	133 135	118 117
19	102 105	92 92	92 92	181 181	68 <b>5</b> 532	1570 1460	490 480	166 159	129	156	141	116
20 21	102	93	92	181	380	1350	470	152	123	155	144	114
22	100	94	92	181	465	1460	460	144	120	154	143	115
23	101	95	92	181	550	1580	1060	150	117	154	142	116
24	102	96	92	181	635	1690	533	160	114 110	155 156	141 140	114 112
25 26	103 104	96 100	93 94	190 210	720 <b>64</b> 7	2070 1880	450 367	170 180	250	157	140	111
27	105	100	92	230	574	1700	315	158	169	158	140	111
28	100	99	91	252	564	1520	299	137	150	153	140	111
29	100		90	325	555	1840	283	138	200	149	140	111
30	100		89	320	671	1160	266	139 140	169	144 141	141	108 104
31	100		88	4544	788		250	6047	4233	5141	4815	3870
Total Mean		2698 96.4	2887 93.1	4714 157	14517 468	37690 1260	639	195	141	166	144	125
Max	105	100	112	325	838	2070	1060	400	250	188	165	144
Min	94	92	88	92	181	555	250	137	110	141	130	104
Acre-ft	6090	5350	5720	9340	28800	75000	3930	12000	8390	10200	8570	7690
•			_		_			_				
			A B = 200			Pote N	iow A	STRAIL I	DT IMIE	_		
Dr	ainage	Dis Area	ohargo , 223 !	o of H Square	Miles,	Pork be	low A de, 7,9	spen i 80 Fee	F WDOA	• 5•a	Level.	
	_	Area	, 223 1	quare	Miles,	Altitu	de, 7,9	00 Fee	t Abov	o Sea Oct.	Level. Nov.	Dec.
Day	Jan.	Feb.	, <b>223</b> 1 Mar.	<b>A</b> pril	Miles, May	Altitu June	<b>de, 7,9</b> July	OO Fee Aug.	Sept.	Oct.	Nov.	Dec.
	<b>Ja</b> n. 104	Feb. 92	, <b>223 1</b> Mar. 94	April 114	Miles,	Altitu June 985	de, 7,9	00 Fee	t Abov	e Bea		Dec.
Day 1	Jan.	Feb. 92 92 92	<b>Mar.</b> 94 90 87	April 114 129 165	May 362 307 285	June 985 985 1120	July 1350 1280 1280	Aug. 620 685 620	Sept. 255 242 234	Oct.	Nov.	161
Day  1 2 3 4	Jan. 104 104 104 104	Feb. 92 92 92 94	Mar. 94 90 87	April 114 129 165 137	May 362 307 285 260	June 985 985 1120 1120	July 1350 1280 1280 1080	Aug. 620 685 620 560	Sept. 255 242 234 225	Oct.	Nov.	161
Day  1 2 3 4 5	Jan. 104 104 104 104 104	Feb. 92 92 92 94 96	Mar. 94 90 87 101 101	April 114 129 165 137 128	May 362 307 285 260 480	June 985 985 1120 1120 1250	July 1350 1280 1280 1080 1100	Aug. 620 685 620 560 555	Sept. 255 242 234 225 234	Oct. 260	Nov. 242	161
Day  1 2 4 5 6	Jan. 104 104 104 104 104 104	Feb. 92 92 92 94 96 100	Mar. 94 90 87 101 101 101	April 114 129 165 137 128 127	May 362 307 285 260 480 560	June 985 985 1120 1120 1250 1110	July 1350 1280 1280 1080 1100 1060	Aug. 620 685 620 560 555 525	Sept. 255 242 234 225 234 242	Oct. 260 278	242 	161
Day  1 2 3 4 5	Jan. 104 104 104 104 104	Feb. 92 92 92 94 96	Mar. 94 90 87 101 101	April 114 129 165 137 128 127 122	May 362 307 285 260 480	June 985 985 1120 1120 1250	July 1350 1280 1280 1080 1100	Aug. 620 685 620 560 555	Sept. 255 242 234 225 234	Oct. 260	Nov. 242	161
Day  1 2 3 4 5 6 7 8 9	Jan. 104 104 104 104 104 104 104 103 102 102	Feb. 92 92 94 96 100 109 106 104	Mar. 94 90 87 101 101 101 99 98	April 114 129 165 137 128 127 122 118 120	May 362 307 285 260 480 560 650 720 940	June 985 985 1120 1120 1250 1110 1030 1070 1400	July 1350 1280 1280 1080 1000 1060 1070 1160 1090	Aug. 620 685 620 560 555 525 500 485	Sept. 255 242 234 225 234 225 234 242 228 214 200	Oct	242  225	161
Day  1 2 3 5 6 7 9 10	Jan. 104 104 104 104 104 104 103 102 102 103	Feb. 92 92 94 96 100 109 106 104	Mar. 94 90 87 101 101 101 99 98 98 102	April 114 129 165 137 128 127 122 118 120 128	May 362 307 285 260 480 560 650 720 940 970	June 985 985 1120 1120 1250 1110 1030 1070 1400 2080	July 1350 1280 1280 1080 1100 1100 1060 1070 1160 1090 1030	Aug. 620 620 560 555 500 485 468	Sept. 255 242 234 225 234 242 228 214 200 325	Oct	242 	161
Day  1 2 4 5 6 7 8 9 10	Jan. 104 104 104 104 104 103 102 102 103 104	Feb. 92 92 94 96 100 109 106 104 104	Mar. 94 90 87 101 101 101 99 98 102 104	April 114 129 165 137 128 127 128 127 128 118 120 128	May 362 307 285 260 480 650 720 940 995	June 985 985 1120 11250 1110 1030 1070 1400 2080 2000	July 1350 1280 1280 1080 1100 1060 1070 1160 1090 1030 995	Aug. 620 620 620 560 555 500 485 468 430	Sept. 255 242 234 225 234 242 242 228 214 200 325 327	278	242 	161
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Day  1	Jan. 104 104 104 104 103 102 102 103 104 107	Feb. 92 92 94 96 100 109 104 104 104 104	Mar. 94 90 87 101 101 99 98 102 104 104	April 114 129 165 137 128 127 122 118 120 128 150 161 188 170	May 362 307 285 260 480 560 650 720 940 995 1020 792	June 985 985 1120 1210 1250 1110 1030 1070 1400 2080 2070 2200	de, 7,9 July 1350 1280 1280 1000 1000 1000 1000 1030 995 950 9830	Aug. 620 685 620 555 525 500 485 430 387 387	Sept. 255 242 234 225 234 242 228 214 200 325 327 318 300 298	260 278 278 282	242  225  208	161 154 135
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Day  1 2 3 3 4 5 6 7 8 9 10 11 12 13 14 15 16	Jan.  104 104 104 104 104 103 102 102 103 104 100 97 118 108	Feb. 92 92 94 96 100 109 104 104 104 104 104 104	Mar. 94 90 87 101 101 101 101 104 104 106 108 118	April 114 129 165 137 128 127 128 120 118 120 160 161 175 175 199	May 3627 285 260 4560 650 6720 940 975 1020 792 620 495 495 495	June 985 1120 1120 1120 1110 1070 1400 2000 2070 22070 1940 2070 1940 1950	July 1350 1280 1280 1080 1080 1070 1060 1070 1060 1030 995 830 830 845 755 730	Aug. 620 685 620 560 5525 500 485 505 468 430 387 400 414 380 337	Sept. 255 242 225 234 225 234 242 228 214 200 298 297 278 270 251	278 278 278 278 282 256	242 225 208	161 154 135 135 154 148
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Day  1	Jan. 104 104 104 104 103 102 103 104 107 1108 97 111 108 105 111	Feb. 922 924 1000 1096 1044 1044 1044 1044 1044 1044 1044 104	Mar. 94 90 87 101 101 101 99 98 102 104 104 108 108 108 108 118 118 161	April 114 129 165 137 128 120 128 120 128 120 161 188 170 169 175 190 165 167	May 362 307 285 260 560 720 940 970 9920 1020 7922 6220 495 495 496 555 500	June 985 1120 1120 1120 1120 1120 1250 11100 2080 2070 2080 2070 2200 2070 1940 1940 1950 1950 1960 1690	de, 7,9  July 1350 1280 1280 1080 1060 1070 1160 1090 1090 550 955 830 845 755 730 730 685 650	Aug. 620 620 565 520 565 525 525 526 485 5468 4387 387 414 387 387 387 387 387 387	Sept. 254 242 234 225 242 228 242 228 2214 200 325 327 318 300 298 297 270 260 250	Oct.  260  278  278  282  256  287  242	242 225 208 208 177 225	161 154 135 154 148
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Day  1	Jan. 104 104 104 104 104 102 102 102 103 107 1188 995 1011 1085 1011 1087 1087 1087 1087 1087 1087 1087	Feb. 922 924 96 1009 1006 1004 1004 1004 1004 1004 1006 1008 1108 1108 1108 1109 101 988 101 2966	Mar. 94 900 87 101 101 101 99 98 98 102 104 104 108 109 114 118 151 128 139 122 148 161 365 865 865	April 114 114 129 165 187 128 127 118 120 128 150 169 175 190 165 165 165 167 230 228 302 280 392 280 392 890 6009	May 3627 285 260 5620 720 970 9970 9920 1020 5885 495 5550 620 725 799 88 19460	June 985 1120 1120 1120 1120 1120 1120 1250 11400 2080 2070 22070 1940 1990 1990 1890 1890 1820 1250 1250 1250 1250 1250 1250 1250 12	de, 7,9  July 1350 1280 1280 1080 1080 1080 1080 1080 1090 1090 10	Aug. 620 5655 520 620 620 620 620 620 620 620 620 620 6	Sept.  2542 234 242 234 242 228 214 2422 228 214 2427 278 297 278 270 260 248 250 248 250 248 250 248 277 277 277 277 277 277 277 277 277 27	Oct.  260  278  278  282  256  287  242  242  234  225	242 225 208 208 177 225 177	161 154 135 135 154 148 161 154 141
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Day  1	Jan. 104 104 104 104 104 102 102 102 103 107 1188 99 105 1101 1085 1011 1085 1011 1087 1087 1087 1088 1077 1188 1077 1087 108	Feb. 922924 96010091006 1004 1004 1004 1004 1004 1004 1008 110 1008 1104 1008 1106 1008 1106 1008 1106 1008 1106 1008 1106 1008 1106 1008 1106 1008 1106 1008 1106 1008 1106 1008 1106 1008 1106 1008 1106 1008 1106 1008 1106 1008 1008	Mar. 94 900 87 1011 1011 99 98 98 98 98 102 104 104 106 118 132 148 161 155 145 128 139 1148 135 128 136 138 1887	April 1149 165 187 128 127 118 1129 165 187 128 120 161 188 170 169 175 190 169 167 230 260 280 390 468 420 468 114	May 3627 285 480 5650 720 940 1020 722 620 7495 4655 550 620 720 720 720 720 720 720 720 720 720 7	June 985 1120 11250 1120 11250 11030 1070 2080 2070 22070 1940 1940 1980 19980 11960 11960 11240 11250	de, 7,9  July 1280 1280 1280 1080 1080 1080 1080 1080	Aug. 620 5655 520 620 620 620 620 620 620 620 620 620 6	Sept.  2542 234 2254 234 2428 214 200 325 327 318 300 298 297 287 2770 258 240 240 240 240 240 240 240 240 240 240	260 278 278 282 256 287 242 242 234 225	242 225 208 208 177 225 177 200	161 154 135 135 154 148 161 154 141
Day  1 2 3 3 4 5 6 7 7 8 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 Total Mean Max Min Max Min Min Acre-ft,	Jan. 104 104 104 104 104 102 102 102 107 107 107 108 997 111 105 101 105 101 107 107 107 107 108 107 107 108 107 107 108 109 107 108 109 107 108 109 108 109 109 108 109 109 108 108 108 108 108 108 108 108 108 108	Feb. 922 94 960 1009 1006 1004 1004 1004 1004 1104 1104 1104	Mar. 94 900 87 101 101 98 98 98 98 102 104 104 106 118 132 148 161 155 128 139 151 128 136 136 3659 154 7260	April 114 1129 165 137 128 127 118 120 161 169 175 175 190 169 165 162 230 280 320 468 420 600 468 11900	May 3627 285 480 5650 720 940 1020 722 620 7495 4655 550 620 720 720 720 720 720 720 720 720 720 7	June 985 1120 11250 11250 1120 11030 1070 12080 20070 22000 2070 21940 1940 1950 11950 11240 11250 112	July 1280 1280 1280 1280 1080 1080 1080 1080	Aug. 620 5655 525 525 525 525 525 525 525 525 52	Sept.  2542 2344 2252 2344 2428 2144 200 325 327 318 300 2987 2770 2558 250 240 2348 245 2344 2306 235 237 237 237 327	Oct.  260  278  282  256  287  242  242  242  244  225	242 225 208 208 177 225 177 200 177	161 154 135 135 154 148 161 154 141

#### ROARING FORK AT GLENWOOD SPRINGS.

Location.—On bridge 500 feet above the mouth of the river in Glenwood Springs. Nearest important tributary enters about 3 miles above the station.

Records Available.—April 6, 1906, to September 30, 1909; September 21, 1910, to December 31, 1916.

Drainage Area.—1,450 square miles.

Gage.—November 20, 1915, a new slope gage established 800 feet above bridge.

Channel.—Practically permanent, but rough. Extremely high water in Grand River may cause backwater at the gage. Measurements made at stages as high as 5.7 feet on Roaring Fork, and 9.2 feet on Grand River have shown no backwater effect.

Discharge Measurements.—Made from highway bridge.

Winter Flow.—Surface ice rarely forms entirely across the river, but slush and anchor ice frequently occur. Discharge measurements sometimes show backwater from ice.

Diversions.—There are court decrees for diversions of 196 second-feet from Roaring Fork above the station, and 795 second-feet from the various tributaries.

Accuracy.—Conditions are favorable for accurate results; estimates should be reliable.

Co-operation.—Records furnished by the United States Geological Survey.

#### CASTLE CREEK NEAR ASPEN.

Location.—In sec. 35, T. 10 S., R. 85 W., in the Sopris National Forest, on the highway bridge 4 miles above Aspen. No tributary between the station and the mouth of the creek except small gulches that carry spring run-off. Nearest tributary above, Conundrum Creek, enters one mile upstream.

Records Available.—February 16, 1911, to December 8, 1916.

Drainage Area.—72 square miles.

Gage.—Automatic gage.

Channel.—Slightly shifting.

Discharge Measurements.—Made from car and cable during high water and by wading at low stages.

Winter Flow.—Affected by ice and discharge measurements are made to determine the flow.

Diversions.—No water is diverted above the station. The Roaring Fork Light & Power Co. and the Newman mine divert water from Castle Creek below the station.

Accuracy.—Results considered excellent except for latter part of 1916.

Discharge o	f Boaring	g Fork	at Glen	wood !	Springs	for 1915.	
Drainage Area, 1.45	0 Sanere	Miles.	Altitud	la 5.74	7 Peet	Above See	Level.

Day		Jan.	Feb.	Mor	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
. •					_	•		•	_	-			
	•••••	370	400	350	370	1370	3100	3290	768	455	615	455	485
	•••••	360	405	350	388	835	4910	3290	705	455	615	480	414
	•	370	360	350	430	800	3880	3110	675	480	588	430	485
		370	370	350	405	768	2910	3000	705	480	588	455	485
		405	860	360	430	705	2550	<b>291</b> 0	675	455	532	480	462
	• • • • • • • • • • • • • • • • • • • •	360	350	350	455	645	2380	3290	615	455	505	455	452
	••••••	405	388	350	505	588	2380	2730	768	405	505	480	420
	<b>-</b> -	••	350	350	480	560	2210	2380	1370	455	505	480	420
	· · · · · · · •	•	370	360	430	560	2910	2380	1140	505	532	480	408
			370	360	455	560	3880	2380	835	455	480	588	452
		370	360	360	480	615	4280	3680	800	532	480	480	420
	•••••	405	360	370	505	1040	6530	2730	735	532	455	430	436
	•••••	•	360	360	532	1620	3880	2730	705	532	455	455	452
		•••••	355	360	615	2550	3290	2550	675	532	480	430	420
	· · · · · · ·		350	374	615	2050	3480	2380	660	560	480	405	420
			360	888	735	2300	4080	2210	645	588	532	480	452
		370	388	370	615	2550	4910	2050	615	532	518	455	366
			388	388	645	2380	4910	1840	560	560	505	455	378
	•••••	••••	370	370	768	1900	4910	1620	560	532	505	455	369
20			388	370	835	1490	5580	1370	615	532	532	505	<b>36</b> 0
			377	360	910	1250	5350	1370	615	480	455	520	420
			368	370	870	1250	4910	1250	602	480	505	485	452
	•••••	360	360	350	800	1440	5810	1140	588	480	455	485	452
	•••••	•••••	350	370	705	1620	5350	1250	645	480	455	520	420
		•	360	405	735	1620	6530	1250	615	532	455	470	420
	•••••		370	388	705	1490	6050	1090	645	735	480	420	420
	• • • • • • • • • • • • • • • • • • •		370	430	835	1250	6050	995	588	645	480	485	360
		•	388	418	800	1370	4280	995	532	645	455	452	360
			•	405	1090	1620	4280	950	455	645	430	390	420
	<b>-</b>	••		388	1490	2050	3780	870	505	615	430	520	452
31				388		2380		835	455		455	******	436
				11512	19683	43226	129350	63905	21071	15769	15462	14080	13174
Mear	n		369	371	654	1390	4310	2060	680	526	499	469	425
		••••	405	430	1490	2550	6530	3680	1370	785	615	<b>58</b> 8	485
Min.			350	350	370	560	2210	835	455	405	480	390	360
Acre	-ft.	•••••	20500	22800	38900	85500	256000	1 <b>27</b> 000	41800	31300	30700	27900	26100

Discharge of Boaring Fork at Glenwood Springs for 1916. Drainage Area, 1,450 Square Miles. Altitude, 5,747 Feet Above Sea Level.

_		`							<b>-</b> .			
Day	Jan.	Feb.		April	_		July	Aug.	Sept.	Oct.	Nov.	Dec.
1	. 420	342	390	670	1820	5050	5990	2690	998	1260	832	555
2	. 420	350	360	670	1580	4830	5750	3030	986	1260	832	592
3	. 452	388	300	670	1470	505 <b>0</b>	5510	3030	976	1010	832	572
4	. 485	388	420	710	1580	5640	5280	3030	965	965	790	555
5	. 420	388	452	670	1820	6230	5050	2690	875	920	790	555
6	. 420	388	485	630	2690	5510		2460	875	965	790	555
7	. 360	388	452	592	3440	5280	4390	2220	875	1260	790	520
8	. 420	388	452	592	4180	5050	5050	2080	875	1240	710	485
9	. 420	370	420	631	4830	6230	4830	2220	875	1210	710	485
10	. 420	370	485	670	5280	7470	4610	2080	875	1160	710	485
11		370	485	832	5050	7730		2220	1470	1310	710	485
12		370	520	920	4830	7990	3770	2080	1360	1260	635	485
13		350	555	965	4610	8520		2470	1360	1160	560	555
14		330	555	920	3910	8520		2860	1260	1160	485	485
15		370	485	965	3210	7990		2220	1260	1160	550	485
16		370	520	1010	2530	7990		1950	1060	1160	610	485
17			555	1060	2220			1700	1080	1210	670	520
18		360	555	1210	2080			1580	1110	1160	670	555
19		350	672	1210	2080			1580	1030	1160	650	555
20		355	790	1090	2530	8520		1470	950	1060	630	555
21		360	1260	965	2450	7730		1360	875	1010	616	555
22		390	965	1060	2370	6970		1260	875	1040	602	555
23		390	875	1260	2080	5990		1260	875	1060	592	538
24		360	832	1470	2370			1110	898	1010	592	520
25		360	790	1700	2690	6110		1160	920	965	555	503
26		360	750	1820	3030	5750		1110	875	965	555	485
27		375	710	2080	2860	6470	2370	1040	832	. 965	555	485
28			670	2370	3320	6230	3030	965	790	965	555	420
29		360	790	3030	3770			875	790	920	555	485
30		•	710	2420	4180	6110		1060	832	875	555	485
31	. 335		630		4610		3030	1010		875		485
		10700		24862		202420		57870		33700		
Mean		369	609	1160	3080	6750	3730	1870	989	1090	656	517
Max	. 485		1260	3030	5280			3030 875	1470 790	1310 875	832 485	592
Min Acre-ft	. 335	330	300	592	1470	4830	2220				39000	420 31800
											0 2000	91900
Unle	ss oth	erwise	noted	i, all d	ischarg	es are i	in cubic	feet p	er seco	nd.		

1 26 35 31 30 38 129 310 111 2 26 34 31 31 36 121 294 99 3 26 34 30 31 35 95 274 95	1915. Above Sea	Level.	
1 26 35 31 30 38 129 310 111 2 26 34 31 31 36 121 294 99 3 26 34 30 31 35 95 274 95	Sept. Oct.	Nov.	Dec.
2 26 34 31 31 36 121 294 99 3 26 34 30 31 35 95 274 95	60 53		36
	62 52	37	35
	67 53		35
4 26 33 31 32 35 79 270 95 5 26 32 32 34 35 72 290 89	65 52 65 51		$\begin{array}{c} 35 \\ 34 \end{array}$
6 26 31 32 34 35 69 267 89	60 50		34
$\frac{7}{1}$ $\frac{26}{1}$ 30 32 33 34 66 249 111	58 48	38	34
$egin{array}{cccccccccccccccccccccccccccccccccccc$	58 48		34
9 26 32 31 32 34 99 260 139 10 26 33 31 31 35 160 277 113	56 48 55 48		34 34
11 26 33 31 32 38 217 294 107	57 46		34
12 26 34 30 30 50 219 284 103	67 45		34
13 26 36 30 29 76 154 280 89 14 26 36 31 30 87 135 274 87	63 43		34
14 26 36 31 30 87 135 274 87 15 26 35 32 30 67 169 256 89	59 43		34
16 27 35 32 30 82 214 212 89	57 43 57 43		33 33
17 27 34 31 29 105 246 195 85	55 43		33
18 27 33 31 29 93 239 212 82 19 27 33 30 30 72 280 203 78	54 43	40	31
90 97 99 99	54 42		31
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	52 42 52 42		31
22 27 33 30 30 54 332 184 69	50 42		31 31
23 27 34 30 30 53 352 169 72	50 42		31
24 27 34 30 30 60 374 164 78 25 27 33 30 30 82 372 171 75	50 42		31
25 27 33 30 30 82 372 171 75 26 28 32 31 30 75 374 154 71	69 40		31
27 29 32 31 31 64 360 148 67	71 40 60 38		32 32
28 30 32 30 32 59 350 137 65	57 37		32
29 32 30 35 66 342 133 64	57 37		33
21 00 10 00 120 04	57 37		34
Total 849 928 953 939 1806 6605 6840 2761	37 1754 1370		34
Mean 27.4 33.1 30.7 31.3 58.3 220 221 89.1	1754 1370 58.5 44.2		1025 33.1
Max 35 36 32 40 105 374 310 184	71 53		36
Min: 26 30 30 29 33 66 115 62 Acre-ft. 1680 1840 1890 1860 3580 13100 13600 5480	50 37	31	31
Acre-ft. 1680 1840 1890 1860 3580 13100 13600 5480	3480 2720	2170	2040
Discharge of Castle Creek near Aspen for	1916.		
Drainage Area, 72 square Miles. Altitude, 7,931 Feet	Above Sea		
1	Sept. Oct.	Nov.	Dec.
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	105 70		46
3 34 34 33 34 68 219 502 249	103 74 97 70		46 45
4 34 32 33 34 70 253 458 244	95 67		45
5 34 32 33 34 81 270 473 237	95 64		45
6 34 32 33 34 105 246 445 230 7 34 32 32 34 139 249 432 206	99 90		45
7 34 32 32 34 139 249 432 206 8 33 32 32 34 156 270 455 199	92 88 86 81		40
9 33 32 32 35 181 322 370 223	86 81 141 74		34
10 31 32 33 36 186 382 372 219	150 71		
11 29 32 34 38 184 412 330 195 12 32 32 33 39 184 434 324 188	133 74	51	
19 94 00 04 101 101 322 100	113 72		
14 34 34 32 37 169 463 334 244	107 - 70 101 - 77		
15 34 34 32 37 141 468 334 203	95 78		
16 33 34 32 38 125 478 350 190	81 75	52	
10 00 00 01 10 101 110	85 74		
19 33 34 34 42 119 510 322 158	81 75 78 72		•
20 32 33 35 40 129 481 317 154	78 <b>7</b> 2 75 70		•
	74 67		
21 31 32 37 40 121 455 310 143	72 67		
21 31 32 37 40 121 455 310 143 22 30 32 35 42 113 422 297 135			
21 31 32 37 40 121 455 310 143 22 30 32 35 42 113 422 297 135 23 30 33 36 46 105 394 290 129	74 70	49	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	74 70 75 68	49 48	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	74 70	49 48 44	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	74 70 75 68 72 67 70 67 67 65	49 48 44 47 48	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	74 70 75 68 72 67 70 67 67 65 67 64	49 48 44 47 48 47	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	74 70 75 68 72 67 70 67 67 65 67 64 64 63	49 48 44 47 48 47	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	74 70 75 68 72 67 70 67 67 65 67 64 64 63 64 62	49 48 44 47 48 47 46 47	
21     31     32     37     40     121     455     310     142       22     30     32     35     42     113     422     297     135       23     30     33     36     46     105     394     290     129       24     30     32     35     49     103     430     280     129       26     30     32     34     51     109     438     314     129       26     30     32     35     56     115     448     310     123       27     30     34     34     63     115     457     284     117       28     30     33     35     72     129     466     260     111       30     32     32     34     92     148     475     255     111       30     32     32     34     86     175     484     250     115       31     31     31     34     199     244     109       40     397     950     1042     1333     4029     11781     10894     5635	74 70 75 68 72 67 70 67 67 65 67 64 64 63	49 48 44 47 48 47 46 47	346
21	74 70 75 68 72 67 70 67 67 65 64 63 64 62 	49 48 44 47 48 47 46 47 1510 50.8	346
21     31     32     37     40     121     455     310     142       22     30     32     35     42     113     422     297     135       23     30     33     36     46     105     394     290     129       24     30     32     35     49     103     430     280     129       26     30     32     34     51     109     438     314     129       26     30     32     35     56     115     448     310     123       27     30     34     34     63     115     457     284     117       28     30     33     35     72     129     466     260     111       29     32     32     34     92     148     475     255     111       30     32     32     34     92     148     475     255     111       31     31     31     34     199     244     109       Total     97     950     1042     1333     4029     11781     10894     5635       Mean     32,2     32,8     33.6     44,4     13	74 70 75 68 72 67 70 67 67 65 67 64 64 63 64 62 2711 2208 90.4 71 20.8 90.4 71 150 90	49 48 44 47 48 47 46 47 50.8	
21	74 70 75 68 72 67 70 67 67 65 64 63 64 62 2711 2208 90.4 71.2 150 90 64 62	49 48 44 47 46 47 1510 50.3 59 41	346

#### MAROON CREEK NEAR ASPEN.

Location.—In sec. 22, T. 10 S., R. 85 W., in the Sopris National Forest, just above the headgate of the Roaring Fork Light & Power Co., 5 miles above Aspen, Colo. Nearest tributary, Willow Creek, enters just below the station.

Records Available.—January 1, 1911, to September 30, 1916.

Drainage Area.—42 square miles.

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge Measurements.—Made by wading, except during high water, when they are made from a footbridge.

Winter Flow.—Discharge measurements indicate that ice does not cause backwater at this station.

Diversions.—One or two small diversions above the station; the Roaring Fork Light & Power Co. diverts water just below.

Accuracy.—Estimates made are reliable.

Co-operation.—Records furnished by the United States Geological Survey.

#### MAROON CREEK NEAR ASPEN (LOWER STATION).

Location.—In sec. 15, T. 10 S., R. 85 W., at highway bridge, 2½ miles southwest of Aspen.

Records Available.—February 13, 1914, to November 30, 1915.

Drainage Area.—54 square miles.

Gage.—Vertical staff.

Discharge Measurements.—Made from single span bridge during high water and by wading at low stages.

Channel.—Slightly shifting.

Winter Flow.—Discharge not seriously affected by ice.

	_					<b>4</b>		e.	- 1012			
Dr	ainage	Dis Area,	ohargo 42 <b>S</b> q	o of M [uare ]	aroon Miles.	Creek z	les <b>8,30</b>	pen 10 D Feet	Above	Sea :	Level.	
Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	34	25	24	23	31	122	241	102	46	38	31	28
2	28	24	24	23	28	129	226 226	95 90	46 47	37 37	, 31 31	28 28
3	28 28	$\frac{25}{24}$	24 24	23 23	28 28	119 112	211	90	45	87	30	28
4 5	28	24	24	24	28	109	211	86	45	37	30	28
6	36	24	24	24	28	114	211	81	44	86	29	28
7	27	24	24	24	28	109	196	81	44	36	29	28
8	28	25	24	24	27	109	196 196	97 86	43 <b>4</b> 3	36 35	28 28	27
9	28 28	$\frac{26}{24}$	23 23	$\frac{23}{24}$	28 28	114 139	196	81	42	34	28	28 27
10	28	24	23	24	28	168	196	79	43	34	28	28
12	27	$\bar{2}\bar{4}$	24	24	34	182	211	77	46	84	28	27
13	27	24	23	25	41	155	196	73	48	34	28	27
14	26	24	23	25	56	155	211 211	72 70	48 42	34 36	29 30	26 27
15 16	26 28	25 26	23 23	25 24	50 50	171 182	196	66	41	36	29	26
17	37	24	23	$\tilde{2}\hat{4}$	66	196	182	64	39	84	28	26
18	31	24	23	25	70	211	182	66	38	34	28	26
19	26	24	23	25	66	211	171	62	37	34	29	27
20	26	24 24	24	25 26	70 72	226 241	166 155	62 59	38 37	33 38	29 29	28 28
21 22	26 29	24 24	_23 _23	26 26	73	241	152	59	37	33	29	27
23	28	24	23	26	77	241	145	59	37	33	29	27
24	39	24	23	26	81	256	139	59	36	33	29	26
25	27	24	23	26	90	256	139	56	43	81	28	26
26	34	24	$\begin{array}{c} 23 \\ 23 \end{array}$	26 26	88 86	$\frac{241}{241}$	134 , 126	54 58	47 41	31 30	28 28	26 26
27 28	28 33	$\begin{array}{c} 24 \\ 24 \end{array}$	23 23	28	79	241	119	50	41	30	28	30
29	25		23	30	86	241	119	48	39	30	30	26
30	25		22	31	81	241	109	47	41	31	29	26
31	25		22	750	90	E 4 77 9	106	47	1054	31		26
Total Mean	894	$\begin{array}{c} \textbf{680} \\ \textbf{24.3} \end{array}$	$\begin{array}{c} 721 \\ 23.3 \end{array}$	752 25.1	1716 55.4	5473 182	5475 177	$\begin{array}{c} 2171 \\ 70.0 \end{array}$	$1254 \\ 41.8$	1052 33.9	868 28.9	840 27.1
Max	39	26	24	31	90	256	241	102	47	38	31	30
Min	25	24	22	23	27	109	106	47	. 36	30	28	26
Acre-ft.	1770	1350	1430	1490	3410	10800	10900	4300	2490	2080	1720	1670
			_					<u>.</u>				
	-1					Creek 1					T.owol	
	_	Area,	, 42 S	luare :	Miles.	Altitu	le, 8,30	Ö Peet	Above	Sea		_
<b>Dr</b> Day	Jan.	Feb.	<b>42 S</b> c Mar.	<b>April</b>	Miles. May	Altitud June	<b>ie, 8,30</b> July	Ö <b>Feet</b> Aug.	Above Sept.		<b>Level.</b> Nov.	Dec.
Day 1	Jan. 26	Feb. 24	<b>42 S</b> c Mar. 22	April 23	Miles. May 40	Altitude June 155	<b>le, 8,30</b> July 334	Ö Feet Aug. 272	Above Sept. 129	Sea Oct.	Nov.	Dec.
Day 1 2	Jan. 26 25	Feb. 24 25	<b>42 S</b> Mar. 22 22	April 23 23	Miles. May 40 40	June 155 163	<b>le, 8,30</b> July 334 334	Ö Feet Aug. 272 288	Above Sept. 129 117	Sea Oct.	Nov.	Dec.
Day 1 2 3	Jan. 26 25 24	Feb. 24 25 27	Mar. 22 22 22 22	April 23 23 23 23	May 40 40 39	June 155 163 171	July 334 334 350	<b>Āug.</b> 272 288 272	Sept. 129 117 110	<b>Sea</b> Oct.	Nov.	Dec.
Day 1 2	Jan. 26 25	Feb. 24 25 27 25 24	Mar. 22 22 22 22 22 22	April 23 23 23 23 23 23 23	May 40 40 39 42 44	June 155 163 171 182 199	July 334 334 350 365 350	Aug. 272 288 272 272 272 266	Above Sept. 129 117	Sea Oct.	Nov.	Dec.
Day  1 2 3 4 5 6	Jan. 26 25 24 24 24 24	Feb. 24 25 27 25 24 24 24	Mar. 22 22 22 22 22 22 23	April 23 23 23 23 23 23 23	May 40 40 39 42 44 53	June 155 163 171 182 199 196	July 334 334 350 365 350	Aug. 272 288 272 272 272 266 260	Sept. 129 117 110 103 103 98	Sea Oct.	Nov.	Dec.
Day 1 2 3 4 5 6 7	Jan. 26 25 24 24 24 24 24	Feb. 24 25 27 25 24 24 24 24	Mar. 22 22 22 22 22 22 24	April 23 23 23 23 23 23 23 23 23	May 40 40 39 42 44 53 68	June 155 163 171 182 199 196	July 334 334 350 365 350 350	Aug. 272 288 272 272 266 260 253	Sept. 129 117 110 103 103 98 96	Sea Oct.	Nov.	Dec.
Day  1 2 3 4 5 6 7 8	Jan. 26 25 24 24 24 24 24 25	Feb. 24 25 27 25 24 24 24 24 24	Mar. 22 22 22 22 22 22 24 23	April 23 23 23 23 23 23 23 24	May 40 40 39 42 44 53 68 83	June 155 163 171 182 199 196 196 205	July 334 334 350 365 350 350 350	Aug. 272 288 272 272 266 260 253 247	Sept. 129 117 110 103 103 98 96 92	Sea. Oct.	Nov.	Dec.
Day  1 2 3 4 5 6 7 9	Jan. 26 25 24 24 24 24 25 26	Feb. 24 25 27 25 24 24 24 24	Mar. 22 22 22 22 22 22 24	April 23 23 23 23 23 23 23 23 23	May 40 40 39 42 44 53 68	June 155 163 171 182 199 196	July 334 334 350 365 350 350	Aug. 272 288 272 272 266 260 253	Sept. 129 117 110 103 103 98 96	Sea. Oct.	Nov.	Dec.
Day  1 2 3 4 5 6 7 8	Jan. 26 25 24 24 24 24 25 26 26	Feb. 24 25 27 25 24 24 24 24 24 23	Mar. 22 22 22 22 22 23 24 23 223 223	April 23 23 23 23 23 23 24 24 25	May 40 40 39 42 44 53 68 83 96 110	June 155 163 171 182 199 196 205 220 225 256	July 334 334 336 350 350 350 350 350 350 354	Aug. 272 288 272 272 266 260 253 247 241 229	Sept. 129 117 110 103 103 98 96 92 96 117 115	Sea. Oct.	Nov.	Dec.
Day  1 2 4 5 6 7 8 10 11	Jan. 26 25 24 24 24 24 24 25 26 26 26	Feb. 24 25 27 25 24 24 24 24 24 23 23	Mar. 22 22 22 22 23 24 23 22 23 22 23 22 22 23 22 23 22 23 22 23 22 23 22 22	April 23 23 23 23 23 23 23 24 24 24 25 26	May 40 40 40 49 42 44 53 68 83 96 110 115	June 155 163 171 182 199 196 205 220 235 272	July 334 350 365 350 350 350 350 350 334 334	Aug. 272 288 272 272 266 260 253 247 241 241 229 226	Sept.  129 117 110 103 103 98 96 92 96 117 115	Sea Oct.	Nov.	
Day  1	Jan. 26 25 24 24 24 24 25 26 26 24 25	Feb. 24 25 27 25 24 24 24 24 24 23 23	Mar. 22 22 22 22 22 22 23 24 23 22 23 22 22 22 22 22 22 23 22 23 22 22	April 23 23 23 23 23 23 24 24 25 25	May 40 40 39 42 44 53 68 83 96 110 115 117	June 155 163 171 182 199 196 205 220 235 256 272 272	July 334 334 350 3650 350 350 350 350 354 334 334 3318	Aug. 272 288 272 272 266 260 253 247 241 229 226 235	Sept. 129 117 110 103 103 98 96 117 115 105	Sea Oct.	Nov.	Dec.
Day  1	Jan. 255 224 224 224 225 226 226 226 226 225	Feb. 24 25 27 25 24 24 24 24 24 23 23	Mar. 22 22 22 22 23 24 23 22 23 22 23 22 22 23 22 23 22 23 22 23 22 23 22 22	April 23 23 23 23 23 23 23 24 24 24 25 26	May 40 40 40 49 42 44 53 68 83 96 110 115	June 155 163 171 182 199 196 205 220 235 272	July 334 350 365 350 350 350 350 350 334 334	Aug. 272 288 272 272 266 260 253 247 241 241 229 226	Sept.  129 117 110 103 103 98 96 92 96 117 115	Sea Oct.	Nov.	
Day  1	Jan. 255 244 224 224 225 226 226 225 225 225	Feb. 24 25 27 25 24 24 24 24 23 23 23 23 23	Mar. 22 22 22 22 23 24 23 22 23 22 23 22 22 23 22 23 22 22 23 22 22	April 23 23 23 23 23 23 24 24 25 25 25 26	May 40 40 39 42 44 53 68 83 96 110 115 110 107	June 155 163 171 182 199 196 205 220 235 256 272 288 288 288	July 334 334 336 365 360 350 350 353 334 334 338 318 303	Aug. 272 288 272 266 260 253 241 241 229 226 235 247 2226	Sept. 129 117 110 103 103 98 96 92 117 115 103 96 92 90	Sea Oct.	Nov.	
Day  1	Jan. 255 224 224 224 225 225 225 225 255	Feb. 24 25 27 225 24 24 24 24 23 23 23 23 23 23	Mar. 22 22 22 22 22 23 24 23 22 22 22 22 22 22 22 22 22 22 22 22	April 23 23 23 23 23 24 24 24 25 25 25 27	May 40 40 39 42 44 53 68 83 96 110 115 117 119	June 155 163 171 182 199 196 205 220 235 256 252 272 272 288 288 303	July 334 334 350 365 350 350 350 3534 334 334 3318 303 303	Aug. 272 288 272 266 260 253 247 241 229 226 235 247 229 226 217	Sept. 129 117 110 103 103 98 96 92 96 117 115 105 92 90 90	Sea Oct.	Nov.	
Day  1	Jan. 26 25 24 24 24 24 25 26 26 25 25 25 26	Feb. 24 25 24 24 24 24 23 23 23 23 23 23	Mar. 22 22 22 22 23 24 23 22 22 22 22 22 22 22 22 22 22 22 22	April 23 23 23 23 23 23 24 24 25 25 25 26 27 28	May 40 40 39 42 44 53 68 83 96 110 115 117 119 115 110 107	June 155 163 171 182 199 196 196 205 220 225 256 272 288 288 288 303 303 303 318	July 334 334 3350 365 350 350 353 353 353 353 353 353 353 35	Aug. 272 288 272 266 260 253 247 241 229 226 235 247 229 226 217	Sept. 129 117 1103 103 96 92 117 115 103 96 92 90 90 83	Sea Oct.	Nov.	
Day  1	Jan. 26 25 24 24 24 24 25 26 26 25 25 25 25 25 28	Feb. 24 25 25 24 24 24 24 23 23 23 23 23 23 23 23 23	Mar. 22 22 22 22 23 24 23 22 22 22 22 22 22 22 22 22 22 22 22	April 23 23 23 23 23 24 24 25 25 25 25 27 27	May 40 40 40 49 42 44 53 68 83 910 115 117 115 110 105 105	June 155 163 171 182 199 196 205 220 235 272 272 288 288 288 303 303 318	July 334 334 350 365 350 350 350 350 351 334 318 303 303 303 303	Aug. 272 288 272 266 260 253 247 241 229 226 247 229 226 217 229	Sept. 129 1170 103 103 98 96 96 117 105 105 96 92 90 90 83 83	Sea Oct.	Nov.	
Day  1	Jan. 26 25 24 24 24 24 25 26 26 25 25 25 26	Feb. 24 25 24 24 24 24 23 23 23 23 23 23	Mar. 22 22 22 22 23 24 23 22 22 22 22 22 22 22 22 22 22 22 22	April 23 23 23 23 23 23 24 24 25 25 25 26 27 28	May 40 40 39 42 44 53 68 83 96 110 115 117 119 115 110 107	June 155 163 171 182 199 196 196 205 220 225 256 272 288 288 288 303 303 303 318	July 334 334 3350 365 350 350 353 353 353 353 353 353 353 35	Aug. 272 288 272 266 260 253 247 241 229 226 235 247 229 226 217	Sept. 129 117 1103 103 96 92 117 115 103 96 92 90 90 83	Sea Oct.	Nov.	
Day  1	Jan. 265 224 224 224 225 225 225 225 227 27	Feb. 24 24 24 24 24 24 24 23 23 23 23 23 22 22 22 22	Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 23 23 23 23 23 23 24 24 24 25 25 25 27 28 28 28	May 40 40 40 39 42 44 53 68 83 96 110 117 115 110 107 77 112	June 155 163 171 182 199 196 205 220 235 272 272 288 288 303 318 334 318 318	July 334 334 350 365 350 350 350 350 350 350 350 350 350 35	Aug. 228 272 272 260 253 241 241 229 226 2357 241 241 205 196	Sept. 129 117 103 103 98 96 117 105 105 105 92 90 83 79 79 75	Sea Oct.	Nov.	
Day  1	Jan. 255 224 224 224 225 225 225 225 227 227 224	Feb. 245 227 225 4 4 2 2 4 4 2 2 4 4 2 2 3 3 2 2 3 3 2 2 3 2 2 2 2	Mar. 222 222 223 224 223 224 223 224 225 225 225 225 225 225 225 225 225	April 23 23 23 23 23 23 24 24 25 25 25 27 28 28 29	May 40 40 40 39 42 44 53 68 83 96 115 117 115 115 105 77 112 1105	June 155 163 171 182 196 196 205 220 225 256 272 288 288 303 303 303 334 334 334 338 318 318 318	July 334 3350 365 365 360 3500 3500 3503 3503 35	Aug. 272 288 272 272 272 272 272 272 247 241 229 226 247 229 226 217 208 201 208 205 196	Sept. 129 117 110 103 103 98 96 92 96 117 115 103 96 92 90 97 75	73	Nov.	
Day  1	Jan. 255 2244 224 225 225 225 225 226 227 227 224 424 44 42 42 42 42 42 42 42 42 42 4	Feb. 24 24 24 24 24 24 23 23 23 23 23 22 22 22 22 22 22 22	Mar. 222 223 223 223 223 223 223 223 224 233 224 234 244 24	April 23 23 23 23 23 23 24 24 24 25 25 25 27 28 28 28	May 40 40 40 39 42 44 53 68 83 96 110 115 117 115 1107 105 777 105 105 777 110 105	June 155 163 171 182 199 196 196 220 235 256 272 288 288 288 288 303 303 318 318 318 303	Je, 8,30  July  334  3350  350  350  350  350  351  334  318  303  303  303  288  288  288	Aug. 272 288 2772 278 260 253 241 241 229 226 217 229 2216 217 219 218 205 196 1914 1911 82	Sept. 129 1170 103 103 98 96 96 117 105 105 96 92 96 97 75 75 77	73	Nov.	
Day  1	Jan. 255 224 224 224 225 225 225 225 227 227 224	Feb. 245 227 225 4 4 2 2 4 4 2 2 4 4 2 2 3 3 2 2 3 3 2 2 3 2 2 2 2	Mar. 222222222222222222222222222222222222	April 23 23 23 23 23 23 24 24 25 25 25 27 28 28 29	May 40 40 40 39 42 44 53 68 83 96 115 117 115 115 105 77 112 1105	June 155 163 171 182 196 196 205 220 225 256 272 288 288 303 303 303 334 334 334 338 318 318 318	July 334 3350 365 350 350 350 350 350 350 350 350 350 35	Aug. 272 288 272 272 272 272 272 272 247 241 229 226 247 229 226 217 208 201 208 205 196	Sept. 129 117 110 103 103 98 96 92 96 117 115 103 96 92 90 97 75	73	Nov.	
Day  1	Jan. 25444442242244444444444444444444444444	Feb. 245 225 224 224 224 223 223 223 223 222 222 222	Mar. 222 223 223 223 223 223 223 223 223 22	April 23 23 23 23 23 23 24 24 24 24 25 26 27 28 28 29 34 39	May 40 40 40 39 42 44 53 68 83 96 110 115 117 105 105 77 110 105 105 105 105 105 105 105 105 105	June 155 163 171 182 199 196 205 2205 225 272 288 303 318 334 318 303 303 303 303 303	Je, 8,30  July  334  3350  3650  3600  3500  3500  3534  3318  318  303  303  303  288  288  272  288  272  272	Aug. 272 288 2772 278 260 253 241 241 229 226 237 241 241 219 217 219 217 2117 219 217 217 218 205	Sept. 129 1170 103 103 98 96 117 105 92 96 117 105 96 92 90 83 79 75 75 72 664	73	Nov.	
Day  1	Jan. 2544224422442244224442244422444224	Area. Feb. 2457254442442442332233222222222222222222	Mar. 222 222 223 222 223 223 222 223 224 224	April 23 23 23 23 23 23 24 24 25 25 26 27 28 28 28 29 30 34 36 39 41	May 40 40 40 39 42 44 53 68 83 96 115 117 115 110 107 105 77 112 1105 101 103 105 1101 105 1101 1105	June 155 163 171 182 196 196 205 220 225 256 272 288 203 303 303 303 303 303 303 303 303	Je, 8,30  July  334  3350  365  3650  3500  3500  3503  3033  3033  3033  3033  3033  3033  2288  2272  2272  2772	Aug. 272 288 272 272 272 272 260 263 247 241 229 226 247 229 226 217 4208 205 194 182 179 174 168 160	Sept. 129 110 103 103 98 96 92 96 115 105 105 96 97 77 77 77 77 76 66 64	73	Nov.	
Day  1	Jan. 22544444422222222222222222222222222222	Feb. 245 225 244 224 224 223 223 223 222 222 222 222	42 Sec. Mar. 2222223222222222222222222222222222222	April 233 233 223 223 224 225 225 226 227 228 229 234 244 245 265 27 288 290 346 391 45	May 40 40 40 39 42 44 53 683 96 110 115 117 105 110 105 77 105 105 110 105 110 105 112 110 112 110 115	June 155 163 171 182 199 196 205 220 235 256 272 288 288 288 303 303 318 318 318 303 303 303 318 318 318 318 303 303 303	1e, 8,30  July 334 3350 350 350 350 350 350 351 334 3318 303 303 303 288 288 272 272 2772	Aug. 272 272 272 272 272 260 2537 2411 229 226 247 229 2217 2217 2179 174 168 160 155	Sept. 129 1170 103 103 98 96 96 117 105 105 105 105 105 105 105 105 105 105	73	Nov.	41
Day  1	Jan. 65444444444444444444444444444444444444	Feb. 24 24 24 24 24 24 24 23 23 23 23 23 22 22 22 22 22 22 22 22	Mar. 222 222 223 223 223 223 223 223 223 22	April 23 23 23 23 23 23 24 24 25 25 26 27 28 28 28 29 30 34 36 39 41	May 40 40 40 39 42 44 53 68 83 96 115 117 119 115 105 105 105 105 101 105 105	June 155 163 171 182 196 196 205 220 225 256 272 288 203 303 303 303 303 303 303 303 303	1e, 8,30  July  334  3350  3650  3600  3500  3500  3503  334  318  318  319  303  303  2888  272  272  272  2772	Aug. 272 288 272 272 272 272 272 272 272 272	Sept. 129 110 103 103 98 96 92 96 115 105 105 96 97 77 77 77 77 76 66 64	733	Nov.	41
Day  1	Jan. 22544444222222222222222222222222222222	Feb. 245 227 224 224 224 224 223 223 223 223 222 222	Mar. 222 223 223 223 223 223 223 223 223 22	April 23 23 23 23 23 23 24 24 25 25 26 27 28 27 28 29 30 34 36 41 42 847	May 40 40 40 39 42 44 53 683 96 110 115 117 105 110 105 77 105 105 110 105 110 105 112 110 112 110 115	June 155 163 171 182 199 196 205 2205 225 272 288 303 318 318 318 318 318 318 318 318 318 31	1e, 8,30  July 334 3350 350 350 350 350 350 351 334 3318 303 303 303 288 288 272 272 2772	Aug. 272 272 272 272 272 260 2537 2411 229 226 247 229 2217 2217 2179 174 168 160 155	Sept. 129 1170 103 103 98 96 96 117 105 105 105 105 105 105 105 105 105 105	73	Nov.	41
Day  1	Jan. 654444422244422222222222222222222222222	Feb. 245 277 225 4 244 224 224 223 223 223 223 222 222 2	42 Sept. Mar. 222 222 222 222 222 222 222 222 222 2	April 233 233 233 223 223 224 225 225 226 227 228 228 229 336 341 452 452 452 452 452 452 452 452 452 452	May 40 40 40 39 42 44 53 68 83 96 115 117 115 115 105 105 105 105 101 105 105 105	June 155 163 171 182 196 196 205 225 256 272 288 203 303 303 303 303 303 303 303 303 303	1e, 8,30  July  334  3350  3650  3500  3503  3503  3534  318  318  318  318  328  2288  272  272  272  272  272  2	Aus. 272 288 272 278 276 260 260 253 247 241 229 226 247 229 226 217 208 2174 208 2174 1680 1555 1456 6747 218	Sept. 129 110 103 103 103 98 96 92 96 110 103 98 96 97 115 103 96 90 90 90 90 90 83 83 79 75 72 76 64 64 661 268 95	733	Nov.	41
Day  1	Jan. 65444444444444444444444444444444444444	Feb. 245 227 224 224 224 223 223 223 223 222 222 222	Mar. 22222342222222222222222222222222222222	April 233 233 233 223 224 224 225 225 226 227 228 228 239 346 329 415 42 284 284 284 284 284 284 284 284 284	May 40 40 40 39 42 44 53 68 83 96 110 115 117 105 107 105 105 112 110 105 110 105 110 105 110 105 110 105 110 105 110 105 110 115 110 110	June 155 163 171 182 199 196 196 220 235 256 272 288 238 303 303 318 318 318 318 318 318 318 318 318 31	1e, 8,30  July 3344 3350 3550 3550 3550 3550 3534 334 3318 303 303 303 288 288 272 272 272 272 272 272 272 272	Aug. 22882 2772 22882 2772 2260 2537 22411 2229 2265 2247 2229 2217 4208 2056 1994 19168 1655 1555 6747 2188	Sept. 129 110 103 103 103 98 96 916 115 105 96 99 90 90 98 83 79 75 72 72 72 72 72 72 72 72 72 72 72 72 72	73 73	Nov.	41
Day  1	Jan. 65544444444444444444444444444444444444	Feb. 245 227 224 224 224 224 223 223 223 223 223 222 222	Mar. 222 223 223 223 223 223 223 223 223 22	April 233 233 233 233 233 234 244 255 267 282 288 299 304 452 452 452 453	May 40 40 40 39 42 44 53 68 83 96 115 117 115 105 105 105 105 105 101 105 105 105	June 155 163 171 182 199 196 205 2205 225 2272 288 303 318 318 318 318 318 318 318 318 318 31	1e, 8,30  July  3344  3350  3650  3650  3500  3503  3534  318  318  303  303  2888  2888  272  272  272  272  272	Aug. 272 288 3 247 241 229 226 247 2214 229 226 214 208 191 1829 174 168 160 155 6747 218 288 5	Sept.  129 117 110 103 98 96 92 96 117 115 103 96 92 90 83 83 87 79 75 72 66 64 61 61 61 2686 12961	733	Nov.	41
Day  1	Jan. 25444224422442244224422444224442244422	Feb. 245 227 225 4 4 4 2 4 4 2 4 4 2 4 4 2 3 3 2 2 3 2 2 2 2	Mar. 222 222 222 222 222 223 222 223 222 223 223 222 223 233 2	April 233 233 233 233 233 224 244 225 265 226 227 228 228 229 304 45 45 45 26 848 228 848 288 31680	May 40 40 40 39 42 44 53 68 83 96 115 117 115 105 105 105 105 105 105 105 105 105	June 155 163 171 182 199 196 196 220 235 256 272 288 238 303 303 318 318 318 318 318 318 318 318 318 31	1e, 8,30  July  334  3350  3650  3500  3500  3503  334  3318  318  318  303  303  -288  272  272  272  272  272  272  27	Aug. 2728 2722 2722 2722 2722 2722 2722 272	Sept.  129 110 103 103 98 96 92 96 115 105 105 96 97 75 72 76 64 64 661 2686 129 5330	73	Nov.	41

Discharge of Maroon Creek ne	ar Aspen (Lower Station) for 1915.
Drainage Area, 54 Square Miles.	Altitude, 8,300 Feet Above Sea Level.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	13	12	12	11	17	93	290	96	46			
2	18	12	12	11	14	98	250	115	44		7	
3	13	12	12	11	13	103	245	88	42			
4	12	12	12	īī	12	100	230	61	61	54		
5	12	12	12	īī	12	97	230	58	40	13	7	
6	12	11	12	12	13	94	230	54	35		7	
7	12	10	11	12	14	97	5 <b>5</b> 5	54	30			
8	13	10	11	12	15	100	220	68	25			
9	12	12	11	12	15	103	210	60	22			
10	11	12	11	12	16	138	200	56			7	
11	10	12	12	12	16	165	220	54	22	46		
12	11	13	12	12	26	180	240	54	25	46	5	
18	12	13	12	12	36	150	260	54	28			••••
14	12	12	12	12	46	150	200	54	23	•		
15	12	12	11	12	57	170	185	54	22	•••••	7	
16	12	12	11	12	57	190	170	54	21			
17	12	12	11	12	60	210	170	54	20		6.	·····•
18	12	12	11	12	65	230	170	54	54	13		
19	12	12	11	12	62	245	170	54	18			
20	12	12	11	12	60	245	157	46	16	•••••	••••••	
21	12	12	11	12	57	245	144	47	15	••••••	8	
22	11	12	11	12	58	265	132	48	15	9		
23	11	12	11	13	70	290	125	49	15		•••••	·
24	11	12	11	14	83	290	118	49	15		•••••	•
25		12	11	13	85	290	111	47	15			•••••
26		12	11	12	83	290	104	45	20	13	5	
27		12	11	13	80	290	97	260	18		• • • • • • • • • • • • • • • • • • • •	
28	12	12	11	14	77	290	92	45	18			
29	12		11 11	16 17	74	290 290	87	43	16		8	
30	12 12	•••••	11	11	70 80	290	82	42	18	13	7	••••••
31		333	351	371	1443	5788	78	42		•••••	••••••	•
Total	367 11.8	11.9	11.3	12.4	46.5	193	5772 186	1959	776	•••••	•••••	••
Mean	11.8	11.9	11.3	17.4	40.5 85	290	555	63.2	25.9	••	••••••	•••••
Max	10	10	11	11	12	93	78	260	61	••••••		·····•
Min	726	661	695	738	2860	11500	11400	42	15	•••••	•••••	••
Acre-ft.	120	001	090	100	4000	11900	11400	3890	1540	•••••	•••••	•

Unless otherwise noted, all discharges are in cubic feet per second.

#### NORTH FORK OF FRYING PAN CREEK NEAR NORRIE.

Location.—On a highway bridge in sec. 21, T. 8 S., R. 83 W., in the Sopris National Forest, about 1 mile from Norrie. No tributaries between the station and the mouth of the creek.

Records Available.—February 18, 1911, to November 9, 1916.

Drainage Area.—42 square miles.

Gage.—Vertical staff.

Channel.—Practically permanent, but rough.

Discharge Measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter Flow.—Affected by ice.

Diversions.—No water is diverted above the station, so the records represent the natural run-off.

Accuracy.—Owing to the scattering gage heights and the probable error in mean daily stage as determined from one reading, the estimates cannot be considered better than fair.

Co-operation.—Station maintained by the United States Geological Survey in co-operation with the United States Forest Service. Records furnished by the United States Geological Survey.

#### FRYING PAN CREEK AT NORRIE.

Location.—At the highway bridge in Norrie, in sec. 28, T. 8 S., R. 83 W., in the Sopris National Forest, 1 mile above the entrance of the North Fork.

Records Available.—February 18, 1911, to November 12, 1916.

Drainage Area.—92 square miles.

Gage.—Vertical staff.

Channel.—Slightly shifting after high water.

Discharge Measurements.—Made from the bridge.

Winter Flow.—Ice probably causes backwater during the winter months.

Diversions.—No water is diverted from this creek either above or below the station.

Accuracy.—Records reliable.

Co-operation.—Records furnished by the United States Geological Survey.

Discharge of	of Morth	Fork Fry	ing Pan (	Creek nea:	r Morris	for 1915.
Drainage Area	, 42 Squ	are Miles.	Altitude	, 8,431 Pc	et Above	Sea Level

Day	,	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1			6	6	6	80	300	200	22	10	17	8	13
2			6	6	6	75	280	185	20	10	16	8	13
3			6	6	6	69	240	185	18	10	14	8	13
4			6	6	6	66	200	170	16	10	13	8	12
5			6	6	7	63	163	165	14	10	13	8	12
6			6	6	7	60	140	141	13	10	12	`8	12
7			6	6	8	56	120	135	45	10	10	9	12
8			6	6	10	60	150	130	100	10	10	9	11
9			6	6	14	64	185	125	69	10	10	10	10
10			6	6	18	69	250	120	45	10	10	10	10
11			6	6	22	101	300 .	140	32	10	10	10	10
12		4	6	6	26	120	280	120	26	10	10	9	11
13			6.	6	26	. 300	200	120	22	10	11	9	11
14			6	6	36	203	180	110	18	10	12	9	12
15			6	6	45	120	210	101	18	10	12	8	11
16			6	6	58	208	255	78	18	10	12	8	11
17			6	6	60	250	305	56	16	10	11	8	10
18			7	6	75	210	305	62	16	10	10	10	10
19		<b>-</b>	7	6	70	170	305	56	15	10	14	12	10
20			7	6	76	130	300	50	15	10	12	14	10
21			7	6	84	101	270	50	15	9	12	14	10
22			7	6	84	84	255	45	14	9	12	14	9
23			6	6	84	84	425	45	14	8	11	14	9
24	•	•	6	6	84	110	375	40	13	10.	11	14	9
25		•••••	6	6	84	150	325	40	13	26	11	14	8
26	····		6	6	76	185	280	35	12	40	10	14	8
27			6	6	69	150	305	35	12	35	10	14	8
28			6	6	69	120	280	32	12	22	9	14	7
29		6	•••••	7	69	159	250	30	11	18	9	13	7
30		6	•••••	7	80	170	220	30	10	18	8	13	7
31_		6		100	1005	185	5050	26	10		8		. 7
	'otal		173	189	1365	3972	7653	2837	694	395	350	321	313
	an		6.18	6.1	45.5	128	255	91.5	22.4	13.2	11.3	10.7	10.1
	x		7	7	84	300	425	200	100	40	17	14	13
Miı			6	6	6	56	120	26	10	8	8	8	7
Acı	e-ft.	•	343	375	2710	7870	.15200	5630	1380	786	695	637	621

Discharge	of	Morth	Pork	Frying	Pan	Creek	near	Morrie	for	1916.	
Drainage At	ma.	42 Sax	are M	Mleg. À	Ititud	la. 8.43	1 Pee	t Above	a Sas	Level	L

Day	Jan.	Feb.	Mar.	Apri	l May	, June	July	Aug	. Sept	. Oct.	Nov.	Dec.
1	6	6	9	35	105	248	198	77	25	28	19	. <b></b>
2	Ğ	6	9	38	82	255	186	84	19	24	16	
3	Ř	6	9	41	58	262	174	84	18	25	12	
4	Ř	6	9	36	110	262	162	84	16	25	12	
5	Ř	ĕ	8	32	120	262	152	74	16	24	13	
6	ĕ	ž	8	32	152	262	141	52	16	24	14	
7	6	ż	Š.	28	222	222	141	52	16	25	18	
8	ě.	ż	š	25	235	263	141	52	16	25	22	
9	ě	Ż	8	29	319	304	141	52	Ī6	22	25	
10	Ř	7	9	33	304	366	141	42	34	24		
11	Ř	ż	10	56	262	383	152	32	52	25		
12	ĕ	ż	īĭ	58	255	400	114	42	41	25		
13	ĕ	ż	12	. 60	248	383	101	42	41	25		
14	ĕ	ż	14	58	200	400	92	120	41	25		
15	ĕ	Ż	15	58	152	366	92	120	33	26		
16	ě	ż	16	58	141	319	92	46	25	26		
17	ĕ	ġ	18	58	130	334	92	44	25	46		
18	. ž	8	24	ŽŽ	120	350	92	41	25	50		
19	Ż	Š.	31	64	110	350	92	88	23	48		
20	7	8	36	52	110	366	64	36	22	48		
21	7	8	101	58	110	335	64	34	19	46		
22	7	8	58	64	115	304	64	32	18	52		
23	7	8	41	82	120	283	62	28	18	46		
24	7	8	58	101	152	262	60	25	18	41		
25	7	8	31	106	163	242	58	26	19	36		
26	7	9	41	110	174	222	55	26	19	32		
27	6	9	41	130	152	216	52	28	18	30		
28	6	9	36	152	169	210	64	22	16	28		
29	6	9	36	174	186	216	64	22	16	22		
30	6		32	130	204	222	82	22	16	16		
31	6		32		222		101	24	•	22		******
Total	195	215	779	2035	5202	8869	3286	1503	697	961	151	
Mean	6.29	7.41	25.1	67.8	168	296	106	48.5	23.2	31.0	•••••	
Max	7	9	101	174	319	400	198	120	52	52	······	
Min	. 6	6	8	25	58	210	52	22	16	16		
.Acre-ft.	387	426	1540	4030	10300	17600	6520	2980	1380	1910	•••••	•••••

#### Discharge of Frying Pan Creek at Morrie for 1915. Drainage Area, 92 Square Miles. Altitude, 8,431 Feet Above Sea Level.

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					22	93	400	325	74	51	45	26	24
2				••••••	23	93	400	325	70	52	50	25	22
3				•••••••	25	93	355	278	67	54	50	23	26
4			·····	********	28	93	300	278	ői	56	44	22	26
5			•	•	30	93	278	265	61	56	37	22	26
ě			•••••	••••••	32	86	260	250	56	55	37	23	26
7		••••••	•••••	•	35	80.	235	240	100	55	37	24	26
8				••••••					167	54	37	26	26
9		•••••		•	40	95	305	235		53	37	22	26
10		•••••		•••••	60	120	455	211	131	51	44	26	28
11				••••••	80	150	690	195	100		55	32	26
		•••••		•••••	86	178	700	178	86	46			
12		•••••	••••••	•••••	93	200	635	175	84	55	37	31	25
13	•••••	•••••		•••••	80	542	498	180	82	51	38	29	26
14	•••••	•			80	378	455	185	80	51	40	26	26
15		•		·	80	325	470	188	78	51	38	21	26
16		•••••			93	400	610	178	76	51	37	18	26
17	•••••			••••••	95	455	800	160	73	51	44	17	26
18				•	105	430	810	140	61	49	40	19	26
19		•	<b>-</b>		80	400	810	123	61	- 47	37	19	26
20	•	•			86	200	810	116	61	46	37	21	26
21			••••••		93	158	810	108	61	46	38	24	26
22					93	158	810	100	61	46	37	26	25
23				• • • • • • • • • • • • • • • • • • • •	93	180	910	100	61	46	40	26	23
24					93	235	910	108	61	48	40	30	22
25					93	342	810	104	61	56	36	25	22
26					93	290	810	1.00	61	75	32	28	23
27					80	260	500	95	59	70	30	30	24
28					80	270	498	90	53	65	27	26	24
29					86	308	415	85	54	59	26	24	24
30					93	285	305	80	56	. 57	26	24	24
31						278		77	54		26		24
Т	otal				2150	7268	17054	5272	2271	1603	1179	735	776
Mea	an				71.7	234	568	170	73.3	53.4	38.0	24.5	25.0
Ma:	x				105	542	910	325	167	75	55	32	28
					34	80	235	77	53	46	26	17	22
	e-ft.				4270	14400	33800	10500	4510	3180	2340	1460	1540

•	Discharge of Prying I	an Creek at Morrie for 1916.	•
Drainage	Area, 92 Square Miles.	Altitude, 8,431 Feet Above Sea	Level.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	. 24	25	32	60	180	605	515	298	83	68	65	
2	0.4	26	32	40	130	620	650	262	79	87	65	·
3	. 24	25	32	47	103	650	580	250	72	83	32	
4	. 24	24	33	47	166	640	480	. 228	65	67	37	
5	. 24	24	34	45	220	620	435	195	58	65	44	
6		25	<b>3</b> 5	40	280	605	375	190	74	65	50	•
7		26	37	37	495	605	395	185	70	65	50	
8		25	40	37	455	605	420	180	65	65	5.0	
9		25	42	46	628	740	440	210	96	69	44	
10		24	44	. 56	560	930	455	210	126	69	37	
11	. 23	25	47	76	605	1040	395	166	114	74	37	
12	. 22	26	48	78	605	930	380	166	103	78	44	
13		26	50	69	538	785	355	190	108	67		
14	. 23	26	52	69	500	760	315	245	96	65	•••••	
15	. 23	25	54	69	375	740	298	220	83	62		
16	. 24	25	57	60	315	740	280	180	78	58		
17		26	60	65	315	785	260	180	76	83	•••••	
18		27	65	95	280	840	245	147	74	83		
19		27	70	90	228	740	262	139	65	83		,
20		28	103	80	195	695	240	134	65	8 <b>3</b>		
21	. 23	28	139	-89	210	680	210	126	62	8 <b>3</b>		
22		29	85	103	245	645	200	117	58	83		
23	. 25	29	62	108	195	620	180	110	62	83		
24	. 26	30	79	120	375	605	180	103	66	74		
25	. 25	30	53	126	460	605	180	114	69	74		
26	. 24	31	65	152	375	605	180	114	62	74		
27	. 24	31	65	186	335	605	195	106	58	71		
28	. 24	32	65	287	380	605	228	99	54	68		
29		32	58	262	435	605	228	93	50	65		
30			50	210	495	550	260	93	50	65		
31	. 24		69		560		315	90		65		
Total	733	782	1757	2849	11238	20800	10131	5140	2241	2244	555	
Mean	23.6	27.0	56.7	95	363	693	327	166	74.7	72.4		
Max		32	139	287	628	1040	650	298	126	87		
Min		24	<b>32</b>	37	130	550	180	90	50	58		
Acre-ft.	1450	1550	3490	5650	22300	41200 <sub>1</sub>	20100	10200	4440	4450		
Unl	less ot	herwis	e note	d, all	dischar	rges are	in cu	bic fee	t per	second.		

#### FRYING PAN CREEK AT THOMASVILLE.

Location.—At a private bridge in sec. 7, T. 8 S., R. 83 W., 1,000 feet S. W. of railroad station. Nearest tributary, Deadman Gulch, enters 1/2 mile below.

Records Available.—January 2, 1911, to November 30, 1916.

Drainage Area.—175 square miles.

Gage.—Vertical staff.

Channel.—Practically permanent, but rough.

Discharge Measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter Flow.—Ice causes backwater during the winter months, and discharge measurements are made to determine the flow.

Diversions.—As there are no court decrees for diversion of water above the station, it is probable that the records represent the natural run-off from the drainage basin.

Accuracy.—Conditions favorable for fairly accurate determination of discharge; results should be reliable.

#### CRYSTAL RIVER AT MARBLE.

Location.—Near the electric railway bridge of the Colorado Yule Marble Co., in sec. 26, T. 11 S., R. 88 W., at Marble. Nearest tributary, Carbonate Creek, enters above Marble.

Records Available.—November 1, 1910, to November 30, 1915.

Drainage Area.—77 square miles.

Gage.—A vertical hook gage graduated to hundredths of a foot.

Channel.—Shifts slightly at long intervals.

Discharge Measurements.—Measurements made from car and cable and by wading.

Winter Flow.—Gage heights at this station little, if any, affected by ice.

Diversions.—There are no court decrees for diversions above the station, but for 114 second-feet below Marble.

Accuracy.—Conditions are favorable for fairly accurate results and the estimates are considered reliable.

Co-operation.—The field data are furnished through the courtesy of the Colorado-Yule Marble Co. to the United States Geological Survey, from whom records were obtained.

Discharge of Frying Pan Creek at Thomasville for 1915.

Drainage Area, 175 Square Miles. Altitude, 7,968 Feet Above Sea Level.

Day		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		21	22	25	3.0	375	885	600	139	78	72	46	46
		21	22	25	31	310	940	600	133	74	76	43	43
3		21.	22	26	38	245	650	550	109	ŻÔ	76	44	50
4		20	23	28	40	181	525	550	98	69	72	44	46
5		20	23	27	43	160	502	502	94	70	69	44	43
6		20	22	27	45	151	480	435	92	68	68	41	44
7		žĭ	22	26	48	155	435	395	285	66	70	44	42
8		21	22	26	51	158	480	435	355	68	84	46	44
ğ		$\bar{2}\bar{1}$	23	26	64	162	575	415	355	66	75	48	44
10		$\overline{21}$	24	26	70	165	1160	415	252	66	69	57	43
	•••••	21	24	26	105	236	1400	395	192	59	87	56	45
12		22	24	26	109	358	1220	395	170	76	86	55	40
13		- 22	25	25	110	480	725	415	146	62	72	51	41
14		22	26	25	115	625	750	395	130	68	68	46	42
15	<b>-</b>	22	28	25	125	480	725	375	130	66	64	46	40
16		22	28	26	140	540	830	355	130	74	66	45	40
17		21	28	26	190	600	1340	338	116	72	75	42	38
18		21	28	26	285	562	1160	285	110	70	70	46	39
19		22	27	28	192	525	1280	285	105	66	66	46	38
20		23	27	31	210	450	1400	252	105	65	69	49	37
21		22	26	28	236	376	1160	221	98	56	70	49	39
22		21	26	26	236	302	1220	206	87	59	68	45	.40
23		21	26	25	236	<b>36</b> 8	1050	206	98	57	64	46	39
24		22	26	26	205	435	1050	221	94	59	57	56	38
		. 22	26	26	190	550	1050	206	86	70	56	46	37
			26	27	146	504	995	206	84	105	51	<b>52</b>	36
		22	25	28	192	458		187	81	92	51	55	35
28		21	25	28	200	458	725	187	82	91	49	46	34
		21		29	225	458	650	176	81	86	49	46	33
	<b>-</b>			29	435	502	550	160	78	81	49	46	35
31		22	•••••	30		502		146	78		51		37
To	tal.	663	696	828	4342	11831	26612	10509	4193	2129	2069	1426	1248
Mear	n	21.4	24.9	26.7	145	382	887	339	135	71.0	66.7	47.5	40.3
Max.			28	31	435	625	1400	600	355	105	87	57	50
Min.		. 20	22	25	30	151	435	146	78	56	49	41	33
Acre	-ft.	1320	1380	1640	8630	23500	52800	20800	8300	4220	4100	2830	2480
		ess ot	herwis	e note	d, all	dischar	ges are	in cub		per s			

Di	ainage	Disch:	175 s	Pryi: Square	ig Pan Miles.	Creek :	st Thor	nasvill 68 Fee	e for l	1916. 70 <b>Se</b> a	Level	
Day	Jan.	Feb.	Mar.	April	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	. 40	40	81	130	285	675	575	480	87	120	87	
2	. 39	41	85	120	320	625	575	355	87	111	77	
3		42	85	102	480	675	550	355	87	111	81	•••••
4		43	94	106	575	675	550	395	94	106 99	75	
5 6		44 45	$\begin{smallmatrix}90\\102\end{smallmatrix}$	102 116	575 625	725 775	525 525	$\frac{355}{320}$	102 87	99	75 70	
7		46	90	116	575	775	525	320	87	102	ŻŎ	
8		47	102	111	525	940	525	338	90	102	70	
9		48	102	102	435	1100	525	320	221	106	70	
10		49	102	116	480	1100	525	302	221	111	66	.:
11 12	. 38 . 36	48 48	102	111	480	1160	502	285	221	111	70	•••••
13		48	111 106	141 135	480 4 <b>80</b>	1160 1160	502 <b>480</b>	302 <b>302</b>	215 <b>206</b>	111 111	68 <b>66</b>	•••••
14		48	106	135	435	1220	435	302	192	116	64	
15		48	120	153	435	1280	395	320	165	120	64	75
16		49	116	192	502	1280	355	320	130	111	64	
17		51	120	165	525	1400	338	252	124	111	64	
18 19	• • •	54 56	124 130	160 178	550 550	1460 1400	320 320	221 192	120 116	116 120	64 64	••••••
20	4.0	58	153	178	550	1520	320	187	111	111	64	
21		60	192	170	502	1460	320	165	111	iii	64	
22	. 39	62	170	187	525	1400	320	170	111	120	64	
23		64	153	192	525	1100	285	170	102	120	64	
24		66	160	206	575	995	320	165	99	137	64	
25 26		68 71	178 141	178 187	600	940	302 285	170 160	87 85	130	64	•
26		73	.137	187	600 600	885 725	285	120	85	111 111	64 65	
28		75	124	221	600	625	320	106	81	102	64	
29		77	124	187	575	675	320	124	85	90	66	
30			124	192	625	625	355	130	81	87	64	
31	. 40	1500	137	4580	625	00505	502	111		87		•
Mean	1231	1569 <b>54.1</b>	3761 121	4576 153	16214 <b>523</b>	30535	12981	7814	3690	3411	2036	
Max		77	192	206	685	10 <b>20</b> 1520	419 575	252 480	123 221	110 137	<b>67.9</b> 87	•••••
Min		40	81	102	285	625	285	106	81	87	64	
Acre-ft.	2440	3110	7440		32200	60700	25800		7320	6760	4040	********
		_		_								
T	rainac	D Ares	1SCHAP L 77 S	ge of (	Crystal Wiles	River Altitu	at Mar	ble for	1915.	. <b>S</b>	T.ewal	
		e Ares	L, 77 S	quare	Miles.	Altitu	đe, 7,80	O Peet	Abov	_		_
Day	Jan.	Feb.	<b>, 77 S</b> Mar.	<b>quare</b> April	Miles. May	Altitu June	<b>de, 7,80</b> July	O Feet Aug.	Abov Sept.	Oct.	<b>Level.</b> Nov.	Dec.
Day 1	Jan. 49	<b>Feb.</b> 25	<b>4, 77 S</b> Mar. 22	quare April 24	Miles. May 213	Altitu June 685	<b>de, 7,80</b> July 1040	O Feet Aug. 305	Above Sept. 70	Oct.	Nov.	
Day 1 2	Jan. 49 49	Feb. 25 24	<b>Mar.</b> Mar. 22 22	April 24 25	May 213 186	June 685 658	<b>de, 7,80</b> July 1040 1100	Aug. 305 270	Sept. 70	Oct.	Nov.	Dec.
Day 1	Jan. 49 49 49	Feb. 25 24 23	Mar. 22 22 22 22	April 24 25 25	May 213 186 130	June 685 658 658	July 1040 1100 915	Aug. 305 270 226	Sept. 70 73 83	Oct.	Nov.	••
Day  1  2  3  4	Jan. 49 49 49 49	Feb. 25 24	Mar. 22 22 22 22 22	April 24 25 25 28	May 213 186 130 120	Altitu June 685 658 658 452	de, 7,80 July 1040 1100 915 795	Aug. 305 270 226 186	Sept. 70 73 83 83	Oct.	Nov.	••
Day 1 2 3 4 5 6	Jan. 49 49 49 49 49 47	Feb. 25 24 23 25 27 28	Mar. 22 22 22 22 22 22 22 22	April 24 25 25	May 213 186 130	June 685 658 658	July 1040 1100 915	Aug. 305 270 226	Sept. 70 73 83	Oct.	Nov.	••
Day  1 2 3 5 6 7	Jan. 49 49 49 49 47 47	Feb. 25 24 23 25 27 28 25	Mar. 22 22 22 22 22 22 22 22 22	April 24 25 25 28 31 36 35	May 213 186 130 120 111 102 60	June 685 658 658 452 385 345 325	de, 7,80 July 1040 1100 915 795 975 975	Aug. 305 270 226 186 162 162 174	Sept. 70 73 83 83 76 80 65	Oct.	Nov.	
Day  1 2 4 5 6 7 8	Jan. 49 49 49 49 47 47	Feb. 25 24 23 25 27 28 25 28	Mar. 22 22 22 22 22 22 22 22 22	April 24 25 25 28 31 36 35 33	May 213 186 130 120 111 102 60 111	June 685 658 658 452 385 325 288	de, 7,80 July 1040 1100 915 795 975 975 975	Aug. 305 270 226 186 162 162 174 226	Sept. 70 73 83 83 76 80 65 78	Oct.	Nov.	
Day 1	Jan. 49 49 49 47 47 47	Feb. 25 24 23 25 27 28 25 28 25	Mar. 22 22 22 22 22 22 22 22 22 22	April 24 25 25 28 31 36 35 33 44	May 213 186 130 120 111 102 60 111 130	June 685 658 658 452 385 345 325 288 365	July 1040 1100 915 795 975 975 975 975	Aug. 305 270 226 186 162 174 226 200	Sept. 70 73 83 83 76 80 65 78	Oct.	Nov.	
Day 1 2 3 4 5 6 7 8 9 10	Jan. 49 49 49 47 47 47	Feb. 25 24 23 25 27 28 25 28 25 25 25	Mar. 22 22 22 22 22 22 22 22 22 22 22	April 24 25 25 28 31 36 35 34 4 35	May 213 186 130 120 111 102 60 111 130 130	Altitu June 685 658 658 452 385 345 325 288 365 550	de, 7,80  July  1040  1100  915  795  975  975  975  975  1040	Aug. 305 270 226 186 162 162 174 226 200 186	Sept. 70 73 83 83 76 80 65 78 72 68	Oct.	Nov.	
Day  1 2 3 4 5 6 7 10 11 11	Jan. 49 49 47 444 47 47 47 47	Feb. 25 24 23 25 27 28 25 28 25	Mar. 22 22 22 22 22 22 22 22 22 22	April 24 25 25 28 31 36 35 33 44	May 213 186 130 120 111 102 60 111 130	June 685 658 658 452 385 345 325 288 365	July 1040 1100 915 795 975 975 975 975	Aug. 305 270 226 186 162 174 226 200	Sept. 70 73 83 83 76 80 65 78	Oct.	Nov.	
Day  1 2 3 4 5 6 7 8 9 10 11 12	Jan. 49 49 49 47 47 47 47 41 38	Feb. 25 24 23 25 27 28 25 25 25 24 24 24	Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 25 28 31 36 33 44 35 35 45 42	May 213 186 130 120 111 102 60 111 130 130 151 200 385	June 685 658 658 452 385 345 325 288 365 550 795 1040 630	July 1040 1100 915 795 975 975 975 975 1040 975	Aug. 305 270 226 186 162 174 226 200 186 186 174 174	Sept. 70 73 83 83 76 80 65 78 72 68 66 111 83	Oct.	Nov.	
Day  1 2 4 5 6 7 8 10 11 11 12 13	Jan. 49 49 49 47 44 47 47 47 47 41 36	Feb. 25 24 23 25 25 25 24 24 24 24	Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 26 28 31 36 35 35 45 45 44 44	May 213 186 130 120 111 102 60 111 130 130 151 200 385 525	June 685 658 452 385 345 325 288 365 795 1040 630 795	July 1040 1100 915 795 975 975 975 975 1040 975 1040 960	Aug. 305 270 226 186 162 174 226 200 186 186 174 174	Sept. 70 73 83 83 76 80 65 72 68 66 111 83 72	Oct.	Nov.	
Day  1 2 3 5 6 7 9 10 11 11 12 13 14	Jan. 49 49 49 47 47 47 47 47 41 38 38 38	Feb. 25 24 25 27 28 25 25 25 24 24 24 24 22	Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 25 31 36 35 44 35 45 42 42 45 56	May 213 186 130 120 111 102 60 111 130 130 130 135 525 525 565	June 685 658 658 658 345 325 325 550 650 630 795 975	July 1040 1100 915 795 975 975 975 1040 1000 91000 920	Aug. 305 270 226 162 164 226 200 186 174 174 174	Sept. 70 73 83 83 76 80 65 78 72 68 66 111 83 72 70	Oct.	Nov.	
Day  1 2 4 5 6 7 8 10 11 11 12 13	Jan. 49 49 49 47 47 47 47 47 47 48 38 36 36 32	Feb. 25 24 23 25 25 25 24 24 24 24	Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 25 25 31 36 35 34 4 36 42 44 4 5 51	May 213 186 130 120 111 102 60 111 130 150 250 385 525 365 430	June 685 658 452 385 325 288 365 550 795 1040 630 795 1100	July 1040 11040 11040 915 795 975 975 975 1040 975 1040 960 9260 9880	Aug. 305 270 226 186 162 162 226 200 186 186 187 174 174 162 151	Sept. 70 73 83 83 85 76 80 65 72 68 66 111 83 72 70 60	Oct.	Nov.	
Day  1 2 3 4 5 6 7 8 10 11 12 13 14 15 16	Jan. 49 49 49 47 44 47 47 47 47 47 48 316 336 336	Feb. 25 24 25 25 25 24 24 24 22 23 24 24	Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 25 31 36 35 44 35 45 42 42 45 56	May 213 186 130 120 111 102 60 111 130 130 130 135 525 525 565	June 685 658 658 658 345 325 325 550 650 630 795 975	July 1040 1100 915 795 975 975 975 1040 1000 91000 920	Aug. 305 270 226 162 164 226 200 186 174 174 174	Sept. 70 73 83 76 80 65 78 72 70 66 111 83 72 70 66 2	Oct.	Nov.	
Day  1 2 3 4 5 6 7 8 9 10 11 12 11 12 11 15 11 16 17 18 19	Jan. 49 49 49 47 44 47 47 47 48 38 36 38 32 30 31	Feb. 25 24 23 25 27 28 25 28 25 28 25 24 24 24 24 24 24 23 24 24 23 23	Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 28 31 35 35 45 42 44 56 68 68 68 68 68 68 68 68 68 68 68 68 68	May 213 186 130 120 111 102 60 111 130 151 200 385 525 365 475 475	Altitu June 685 658 452 385 345 325 550 795 1040 630 795 975 1100 1100	July 1040 1100 1100 915 795 975 975 975 975 1040 1000 960 920 8800 840 800	Aug. 305 270 226 186 162 174 226 200 186 186 174 174 162 151 150 130	Sept. 70 73 83 83 85 76 80 65 72 68 66 111 83 72 70 60	Oct.	Nov.	
Day  1	Jan. 49 49 49 47 47 47 47 47 41 38 38 32 32 32 32 33 33 33	Feb. 25 24 22 25 25 25 24 24 24 22 23 23 23 23 23 23 23	Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 28 316 35 34 4 35 45 42 42 45 60 870 870	May 213 186 130 120 111 102 60 111 130 151 250 285 525 475 452 475 452 305	June 655 658 452 385 345 325 550 795 1040 630 795 1100 1160 1100 1280	July 1040 1100 915 795 975 975 975 975 1040 1000 920 880 800 762	Aug. 305 270 186 162 174 226 186 200 186 186 174 174 162 151 140 130	Sept. 70 73 83 83 76 65 72 68 66 111 83 70 602 62 65 88	Oct.	Nov.	
Day  1 2 3 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	Jan. 49 49 49 49 47 47 47 44 41 386 36 280 311 30	Feb. 254 23 257 288 255 224 24 24 223 24 223 23 23 23 23	Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 28 36 36 35 44 35 46 561 53 66 70 102	May 213 130 120 111 102 60 111 200 151 200 525 452 452 305 240	June 685 658 452 385 345 325 345 325 1040 630 795 1100 1100 1100 1220	July 1040 11400 11400 11400 115 795 975 975 975 975 1040 1000 960 980 840 840 860 766 725	Aug. 305 270 226 186 186 200 186 200 186 174 174 162 151 151 151 151 111	Sept. 70 73 83 83 76 65 72 68 6111 83 72 70 60 62 60 56 60	Oct.	Nov.	
Day  1	Jan. 49 49 49 47 47 47 47 47 47 48 38 36 36 32 30 28 30 28 30 20 20 20 20 20 20 20 20 20 20 20 20 20	Feb. 25 24 22 25 25 25 25 24 24 22 23 23 23 23 23 23 22 24	Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 28 36 36 36 35 44 56 60 70 102	May 213 186 130 120 111 102 60 111 130 151 200 385 525 475 475 4305 2405 213	June 685 658 658 452 345 325 550 630 795 975 1100 1160 1100 1280 1280	July 1040 1100 1100 915 795 975 975 975 975 1040 1000 920 8800 760 725 695	Aug. 305 270 226 186 162 162 200 186 174 162 151 140 120 121	Sept. 70 73 83 83 85 65 80 65 72 66 66 111 83 72 70 62 62 62 65 8	Oct.	Nov.	
Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 223	Jan. 49 49 49 47 47 47 47 41 38 36 30 31 30 30 25	Feb. 254 233 227 285 225 224 224 224 223 224 223 223 223 223 223	Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 28 31 36 33 44 35 45 45 60 86 70 102 111	May 213 186 130 120 60 111 130 151 200 385 525 430 525 475 452 240 213	Altitu June 685 658 452 885 345 325 288 365 795 1040 630 795 1100 1100 1100 1220 1280 1340	July 1040 11400 11400 115 795 975 975 975 975 975 1040 1000 9880 8400 8800 7605 7606 6606	Aug. 305 270 226 1862 162 200 1866 186 174 174 151 151 151 111 111	Sept. 70 73 83 83 83 85 76 80 65 78 66 111 72 72 72 60 62 65 65 60 60 60 65 60 60 60 60 60 60 60 60 60 60 60 60 60	Oct.	Nov	
Day  1	Jan. 49 49 49 47 47 47 47 47 48 38 36 32 30 28 30 31 31 31 32 57 27 27	Feb. 254 23 257 286 227 286 225 224 224 223 223 223 223 222 223 222 223	Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 25 28 31 36 35 44 42 44 44 45 102 111 111 96 111	May 213 218 130 120 111 102 60 111 130 151 200 385 525 475 450 240 213 270 213 270	June 655 658 452 885 345 288 365 1040 630 795 1100 1100 1100 1280 1220 1280 1280 1280	July 1040 1100 1100 915 795 975 975 975 975 1040 1000 920 8800 760 725 695	Aug. 305 270 226 186 162 162 200 186 174 162 151 140 120 121	Sept. 70 73 83 83 85 65 80 65 72 66 66 111 83 72 70 62 62 62 65 8	Oct.	Nov.	
Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 255	Jan. 49 49 49 447 447 477 477 477 427 388 344 344 311 340 277 277 277 277 277 277 277 277 277	Feb. 254 233 227 288 225 224 224 223 223 222 222 222 222 222	Mar. 22 222 222 222 222 222 222 222 222 22	April 24 25 28 36 36 35 44 56 651 53 66 70 70 70 102 111 111 111	May 213 130 120 60 111 130 151 200 525 365 452 305 2270 3355	June 685 658 452 385 345 325 550 795 104 1100 1100 1100 1220 1280 1340 1280 1280	July 1040 11400 11400 11400 115 795 975 975 975 975 1040 1040 1040 725 620 655 620 655 555	Aug. 305 270 226 186 186 200 162 174 174 161 151 151 151 151 111 111 111 111 111	Sept. 70 73 83 83 83 85 72 80 65 111 83 72 72 660 660 660 600 130	Oct.	Nov.	
Day  1 2 3 4 5 7 8 9 10 11 12 11 12 11 15 16 17 18 19 20 21 22 23 24 25 26	Jan. 49 49 49 47 47 47 47 44 4 4 4	Feb. 254 23 255 227 288 255 224 244 244 24 223 23 23 23 23 23 22 22 22 22 22 22 22	, 77 st. Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 25 28 31 36 33 44 45 42 46 51 53 60 86 86 70 102 111 111 1111 1121	May 2130 1200 1111 1300 1511 1300 385 525 475 4525 475 2403 270 385 305 270	June 655 658 452 385 345 288 365 550 795 1100 1100 1100 11280 1280 1280 1280 128	July 1040 11400 11400 11400 1915 795 975 975 1040 975 1040 975 1040 1000 960 725 655 655 5550 515	Aug. 305 270 226 186 262 162 274 200 186 174 174 162 151 140 120 111 111 111 111 111 916	Sept. 70 73 83 83 76 68 80 658 72 68 66 111 83 72 70 62 62 62 62 62 62 62 62 62 62 62 62 62	Oct.	Nov.	
Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 222 23 24 27 28	Jan. 49 49 49 444 411 386 344 41 300 27 27 27 24 24	Feb. 254 23 257 285 226 224 244 224 223 223 222 222 222 228	, 77 s Mar. 22 222	April 24 25 28 31 36 35 34 45 35 46 51 60 86 70 102 111 96 111 120 186	May 213 186 130 120 60 111 130 151 200 385 525 430 525 240 213 270 345 270 345 270 345 270 345	### Altitu  June  685  658  452  885  345  325  795  1000  1100  1100  1120  1120  1280  1280  1120  1120  1120  1120	July 1040 11400 11400 11400 115 795 975 975 975 975 975 1040 960 980 8400 7605 650 650 6516 4406	Aug. 3050 2266 1862 162 200 1866 1866 1866 1874 1774 1551 1551 1551 1551 1551 1551 15	Sept. 70 70 83 83 83 85 76 80 65 78 66 61 183 72 72 60 60 60 60 60 20 00 130 92 86	Oct.	Nov.	
Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 27 28 29	Jan. 49 49 49 444 477 447 441 388 320 288 311 334 327 256 277 24 24 24 24 24	Feb. 254 233 257 288 225 224 224 224 223 223 222 222 222 222 222	, 77 <b>8</b> Mar. 22 222 222 222 222 222 222 222 222 222	April 24 25 28 36 36 35 44 35 46 51 53 67 70 111 111 120 186 226	May 213 186 130 120 102 60 111 130 151 200 151 200 152 475 475 475 240 213 217 345 270 2570	June 685 658 452 385 345 325 345 325 1040 630 795 1100 1100 1220 1280 1280 1240 1280 1240 1280 1220 1160 1100	de, 7,80  July 1040 11000 11000 915 795 975 975 975 975 1040 1000 8800 840 840 8760 725 625 625 515 6480 4410	Aug. 305 270 226 186 186 200 186 200 186 174 174 162 151 151 140 120 120 121 111 111 111 111 111 86 80	Sept. 70 73 83 83 83 85 66 80 65 86 66 111 83 72 760 62 600 588 660 200 130 86 86	Oct.	Nov.	
Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 27 28 29 30 31	Jan. 49 49 49 441 447 447 441 386 344 327 226 277 244 244 244 244 244	Feb. 254 23 257 285 226 224 244 224 223 223 222 222 222 228	, 77 8 Mar. 22 22 22 22 22 22 22 22 22 22 22 22 22	April 24 25 28 31 36 35 34 45 35 46 51 60 86 70 102 111 96 111 120 186	May 213 186 130 120 60 111 130 151 200 385 525 430 525 240 213 270 345 270 345 270 345 270 345	June 655 658 452 385 345 325 500 795 1000 1100 1100 1220 1280 1280 1280 1280	July 1040 11400 11400 11400 1150 975 975 975 975 1040 975 1040 975 1040 975 1040 975 1040 975 1040 975 1040 975 1040 975 1040 980 880 880 880 880 880 880 880 880 88	Aug. 3050 2266 1866 2000 162 2266 1866 2000 174 174 174 174 174 174 174 174 174 174	Sept. 70 70 83 83 83 85 76 80 65 78 66 61 183 72 72 60 60 60 60 60 20 00 130 92 86	Oct.	Nov.	
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Day  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 27 28 29 30 Total Mean Max	Jan. 49 49 49 49 447 447 447 441 388 320 328 327 287 244 244 244 244 244 244 244 244 244 24	Feb. 254 233 257 288 255 254 244 224 223 224 223 222 222 222 222 22	, 77 8 22 22 22 22 22 22 22 22 22 22 22 22 2	April 24 25 28 36 35 36 35 36 35 44 56 66 70 102 111 111 120 186 226 345 2377 79.25	May 213 130 120 60 111 130 151 200 152 365 452 365 452 305 270 213 270 3458 8220 26525	June 655 658 452 385 345 325 500 795 1000 1100 1100 1220 1280 1280 1280 1280	de, 7,80  July 1040 11400 11400 915 795 975 975 975 975 1040 1040 1040 1040 1040 1040 1040 104	Aug. 3050 2266 1862 1622 1622 1622 1642 2000 1866 1744 1742 1551 1511 1111 1111 1111 1111 1111 11	Sept. 70 73 83 83 83 86 80 65 78 72 66 111 83 72 70 60 62 60 60 20 92 86 60 20 23 86 79 22 86 79 22 86 79 22 86	Oct.	Nov	
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#### EAST ELK CREEK NEAR NEW CASTLE.

Location.—At the highway bridge on line between secs. 24 and 25, T. 5 S., R. 91 W., 2½ miles northwest of New Castle, Colo. No tributaries between the station and the mouth.

Records Available.—January 19, 1911, to July 12, 1915.

Drainage Area.—60 square miles.

Gage.—Vertical staff.

Channel.—Permanent prior to high water of 1912, when it shifted.

Discharge Measurements.—Made from the bridge during high water and by wading during ordinary stages.

Winter Flow.—Little backwater from ice at this station during the winter, except for short periods.

Diversions.—There are court decrees for diversions of 43 second-feet from East Elk Creek, chiefly above the station.

Accuracy.—Owing to the very meager gage heights, estimates have not been made other than for the days having gage heights.

Co-operation.—Records furnished by the United States Geological Survey.

#### EAST RIVER AT ALMONT.

Location.—At highway bridge at Almont, 100 feet above the junction of East and Taylor Rivers.

Records Available.—July 27, 1910, to November 30, 1913; March 7, 1916, to December 2, 1916. A station was maintained at this point from April 15 to October 8, 1905, but the gage was referred to a different datum.

Drainage Area.—295 square miles.

Gage.-Vertical staff.

Channel.—Shifting.

Discharge Measurements.—Made from bridge.

Winter Flow.—Ice causes backwater in varying amounts, but no measurements have been made to determine this.

Diversions.—There are court decrees for diversion of 78 second-feet from East River, above the station, and 52 second-feet from tributaries.

Accuracy.—Results for 1916 good.

## Discharge of East Elk Greek at New Castle for 1915. Drainage Area 60 Square Miles. Attitude, 5,552 Feet Above Sea Level.

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				9	10	77						·	
2	•••••			13	11			64		••	•		•
3	•••••	••••••	•••••		10	•••••	145	•••••		•			*
5		12	11	9	•••••	31	145	•••••		•		•	•••••
6			11		*******			••••••	*******	••••••	••••••		••••••
7			·······		13	••••••	124						
8		•••••		10	15	23							••••••
. 9	•••••	12			••••	•••••	145						•
10 11		•	10	8	15	23	192	•••••	•••••	•••••			•••••
12			*******		19	25	*******	20					
18			9	10			•••••						
14		12	••-	8	27	•••••	230	•					*******
15			•••••		•••••	77	250	······					
16 17	•••••		•••••	•••••	••••••	132	•••••	•		•	••-		••••••
18			********	9	*******		312						
19			10	8	40	/							
20	•••••		11					•••••	•	•••••		•	
$\begin{array}{c} 21 \\ 22 \end{array}$			•••••	9	55	48	290		•		••••••	••••••	
23			••••		••••••	64		••••••	•••••	•••••	•••••		••••••
24				••••••	. 42								
25		******	9		*******	73	175	•					••
26	•••••		10	10	******		*******					••••••	•••••
27 28	•	9 12	•••••		42	73	145		•••••	•••••	••••••	•••••	•••••
29		12		10	84		119						
80		10	•••••							*******		•••••	•
31	•		•••••	•••••		160	<b></b>	•••••	•••••	••••		•	

## Discharge of East River at Almont for 1916. Drainage Area, 295 Square Miles. Altitude, 8,031 Feet Above Sea Level.

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					178	1020	1530	1260	850	228	178	178	95
2					178	905	1820	1200	745	228	178	155	95
3					178	850	1890	1200	605	228	178	155	
7					178	962	1890	1080	650	228	178	155	
Ē					178	1080	1890	1080	695	228	178	155	
ĕ		•••••			178	1260	1740	1080	745	228	178	155	
7		•••••	••••••	44	178	1600	1740	962	745	228	178	155	•••••
ģ		••••••		51	178	1740	1600	962	650	228	380	155	
			•••••	75	178	1960	1670	1200			228		
. 9	•		•••••						650	228		155	•••••
10		•••••		66	200	2110	2260	1200	565	380	228	155	•••••
11	•••••	••••••		66	285	1890	2420	1080	565	348	228	138	<b></b>
12	•••••	•••••	••••••	66	285	1820	2420	1080	488	315	228	95	******
13	•	•••••		66	285	1740	2580	962	565	285	228	95	
14	•••••	······		66	285	1600	2900	962	605	255	228	95	
15			• • • • • • • • • • • • • • • • • • • •	75	315	1600	2980	850	695	228	228	95	
16				85	348	1460	2980	850	650	228	228	95	
17				85	348	1330	3060	850	565	228	228	95	
18				85	348	1330	2820	745	488	228 <sup>-</sup>	228	95	
19				85	348	1260	2740	745	415	228	228	95	
20				85	348	1140	2340	695	348	228	228	95	
21				95	380	1080	2420	650	348	228	228	95	
22				108	450	1080	2110	650	348	228	228	95	
23				108	605	1080	1890	565	348	228	228	95	
24				108	650	1080	1670	565	348	228	228	95	
25				108	695	1080	1670	56 <b>5</b>	285	200	228	95	
26				108	795	1080	1670	565	285	178	200	95	
27				108	962	1080	1670	525	285	178	178	95	
28				108	1080	1200	1670	605	255	178	178	95	*******
29				108	1200	1260	1530	695	228	178	178	95	*******
30				108	1080	1400	1400	1020	228	178	178	95	
31				108		1460		962	228		178		•••••
	Cotal			2175	12894	41537	62970	27410	15470	7005	6592	3516.	
				87	430	1340	2100	884	499	234	213	117	•
	X			108	1200	2110	3060	1260	850	380	380	178	•••••
	n			44	178	850	1400	525	228	178	178	95	********
		•••••		4320	25600	82400	125000	54400	30700	13900	13100	6960	
				-3-0								5500	

#### TAYLOR RIVER AT ALMONT.

Location.—At highway bridge in Almont, in sec. 22, T. 51 N., R. 1 E., New Mexico principal meridian, 800 feet above the junction of Taylor and East Rivers.

Records Available.—July 27, 1910, to November 30, 1913; March 15, 1915, to December 2, 1916.

Drainage Area.—413 square miles.

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge Measurements.—Made from highway bridge.

Winter Flow.—Ice causes backwater.

Diversions.—There are no court decrees for diversions from Taylor River, but from Willow Creek, which enters above, there are decrees for 12 second-feet diversion.

Accuracy.—Conditions are favorable for accurate results; the estimates are considered good.

Co-operation.—Records furnished by the United States Geological Survey.

#### GUNNISON RIVER NEAR GUNNISON.

Location.—At highway bridge, 2 miles below Gunnison. Nearest tributary, Tomichi Creek, enters about 1 mile below.

Records Available.—November 27, 1910, to November 30, 1914; April 27, 1916, to August 14, 1916.

Drainage Area.—1,010 square miles.

Gage.—Bristol automatic gage.

Channel.—Somewhat shifting.

Discharge Measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter Flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 250 second-feet from Gunnison River, between this station and the forks at Almont, and diversions of 270 second-feet from intervening tributaries.

Co-operation.—Station is maintained in co-operation with the United States Geological Survey.

	_	•	D	ischar	ge of	Taylor	Biver :						
ъ-		_				Miles.		ide, 8,0					_
Da	•	Jan.	Feb.	Mar.	April	-	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1 2					$\frac{215}{215}$	$\frac{305}{258}$	$\begin{array}{c} 915 \\ 1020 \end{array}$	868 820	258 258	215 215	258 258	178 178	
3					235	258	778	778	258	215	235	178	
4			•••••		258	258	655	695	258	215	215	178	••••
5 6					$\frac{258}{258}$	$\frac{258}{258}$	618 545	655 <b>6</b> 95	$\frac{215}{215}$	$\begin{array}{c} 215 \\ 215 \end{array}$	$\begin{array}{c} 215 \\ 178 \end{array}$	178 178	
7					• 258	258	545	695	258	215	178	178	
8		•			280	258	545	618	385	195	178	178	
9 10			<b>-</b>		305 358	$\begin{array}{c} 258 \\ 280 \end{array}$	695 868	545 545	330 305	178 178	$\frac{178}{178}$	178 178	/
11					385	358	1270	545	305	215	178	178	
12					358	510	1410	510	305	178	178	178	
13 14					305 305	618 820	1080 968	510 478	305	178 178	178 178	178 178	
15				178	358	510	1020	415	305	178	195	178	
16				178	358	575	1080	358	305	178	195	178	
17 18				$\frac{178}{178}$	305 305	655 545	$\frac{1340}{1270}$	330 305	305 280	178 178	178 178	178 178	•
1.9				178	358	478	1270	305	258	178	178	178	
20				178	415	445	1560	305	258	178	178	178	
$\begin{array}{c} 21 \\ 22 \end{array}$		•	•	178 178	415	358 415	$1560 \\ 1480$	305	258	178 178	178	178	•
23				178	385 358	415	1410	<b>305</b> 305	258 258	178	1 <b>78</b> 178	178 178	
24				178	305	445	1270	305	258	178	178	178	
$\begin{array}{c} 25 \\ 26 \end{array}$		•••••		$\frac{178}{178}$	358 358	655 618	$\frac{1200}{1080}$	305 305	258	178	178 178	178	••
27				178	415	545	1020	358	258 258	358 305	178	178 178	
28				178	415	510	968	305	258	258	178	195	
29		•	••••••	$\frac{178}{215}$	478	545	868	305	215	258	178	178	
30 31				215	415	415 510	820	280 258	215 215	258	178 178	178	
	otal			3100	9994	13564	31128	14311	8380	6200	5843	5357	
Me	an			$\frac{182}{215}$	333	438	1040	462	270	207	188	179	
	x n			178	478 215	820 258	1560 545	868 258	$\frac{385}{215}$	358 178	258 178	195 178	
					19800		61900			12300			
			_			Maria	T04	-4 4 1					
	Di	ainag					River :				e Sea	Level.	
Da		_	e Ares	i, 413	Bquare	Miles.	Altiti	ide, 8,0	31 Pee	t Abov			Dec.
Da 1	У	Jan.	e Area Feb.	<b>Mar.</b>	<b>April</b>	Miles. May	Altitu June	<b>ide, 8,0</b> ; July	31 <b>Pee</b> Aug.	t Abov Sept.	Oct.	Nov.	Dec.
$\frac{1}{2}$	у	_	e Ares	i, 413	April 258 258	May 478 415	June 1140 1340	July 1380 1310	31 <b>Pee</b> Aug. 780 <b>6</b> 90	t <b>Abov</b> Sept. 276 276	Oct. 232 232	Nov. 210 210	Dec. 132 132
1 2 3	у 	Jan.	Feb.	Mar.	April 258 258 258 258	May 478 415 385	June 1140 1340 1640	July 1380 1310 1310	Aug. 780 690 650	Sept. 276 276 276 276	Oct. 232 232 232	Nov. 210 210 210	132
1 2 3 4	y  	Jan.	Feb.	Mar.	April 258 258 258 258 258	May 478 415 385 478	June 1140 1340 1640 1640	July 1380 1310 1310 1310 1180	Aug. 780 690 650 650	t Abov Sept. 276 276 276 276 276	Oct. 232 232 232 232	Nov. 210 210 210 210 210	132 132
1 2 3 4 5 6	y  	Jan.	Feb.	Mar.	April 258 258 258 258 258 258 258	May 478 415 385 478 778 968	June 1140 1340 1640 1640 1480 1340	July 1380 1310 1310 1380 1180 1180	Aug. 780 690 650 650 610 500	Sept. 276 276 276 276 276 276 276 276	Oct. 232 232 232 232 232 232 232	Nov. 210 210 210	132
1 2 3 4 5 6 7	y 	Jan.	Feb.	Mar. 	April 258 258 258 258 258 258 258 258 258	May 478 415 385 478 778 968 1200	June 1140 1340 1640 1640 1480 1340 1340	July 1380 1310 1310 1310 1180 1180 1050 935	Aug. 780 690 650 650 610 500	Sept. 276 276 276 276 276 276 276 276 276	Oct. 232 232 232 232 232 232 232	Nov. 210 210 210 210 210 210 210 210	132 132
1 2 3 4 5 6 7 8	y	Jan.	Feb.	Mar. 	April 258 258 258 258 258 258 258 258 258 258	May 478 415 385 478 778 968 1200 1410	June 1140 1340 1640 1480 1340 1340 1340 1480	July 1380 1310 1310 1180 1180 1180 1935	Aug. 780 690 650 650 610 500 500	Sept. 276 276 276 276 276 276 276 276 276 276	Oct. 232 232 232 232 232 232 465	Nov. 210 210 210 210 210 210 210 210 210 210	132 132
1 2 3 4 5 6 7	y    	Jan.	Feb.	Mar. 	April 258 258 258 258 258 258 258 258 258 258	May 478 415 385 478 778 968 1200	June 1140 1340 1640 1480 1340 1340 1340 1340 1710 1940	July 1380 1310 1310 1310 1180 1180 1050 935	Aug. 780 690 650 650 610 500	Sept. 276 276 276 276 276 276 276 276 276	Oct. 232 232 232 232 232 232 237 378	Nov. 210 210 210 210 210 210 210 210	132 132
1 2 3 4 5 6 7 8 9 10	y	Jan.	Feb.	305 258 258 280 280	April 258 258 258 258 258 258 258 258 258 258	May 478 415 385 478 778 968 1200 1410 1640 1780 1640	June 1140 1340 1640 1480 1340 1340 1340 1340 1480 1710 1940 2240	July 1380 1310 1310 1310 1180 1180 1050 935 935 990 1050	Aug. 780 690 650 650 610 500 500 500 500	Sept. 276 276 276 276 276 276 276 276 276 276	Oct. 232 232 232 232 232 232 237 237 378	Nov. 210 210 210 210 210 210 210 210 210 210	132
1 2 3 4 5 6 7 8 9	y	Jan.	Feb.	Mar. 	April 258 258 258 258 258 258 258 258 258 258	May 478 415 385 478 778 778 1200 1410 1640 1780 1640 1340	June 1140 1340 1640 1480 1340 1340 1340 1340 1710 1940	July 1380 1310 1310 1310 1180 1180 1050 935 935 990 1050	Aug. 780 690 650 650 610 500 500 500 500	Sept. 276 276 276 276 276 276 276 276 276 276	Oct. 232 232 232 232 232 237 237 237 378	Nov. 210 210 210 210 210 210 210 210 210 210	132
1 2 3 4 5 6 7 8 9 10 11 12 13	y	Jan.	Feb.	Mar.  305 258 280 280 288 258 258	April 258 258 258 258 258 258 258 258 258 258	May 478 415 385 478 968 1200 1410 1640 1780 1640 1080	June 1140 1340 1640 1480 1340 1340 12240 2240 22380	July 1380 1310 1380 1310 1180 1180 1050 935 930 1050 1050 935	Aug. 780 690 650 650 650 650 500 500 500 500 435	Sept. 276 276 276 276 276 276 276 276 276 276	Oct. 232 232 232 232 232 237 237 237 378 378 378 378	Nov. 210 210 210 210 210 210 210 210 210 210	132
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	y	Jan.	Feb.	Mar.  305 258 258 280 280 258 258 258 258 258 258	April 258 258 258 258 258 258 258 258 258 258	May 478 415 385 478 778 968 1200 1410 1640 1780 1080 1080	June 1140 1340 1640 1480 1340 1480 1710 12240 2240 22380	July 1380 1310 1310 13180 1180 1180 1050 935 990 1050 1050 1050 9935 830	Aug. 780 690 650 650 650 650 500 500 500 500 435 500 435	Sept. 276 276 276 276 276 276 276 276 276 405 378 325 325	Oct. 232 232 232 232 232 232 232 378 378 378 378 378	Nov. 210 210 210 210 210 210 210 210 210 210	132 132
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	y	Jan.	Feb.	Mar.  305 258 258 280 280 280 288 258 258 258 258 258 258 258 258 258	April 258 258 258 258 258 258 258 258 258 258	May 478 415 385 478 778 968 1200 1410 1640 1780 1640 1080 1080 1080 968	June 1140 1340 1640 1340 1340 1340 1340 12240 2240 22380 2380	July 1380 1310 1310 1180 1180 1050 1050 1050 1050 1050 10	Aug. 780 650 650 650 500 500 500 435 500 435 572	Sept. 276 276 276 276 276 276 276 276 276 405 378 325 325 325	Oct. 232 232 232 232 232 232 232 378 378 378 378 378 378	Nov. 210 210 210 210 210 210 210 210 210 170 170 151 151	132
1 2 3 4 5 6 7 8 9 10 11 12 14 15 16 17 18	y	Jan.	Feb.	Mar. Mar. 305 258 258 280 288 258 258 258 258 258 258 258 258 258	April 258 258 258 258 258 258 258 258 258 258	May 478 418 385 478 778 968 1200 1410 1780 1640 1780 1080 968 968 968	June 1140 1340 1640 1340 1340 1340 1240 2240 2240 22380 2380 2510	July 1380 1310 1310 1180 1180 1050 1050 935 990 1050 1050 990 1050 970 735 830 735 735	Aug. 780 690 650 650 500 500 435 572 5435	<b>Abov</b> Sept. 276 276 276 276 276 276 276 276 276 378 325 325 325 325	Oct. 232 232 232 232 232 232 232 237 378 378 378 378 378 378 378	Nov. 210 210 210 210 210 210 210 210 210 170 1751 1551 1551	132 132
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12334567891011123144567111231441561711892212223422267829301	y	Jan.	e Area	Mar.  305 258 258 258 258 258 258 258 258 258 25	April 258 2588 2588 2588 2588 2588 2588 2588	May 478 478 478 478 478 478 968 1200 1410 1640 1780 1640 1080 1080 968 868 868 878 778 778 778 778 778 778 7	June 1140 1640 1640 16480 11480 11480 11480 11480 12440 2240 2280 2380 2380 1880 1180 11380 11380 11380 11380 11380 11380 11380	146, 8,0°  July 1380 1310 1310 1180 1180 1050 935 990 1050 1050 1050 1050 500 435 435 6510 735 6510 735 6510 735	31 Pee Aug. 7890 6500 5000 5000 5000 5000 4355 572 5035 405 378 325 325 325 325 3264 1864	## Abov  Sept.  276 276 276 276 276 276 276 276 276 27	Oct. 222222222222222222222222222222222222	Nov. 210 210 210 210 210 210 210 210 210 210	132
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12334567890112331456789011223222678901121314567890112222244 MMair	y	Jan.	e Area	Mar.  305 258 258 258 258 258 258 258 258 258 25	April 2588 2588 2588 2588 2588 2588 2588 258	May 478 478 478 478 968 1200 1410 1640 1780 1640 1080 1080 968 968 968 978 778 778 778 778 778 778 778 778 77	June 1140 1640 1640 1640 1648 1340 1480 1480 1240 2240 2280 2380 2380 1880 1380 1380 1380 1380 1380 1380 1	146, 8,0°  July 1380 1310 1310 1180 1050 1050 1050 1050 1050 1050 10	31 Pee Aug. 7890 6500 6500 5000 5000 5000 4355 572 5035 405378 378 378 325 3206 276 276 276 138447 786	**E Abov Sept. 2766 2776 2776 2776 2776 2776 2776 277	Oct. 232223222322232223222322232223222322322	Nov. 210 210 210 210 210 210 210 210 210 210	132
12334567890112331456789011223222678901121314567890112222244 MMair	y  Total aanxn.	Jan.	e Area	Mar.  3058 2588 2588 2888 2888 2888 2888 2588	April 2588 2588 2588 2588 2588 2588 2588 258	May 478 415 385 478 968 1200 1410 1780 1640 1080 1080 1080 1080 1080 1080 1780 178	June 1140 1640 1640 1640 17340 17340 17940	146, 8,0°  July 1380 1310 1310 1310 1180 1050 935 930 1050 1050 1050 1050 1050 1050 1050 10	31 Pee Aug. 7890 6500 6500 5000 5000 5000 3785 600 4355 5720 4355 8378 378 378 325 325 276 276 138647 780 276 2760 2776	**E	Oct. 232 232 232 232 232 232 232 232 232 23	Nov. 210 210 210 210 210 210 210 210 210 210	132

	Discharge of Gunnison	River near Gunnison for 1916.	
Drainage	Area, 1,010 Square Miles	s. Altitude, 7,673 Peet Above Sea Level	•

D٤	ıy	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	•					1990	3320	3160	1450				
2		•••••	•••••			1990	3320	3000	1580	••••		•••••	
3	•••••	•••••			• • • • • • • • • • • • • • • • • • • •	1920	3400	2920	1520	•••••			•••••
4					•	2130	<b>356</b> 0	2680	1450		•••••		
5		*				2600	3640	2600	1330				
6		•••••	•••••			2680	3560	2600	1330			••••••	
7				•••••	•••••	3160	3480	2440	1220	•			
8		•••••	•••••	•••••	•	3400	3400	2440	1220				
9		••••	•		•	3730	3640	2520	1160	•••••	••••		
10			•	•••••	••••••	3990	4080	2600	1220	•			
11						3990	4170	2280	1110			····	
12		•••••	•••••	•••••		3820	4260	2060	950	•	·		
13	•	•	•••••	•	•••••	3730	4530	2060	1060				
14						3240	4620	1990	1220				<del>-</del>
15					•••••	2760	4530	1850	*******				
16		•••••	•	•••••		2520	4530	1850	•••••	•••••			
17		•••••				2360	4620	1640					
18			•••••		•	2130	4530	1580	•		•••••		
19						2200	4530	1520					
20						2280	4530	1450		·			
21		• • • • • • • • • • • • • • • • • • • •	•			2200	4170	1390					
22		•••••				2200	3900	1330		`			
23		•••••	••••••			2130	3560	1280					
24			•		•	1990	3400	1250			•••••		
25	•••••			•••••	•••••	2130	3240	1220	••				
26			•••••	•••••		2200	3160	1280	•••••		••••		
27	•	•••••	•••••		1810	2200	3160	1220	•••••				
28	••••••				2240	2280	3240	1390	*******				
29		• • • • • • • • • • • • • • • • • • • •		•	2550	2440	3240	1390		•			
30	•••••			•••••	2160	2840	3240	1330	•••••				
31		•••••	•••••			3080		1390					
	Total	•	•••••	•••••	8760	82310	114560	59710	30230	16050		•	
	an				2190	2660	3820	1930	975	535			
	X				•	3990	4620	3160	1580		•		
	n					1920	3160	1220			•••••	•	*******
Ac	re-ft.			•	17400	164000	227000	119000	60000	31800	•••••		•••••
				~ -									

Aug. 15 to Aug. 31, estimated 730 sec. ft. Sept. estimated 535 sec. ft.

Unless otherwise noted, all discharges are in cubic feet per second.

#### UNCOMPAHGRE RIVER AT OURAY.

Location.—Near highway bridge in sec. 31, T. 44 N., R. 7 W., New Mexico principal meridian, half a mile south of Ouray, Colo. Nearest tributary, Canon Creek, enters 150 feet below; nearest tributary above is Bear Creek.

Records Available.—January 25, 1911, to December 31, 1916; January 7 to March 17, 1908, records were kept at the power plant of the Ouray Electric Light & Power Co., 1 mile south of Ouray.

Drainage Area.—44 square miles.

Gage.—Vertical staff.

Channel.—Permanent, except at time of high water, when channel scours and fills.

Discharge Measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter Flow.—Little if any backwater from ice at this station, as

channel remains open during the year.

Diversions.—Water is diverted 2 miles above the station by the Ouray Light & Power Co. This amounts approximately to 8 second-feet and is returned to the river below the station.

Accuracy.—Results considered reliable.

# UNCOMPAHGRE RIVER BELOW OURAY.

Location.—At left bank 700 feet above the lowest bridge in Ouray, one-third mile below the railroad station. It is below all tributaries in Ouray.

Records Available.—May 12, 1913, to December 31, 1916.

Drainage Area.—76 square miles.

Gage.—Vertical staff, moved upstream from former location. No relation established between old and new gages.

Control.—Shifting.

Discharge Measurements.—Made from bridge and by wading.

Winter Flow.—Ice causes little or no backwater as the warm springs above prevent freezing.

Diversions.—There are no diversions which are not returned to the

river above the station.

Accuracy.—Owing to the high altitude of the station (7,700 feet), there are diurnal fluctuations of stage at certain seasons, due to alternate melting and freezing, and the mean daily gage height, based on morning and evening readings and the maximum stage for the 24-hour period, may be somewhat in error. For this reason, and because of the shifting character of the channel, the estimates can not be considered better than fair, or, possibly, good.

Co-operation.—Records furnished by the United States Geological

Survey.

Discharge of Uncompangre River at Ouray for 1915.

Drainage Area, 44 Square Miles. Altitude, 7,710 Feet Above Sea Level.

Day		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1 .		7	4	4	16	100	244	285	68	29	15	3.0	8
2	•••••	ż	ŝ	4	17	82	261	282	68	27	15	3.0	6
8 .		ė		4	22	68	206	263	66	26	14	3.0	ě
		Ř	ř	4	28	72	173	247	62	20	îi	3.0	ĕ
4 5		ž	5 5 5	1	42	72	182	294	58	18	18	3.0	ž
6 .		7	Ĕ	à	36	72	140	266	60	17	8	3.0	8
		ġ	5 5	Ā	25	62	122	253	58	17	š	8.0	6
7 8 . 9		8	5	ã	29	73	230	239	58	17	8	7	5
ğ.	•	š	ĕ	4	27	85	333	218	58	16	š	5	4.2
10		8	ĕ	4	21	102	420	206	48	16	8	4.6	4.2
ii .		ğ	Š	į.	38	184	518	244	47	16	8	3.0	3
12		8	5	4	51	263	378	253	47	16	8	1.3	2.7
13	••••••	š	ă	4	58	302	266	204	46	15	26	1.3	2.4
14		8	4	4	58	224	250	194	40	15.	39	2.1	1.8
15	••••••	ž	5	5	54	228	282	204	3Š	14	30	5.	1.5
10		7	5	5	46	234	323	184	37	14	ĭĭ	4.2	1.5
17	•••••	5	5	5	46	208	474	180	37	14	- 8	3.2	1.3
īš	•••••	7	5	5	44	199	530	154	37	14	ž	4.6	1.3
19		ė	4	5	58	156	570	144	37	13	ż	6	1.3
20	••••	ž	5	5	75	119	570	131	37	13	6	š	1.8
21		5	5	5	85	106	530	114	36	-8	. 6	10	1.3
22		4	5	6	79	102	550	114	36	Š	ĕ	9°	1.3
99		4		7	67	129	550	114	36	3	5	ğ	1.1
0.4		5	5 5	7	65	138	510	108	33	3	5	ž	1.1
25		6	5	Ż	68	182	458	92	33	95	5	1.8	1.1
26		7	5 5	ġ.	87	156	443	92	33	21	4.2	3	1.1
27		7	5	9	180	136	439	90	33	20	4.2	4.6	1.1
28		7	5	11	192	140	382	85	32	Ĩ8	3.8	7	1.3
29		7		10	269	144	317	80	32	16	3.4	7	1.3
30		7		9	184	148	288	80	32	15	3,0	Ř	1.5
31		3	*******	12		164		75	30		3.0		1.5
To		209	138	177	2067	4450	10945	5489	1374	551	291.6	148.5	92.2
Mean		6.74	4.93	5.71	68.9	144	365	177	44.3	18.4	9.41	4.95	2.97
Max.		9	6	12	269	802	570	294	68	95	30	.10	8
Min		3	. 4	4	16	62	122	75	30	3	3	1.3	1.1
Acre-	-ft.	414	274	351	4100	8850	21700	10900	2720	1090	579	295	183

Discharge	of Uncom	pahgre <b>E</b> iver	at Ouray	for 1916.
Drainage Area, 44	Square Mi	les. Altitude.	7.710 Peet	Above Sea Level.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.8	0.5	0.9	40	85	330	182	92	58	53	36	9
2	1.8	0.7	1.1	42	74	330	160	99	58	52	36	9
3	2.1	0.9	` 1.1	30	64	396	160	106	58	49	36	13
4	2.1	0.9	1.1	30	88	345	160	106	58	48	36	13
5	1.3	1.3	1.1	37	119	345	160	106	58	34	36	13
6	0.7	1.1	1.1	37	138	362	160	106	48	196	36	13
7	0.7	0.9	1.3	40	194	443	150	106	48	135	36	10
8	0.9	2.4	3.0	42	196	417	150	106	48	106	36	7
9	0.9	0.9	5.0	42	263	446	150	106	48	102	30	Ž
10	1.1	0.9	8.2	48	294	538	140	106	58	144	30	7
11	0.9	0.9	11.0	50	297	550	131	92	58	194	30	2 i
12	0.7	0.9	12.0	52	285	522	131	92	58	144	30	23
13	0.7	0.9	13	48	218	498	122	92	58	84	18	23
14	6.5	0.9	13	48	194	435	122	92	58	80	20	22
15	3.8	0.9	15	46	131	432	122	92	58	61	23	23
16	0.9	0.9	15	54	131	392	122	86	58	75	30	18
17	0.9	1.1	15	58	114	388	114	86	58	73	ĭĭ	ĩ2
18	0.7	1.1	40	62	122	368	106	80	58	63	30	22
19	0.7	1.1	40	66	140	365	92	80	64	75	30	23
20	0.9	1.1	40	70	140	362	92	80	68	72	30	16
21	0.9	1.5	48	74	140	358	92	75	68	72	30	10
22	0.9	1.8	56	78	131	294	86	75	62	41	18	16
23	0.9	26.0	40	68	173	236	86	64	58	41	23	18
24	0.9	15.0	40	80	199	247	86	64	56	42	23	18
25	0.9	0.9	30	100	201	231	86	58	52	28	23	18
26	0.7	0.9	29	120	216	231	80	58	48	61	23	18
27	0.7	0.9	30	140	194	206	92	58	57	49	10	18
28	0.7	0.9	30	162	221	206	80	48	58	41	23	18
29	0.7	0.9	42	126	224	206	80	48	59	41	23	18
30	0.7		32	72	253	182	80	40	58	39	23	18
31	0.5		30		342		106	48		39		18
Total	38.6	69.1	644.9	1962	5581	10661	3680	2547	1712	2334	819	492
Mean	1.25	2.38	20.8	65.4	180	355	119	82.2	57.1	75.3	27.3	15.9
Max	6.5	26	56	162	342	550	182	106	68	196	36	23
Min	9.5	0.5	0.9	30	64	182	80	40	48	28	10	7
Acre-ft.	76.9	137	1280	3890	11100	21100	7320	5050	3400	4630	1620	978

# Discharge of Uncompander River below Oursy for 1915. Drainage Area, 76 Square Riles. Attitude, 7,710 Peet Above Sea Level. Jan. Feb. Mar. April May June July Aug Sent Oct Nov.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	22	22	27	40	125	384	478	141	58	51	31	32
2	21	25	28	44	113	369	472	128	58	51	31	29
3	20	24	27	62	90	263	426	119	58	49	31	29
4	20	21	27	68	87	233	384	115	55	44	31	29
5	. 21	10	27	71	87	214	472	111	55	42	31	29
6	20	10	28	69	79	201	432	121	54	41	30	31
7	21	15	29	58	72	172	395	121	54	41	35	29
8	19	20	29	55	75	214	359	121	51	41	33	28
9	20	25	29	53	79	438	350	121	51	39	32	26
10	21	27	29	45	82	682	331	101	51	39	32	26
11	25	29	30	65	217	857	374	100	51	38	28	25
12	22	28	30	71	321	530	405	100	49	38	21	25
13	22	26	30	87	416	395	364	99	49	38	22	26
14	22	25	30	87	416	410	364	85	47	38	26	28
15	22	25	30	83	263	443	359	79	47	38	26	28
16	23	25	31	79	283	600	369	77	45	37	26	28
17	18	25	31	75	255	884	345	74	45	35	29	28
18	23	25	32	75	214	1110	321	71	45	33	29	28
19	22	24	32	89	189	1180	278	68	45	33	34	28
20	21	25	32	92	162	1090	259	67	43	33	34	28
21	20	. 26	33	109	149	1070	244	66	39	35	36	28
22	19	26	33	101	130	1130	244	65	39	35	34	28
23	17	28	33	94	178	1070	237	62	31	35	34	26
24	18	28	37	87	169	983	227	62	31	35	34	26
25	18	28	33	101	211	947	189	59	27.8	35	28	26
26	20	26	36	111	207	911	192	58	62	32	29	26
27	20	26	39	181	162	798	175	58	59	32	32	26
28	21	26	43	220	167	586	164	58	54	32	34	26
29	22		41	259	172	551	159	58	54	32	34	28
30	24		39	255	201	404	159	58	51	$\bf 32$	34	28
31	18		41		207		149	58		31		28
Total		670	996	2886	<b>5</b> 5 <b>78</b>	19119	9676	2681	1709	1165	921	856
Mean	20.7	23.9	32.1	96.2	180	637	312	86.5	57.0	37.6	30.7	27.6
Max		29	43	259	416	1180	478	141	278	51	36	32
Min		10	27	40	72	172	149	58	31	31	21	25
Acre-ft.	1270	1330	1970	5720	11100	37900	19200	5320	3390	2310	1830	1700

Discharge of Uncompander River below Ouray for 1916.

Drainage Area, 76 Square Miles. Altitude, 7,710 Feet Above Sea Level.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	28	28	32	56	142	658	402	258	91	59	63	40
2		28	33	58	155	650	402	264	91	61	63	40
3		29	33	45	122	690	402	290	91	61	63	40
4		29	33	45	107	860	402	296	91	63	63	40
5		31	35.	<b>56</b>	125	533	402	293	91	54	63	40
6	30	21	35	54	207	592	397	290	75	274	63	40
7	26	29	35	45	406	592	397	286	75	202	63	28
8	29	32	38	39	397	910	379	283	75	222	59	24
9	28	28	42	54	384	931	388	280	75	193	58	24
10	31	28	47	58	520	1010	388	220	96	160	54	24
11	29	30	53	. 80	514	820	384	217	91	193	54	35
12		30	53	80	402	1050	374	214	71	176	54	35
13		27	58	61	249	1070	374	212	71	156	35	38
14		30	63	58	249	1040	374	210	71	142	38	38
15		27	66	. 61	249	784	384	207	71	135	39	38
16		30	71	80	189	1040	379	204	71	135	40	37
17		30	69	80	142	920	379	160	71	122	42	38
18		33	69	95	155	766	370	100	71	110	42	39
19		35	69	110	217	757	304	160	71	84	40	39
20	28	• 32	72	125	198	706	237	160	69	96	40	34
21		34	75	140	198	698	170	160	69	110	40	31
22		36	77	156	198	457	191	160	71	107	40	32
23		34	65	155	217	457	170	110	71	84	39	32
21	0.77	32	65	156	222	457	170	110	65	.84	39	33
25	0.77	31	46	197	252	457	191	110	59	122	39	33
26		31	46	238	283	457	191	96	54	110	39	34
27 28		31	43	279	290	457	195	96	56	94	39	34
		31 31	46	321	290	457	200	96	56	94 73	39 39	34 34
0.0		91	58	238	397	402	204	91	54	73	39	35
30	27	•	43	155	552	402	210	82	54		99	35
Total.		878	46 1616	3375	546	21080	252 9662	91	2188	$\begin{array}{c} 63 \\ 3712 \end{array}$	1428	1078
Mean		30.3	52.1	112	$8574 \\ 277$	703	312	5866 189	72.9	120	47.6	34.8
Max		36	77	321	552	1070	402	296	96	274	63	40
Min		21	32	321	107	402	170	82	54	54	35	24
Acre-ft.		1740	3200	6660	17000	41800		11600	4340	7380	2830	2140
		1140		0000	11000	41900	19200	11000	707U	1000	2000	2110

Unless otherwise noted, all discharges are in cubic feet per second.

# UNCOMPAHGRE RIVER AT MONTROSE.

Location.—At highway bridge, one-fourth mile west of Montrose. Nearest important tributary, Happy Canyon Creek, enters about 2 miles below.

Records Available.—April 22, 1903, to December 16, 1913; March 8, 1915, to October 31, 1916.

Drainage Area.—565 square miles.

Gage.—Vertical staff; location and datum unchanged.

Channel.—Extremely shifting.

Discharge Measurements.—Made from the bridge.

Winter Flow.—Although ice forms along the edges of the river during the winter months, the river does not freeze over. Observations of gage heights are, however, discontinued during November, December, January, February, and March.

Diversions.—Uncompander River is so over-appropriated that the United States Reclamation Service is constructing a tunnel and canal to divert 1,300 second-feet from Gunnison River into the Uncompander

above Uncompangre.

Accuracy.—Although the channel is extremely shifting, sufficient discharge measurements were made to afford data for estimates by the indirect method, and these estimates may be considered reliable.

Co-operation.—Records furnished by the United States Geological

Survey.

### · UNCOMPAHGRE RIVER NEAR DELTA.

Location.—At highway bridge on township line between Tps. 95 and 96, 2 miles south of Delta; no tributaries between the station and the mouth and no important tributaries for several miles upstream.

Records Available.—April 29, 1903, to December 18, 1913; March 8, 1915, to October 31, 1916.

Drainage Area.—1,130 square miles.

Gage.—Vertical staff.

Channel.—Extremely shifting.

Discharge Measurements.—Made from the bridge.

Winter Flow.—The flow is probably not materially affected by ice, although ice forms along the edges and slush ice frequently occurs. Observations are discontinued during the winter months.

Diversions.—The normal flow is diverted during the irrigation season by ditches above the station, so that the records represent largely return seepage water.

Accuracy.—Estimates only fair, or, for certain periods, possibly good, measurements being insufficient to permit use of indirect method for shifting channels to fullest extent.

Co-operation.—Records furnished by the United States Geological Survey.

Discharge of Uncompanyre River at Montrose for 1915.

Drainage Area, 565 Square Miles. Altitude, 5,820 Feet Above Sea Level.

Day	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1			•••••	******	57	400	196	422	168	84	124	8	70
2				*******	27	247	364	258	111	111	124	8	78
3					35	168	210	196	106	117	367	9	78
4					42	155	168	196	84	47	232	13	85
5	•••••				49	196	190	240	102	21	208	13	114
6		••••••		•••••	57	210	378	400	102	84	169	13	85
7	•		•••••		125	193	176	181	144	92	94	13	85
8				57	35	176	258	275	275	42	73	13.	82
9	•••••			71	20	210	204	240	155	27	74	13	78
10		•••••		35	20	210	355	295	150	75	78	1,3	85
11				31	14	240	860	323	163	72	64	18	78
12			•••••	27	9	335	778	391	139	68	52	13	70
13				35	38	445	445	315	117	92	46	12	70
14		•	•••••	35	92	490	225	295	75	96	29	13	57
15		•••••		35	84	275	295	258	92	92	78	18	57
16		•••••	•••••	35	92	335	225	155	84	42	50	42	
17		•		57	71	400	540	102	84	25	46	42	
18	•••••			71	132	347	590	92	75	84	40	46	
19	•			71	303	176	832	68	87	105	188	52	
20		•		87	210	210	950	54	87	92	33	49	
21	•••••	•••••	•••••	87	347	128	750	54	39	84	32	57	•
22	•••••	•••••	• • • • • • • • • • • • • • • • • • • •	87	219	128	832	144	115	102	22	57	
23				87	196	160	1020	150	87	98	29	57	•••••
24		•		105	146	155	750	155	102	102	29	57	
25	•	•••••		87	137	155	640	258	102	98	29	57	•••••
26	•	•••••		87	89	144	750	258	60	219	20	37	
27	•••••	•••••	• • • • • • • • • • • • • • • • • • • •	105	141	111	668	315	111	105	12	57	•••••
28	•			88	343	68	590	258	92	89	42	57	•••••
29				71 71	327	96	445	176	92	132	13	46	•••••
30		•••••	••••••	57	778	115 115	445	225	84	126	8	57	
31			• • • • • • • • • • • • • • • • • • • •		4005		1 7 1 8 0	144	84		8		2222
	otal	······	•	1579	4235	6793	15129	6893	3368	2623	2418	950	1172
	an			65.8	141	219	504	222	109	87.4	77.8	81.7	78.1
			• • • • • • • • • • • • • • • • • • • •	105 27	778 9	490 68	1020	422 54	275	219	367	57	******
	1,	•••••		3130	8390		168 30000		89 6700	21	4700	1008	
ACI	e-ft.	•••••						13600		5200	4780	1890	2320
	Unle	ess ot	herwis	e note	d, all	dischar	ges are	in cub	oic feet	per s	econd.		

	Di	ainag									~	The A off.	
Da;		Jan.	Feb.		April		June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1						188	264	320	196	232	52		
2		•••••	•		•	136	355	351	481	202	94		
3		•••••		••••••	•	114	463	328	375	248	114		
5					54	$\frac{114}{202}$	392 405	355 324	703 500	217 238	124 124	•	
6						271	486	254	703	153	202		
7			•••••		•••••	316	477	523	832	124	281		
8		•••••	•	••••••		264	547	328	532	124	355	•••••	
ő					*******	367 396	575 518	211 245	454 396	180 343	`258 258		•••••
ĭ						335	248	458	248	107	396		
12						258	388	504	281	202	305		
13		••	•••••			238	728	295	316	174	202		
5					•••••	238 238	594 384	- 264 - 267	1200 463	180 148	202		
6					136	281	401	405	509	136	248 208		
7					148	298	379	347	509	114	264		
.8		•			136	298	422	331	355	114	238		
9		•••••	,	••••••	94 52	375 396	427 427	281 284	281	114	238		
21					217	375	384	254	217 174	107 <b>124</b>	. 129 85	• • • • • • • • • • • • • • • • • • • •	•••••
2					226	418	316	258	136	114	94	•	
3					238	335	339	261	217	114	89		
4	•			•••••••	305	264	409	375	202	114	94		
5		•••••	•••••	•	248	328	371	369	238	99	94.		
6		••••	••••••		238 169	298 <b>298</b>	401 445	542 547	217 161	94	94	••••••	
		••••••			217	343	396	392	169	114 94	89 94		•••••
9					375	335	703	316	217	70	78		•••••
0			•••••		202	375	. 355	585	248	57	64	,	
1_						440		405	217		64		
Т	'ntai				3001	9132	12999	10969	11747	4451	5231	•••••	
Æ9₽	an				200	295	433	354	379	148	169	•••••	
ea Vaz	an x					295 440	433 728	354 585	1200	343	169 396		
Mea Maz Min	an x				200	295	433	354 585 211	1200 136	343 57	169 396 52		
Mea Maz Min	an x 1				200  5950	295 440 114 18100	433 728 248 25800	354 585 211 21800	1200 136 23300	343 57 8810	169 396 52 10400		
Mea Maz Min	an x l e-ft,		Disc	harge	200 5950	295 440 114 18100	433 728 248 25800	354 585 211 21800	1200 136 23300	343 57 8810	169 396 52 10400		
Mea Max Min Acr	an x 1 re-ft, <b>D</b> r	ainag	Disc e Area	harge, 1,130	5950 of Un Square	295 440 114 18100 compal Miles	433 728 248 25800 1gre Ri	354 585 211 21800 Ver at ade, 4,9	1200 136 23300 Delta 70 Fee	343 57 8810 For 19]	169 396 52 10400 L5.	Level.	
Mea Max Min Acr	an x 1 re-ft, <b>D</b> r		Disc	harge, 1,130	5950 of Un Square	295 440 114 18100 compal May	433 728 248 25800 1gre Ri Altit	354 585 211 21800 <b>ver at</b> <b>ude, 4,9</b> July	1200 136 23300 Delta 1 70 Fee Aug.	343 57 8810 For 191 t Abov	169 396 52 10400 15. 70 Sea Oct.	Level.	Dec
Mea (a) Min	an x h re-ft. <b>Dr</b>	ainag	Disc e Area	harge, 1,130	5950 of Un Square	295 440 114 18100 compal Miles	433 728 248 25800 1gre Ri	354 585 211 21800 Ver at ade, 4,9	1200 136 23300 Delta 1 70 Fee Aug. 108	343 57 8810 <b>for 19</b> 1 <b>t Abo</b> v Sept. 50	169 396 52 10400 <b>15.</b> <b>7e Sea</b> Oct. 191	Level. Nov. 98	Dec 20
Mean Min Acr	an x 1 re-ft, <b>D</b> x	ainag Jan.	Disc Area Feb.	harge, 1,130	200 	295 440 114 18100 compal • May 750 325 164	433 728 248 25800 <b>1gre Bi</b> Altitu June 118 191 164	354 585 211 21800 Ver at ide, 4,9 July 152 129 98	1200 136 23300 Delta 1 70 Fee Aug. 108 98	343 57 8810 For 191 t Abov	169 396 52 10400 15. 70 Sea Oct.	Level.	Dec 20 20
Alex Max Min Cr Day 1 2 3	an x l re-ft, <b>Dr</b>	Jan.	Disc Area Feb.	harge , 1,130 Mar.	200 	295 440 114 18100 compal • May 750 325 164 118	433 728 248 25800 <b>1gre Ri</b> Altit June 118 191 164 152	354 585 211 21800 Ver at: ade, 4,9 July 152 129 98	1200 136 23300 Delta 1 70 Fee Aug. 108 98 89	343 57 8810 For 191 t Abov Sept. 50 50 64 64	169 396 52 10400 15. 70 Sea. Oct. 191 220 345 365	Nov. 98 152 140 129	Dec 20 20 20
Aea Ain Cr Day 1 2	an x l re-ft, <b>Dr</b>	Jan.	Disc Area Feb.	harge, 1,130	200 	295 440 114 18100 compal May 750 325 164 118 103	433 728 248 25800 <b>1gre Bi</b> Altitude June 118 191 164 152 152	354 585 211 21800 <b>ver at</b> : <b>ude, 4,8</b> July 152 129 98 89 118	1200 136 23300 Delta 1 70 Fee Aug. 108 98 89 89	343 57 8810 For 191 t Abov Sept. 50 50 64 64 64	169 396 52 10400 <b>15.</b> <b>9e Sea</b> Oct. 191 220 345 365 285	Nov. 98 152 140 129 140	Dec 20 20 20 20 20
Mean Min Cor 1 2 3 4 5 6	Dr	Jan.	Disc e Area Feb.	harge, 1,130	200 	295 440 114 18100 compal May 750 325 164 118 103 140	433 728 248 25800 <b>1gre Ri</b> - Altit June 118 191 164 152 152 435	354 585 211 21800 <b>ver at</b> 16, 4,8 July 152 129 98 89 118 140	1200 136 23300 Delta 1 770 Fee Aug. 108 98 89 89 89	343 57 8810 <b>for 191</b> <b>t Abov</b> Sept. 50 64 64 64 64	169 396 52 10400 15. 76 Sea Oct. 191 220 345 365 365 268	Nov. 98 152 140 129 140 140	Dec 20 20 20 20 20 20
Alex Max Min Cr Day 1 2 3	an x h re-ft, Dr	ainag Jan.	Disc Area Feb.	harge, 1,130	200 	295 440 114 18100 compal May 750 325 164 118 103	433 728 248 25800 <b>1gre Bi</b> Altitude June 118 191 164 152 152	354 585 211 21800 <b>ver at</b> : <b>ude, 4,8</b> July 152 129 98 89 118	1200 136 23300 Delta 1 70 Fee Aug. 108 98 89 89 89 89	343 57 8810 For 191 t Abov Sept. 50 64 64 64 64 72	169 396 52 10400 <b>15.</b> <b>Sea.</b> Oct. 191 220 345 365 285 226 220	Nov. 98 152 140 129 140 140 152	Dec 20 20 20 20 20 20 20
Mean Min Cr Day 1 2 3 4 5 6 7	Dr	Jan.	Disc Area Feb.	Sharge, 1,130 Mar	200 5950 of Un Squar April 64 57 57 68 80 98 98 98 164 98	295 440 114 18100 compal May 750 325 164 118 103 140 98 89 80	433 728 248 25800 <b>agre Bi</b> Altit June 118 191 164 152 435 325	354 585 211 21800 Ver at: ade, 4,9 152 129 98 89 118 118	1200 136 23300 Delta 1 770 Fee Aug. 108 98 89 89 89	343 57 8810 <b>for 191</b> <b>t Abov</b> Sept. 50 64 64 64 64	169 396 52 10400 <b>15.</b> <b>Ye Sea.</b> Oct. 191 220 345 365 285 285 220	Nov. 98 152 140 129 140 140 152 178	Dec 20 20 20 20 20 20 20 20
Mean Man Man Man Man Man Man Man Man Man M	Dr	Jan.	Disco Area	harge, 1,130 Mar.  152 140 140	200 5950 of Un Squar April 64 57 68 80 98 164 98	295 440 114 18100 compal May 750 325 164 118 103 140 98 89 80 98	433 728 248 25800 agre Ei Altitu June 118 191 164 152 162 435 325 235 191	354 585 2111 21800 <b>Ver at</b> <b>ude, 4,9</b> 152 129 98 89 118 140 118 98	1200 136 23300 <b>Delta</b> 1 70 <b>Fee</b> Aug. 108 89 89 89 89 89 191 152 140	343 57 8810 For 191 t Abov Sept. 50 64 64 64 64 72 72	169 396 52 10400 <b>15.</b> <b>Sea.</b> Oct. 191 220 345 365 285 226 220	Nov. 98 152 140 129 140 140 152	Dec 20 20 20 20 20 20 19
Mean Man Nation 12 3 4 5 6 7 8 9 0 1	Dr	Jan.	Disc Area Feb.	harge, 1,130 Mar.  152 140 140 129	200 5950 of Un Squar April 64 57 68 80 98 164 98 98 184	295 440 114 18100 compal May 750 325 164 118 103 140 98 89 89	433 728 248 25800 agre Ei Altit June 118 1164 1152 435 325 235 235 191	354 585 211 21800 <b>Ver at</b> <b>ude, 4,9</b> 152 129 98 89 118 140 98 108 98 89 89	1200 136 23300 Delta : '70 Fee Aug. 108 89 89 89 89 89 191 152 140 118	343 57 8810 <b>Cor 191</b> <b>t Abov</b> Sept. 50 64 64 64 64 72 72 80 64 64	169 396 10400 15. Fo Sea Oct. 191 220 345 285 285 220 220 286 164	Nov. 98 152 140 140 152 178 164 191	Dec 20 20 20 20 20 20 20 19 17 15
Mean Man Nam	Dr	Jan.	Disc. Area Feb.	harge, 1,130 Mar.  152 140 140 129 118	200 5950 of Un Squar April 57 68 80 98 98 164 57 68 89 88 98	295 440 114 18100 compal May 750 325 164 118 108 140 98 80 98 98 129	433 728 248 25800 agre Ed. Altit June 118 191 164 152 435 325 235 191 410	354 585 211 21800 <b>ver at</b> <b>nde, 4,8</b> July 152 129 98 89 118 98 108 98 89 140	1200 136 23300 Delta 1 70 Fee Aug. 108 98 89 89 80 98 191 152 140 118	343 57 8810 For 191 t Abov Sept. 50 64 64 64 72 80 64 64 64 64	169 396 52 10400 L5. Fe Sea. Oct. 191 220 2345 365 285 268 220 220 285 164 191	Nov. 98 152 140 140 140 152 178 164 191 152	Dec 20 20 20 20 20 20 20 19 15 19
Mean Man Man Man Man Man Man Man Man Man M	Dr	Jan.	Disc.	harge, 1,130 Mar.  152 140 129 118 129	200 5950 of Un Equar April 67 57 68 80 98 98 164 98 89 84 89 87	295 440 114 18100 compal May 750 325 164 1103 1403 98 89 89 89 129 250	433 728 248 25800 agre mi Altitu June 118 191 164 152 152 435 235 235 235 235 235 235 255 255 255 2	354 585 211 21800 <b>ver at</b> <b>ude, 4,5</b> July 129 98 89 118 140 118 98 108 98 89 140 1140	1200 136 23300 <b>Delta</b> 1 70 <b>Fee</b> Aug. 108 98 89 89 89 89 191 152 140 118 108	343 57 8810 For 191 t Abov Sept. 50 64 64 64 72 72 72 80 64 64 64 64 64	169 396 52 10400 L5. Fe Sea Oct. 191 220 345 365 225 220 220 285 164 161 191	Nov. 98 152 140 140 152 178 164 191 155 164	Dec 20 20 20 20 20 20 19 175 19
Team 12345678901234	Dr	Jan.	Disc. Area Feb.	harge, 1,130 Mar.  152 140 140 129 118	200 5950 of Un Squar April 57 68 80 98 98 164 57 68 89 88 98	295 440 114 18100 compal May 750 325 164 118 108 140 98 80 98 98 129	433 728 248 25800 agre Ed. Altit June 118 191 164 152 435 325 235 191 410	354 585 211 21800 <b>ver at</b> <b>nde, 4,8</b> July 152 129 98 89 118 98 108 98 89 140	1200 136 23300 Delta 1 70 Fee Aug. 108 98 89 89 80 98 191 152 140 118	343 8810 For 191 t Abov Sept. 50 64 64 64 64 64 64 64 64 64	169 396 52 10400 L5. Fe Sea. Oct. 191 220 345 365 268 220 285 164 191 206	Nov. 98 152 140 140 140 152 178 164 191 152 164	Dec 20 20 20 20 20 20 19 17 15 19 19
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1ea 1an 12345678901234567890	Dry	ainag Jan.	Disco Area	152 140 140 129 118 129 118 129 164 152	200	295 440 114 18100 compal May 750 325 164 118 109 80 98 80 98 129 250 450 365 365 367 235 191	433 728 248 25800 <b>1970 Edi</b> - 118 191 164 152 152 152 435 325 235 191 410 570 515 250 410 250 430	3585 211 21800 ver at ude, 4,3 152 129 98 89 118 118 98 118 118 98 108 89 89 89 89 89 89 89 89 89 89 89 89 89	1200 136 23300 Delta: '70 Fee Aug. 108 89 89 89 89 191 152 140 118 108 98 98 98 108 118 118 108 88 88 88 88 88 88 88 88 88 88 88 88 8	343 8810 For 191 5 Abov Sept. 50 64 64 64 64 64 64 64 64 64 64 64 80 80 80 89 89	169 396 52 10400 IS. Oct. 191 220 345 285 268 220 220 220 220 220 220 220 220 220 22	Nov. 988 152 140 140 140 140 140 152 178 164 191 191 191 191 220 220	Dec 20 20 20 20 20 17 15 19 19 19 19 19 19 19 19 19 19 19 19 19
Team.c at 23456789012345678901	Dr	ainag Jan.	Disco Area	harge, 1,130 Mar.  152 140 140 129 118 129 114 98 118 129 164	200	295 440 114 18100 compal May 750 3254 118 108 108 89 80 98 89 129 250 3065 388 317	433 728 248 2580 01gre Ei Altit June 118 152 152 435 235 235 191 410 570 515 250 191 250 250 240	354 585 211 21800 <b>ver at</b> <b>ude, 4,9</b> 152 129 98 89 140 118 98 108 98 89 140 118 98 89 88 89 140 108 98	1200 136 23300 Delta : '70 Fee Aug. 108 89 89 89 89 89 89 191 152 140 118 98 98 140 118	343 347 8810 For 191 t Abov Sept. 500 644 644 642 772 804 644 644 642 780 89 89 89 89 89 88	169 396 52 10400 <b>15.</b> <b>7• Sea.</b> Oct. 191 2205 365 285 268 220 285 164 191 206 162 220 220 220 220 220 220 220 220 220 2	Nov. 98 152 140 140 140 152 178 164 164 191 220 220 220 220	Dec 20 20 20 20 19 11 11 11 11 11 11 11 11 11 11 11 11
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Tean of the part o	Dry	ainag Jan.	Disco Area	152 140 140 129 164 152 164 129 164 118 118 118 118 118 118 118 118 118 11	200	295 440 114 18100 Compal Exical 750 325 164 118 1098 89 98 129 250 305 365 365 365 365 365 365 365 365 365 36	433 728 248 25800 agra &i 118 191 162 152 152 325 235 191 410 570 515 250 250 410 630 630 630 630 630 630 630 630	3585 215 21800 <b>ver at</b> <b>ude, 4,9</b> 152 129 98 89 118 108 98 89 140 118 108 98 89 140 118 108 98 89 64 64 64	1200 136 23300 Delta: '70 Fee Aug. 108 89 89 89 89 89 191 152 140 118 108 108 118 118 108 140 118 164 64 64 72	347 8810 8810 For 191 5 Abov Sept. 50 644 644 722 80 80 80 89 89 89 98 98 98 98 98 98 98 98 98 98	169 396 52 10400 15. Ye Sea Oct. 191 220 345 220 220 220 220 220 220 220 164 164 129 140 129 140 140 118	Tevel.  Nov. 988 152 140 140 140 140 140 140 140 140 140 140	Decc 20 20 20 20 20 19 11 11 11 11 11 11 11 11 11 11 11 11
Mean 12345678901234567890123456	Dry	Jan.	Disc.	152 140 140 129 118 129 114 152 164 161 129 118 129 114 129 118 129 118 129 118 129 118 129 118 129 118 129 118 129 118 129 118 129 118 129 118 129 118 129 118 129 118 129 118 129 118 129 118 129 129 129 129 129 129 129 129 129 129	200	295 440 114 18100 compel May 750 3264 118 108 80 98 89 129 450 3065 3887 235 191 268 220 164 178 191	433 728 248 2580 mi Altitude June 118 152 152 435 325 235 191 250 410 630 630 630 5410	354 585 211 21800 ver at ide, 4,9 152 129 98 89 118 108 98 108 98 108 98 108 98 108 98 64 64 64 108	1200 136 23300 <b>Delta</b> : '70 <b>Fee</b> Aug. 108 89 89 89 89 89 115 118 118 118 118 118 118 118 118 118	347 8810 For 191 t Abor Sept. 500 644 644 642 772 804 644 644 642 780 889 988 988 988 988 988	169 396 10400 15. 7• Sea Oct. 191 2205 365 285 268 220 285 164 191 206 206 220 220 220 2164 140 140 140 140 140 188	Nov. 98 152 140 140 140 140 152 178 164 164 191 220 220 220 220 220 220 164 178 179 1	Dec 20 20 20 20 20 19 17 15 19 19 19 19 19 19 19 19 19 19 19 19 19
1623456789012345678901234567	Dry	Jan.	Disc.	152 140 140 129 118 119 164 164 164 164 164 118 129 118 118 118 129 118 118 129 118 119 119 119 119 119 119 119 119 11	200	295 440 114 18100 compal May 750 3254 1118 103 98 80 98 129 250 305 368 317 268 317 2191 220 164 1791 164	433 7248 248 2580 <b>Alti</b> June 118 152 152 435 235 235 191 250 250 630 630 630 630 630 630 642 412	3545 5211 21800 ver at ude, 4,9 1522 1298 89 1188 988 140 1188 988 140 1188 988 1089 140 1188 988 1089 140 1188 988 1089 140 1188 1089 140 1188 1089 140 1188 1089 140 1188 1089 140 1188 1089 140 1188 1089 140 1188 1089 140 1188 1089 140 1188 1089 140 1188 1089 140 1188 1089 140 1188 1089 140 1188 1089	1200 136 23300 Delta: '70 Fee Aug. 108 98 89 89 89 89 89 89 191 108 98 98 108 118 118 118 118 140 118 140 118 140 140 140 140 140 140 140 140 140 140	347 8810 8810 For 191 t Abov 50 500 664 664 672 772 800 800 808 988 988 988 988 988 988 988	169 396 10400 15. Ye Sea Oct. 191 220 385 2285 220 220 220 220 220 220 220 220 164 191 206 152 252 252 252 164 140 140 140 140 140 140 140 140 140	Nov. 98 152 140 140 152 178 191 191 191 191 191 191 191 191 191 19	Dec 20 20 20 20 20 17 15 19 19 19 19 19 19 19 19 19 19 19 19 19
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Alainr 01234567890123456789012345678901	Dry	Jan.	Disc.	152 140 140 129 118 129 114 152 164 164 129 118 129 114 118 129 129 129 129 129 129 129 129 129 129	200	295 440 114 18100 compel 755 164 1188 108 89 89 129 450 3055 3887 235 1268 3887 235 1291 164 1188 1191 1188 180	438 728 248 2580 mi Altit June 118 152 152 152 235 235 191 250 410 630 630 630 630 640 630 640 630 630 630 630 630 630 630 630 630 63	3545 5855 2110 21800 ver at 104, 4,9 1522 1298 89 1182 108 988 108 988 108 988 108 988 108 988 108 988 108 989 118 108 989 118 108 989 118 108 989 118 108 989 118 108 108 108 108 108 108 108	1200 136 23300 Pelta: '70 Fee Aug. 108 89 89 89 89 89 115 118 108 118 118 118 118 118 118 118 118	3437 8810 For 1915 Abov Sept. 500 664 664 664 664 664 664 664 664 664 6	169 396 52 10400 <b>15.</b> <b>Fe Sea.</b> Oct. 191 2245 365 2855 268 220 286 164 129 164 140 140 140 140 140 140 140 140 140 14	Nov. 98 152 140 140 140 140 140 140 152 178 164 191 191 191 220 220 220 220 220 191 164 178 178 178 178 178 178 178 178 178 178	Decc 200 200 200 200 199 17 15 199 199 199 199 199 199 199 199 199
Mean 1234567890123456789012345678901 T	Dry	Jan.	Disco Area Feb.	152 140 140 129 118 129 114 98 118 129 164 146 146 148 129 118 118 129 118 149 118 129 118 129 118 129 139 140 140 140 140 140 140 140 140 140 140	200	295 440 114 18100 pal 18100 pal 18100 pal 18200 3254 11183 1040 889 1290 4500 3305 3888 3175 1291 2620 1648 1191 1164 11298 1108 6473	433 728 248 2580 agre ki 118 152 152 152 325 235 191 250 250 191 250 250 630 630 630 630 630 630 630 630 630 63	3545 21121 211800 ver at 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	1200 136 23300 Delta: '70 Fee Aug. 108 98 89 89 89 89 89 191 108 98 98 108 118 118 118 118 118 64 64 64 64 64 64 64 64 64 64 64 64 64	343 8810 8810 For 191 4 Abov 50 500 644 644 644 644 644 644 644 644 644 6	169 396 10400 15. Fe Sea Oct. 191 220 345 228 220 220 220 220 220 220 220 220 220	Nov. 98 152 140 140 152 178 191 152 164 191 152 220 220 220 220 220 191 164 178 191 191 191 191 191 191 191 191 191 19	Dec 200 200 200 200 199 177 155 199 199 199 199 199 199 199 199 199
Mean 123456789012345678901 Tes	Dr Dr Ootal an	Jan.	Disco Area	152 140 140 129 118 129 164 152 164 129 118 118 129 164 118 129 118 118 129 118 129 119 119 119 119 119 119 119 119 119	200	295 440 114 18100 201118 105 25164 1188 1040 1188 1040 1188 1040 105 105 105 105 105 105 105 105 105 10	433 7248 248 25800 agra mi 118 191 162 152 152 325 235 191 410 570 515 250 410 630 630 630 630 630 630 630 630 630 63	3545 5855 2110 21800 ver at 104, 4,9 1522 1298 89 140 1188 108 98 140 1188 98 140 1188 98 140 108 98 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 140 140 140 140 140 140 140	1200 136 23300 Delta: '70 Fee Aug. 108 89 89 89 89 191 115 108 118 108 118 118 118 118 118 118 118	3437 8810 For 191 5 Abov Sept. 50 644 644 644 644 644 644 644 644 644 64	169 396 52 10400 <b>15.</b> <b>Fe Sea.</b> Oct. 191 2245 365 2268 220 285 164 129 129 140 140 148 118 118 118 118 5792	Nov. 988 152 140 140 140 140 140 140 140 200 200 220 220 220 220 220 220 210 164 178 191 191 164 178 191 191 167 178 178 178 178 178 178 178 178 178 17	Dec 200 200 200 200 200 179 199 199 199 199 199 199 199 199 199
Mean Mic 23456789012345678901 Team Mic 2345678901 Team Mic 234567901 Te	Dr Dr Votal an	Jan.	Disc.	152 140 140 129 118 129 114 152 118 129 114 152 164 118 129 118 129 118 129 164 118 129 118 129 164 165 118 129 129 129 129 129 129 129 129 129 129	200	295 440 1114 18100  COMPAN  T10  May 750 164 1188 103 889 129 450 3065 388 317 235 191 164 1181 1181 1181 1188 80 6473 2750	438 728 248 2580 agre with 118 1152 152 152 1570 570 570 5250 191 250 410 630 630 630 642 410 630 630 630 630 630 630 630 63	3545 2110 21800 ver at ide, 4,9 1522 1298 898 1408 1088	1200 136 23300 Pelta: '70 Fee 108 89 89 89 89 89 115 118 108 118 118 118 118 118 118 118 118	347 8810 8810 For 191 t Abov 50 664 664 664 672 72 72 80 80 80 89 98 98 98 98 98 1178 1164 22 3186 410	169 396 10400 15. 7• Sea Oct. 191 220 3465 2268 220 285 164 1916 206 152 250 191 40 140 118 108 118 118 5792 1365	Level. Nov. 98 152 140 152 178 191 191 152 164 191 191 191 191 191 178 191 191 191 191 191 191 191 191 191 19	Dec 200 200 200 200 19 17 15 19 19 19 19 19 19 19 19 19 19 19 19 19
Meanir 234567890123456789012345678901 Tean Mainr	Dr Dr Ootal an	ainag Jan.	Disco Area	152 140 140 129 118 129 164 152 164 129 118 118 129 164 118 129 118 118 129 118 129 119 119 119 119 119 119 119 119 119	200	295 440 114 18100 20118 251 168 103 254 118 103 889 129 250 305 3688 317 2688 317 2191 2688 317 1164 1129 1164 129 1168 873 750 80	433 7248 248 25800 agra mi 118 191 162 152 152 325 235 191 410 570 515 250 410 630 630 630 630 630 630 630 630 630 63	3545 5855 2110 21800 ver at 104, 4,9 1522 1298 89 140 1188 108 98 140 1188 98 140 1188 98 140 108 98 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 108 99 140 140 140 140 140 140 140 140	1200 136 23300 Delta: '70 Fee Aug. 108 89 89 89 89 191 115 108 118 108 118 118 118 118 118 118 118	347 8810 8810 For 191 50 500 644 644 644 644 644 644 644 644 644 6	169 396 52 10400 <b>15.</b> <b>Fe Sea.</b> Oct. 191 2245 365 2268 220 285 164 129 129 140 140 148 118 118 118 118 5792	Level. Nov. 98 152 140 140 152 178 164 191 191 191 191 1678 191 1678 191 178 191 1678 191 191 1678 191 191 191 191 191 191 191 191 198	

Discharge	of Uncompander	e River at Delta	for 1916.
Drainage Area 1,130	Square Miles	Lititude 4,970 Fee	t Above Sea Level.

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				•••••		338	73	92	227	148	102		
2				•••••	•	124	136	64	457	136	141		
3		•••••	••••	•	••••••	92	124	69	367	148	166	:	
1		•••••			•••••	82	188	56	457	148	174	•••••	
5		•••••	••••	•••••	•	82	161	82	506	136	166	•	•
9		••••••	•••••	••••••	•••••	202 330	182 224	40 40	642 730	161 113	174 359		
Ŕ		•	•	•	•••••	397	188	82	506	113	532	•	•••••
9		•	••••		•••••	424	117	88	506	136	346		
10						452	233	826	354	402	388		
11						420	161	218	227	346	700		
12						310	141	88	202	141	548		
13						302	166	213	202	218	402		•••••
14					•••••	250	410	77	1210	202	375		
15						180	166	82	410	188	532		
16				••••••	48	146	211	113	559	161	433		
17					82	141	96	124	481	136	467	••••	
18					161	146	102	82	402	124	481		<i>'</i>
19					124	153	174	82	326	136	506		
20			•		64	188	224	77	244	136	420		
21		• • • • • • • • • • • • • • • • • • • •		••••••	73	338	166	64	161	131	367		
22				•	113	334	166	64	131	136	359	· · · · · · · · · · · ·	
23			•••••	••••••	188	268	102	73	136	136	326		•••••
24					306	244	174	73	148	174	420	•	
25 26		••••			287	371	161	73	136	136	367	••••••	
20 27				•••••	306 196	233 161	174 174	367 306	113 102	156 141	334 326	•••••	*******
28		••••••	•	•	218	188	148	306	92	156	295	•••••	
29				•	148	188	136	218	109	136		••••••	
30				••••••	367	188	148	346	174	92			•••••
31						148		410	218				
	otal				2681	7420	5026	4395	10535	4823	10206		
	an				179	239	168	142	340	161	364		
	x				367	452	410	410	1210	402			
					48	82	.73	40	92	92			
Acı	e-ft.				5330	14700	10000	8730	20900	9580	20200		

Unless otherwise noted, all discharges are in cubic feet per second.

### CANON CREEK AT OURAY.

Location.—At Ouray, Colo., in sec. 31, T. 44 N., R. 7 W., New Mexico principal meridian, in the Uncompander Forest, 200 feet above the mouth of the creek. Nearest tributary, a small stream, enters from the east some distance above.

Records Available.—January 25, 1911, to November 30, 1915; discontinued November 30, 1915.

Drainage Area.—26 square miles.

Gage.—Vertical staff.

Channel.—Extremely shifting.

Discharge Measurements.—Made from near-by foot-bridge during high water and by wading at ordinary stages.

Winter Flow.—Ice causes practically no backwater at this station.

Diversions.—No water is diverted above the station, so the records represent the natural run-off.

Accuracy.—Results considered fair.

Co-operation.—Records furnished by the United States Geological Survey.

# Discharge of Canon Creek at Ouray for 1915. Drainage Area, 26 Square Miles. Altitude, 7,710 Peet Above Sea Level.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	. 8	7	<b>8</b>	20	49	151	291	79	22	16	8	
2	8.	į.	š	2š	36	143	285	64	22	16	8	
3	š	ž	š	39	29	113	264	59	$\bar{2}\bar{2}$	16	8	
4	8	11	. 8	35	29	94	258	57	19	14	8	
5	ğ	- 8	8.		29	98	310	54	19	13	Ř	
6	9	8	š.	37	24	93	314	62	19	13	Š.	
7	9	8	š	31	21	84	301	64	19	12	ğ	
8	9	ğ	š	29	$\tilde{2}\hat{2}$	96	267	66	19	12	6	
9	. 9	11	8	29	25	170	244	64	12	10	6	
10	9	īī	8	23	32	222	227	52	12	9	Ğ.	
11	. 9	- 9	8	21	76	258	294	48	15	9	5	
12	9	9	. 8	28	116	225	273	44	• 15	8	4	
13	ğ	š	š	27	145	190	267	41	15	7	4	
14	9	8	š	42	145	170	264	39	15	7	5	*******
15	10	8	8	44	118	209	264	35	15	6	5	
16		ğ	ğ	34	143	252	261	33	14	Ğ.	9	
17		9	9	30	121	359	244	32	14	6	8	
18	Ď.	. 8	11	36	105	401	217	32	14	6	9	
19		8	īī	42	76	426	192	31	12	Ğ.	9	
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Total		235			2105	8096	6528	1274	554	285	238	
Mean		8.39			67.9	270	211	41.1	18.5	9.19	7.93	•••••
Max		11	21	143	145	469	314	79	111	16	12	•••••
Min		2		20	21	84	83	24	11	5	4.70	
Acre-ft.	486	466	701	2840	4180	16100	13000	2530	1100	565	472	•••••

# RIO GRANDE DRAINAGE

RIO GRANDE AT THIRTY-MILE BRIDGE, NEAR CREEDE, COLO.

Location.—In the Rio Grande National Forest, about 30 miles southwest of Creede, in sec. 13, T. 40 N., R. 4 W.; a short distance above mouth of Squaw Creek.

Records Available.—June 18, 1909, to November 30, 1916.

Drainage Area.—163 square miles.

Gage.—Staff gage.

Channel.—Section is gradually filling in.

Discharge Measurements.—Made from car and cable except during low stages, when they are made by wading.

Winter Flow.—Ice causes backwater during the winter months and records are discontinued.

Diversions.—So far as known, no water is diverted above the station.

Artificial Control.—A short distance above the station the San Luis Valley Irrigation District has constructed the large Rio Grande reservoir which materially modifies the flow of the river; also Lost Lake Reservoir.

Accuracy.—Results considered good.

Co-operation.—Station maintained in co-operation with San Luis Valley Irrigation District.

# RIO GRANDE NEAR CREEDE.

Location.—In the Rio Grande National Forest, at a highway bridge in about sec. 8, T. 41 N., R. 1 E., a quarter of a mile from Wason siding and 3 miles southeast of Creede. Nearest tributary, Willow or Goblin Creek, enters a short distance upstream.

Records Available.—April 24, 1907, to November 30, 1916.

Drainage Area.—689 square miles.

Gage.—An automatic recording gage.

Channel.—Practically permanent.

Discharge Measurements.—Made from bridge.

Winter Flow.—River frozen over during winter months; ice causes backwater at gage.

Reservoirs.—Daily, monthly and annual discharges modified by storage in the Rio Grande and Santa Maria Reservoirs, 30 miles above.

Diversions.—There are no court decrees for diversions from the Rio Grande above this station, but for diversions of 39 second-feet from tributaries.

Accuracy.-Good.

Co-operation.—Maintained by the State engineer in co-operation with the United States Forest Service.

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31 ...... 110 Total. 4665 Mean..... 150 Max...... 405

162 450

	220			E	GHTE	ENTH	BIENN	IAL RE	PORT				
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	Dr	aines	o Ares	700 i	rge of	Bio G	rande a	t <b>Was</b> c ide, 8,5	n for	1915. t Abov	re See	T-ewel	
Da	y	Jan.	Feb.		April		June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	••••••	88	104	104	133	605	2020	1970	1300	635	300	545	160
2		89 91	107 99	107 105	144 156	485 400	2380 2200	1800 1700	1260 1130	635 635	260 240	485 300	140 150
4	•	97	100	100	210	850	1860	1600	1010	485	225	210	140
5		97	92	110	240	300	1600	1600	970	740	225	181	145
6 7	••••••	99 92	92 96	100	210	325	1350	1700	1050	635	225	181	145
8	······	87	98	100 105	181 210	280 260	1210 1260	1550 1450	1130 970	635 635	225 210	195 195	140 145
9		94	101	105	195	260	1550	1350	930	635	225	195	150
10		98	115	110	181	280	2020	1300	930	635	350	195	125
11 12	<b>-</b>	91 93	114 105	105 110	225 280	375 740	2640 2840	1350	930	635	375	117	95 90
13		96	109	112	280	1090	2510	1400 1500	890 930	635 635	350 350	117 127	90
14	•	91	102	115	360	1450	2260	1450	930	635	350	127	85
15		94	104	110	300	1350	2320	1350	930	705	350	138	85
16 17		92 89	103 106	115 105	225 240	1500 1800	2440 2770	1400 1450	890 850	635 575	350 400	138 138	85 85
18		91	106	100	240	1700	2840	1450	850	515	400	185	85
19		93	102	105	280	1400	3320	1450	775	455	455	200	85
20	·······	96	102	115	300	1170	3320	1450	740	425	400	200	85
$\begin{array}{c} 21 \\ 22 \end{array}$	······	96 94	102 97	120 115	325 325	1050 970	3320 3320	1300 1300	740	400	575	195	90
23		81	99	115	300	1010	3120	1300	740 740	400 350	670 670	200 200	90 90
24		80	95	120	280	1300	2900	1260	740	300	670	155	90
25	••••••	84	100	115	260	1550	2770	1260	740	455	670	137	90
$\begin{array}{c} 26 \\ 27 \end{array}$	·····	90 90	105 100	$\frac{125}{125}$	300 400	$\frac{1350}{1260}$	2700 2580	1550 1920	740 705	775	705	127	90
28		96	100	125	485	1260	2440	1650	670	515 455	670 670	117 127	90 90
29		97		125	575	1550	2320	1550	605	375	635	195	90
30	<b>-</b>	101		133	740	1400	2080	1500	605	325	605	175	90
31	otal	107	2855	133 3489	8520	1800 30620	72260	1450	635 27055	10505	575		90
Me	an	92.7	102	113	284	988	2410	1490	873	16505 550	432	5797 193	3300 106
Ma	x	. 107	115	133	740	1800	3320	1970	1300	775	705	545	160
Mi	1	80	92	100	133	260	1210	1260	605	300	210	117	85
Acı	e-ft.	5700	5660 Jan 1				143000 Nov. 11	91600	53700	32700	26600	11500	6520
	2.50									1010	-		
	Dr	ainag	o Area	, 700 E	quare	Miles.	rande a Altitu	de. 8.59	I Fee	tate.	e Ses	Level.	
Da		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	••••••	95	115	145	285	915	2180	1500	1740	465	260	1120	
2 3		95 95	115 115	145 150	305 355	835 725	2230 2340	1600 1600	1800 1900	435	330	1080	•••••
4	·······	95	120	160	330	725	2580	1540	1700	435 435	330 305	1040 955	
5		95	120	160	330	835	1540	1440	1640	435	285	835	
6		95	120	170	305	1170	1500	1260	1700	465	620	795	
7 8	•••••••	100 100	125 125	170 190	285 260	1500 1850	1500 1500	1220 1350	1700 1700	435 380	1040	795	•••••
9		100	125	200	305	2180	1640	1540	1640	435	1260 1260	760 725	•
10		100	130	200	355	2520	1850	1800	1640	525	1640	655	••••••
11		100	130	200 225	435	2580	1960	1700	1220	525	1960	585	
12 13		100 100	130 130	225	· 405	2460 2340	1850 1850	1600 1540	1170 1400	525 465	1900 1740	525 495	•
14		105	135	215	355	2120	1800	1440	1540	435	1700	555	*******
15		105	135	240	355	1800	1700	1400	1260	405	1640	555	
16 17	•	105 105	135 135	275 300	355 435	1600 1500	2120 2280	1600	1170	405	1540	555	•
18		105	450	400	465	1400	2280	1400 1400	1080 995	380 380	1500 1500	555 555	•
19		105	440	580	465	1350	2340	1400	915	355	1440	525	
20		105	435	630	405	1500	2280	1350	835	330	1400	465	
$\begin{array}{c} 21 \\ 22 \end{array}$	•	105 105	145 150	500 400	405 435	1400 1350	2280 2060	1350	760	305	1350	435	•••••
23		405	120	285	495	1260	2060 1640	1300 1300	690 655	305 330	1350 1350	405 405	•••••
24		390	135	260	555	1300	1600	1300	555	330	1300	405	
25	••••••												
	••••••	375	135	320	655	1440	1500	1260	495	330	1260	380	•••••
26		375 360	135 149	320 330	655 725	1440 1500	1500 1540	1260 1300	525	330 330	1260 1260	380 355	
		375	135	320 330 330	655 725 795	1440 1500 1600	1500 1540 1500	1260 1300 1220	525 525	330 330 285	1260 1260 1260	380 355 355	•••••
$\begin{array}{c} 26 \\ 27 \end{array}$		375 360 345	135 149 140	320 330	655 725	1440 1500	1500 1540	1260 1300	525	330 330	1260 1260	380 355	

Min...... 95 Acre-ft. 9220 1170 495 260 260 330 86700 69500 23100 74400 35500 9320 17500 28100 98400 110000 Unless otherwise noted, all discharges are in cubic feet per second. Disc. estimated January 1st-March 27th.

2230

725

260

1170

1960

525 260

11645 37560

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34990

1900

# RIO GRANDE NEAR DEL NORTE.

Location.—At highway bridge in about sec. 30, T. 40 N., R. 5 E., 6 miles west of Del Norte, a short distance below the mouth of Wolf Creek. From October 11, 1889, to November 30, 1906, a station was maintained about 4 miles below the present station and just above Los Pinos Creek. The flow at the two points is comparable, if a few small ditches are disregarded.

Records Available.—May 16, 1908, to November 30, 1916.

Drainage Area.—1,400 square miles.

Gage.—Automatic recording gage. The gage is referred to the same datum as was the chain gage installed May 16, 1908.

Channel.—Slightly shifting at sides from silt deposition at low water.

Discharge Measurements.—Made from bridge.

Winter Flow.—River is frozen over during the winter months.

Reservoirs.—Daily, monthly and annual discharges modified by storage in Beaver Park, Santa Maria and Rio Grande Reservoirs.

Diversions.—There are court decrees for diversions of 101 second-feet from the Rio Grande between the Creede station and Del Norte, and for diversions of 162 second-feet from intervening tributaries.

#### RIO GRANDE AT ALAMOSA.

Location.—At Concrete road bridge in Alamosa, one-third of a mile above D. & R. G. Railroad bridge, where station was originally established in 1894, discontinued in 1895, and re-established in 1912. The flow at the two points is comparable, except for one small ditch diversion. Records initiated by State of Colorado April 19, 1914.

Records Available.—Discharge measurements and gage heights September 24, 1894, to December 31, 1895. Miscellaneous measurements, 1903 and 1910. Daily discharges May 15, 1912, to November 30, 1916.

Drainage Area.—Not measured.

Gage.—An automatic recording gage.

Channel.—Shifting sand.

Discharge Measurements.—From Concrete road bridge at high water and by wading at low water.

Winter Flow.—Ice cover forms during winter months.

Diversions.—Below all but one of the large diversions from the Rio Grande.

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							de nea					Towns	
Day		Jan.	Feb.	Mar.	April	Miles.	June	<b>de, 7,86</b> July		Sept.	-	Nov.	Dec.
1	·•	155	235	235	285	May 1330	3220	2640	Aug. 1480	755	520	<b>5</b> 95	300
2	·	160	250	250	330	1030	3830	2350	1330	755	485	520	280
		170 200	210 215	235 205	390 450	890 845	3650 2880	2210 2080	1230 1130	755 675	450 420	450 310	245 245
_	· · · · · · · · · · · · · · · · · · ·	200	170	210	520	800	2490	2080	1030	755	890	265	225
		210	170	220	450	715	2210	2210	1030	755	360	285	225
_	•••••	175 150	195 205	225 245	390 420	715 635	1950 2080	2020 1880	1130 1180	715 715	360 330	330 310	220 220
		185	220	245	390	635	2490	1760	1130	715	830	310	225
10		205	<b>26</b> 0	255	390	635	3130	1650	980	715	890	330	225
		170	260	235	450	890	3920	1700	1030	675	485 485	245 200	200 185
		180 195	240 260	245 265	520 555	1480 2020	4300 3830	1760 1820	1080 1030	675 715	485	200	185
		170	225	275	635	2720	3380	1820	1030	715	485	210	185
		185	235	295	715	2490	3380	1700	1080	715	520	225 245	170 170
		175 160	230 245	260 260	555 520	2800 2640	3470 3920	1650 1700	1080 1080	. 755 675	520 520	245	170
		170	245	260	555	2420	4020	1650	1030	595	520	245	173
		180	225	230	675	2210	4400	1650	980	555	520	245	175
		195 195	$\frac{225}{225}$	240 285	715 800	2020 1820	4500 4400	1650 1600	935 890	520 485	520 450	290 305	180 180
~~		185	200	290	755	1650	4400	1540	890	450	675	310	185
23		145	210	280	715	1700	4300	1480	935	420	715	310	185
~ =		145	195 220	280 290	635	2140	4120 3830	1480	935 935	360 485	715 715	310 310	190 190
		145 165	240	295	595 675	2640 2350	3560	1430 1880	935	1180	755	255	195
~=		165	225	285	845	2080	3380	3040	845	755	755	245	195
	•••••	195	210	285	1130	2020	3220	2420	800	635	715	230	195 200
	·;······	$\frac{200}{215}$		285 285	1180 1540	2490 2280	3040 2880	2020 1820	755 755	555 555	715 675	225 245	200
31		250		285		2640		1650	800		675		200
	tal	5595	6245	8035	18780	53730	104180	58340	81430			8800	6318
Mear		180	223 260	259 295	626	1730 2800	3470 4500	1880 3040	1010 1480	660 1180	537 755	293 595	204 300
Max. Min.		250 145	170	205	1540 285	635	1950	1430	755	360	330	200	170
Acre	-ft1	1100	12400	15900	37200	106000	206000	116000	62100	39300	33000	17400	12500
1	Note.	—Dis					o Marc	h 31, in				ec. 31	•
	Drai	nage	Dis	Charge 1.400	Square	o Gran	de near Altiti	Del 37	orte fo 88 Fee	r 1916 t Abov	7e Sea	Level	
Day	Drai	nage Jan.	Area, Feb.	<b>1,400</b> Mar.	of Ed Square April	Miles. May	de near Altiti June	<b>ide, 7,8</b> 6 July	38 Fee Aug.	t Abov Sept.	oct.	Nov.	Dec.
1	······································	Jan. 200	Feb. 245	1,400 Mar. 270	<b>April</b> 525	May 1920	June 3580	i <b>de, 7,8</b> 6 July 2420	<b>Aug.</b> 2340	t Abov Sept. 680	Oct. 460	Nov. 1400	
1 2		Jan. 200 205	<b>Area,</b> Feb. 245 245	1,400 Mar. 270 270	April 525 560	May 1920 1720	June 3580 3580	i <b>de, 7,8</b> 6 July 2420 2420	Aug. 2340 2560	t Abov Sept. 680 640	Oct. 460 600	Nov. 1400 1340	
1 2 3	······································	Jan. 200	Feb. 245	1,400 Mar. 270	<b>April</b> 525	May 1920	June 3580	1 <b>de, 7,8</b> 6 July 2420 2420 2420	<b>Aug.</b> 2340	t Abov Sept. 680	Oct. 460	Nov. 1400	
1 2 3 4 5		Jan. 200 205 205 210 210	Feb. 245 245 245 245 245	1,400 Mar. 270 270 270 270 270	April 525 560 600 600 560	May 1920 1720 1460 1460 1720	June 3580 3580 3680 4160 3300	July 2420 2420 2420 2420 2260 2260	Aug. 2340 2560 2640 2420 2200	E Abov Sept. 680 640 600 640 600	Oct. 460 600 640 560 560	Nov. 1400 1340 1280 1180 1020	
1 2 3 4 5		Jan. 200 205 205 210 210 215	Feb. 245 245 245 245 245 250	1,400 Mar. 270 270 270 270 270 290	April 525 560 600 560 560	May 1920 1720 1460 1460 1720 2260	June 3580 3580 3680 4160 3300 3040	July 2420 2420 2420 2420 2260 2260 2120	Aug. 2340 2560 2640 2420 2200 2340	Eept. 680 640 600 640 600 770	Oct. 460 600 640 560 560 770	Nov. 1400 1340 1280 1180 1020 915	
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1		Jan. 200 2005 210 210 2115 220 220 220 2215 215 225 235 240 240 245	Feb. 245 245 245 245 250 250 255 260 260 550 545 320 320 320	1,400 Mar. 270 270 270 270 270 290 310 490 490 525 600 640 725 1020 1060	### April 526   ### April 526   ### 600   ###	May 1920 1720 17460 17460 17460 2260 4460 4690 4470 4160 3770 2720 2490 2490 2490 2490 2490 2490	June 3580 3680 33040 3040 3240 3588 3588 3588 3588 3588 3588 3588 358	July 2420 2420 22260 2120 21980 2340 22400 2260 2200 2260 2260 2260 2260 2	Aug. 2340 2560 22420 2340 22340 22340 22340 22340 22340 1550 1780 2200 1780 1780 1280 1180 1020 1020	## Abov Sept. 640 640 640 600 770 680 640 1120 9152 1815 7780 680 640 600 525 525	7e Sea. Oct. 460 600 640 560 560 770 1340 1780 1850 2840 2340 2340 2260 2060 2060 1920 1780 1780	Nov. 1400 1340 11280 1020 915 915 865 865 865 8770 725 725 815 770 680 640	Dec.
1		Jan. 2005 2005 2100 2105 2100 2105 215 2200 2200	Feb. 245 245 245 250 250 255 255 260 260 550 540 540 540 540 540 540 540 540 54	1,400 Mar. 270 270 270 270 290 265 290 3150 490 490 5266 600 640 725 8150 1060	### April 525 560 6000 5600 5600 490 525 865 865 865 865 865 815 915 11280	May 1920 1720 17460 17460 2880 3480 4690 4670 3220 28490 2720 2490 2720 2490 2490	June 3580 3580 3180 3040 3040 3040 3580 3580 3580 3580 3580 3580 3770 3860 3770 3860 3770 3860 3540	July 2420 2420 2420 2420 2260 2260 1980 1980 2340 22200 2200 2200 2200 2060 2060 2060 1920 1720 1720	Aug. 2340 22560 2420 2340 2340 2200 2340 2200 1780 1780 1780 1180 1180 1020	## Abov Sept. 6840 6640 6600 770 6800 6420 1925 1020 8770 680 640 600 5525	7e Sea. Oct.0 600 640 560 560 770 1340 1780 1850 2640 2260 2260 2060 1920 1780 1780 1780 1780 1780	Nov. 1400 1340 1280 11280 1020 915 865 865 865 8770 640 725 815 8770 725 815	Dec.
1		Jan. 2005 2005 2100 2155 21200 2200 2200 220	Feb. 245 245 245 245 250 2550 2555 260 260 5545 300 268 268 268 268	1,400 Mar. 270 270 270 270 270 270 290 315 400 490 490 525 5600 600 640 725 815 600 5600 5600	### April 525	May 1920 1720 17460 17720 2260 1460 17720 22880 4060 4690 4490 27200 27490 24490 2420 2420 2880	June 3580 3680 3300 3040 3240 3250 3860 3770 3860 3580 3580 3580 3580 3580 3580 2720 25560	July 2420 2420 2420 2260 2120 2120 2490 2340 2260 2200 2060 2060 2060 1780 1590 1590 1780 1780	Aug. 2340 2560 26420 22420 22340 22340 22340 22340 22340 22340 1780 1780 1780 1780 1180 1180 1180 118	## Abov Sept. 640 640 640 600 7780 640 1120 9150 1025 7780 640 600 525 4525 525	7e Sea. Oct. 460 600 640 560 560 770 1340 1780 1850 2840 2340 2340 2060 2060 1920 1780 1780 1780 1780 1780	Nov. 1400 1340 1280 1020 915 865 865 865 8770 725 815 770 725 815 640 640 560	Dec.
1		Jan. 2005 2005 2100 2115 2120 2200 2200 2200	Feb. 2455 2455 2455 2455 2555 2555 2555 255	1,400 Mar. 2700 2700 2770 2770 2955 2900 4900 5255 5600 6405 7255 8156 10200 9658 81600 6640	### April 525 5600 6000 5600 5600 4900 4905 600 865 770 640 640 815 1020 915 815 815 815 815 6120 11600 11600 11660	May 1920 1720 1460 1720 2260 2880 4690 4690 4470 3220 2490 2720 2490 2720 2490 2720 2880 2980	June 3580 3580 3180 3040 3040 3040 3220 3480 3580 3580 3580 3580 3580 3580 3580 2560 2560 2560 2560 25490	July 2420 2420 2420 2420 2420 2260 2260 21980 2340 22400 2200 2200 2200 1980 2200 2000 1980 2060 1920 1750 1650 1590 17590	Aug. 2340 25640 22420 22420 22420 2240 22400 11590 1720 11660 1180 1180 1120 1020 915 770 815 770	## Abox  Sept. 640 640 640 6600 7680 640 1120 1120 8157 7680 640 600 6525 490 5255 525	7e Sea. Oct. 460 6600 640 560 560 770 1340 1780 1850 2880 2340 2260 2060 1780 1720 1780 1780 1780	Nov. 1400 1340 1280 1020 915 915 865 865 865 817 725 815 770 725 815 640 640 640 660 660	Dec.
1		Jan. 2005 2005 2106 2116 2220 2220 2220 2220 2220 2215 2215 2220 2215 2240 2440 2440 2440 2455 5155 5155	Feb. 2455 2445 2450 2550 2555 2555 2600 2600 5550 3400 2888 2458 2458 2458 2458 2458 2458 2458	1,400 Mar. 270 270 270 270 270 290 310 490 490 525 600 640 725 1020 965 815 600 648	## April 526   ## April 526   ## 600	May 1920 1720 17460 17720 2260 4690 4690 4470 4160 3770 22490 2490 2490 2490 2490 2420 2880 2960 2920 2320 2320 2320 2490 2490 2490 2420 2320 2320 2320 2320 2320 2320 232	June 3580 3680 3680 3680 3300 3040 3040 3040 3220 3480 3580 3580 3770 3860 3770 3860 3770 3860 2720 2560 2490 2420	July 2420 2420 2420 2420 2120 2120 21980 2340 2490 2200 2060 2060 2060 2060 1780 1590 1590 1590 1590 1590 1590 1590	38 Fee Aug. 2340 2560 -2420 2240 2240 2240 2240 2240 2250 1780 1780 1780 1180 1180 1180 11020 915 770	## Abov Sept. 640 640 640 600 7780 640 1120 9150 1025 7780 640 600 525 4525 525	7e Sea. Oct.0 6000 6400 560 560 770 1340 1780 1850 2640 2340 2340 2360 2060 2060 1780 1780 1780 1780 1780 1780 1780 178	Nov. 1400 1340 1280 1020 915 865 865 865 8770 725 815 770 725 815 640 640 560	Dec.
1		Jan. 2005 2005 2100 2115 2120 2200 2200 2200	Feb. 2455 2455 2455 2455 2555 2555 2555 255	1,400 Mar. 270 270 270 270 270 270 295 400 490 525 5600 6405 725 1020 1066 815 680 6825	April 525 5600 6000 5600 5600 4900 4995 5000 8450 7770 6440 8415 11280 1	May 1920 1720 17460 17460 17460 2880 3480 4690 4470 3720 2490 2420 2420 2420 2420 2420 2420 24	June 3580 3680 3300 3040 3040 3220 3480 3580 3770 3860 3770 3860 2720 2560 2420 2420 23420	14e, 7,84  July 2420 2420 2420 2420 2120 2120 2120 2120	38 Fee Aug. 2340 25640 -2420 2240 2240 2240 2240 2250 1780 1780 1780 1780 1780 1780 1780 178	## Abox Sept. 640 640 6600 6770 6800 1120 1020 1020 1020 1020 1020 1020 1	7e Sea. Oct.0 600 640 560 560 770 1340 1780 2640 22840 2260 2260 2060 1780 1780 1780 1780 1780 1780 1780 178	Nov. 1400 1340 1280 11280 1020 915 865 865 8770 725 815 7725 6400 6400 5600 5260 490	Dec.
1		Jan. 2005 2005 2100 2215 21200 2220 2220 222	Feb. 245 2445 245 245 245 250 2550 2550 2555 2660 2660 5550 320 2688 2688 2688 2685 2655 2655 2655 2665 2688 2688	1,400 Mar. 270 270 270 270 270 290 310 490 490 525 600 640 725 815 600 648 648 6486 6486 6486	### April 525 560 600 600 560 490 490 525 600 640 640 640 641 512 600 1280 1280 1280 1280 1280 1280 1280 12	May 1920 1720 17460 17720 2260 1460 17720 22880 4690 4690 4470 4160 3770 2490 2490 2490 2490 2490 2490 2490 249	June 3580 3680 3680 3040 3040 3040 3240 3480 3580 3580 3580 3580 3580 3770 3860 3770 3860 3770 3860 2720 2560 2490 2420 2420	July 2420 2420 22260 2120 21980 2340 2340 2200 2200 2060 2060 2060 1780 1590 1590 1590 1590 1600 1600 1600 1600 1600 1600 1600 16	38 Fee Aug. 2340 2560 -2420 -2420 2340 22640 22340 22340 22340 1550 1780 2200 1780 1780 1180 1180 1180 11020 915 770 770 770	## Abox Sept. 640 640 640 600 770 680 640 1120 9150 1815 7770 680 600 525 525 490 460 430	7e Sea. O4t.0 6000 6400 5600 5700 12400 17800 12850 28400 22840 22860 20600 20600 17800	Nov. 1400 1340 1280 1020 915 865 865 865 8770 725 815 770 725 815 680 640 560 640 560 640	Dec.
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1	otal,	Jan. 2005 2005 2100 2115 2115 2120 2220 2220	Feb. 245 2445 245 245 245 245 255 255 255 25	1,400 Mar. 2700 2700 2700 2700 2700 2900 3100 4900 4900 600 600 600 600 600 600 600 600 600	### April 525   560   600   560   560   490   490   526   801   805   805   807   806   807   80	May 1920 1720 12460 17720 22460 17720 22880 4060 4470 4160 37720 22490 22490 22420 2420 2420 2420 2420	June 3580 3580 33040 3040 32400 3480 3580 3580 3580 3580 3580 3580 3580 35	July 2420 2420 2420 2260 2120 2120 2420 2120 2120 2120 2120 212	Aug. 2340 2560 2640 22340 22340 22340 22340 22340 22340 2200 1780 1780 1180 1180 1180 1180 1770 770 770 7770 7	## Abox Sept. 640 640 640 600 770 680 640 1120 1120 680 600 525 525 490 460 430 1120 1120	7e Sea. Oct.0 6000 6400 5600 5600 7700 13400 17800 18500 28400 20600 20600 17800 17800 17800 17800 17800 17800 17800 17800 17800 17800 18600 18600 18600 18600 18600 18600 18600 18600 18600 18600 18600	Nov. 1400 1340 1280 11800 1280 1915 8655 865 865 8770 7255 865 670 640 640 660 600 560 600 640 640 640 640 640 640 640 640 6	Dec.
1	otal	Jan. 2005 2005 2100 2115 21200 2210 2220 2220	Feb. 2445 2445 2445 2445 2445 245 245 245 24	1,400 Mar. 270 270 270 270 270 270 270 265 290 315 600 640 525 660 6725 815 1020 681 1026 681 1026 681 1026 681 1026	### April 525 5600 6000 5600 5600 4900 4905 5000 865 7770 6440 6410 1020 965 815 11200 12820 128475 919 22 8475 949 949 949 949 949 949 949 949 949 94	May 1920 1720 17460 17460 2880 3480 4690 4470 3220 2890 2420 2420 2420 2420 2420 2420 2420 24	June 3580 3580 3180 3040 3040 3040 3180 3580 3580 3580 3580 3580 3580 3580 35	140, 7,84  July 2420 2420 2420 2420 2120 2120 2120 2120	38 Fee Aug. 2340 25640 22420 22440 22440 22440 22440 22400 11590 1780 1780 1780 1780 1780 1780 1780 178	## Abox  Sept. 640 640 640 6600 6600 1120 8150 680 680 6000 6525 490 5255 490 460 1120 600 600 600 600 600 600 600 600 600 6	7e Sea. O46.0 640.0 640.0 560.0 560.0 1780.0 1780.0 1850.0 2840.0 2260.0 2060.0 1780.0 1780.0 1780.0 1780.0 1780.0 1780.0 1780.0 1780.0 1780.0 1780.0 1780.0 1780.0 1780.0 1780.0 1780.0 1780.0 1780.0 1880.0 1880.0 1880.0	Nov. 1400 1280 1280 1020 915 865 865 865 8770 725 860 640 640 660 560 490 24115 804 1400	Dec.
1	otal	Jan. 2005 2005 2100 2215 2100 2215 21200 22200 2215 22200 2215 2220 225 24400 2440 5515 5000 29900 6515 5000 29900 6517 2000 2000 2000 2000 2000 2000 2000 20	Feb. 2455 2445 2450 2550 2550 2550 2550 2550	1,400 Mar. 2700 2700 2700 2700 2900 2955 4000 4900 5255 6000 6400 7255 10200 1066 8156 6400 7256 5600 17185 4006 1066 34106 3410 3410 3410 3410 3410 3410 3410 3410	### April 525 5600 6000 6600 5600 4900 5600 4900 6400 6415 112800	May 1720 17460 1720 2260 17460 4690 2420 2420 2420 2420 2420 2420 2420 24	June 3580 3680 3680 3300 3040 3040 3040 3240 3480 3580 3580 3580 3770 3860 3770 3860 3770 3860 2720 2420 2420 2420 2420 98970 4160 2340 196000	July 2420 2420 2420 2120 2120 21980 21980 2340 2200 2200 2060 2060 2060 2060 1780 1590 1590 1590 1590 1590 1590 1590 159	Aug. 2340 25660 · 2420 2340 22640 22340 2200 1850 1720 1780 1780 1180 1020 915 770 725 770 49785 1610 2640 79900	## Abov  Sept. 640 640 640 600 770 680 640 1120 815 770 680 600 600 525 525 490 460 430 1120 4310 8810	7e Sea. Oct.0 6000 6400 5600 5600 7700 13400 17800 18500 26400 22840 23400 22600 20600 19200 178	Nov. 1400 1280 1280 1020 915 865 865 865 8770 725 860 640 640 660 560 490 24115 804 1400	Dec.
1	otalnne-ftVule	Jan. 2005 2005 2100 2115 2115 2220 2210 2220 222	Feb. 2456 2456 2456 2456 2456 2456 2566 2566	1,400 Mar. 2700 2700 2700 2700 2700 2652 2905 4000 4905 5255 5600 6725 8110 6806 6806 6806 17185 1026 17185 1056 266 2680 2680 2680 2680 2680 2680 2680	April 5260 6000 5660 6000 4900 4905 600 8665 770 640 641 1020 915 815 815 815 815 815 815 815 815 815 8	May 1920 1720 1460 1720 2880 3480 4690 4470 4160 3770 2720 2490 2720 2720 2720 2720 2720 2720 2720 27	June 3580 3580 3180 3040 3040 3040 3180 3580 3580 3580 3580 3580 3580 3580 35	140, 7,84  July 2420 2420 2420 2420 2260 2260 1980 1980 23400 22400 22000 1980 22400 1980 2060 1980 2060 1980 2060 1980 2060 1980 2060 2060 1920 1780 1590 1590 1590 1590 1590 1590 1590 11590	Aug. 2340 2560 2560 22640 22420 22420 2240 22540 22700 1780 1780 1780 1780 1780 1780 1780 1	## Abov  Sept. 640 640 640 600 770 680 640 1120 815 770 680 600 600 525 525 490 460 430 1120 4310 8810	7e Sea. Oct.0 6000 6400 5600 5600 7700 13400 17800 18500 26400 22840 23400 22600 20600 19200 178	Nov. 1400 1280 1280 1020 915 865 865 865 8770 725 860 660 560 560 490 24115 804 1400	Dec.

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	Drainage	Area,			Miles.	Altitu	ide, 7,5	36 Fee	t Abov	s Sea	Level	
Day	Jan.	Feb.		April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	165	190	215	310	647	620	574	1080	67	295	203	260
2		195	220	280	647	790	424	880	60	325	193	320
3		180	220	265	435	1440	320	703	75	295	183	310
4	180	185	220	280	310	1520	245	523	69	265	165	275
5	180	170	225	810	203	1110	201	355	91	237	148	260
6	185	170	230	280	156	731	173	237	114	225	130	260
7	170	180	235	265	135	500	147	187	175	198	130	260
8		180	240	250	125	310	123	155	171	183	148	260
9	175	185	245	225	120	220	101	165	168	148	174	255
10	180	195	250	250	115	235	91	180	176	141	174	245
11	170	195	255	237	110	574	82	175	195	156	174	240
12	175	195	260	225	115	1280	101	140	216	183	193	240
13	180	195	265	250	280	1690	91	150	225	203	193	230
14	170	195	270	280	731	1540	91	145	250	203	174	215
15	175	195	275	250	1330	1130	82	140	265	203	215	200
16	170	200	280	280	1330	992	82	125	295	193	255	200
17	170	200	280	280	1520	1170	82	125	325	193	300	200
18	170	200	280	250	1590	1310	82	130	325	183	340	200
19	175	200	280	250	1550	1380	74	95	310	183	385	200
20	400	200	295	295	1140	1690	74	65	280	165	395	205
21	400	205	280	325	731	1890	67	66	250	148	405	205
22	175	205	265	810	477	1850	60	60	193	135	415	205
23		205	280	310	325	1730	60	60	165	165	375	205
24		210	280	280	477	1690	60	53	141	193	340	205
25		210	295	237	760	1540	6ŏ	47	135	193	325	205
26		210	310	203	647	1280	67	53	141	193	325	210
27		215	310	183	546	1130	415	47	435	193	310	210
28	400	215	310	165	455	1020	1670	60	415	214	280	210
29			310	237	280	862	1710	60	325	214	280	210
30			310	355	340	741	1440	67	325	203	235	
31	400		310		500		1250	53	020	193	200	210
Tota		5480	8300	7917	18127	33965	10099	6381	6377	6216	7562	7120
Mean		196	268	264	585	1130	326	206	213	201	252	230
Max		215	310	355	1590	1890	1710	1080	435	325	415	320 320
Min		170	215	165	110	220	60	47	60	141	130	200
	t.10600					67200	20000			12400		
						-March		12100	12100	12400	19000	14100

					rge of I	Bio Gr	ınde at	Alamo	sa for	1916.			
		ainage			Square	Miles.	Altit	ude, 7,5	36 Pee	t Abov	e Sea	Level.	
Day		Jan.	Feb.	Mar.	April	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1 .		215	320	<b>2</b> 50	635	762	459	212	485	190	95	1200	
		215	320	230	462	660	392	195	900	190	95	1170	
3 .		215	280	195	395	510	371	195	1210	152	110	1170	
	1	215	280	212	350	350	436	195	1420	135	125	1170	
		215	280	212	395	212	555	160	1420	135	110	1110	
6 .		220	290	250	395	270	506	95	1420	118	110	1040	••••••
7 .		220	290	230	310	585	288	54	1560	118	142	985	•••••
8 .		220	295	230	270	1140	268	42	1800	118	635	985	••••••
9		220	300	230	230	1560	268	42	1720	103	1050	955	•
4 6		220	300	250	230	1920	371	67	1600	103	1210	985	•
		225	300	330	212	2120	610	290	1520	255	1350	1040	/
4.0		225	300	418	178	2420	745	418	1320	320	1760	1040	•••••
40		225	305	462	230	2280	750	270	1100	350	2120		•••••
- 4		225	305	535	195	2040	725	212	1200			985	
	••••	225	305	585	178	1720				295	2080	925	••
		225	305				755	212	1360	260	1960	896	•••••
	•			555	178	1850	895	212	1200	250	1860	896	•••••
	•••••	225	805	555	110	1020	990	330	1220	255	1700	925	•
	•••••	235	310	585	95	790	1120	290	1110	245	1700	925	
		245	310	660	160	600	1160	250	905	235	1700	955	
	• • • • • • • • • • • • • • • • • • • •	255	600	735	178	455	1700	195	795	225	1670	955	
21 .		260	590	790	<b>125</b>	475	1400	160	740	230	1590	867	
		260	580	900	110	382	1270	125	690	212	1590	756	
		260	344	900	81	312	1120	110	615	178	1590	783	
		260	350	845	95	232	845	125	565	160	1560	730	
25 .		270	290	735	160	178	685	125	490	178	1520	680	**********
26		550	270	635	250	155	535	142	395	178	1410	655	•••••
27		550	270	610	310	170	395	142	350	178	1410	630	•••••
		530	250	610	330	165	330	160	330	160	1340	630	
~~		530	230	610	440	215	290	125	290	142	1300	605	
••		520		610	610	250	230	125	230	125	1270	580	•
31		320		585		308		125	19ŏ		1270	000	
	otal	8795		15589		25606	20464	5400	30150	5793	37432	27228	•••••
Mea		284	327	501	260	826	682	174	973				•••••
Max		550	600	900	610	2420	1700	418	1800	193	1210	908	
Min		215	230	195	81	155	230	42		350	2120	1200	
					15500				190	103	95	580	•
ACT							40600	10700	09800	11/500	74400	54000	•
	Unit	nio sa:	er Wise	note	u, all a	ischarg	es are	in cubi	c reet	per se	cond.		
	Jan	uary I	st-ren	ruary	arin, (	ischar,	ge esti	mated.					

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#### RIO GRANDE NEAR LOBATOS.

Location.—At highway bridge in sec. 22, T. 33 N., R. 11 E., 10 miles east of Lobatos and a few miles above the Colorado-New Mexico line; 17 miles below mouth of Conejos River.

Records Available.—June 28, 1899, to November 30, 1916.

Drainage Area.—7,700 square miles.

Gage.—Automatic recording gage. This gage is referred to the datum of the original gage.

Channel.—A gash cut in lava rock; shifting blanket of sand.

Discharge Measurements.—Made from bridge.

Winter Flow.—Ice causes backwater varying in amount during the three winter months.

Diversions.—There are court decrees for diversions from the Rio Grande of 5,134 second-feet between the Del Norte station and this one. There are also decrees for diversions from the following tributaries: Minor tributaries above Alamosa, 464 second-feet; Alamosa and tributaries, 2,116 second-feet; Conejos and tributaries, 3,464 second-feet; Culebra and tributaries, 177 second-feet.

## SOUTH FORK OF RIO GRANDE AT SOUTH FORK.

Location.—At highway bridge half a mile west of South Fork station, in sec. 34, T. 40 N., R. 3 E. No tributaries between the station and the mouth and none for several miles above.

Records Available.—August 9, 1910, to November 9, 1916. Also a number of discharge measurements made in 1909 by the United States Geological Survey.

Drainage Area.—216 square miles.

Gage.—Chain gage established May 12, 1912, at the site of the original staff gage, but referred to a different datum. The original gage was washed out by flood October 5, 1911, and was replaced by an inclined staff gage at the railroad bridge at different datum, October 16, 1911. This gage was read until May 12, 1912.

Channel.—Apparently permanent at the present location.

Discharge Measurements.—Made from bridge.

Winter Flow.—Ice causes backwater during the winter months.

Reservoirs.—Daily and monthly discharges modified by storage in Beaver Park Reservoir.

Diversions.—There are court decrees for diversions of 11 second-feet from South Fork above the station; none below.

Level.

							nde nea	r Loba	tos for	r 1915.			
	Dra		Area,			Miles.					ve Sea	Level	•
Day	,	Jan.	Feb.	Mar.	April	May	June		Aug.		Oct.	Nov.	Dec.
1		305	280	325	435	2120	1400	1080	1680	225	400	265	325
2		305	·270	325	435	1920	1860	980	1340	205	400	290	295
3		315	270	325	400	1620	2720	795	1130	205	370	265	<b>3</b> 20
4		315	265	325	370	. 1290	2920	705	885	205	340	265	360
5		300	270	330	400	1030	2500	705	705	205	315	245	350
6		300	260	340	470	840	1980	585	545	205	290	225	320
7	<b>-</b>	300	275	330	470	705	1620	585	435	225	265	205	305
8		295	285	350	470	625	1400	545	370	265	245	190	310
9		295	275	345	470	545	1180	505	370	290	225	205	310
10		295	270	350	470	505	1130	435	400	290	190	245	315
11		300	275	350	545	505	1290	340	400	265	175	270	310
12		300	280	340	585	705	1920	315	370	290	175	270	300
13		295	280	340	545	1240	2640	315	315	315	175	270	305
14		290	285	340	585	1920	2780	290	290	290	205	290	300
15		290	285	340	585	2640	2380	265	290	315	205	310	295
16		290	290	400	625	3280	1860	245	290	340	225	335	285
17		290	290	470	705	3350	1680	245	290	370	225	360	290
18		290	295	470	885	3790	1800	225	290	370	245	385	290
19		295	295	470	840	3790	2180	190	265	370	245	410	295
20		295	300	470	1030	3140	<b>27</b> 20	175	265	340	245	435	295
21		285	300	400	1130	2310	3060	175	245	340	225	435	300
22		285	300	370	1130	1740	3140	190	225	315	225	435	300
23		285	310	400	1290	1340	2920	245	205	245	205	475	300
24		285	300	470	1290	1240	2720	175	205	205	205	470	305
25		280	315	505	1240	1240	2580	175	190	175	245	440	305
26		275	315	470	1180	1460	2240	225	175	175	245	400	305
27		275	315	470	1180	1680	1860	315	175	165	265	385	305
28		275	300	470	1400	1400	1680	1740	175	340	265	385	310
29		285		505	1620	1180	1510	2780	190	470	265	325	310
30		285	*******	505	1920	1130	1290	2500	205	400	290	325	310
31		275		470		1290		1980	225		290		310
7	otal	9050	8050	12370	24700	51570	62960	20025	13140	8415	7885	9810	9535
Me	an	292	288	399	823	1660	2100	646	424	280	254	327	308
Ma:	x	315	315	505	1920	3790	3140	2780	1680	470	400	475	360
Mir		275	260	325	370	505	1130	175	175	165	175	190	285
Acı	re-ft.	18000	16000		49000	102000	125000						
							to Mar					•	•
					-								

Nov. April 810 Dec. Aug. 320 2120 1480 1380 1770 ----------**-**---------------------..... 1480 -----...... ..... -----465 ----------..... -----..... -----...... ..... -----..... ----------..... -----..... 545 505 320 -----..... 1710 -----1770 \*\*\*\*\*\*\* 

57723 18998 1920 613

545

320

47413 33007 1530 1100

81ŏ

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428 720

1320

Acre-ft.22600 26200 47800 51500 164000 114000 37700 83600 25500 94100 65500 Unless otherwise noted, all discharges are in cubic feet per second.

Drainage Area,

Jan.

Dav

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Mean ....

Max. ....

Min.

Total 11394

620

-----

778

Discharge estimated, Jan. 1 to Feb. 24.

Feb.

						ork Bio							
D		inage			orang					t Above		Level	_
Day		Jan. 20	Feb. 65	Mar. 65	April 110	May 853	June 940	July 510	Aug. 259		Oct.	Nov.	Dec.
1 2		20	70	75	133	277	1090	439	209 226.	34	121	28	50
4	•••••	25	50	65	145	242	1010	417		28	110	28	50
3		40	55	45	157	226	765	417	197 183	41	100	34	45
5	••••••	40	30	50	183	211	675	439		64	90	34	45
6		50	30	55 55	157	197	646	417	170 157	81	81	84	45
	•	30	40	60	183	183	618	353	157	72	72	34	45
7 8	•••••	20	45	70	133	183	646	303 814		56	64	56	45
8	••••••	20 35	65	70	157	170	870	295	170	56	64	41	45
10		50		75	133	170	1090		133	48	48	41	40
	•••••	25	95 95	65	183	259	1260	277	110	48	41	48	40
	••••••	25 35	65	70	211	374	1210	259 259	100	41	41	28	40
12 13	•	40	80	80	211	535	1050		100	41	48	41	40
14		25	60	80	226	590	975	259	90	48	56	42	40
	•••••	25 35	65			618		226	100	64	56	48	40
15	•••••			90 80	226		975	197	121	56	56	44	85
	•	80	65		183	705	1010	170	110	72	64	45	35
17	•	20	70	100	183	765	1210	157	90	64	64	46	35
18		25	70	65	183	765	1260	133	81	48	56	48	35
		30	60	60	188	590	1340	121	72	64	48	49	35
		40	60	70	211	510	1340	133	72	48	48	51	35
		40	60	95	226	462	1210	157	64	48	48	52	35
		35	45	105	211	462	1090	133	72	34	48	53	35
23	•••••	20	50	90	170	485	1010	138	72	34	48	54	40
		20	40	90	157	590	905	145	81	34	48	55	40
		20	55	110	157	646	835	145	81	183	41	55	40
26	•	25	70	100	183	562	765	353	81	170	34	55	40
27 28	<b></b>	25	60	105	259	510	705	835	64	110	34	50	40
28		40	50	105	314	485	646	535	72	100	84	50	40
29	• • • • • • • • • • • • • • • • • • • •	45	•••••	105	395	562	590	395	56	90	34	50	40
		55		110	417	618	535	333	48	121	34	50	40
31		70		110		735		277	34		34	•••••	40
	otal		1665	2515	5980	14040	28271	9233	3423		1765	1339	1250
	n	33.2	59.5	81.1	198	453	942	298	110	64.9	56.9	44.6	40.3
			95	110	417	765	1340	835	259	170	121	56	50
	•	20	30	45	110	170	535	121	84	28	34	28	35
Acre		2040	3300	4990	11890	27900		18300	6760	3860	3500	2650	2480
	Note	.—Dis	ch. est	. Jan	1st-M	ch. 29; .	ov. 1	3-Dec.	81.				

	_	ווע	curra	OI E	t athor	POPE BL	o Grand	e at Bo	outh Po	rk for	r 1916.		
_						Miles.	TIME	ae, 8,17	76 Feet				
Day		Jan.	Feb.	Mar.			June	July		Sept.		Nov.	Dec.
	·	45	53	55	175	515	1080	824	326	104	94	161	
2.	· •	45	53	55	175	462	1080	790	326	94	148	148	*******
		45	53	55	160	390	1080	692	306	85	136	148	
		45	53	55	150	413	1290	692	306	94	114	148	
	· · · · · · · · ·	45	53	55	150	515	1120	660	287	85	104	136	
	·	47	53	60	150	692	1240	600	268	161	218	136	
7.		47	53	70	150	968	1240	515	306	125	347	136	
	··-	47	54	85	175	1080	1240	515	268	104	488	125	
		47	54	100	200	1240	1330	600	251	234	542	125	******
		47	54	100	225	1380	1460	571	218	390	600		
		50	54	110	250	1380	1420	515	203	306	824		
		50	54	140	268	1240	1460	462	188	268	660	•••••	
	<b>-</b>	50	54	125	268	1200	1420	437	174	218	488		
		50	54	125	234	1000	1600	413	234	188	437	•••••	
		50	54	130	218	859	1920	390	234	174	390		
		50	55	140	218	724	1740	542	234	161	347		
17 .		52	55	140	287	692	1460	413	203	148	326		
18 .		52	55	140	326	660	1330	462	188	136	326		
19 .	<b>-</b>	52	55	150	306	724	1420	368	161	125	306		
20		52	55	160	251	824	1380	347	161	114	268		*********
0.4		52	54	175	234	724	1080	306	161	114	251		*******
22		52	54	200	326	724	1080	287	148	104	234		*******
~ ~		52	54	200	437	692	1080	251	161	104	218		••••••
		52	54	175	515	790	968	234	161	85	218	•••••	
~=		52	52	175	542	895	931	234	148	85	203		
		52	52	200	571	931	895	306	148	85	188	********	******
		52	50	175	571	968	859	251	136	85	203		•••••
~ ~	•••••••	52	50	175	600	968	859	234	114	85	188		******
~ ~		52	50	150	692	895	859	218	114	85	188		•••••
	······	52		150	692	1080	895	218	125	85	174		•••••
~ -	·········	52		150		1160		306	125		161	•••••	
	otal	1540	1548	3975	9516	26785	36816	13653	6383	4331	9389	•••••	•••••
Mea		59.7	53.4	128	317	864	1230	440	206	144	303		
Max		52	55	200	692	1380	1920	824	326	390	824		•
Min.		45	50	55	150	390	859	218	114	85	94	•••••	•••••
		3060	3070		18900	53100	73200	27100			18600	•	•••••
						dischar						*******	
						to Apri		III Cui	nic 166f	per	secona.		
	DIRC	mar Re	CBLIIII	it <del>o</del> u,	Jan. I	to Apri	1 11.						

# SAGUACHE CREEK NEAR SAGUACHE.

Location.—At Ward's Ranch below the dam site of the Stark-Hagadorn Irrigation Co., 9 miles above Saguache. Ford Creek, the nearest important tributary, enters some distance below.

Records Available.—August 7, 1910, to September 30, 1912; June 1 to November 30, 1916.

Drainage Area.—595 square miles.

Gage.—An automatic recording gage.

Channel.—Shifting.

Discharge Measurements.—Made from footbridge during high water, and by wading at ordinary stages.

Winter Flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 46 second-feet from Saguache Creek above the station, and 365 second-feet below.

# ALAMOSA RIVER ABOVE TERRACE RESERVOIR.

Location.—Four miles above Terrace Dam in sec. 8, T. 36 N., R. 6 E., of New Mexico meridian.

Records Available.—April 25, 1914, to November 12, 1916. For records of flow of Alamosa River prior to April 25, 1914, see station below reservoir.

Gage.—Vertical staff bolted to cribbing support for cable. Datum has remained unchanged. Bristol recording gage installed May 7, 1915. Referred to staff gage.

Channel.—Shifts during high water.

Discharge Measurements.—Made from cable and car at high stages and by wading at low stages.

Winter Flow.—Affected by ice and station discontinued during the winter months.

Diversions.—There are no decreed diversions above this station.

Accuracy.—Although the channel shifts somewhat, enough measurements have been obtained to make the estimates of discharge reliable.

Co-operation.—Station maintained in co-operation with the Terrace Irrigation District.

	70						reek ne Altitud	ar Sag	uache N Fac	for 15	)15.	Level.	
		_	-		quare								
Da	У	Jan.	Feb.		April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		20	25	29	53	224	295	101	80	43	55	38	35
2		20	25	· 29	70	146	339	94	74	38	49	38	35
3		22	25	29	70	122	361	94	67	43	49	38	35
4		22	25	29	80	122	295	87	61	49	43	38	35
5		22	22	30	60	122	224	94	61	55	43	38	40
6		20	22	30	65	115	215	101	61	55	48	38	45
7		20	25	30	60	108	206	94	74	49	38	49	45
8	•	22	25	30	53	101	188	87	94	48	38	49	38
9	********	23	25	35	58	101	215	80	87	38	38	43	36
10	•••••	. 22	26	35	75	101	263	74	74	38	38	43	44
11	•••••	22	26	37	75	130	306	74	61	38	38	28	35
12		22	26	30	8ŏ	224	861	80	61	88	48	23	35
13	•	22	26	35	94	306	350	94	61	38	43	19	38
14	•	22	24	45	108	372	243	101	61	48	43	19	40
	•••••	22	24	55	138	372	215	94	61	49	43	28	36
15	•••••			55	108	339	224	80	61	49	· 43	33	36
16	•	22	26			339	233	74	61	49	43	38	25
17		20	27	42	87						43	43	
18	•	22	27	37	101	328	253	67	55	49			20
19		23	27	30	108	328	243	67	49	49	43	49	20
20		23	27	30	130	295	263	67	49	43	48	43	25
21	•	23	28	40	197	233	233	74	49	43	38	43	30
22		23	28	55	188	197	224	74	49	38	38	43	30
23		20	28	65	154	197	215	80	49	55	38	48	30
24		20	28	55	122	224	197	80	49	94	38	40	30
25		20	28	55	115	273	179	87	61	94	38	35	25
26		20	28	68	115	284	162	115	49	87	38	30	30
27		23	29	58	170	243	154	179	49	67	38	35	25
28		24	29	62	233	206	138	162	43	55	38	30	20
29		24		58	273	233	130	130	43	49	38	25	22
30		24		55	328	253	115	101	43	55	38	30	25
31	•	24		55		253		87	43		38		28
	Cotal	678	731	1328	3568	6891	7039	2873	1840	1533	1277	1089	993
	an	21.9	26.1	42.8	119	222	235	92.7	59.4	51.1	41.2	36.8	32
	х		29	68	328	372	361	179	94	94	55	49	45
	n	20	22	29	53	101	115	67	43	38	38	19	20
	re-ft		1450	2630	7080	13600	14000	5700	3650	3040	2530	2160	1970
AC	Note	1990					12; Nov				2000	2100	T310
	Note	וענ	scn. es	u, Jan	i. ISL U	o whi.	12, 1400	. 21 (0	Dec.	o.			
			Disch	arge (	f Sagu	iache C	reek ne	ar Sag	uache	for 19	16.		
	Dr	ainage					Altitud					Level.	
Da		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.

	Dr	ainage	Arer	595	Square	Miles.	Altitud	le, 7,80	0 Feet	Above	Sea :	Level.	
Day		Jan.	Feb.	Mar	. April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
		28	28	40	47	110	208	124	226	89	58	58	
2	<b>.</b>	28	30	4(	42	110	199	131	235	82	58	58	•••••
3		28	30	48		89	199	117	245	82	58	58	
		28	30	43		82	217	110	190	82	58	58	•
		30	33	45		89	226	103	172	76	58	58	
		28	33	45		117	199	103	190	82	58	52	••••
		28	33	48		155	199	96	235	82	.70	47	
		28	35	48		<b>190</b> .	199	96	245	76	70	47	
		28	35	48		235	208	110	217	76	70	42	
		28	35	50		275	226	163	208	82	70	52	••••
		26	35	50		275	235	147	181	82	76	52	•
	· · · · · •	26	35	5(		275	235	117	181	89	82	52	•
		26	35	50		265	226	110	199	82	70	42	
		26	35	50		255	226	103	208	76	70	37	•••••
		26	35	5(		226	217	89	181	70	76	28	•
	•••••	25	38	50		199	208	96	181	70	70	32	•
		25	38	58		190	217	96	172	64	64	37	•••••
		25	38	58		181	217	96	155	64	64	47	•
19	••••	25	38	60		172	217	89	147	64	70	47	
20		25	38	. 60		199	199	89	124	58	64	47	•••••
		25	40	6		199	190	89	117	58	64	52	
	•••••	25	40	68		181	181	89	110	58	70	47	
		25	40	60		181	163	89	110	58	70	42	
	· · · · · •	25	41	5		172	163	82	103	58	70	42	
25		25	41	50		155	147	76	103	58	64	42	`
		27	41	- 52		163	147	82	96	58	64	47	• • • • • • • • • • • • • • • • • • • •
	•••••	27	41	47		172	139	89	96	58	64	47	•••••
	····-	27	41	52		181	139	89	89	58	64	47	
		27	40	47		190	131	103	89	58	64	47	•
	•••••	27	•	47		190	124	155	89	58	, 58	42	•••••
		27		42		199		199	89		<b>'</b> 58		
Tot		824	1052	1556		5672	5801	3327	4983	2108	2044	1406	•
Mean		26.6	36.3	50.2		183	193	107	161	70.3	65.9	46.9	•••••
Max.		30	41	6		275	235	199	245	89	82	58	
			28	4(		82	124	76	89	58	58	28	•••••
Acre			2090	3090		11300	11500	6580	9900	4180	4050	2790	•
ŗ	nie	ss oth	erwise	not	ed, all	aischar	ges are	in cub	ic feet	per s	econd.		
1	лsc	narge	estima	itea,	Jan. 1	to Mai	ren 25.						

	<b>D</b>						above 1						
Da		_				Miles.		đe, 8,60				Nov.	Dec.
1	•	Jan.	Feb.	Mar.	April 54	May 153	June 562	July 370	Aug. 137	Sept. 44	Oct. 72	NOV.	Dec.
2	********				54	125	646	324	122	44	72		
3		•			54	111	507	324	108	44	62	······	
4					65	139	380	324	108	44	44		
5		•••••	•		54	153	335	347	108	53	44		•••••
7					54 54	111 125	293 314	324 280	108 137	44 44	44 36		
8					54	98	405	260	137	36	36	•••••	
9	*******				54	111	562	240	108	36	36		
10			•		87	125	731	240	95	36	36		
11	*****				54	183	853	240	83	29	29	•••••	•••••
12 13	•••••		•	•••••	76	273	791	260	83	29	29	•	••••••
14	•••••		•		87 76	380 480	646 618	$\frac{240}{222}$	83 72	36 44	29 29	•	
15	••••••		•		87	455	646	204	83	44	29		•
16					87	535	674	187	72	44	29		
17			•••••		76	562	760	153	62	36	29		
18	•••••				76	480	731	137	62	36	29		
19				·	87	380	853	122	53	44	22	•••••	
20			••		87	314	735	137	53		22	•••••	
21 22			*********	•	$\frac{125}{125}$	273 253	665 700	$122 \\ 122$	53 44	36 29	. 22 22	•••••	
23					125	293	700	122	44	29	22		
24					125	357	597	122	`62	29	22		
25		•••••			125	380	597	108	53	53	16		
26					153	335	533	260	62	72	16		
27					168	293	502	597	62	53	16		
28		•			199	293	445	324	53	53		•••••	•••••
29 30		•••••		•••••	253	335	418	240	53	53	16	•••••	
31		•••••	••••••		273	335 455	394	204 170	53 44	62	16 16		•••••
	<b>Cotal</b>	•••••			3048	8895	17593	7326	2457	1272	958		
	an				102	287	586	236	79.3	42.4	30.9		
Ma	X	•••••			273	562	853	597	137	72	72		*******
Mi	n		•		54	98	293	108	44	29	16		
Ac	re-ft.			······	6070	17600	34900	14500	4880	2520	1900		
	. Esti	mated	April	1 and	2 and	Octob	er 31.						
		Disc	harge	of Al	amoga	River	ahove "	Tarrace	Raga	rvoir f	or 191	R.	
	Di	Disc rainage	harge Area	of Al.	amosa iquare	River Miles.	above :						
Da		<b>Disc</b> rainage Jan.	harge Area Feb.	, 102 8	iquare	Miles.	▲ltitu	de, 8,60	00 Pee	t Abov		Teast'	Dec.
1	y	rainag	Area	, 102 8	amosa iquare April 75	Miles.					e Sea		Dec.
1 2	у 	<b>rainag</b> Jan.	Feb.	, <b>102 £</b> Mar.	April 75 75	May 222 200	Altitu June 655 680	July 346 346	Aug. 274 274	t <b>∆bov</b> Sept. 62 62	Oct. 53 52	Nov.	
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1 2 3 4 5 6 7 8 9	y 	Jan.	Feb.	Mar.	April 75 75 75 75 75 75 75 75 63 63 75	May 222 200 178 178 295 435 500 570 645 725	Altitu June 655 680 668 655 630 645 675 717 805	July 346 321 296 274 252 233 214 252 233	Aug. 274 274 274 233 196 196 214 214 196	<b>Example 19 Abov</b> Sept. 62 62 62 52 105 62 62 133 163	oct.  33 52 52 33 33 82 93 148 133 105	Nov. 62 62 62 62 62 42 42 42	
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### ALAMOSA RIVER BELOW TERRACE RESERVOIR.

Location.—One-fourth mile below Terrace Dam in sec. 23, T. 36 N., R. 6 E., of New Mexico meridian.

Records Available.—April 18, 1909, to December 10, 1915; May 19, 1914, to November, 1916.

Gage.—Vertical staff gage bolted to left cliff at station. Gage location has been changed several times since station was established. Bristol gage installed May 7, 1915, referred to staff gage.

Channel.—Shifts during high water.

Discharge Measurements.—Made from cable at high stages and by wading at low stages.

Winter Flow.—Ice causes backwater effect and station is discontinued during the winter months.

Diversions.—There are no decreed diversions above this station.

Accuracy.—Although channel shifts somewhat, enough measurements have been made to make the estimates of discharge reliable.

Co-operation.—Station maintained in co-operation with the Terrace Irrigation District.

# LA JARA CREEK NEAR CAPULIN.

Location.-In sec. 29, T. 34 N., R. 7 E., 13 miles above Capulin.

Records Available.—April 1 to October 31, 1916.

Drainage Area.—73 square miles.

Gage.—Bristol automatic.

Channel.—Fairly permanent.

Discharge Measurements.—By wading 25 to 40 feet below gage, except at extreme high water when measurements are made from highway bridge, 1½ miles below. Two small ditches of not to exceed 6 cubic feet per second capacity divert water between gage and bridge.

Diversions.—Station is above all decreed ditches.

Regulation.—Flow is regulated to some extent by the La Jara reservoir.

Co-operation.—Station maintained in co-operation with the Terrace Irrigation District.

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		•••••		E.15	57	562	615	112	60	60		•••
		•••••	·····	15	57	588	562	112	60	60	*******	
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		•••••	• • • • • • • • • • • • • • • • • • • •	19	106	327	512	92	60	41		
••••••		••••••	•	19	106	327	562	92	67	41	•	
•••••	•••••		•••••	23	97	365	588	112	60	41	•••••	
•	•••••			23	97	405	489	123	60	41		
•••••	•••••	•••••		19	97	425	467	112	53	35	•••••	
•			•	19	115	512	345	123	53	35	•	
•		•		19	135	797	248	145	53	35	•	•••
	•••••			23	135	865	327	134	47	35	•	•••
•••••	•		•••••	32	146	797	345	134	67	30	*******	
•••••				44	168	700	365	134	83	30		
			•	44	181	615	310	. 134	60	30		
	•	•		38	194	670	262	134	85	30		•
	•			44	293	763	202	123	41	30		
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			•	57	365	831	134	67	47	26		
				57	310	797	123	53	47	26		
				72	310	797	145	53	60	26		
				72	345	797	145	53	35	26		
•	•••••		•••••	64	365	763	123	53	35	26		
				57	365	700	83	60	35	26		
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				57	365	730	67	47	35	35		
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					425		92	60		$\mathbf{E.53}$		
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x				72	512	935	615	145	83	60		
n	•••••			15	57	327	47	47	35	26		
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# CONEJOS RIVER NEAR MOGOTE.

Location.—At highway bridge near Mogote. From September 1, 1899, to March 31, 1900, and from April 17, 1903, to October 31, 1905, a station was maintained about 4 miles above Mogote. From March 21, 1907, to October 5, 1911, a station was maintained at Jacobs' Ranch, 8 miles above Mogote.

Records Available.—January 1, 1912, to November 30, 1916.

Drainage Area.—282 square miles.

Gage.—An automatic recording gage.

Channel.—Apparently permanent at present location.

Discharge Measurements.-Made from bridge.

Winter Flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversion of 3,476 second-feet from Conejos River, all but 66 second-feet being diverted below the present station.

Reservoirs.—No reservoirs have been constructed on the Conejos above this station.

# LOS PINOS CREEK NEAR ORTIZ, COLO.

Location.—At a small semi-circular flume supported by cables, 2½ miles above Ortiz, Colorado.

Records Available.—January 1, 1914, to October 31, 1916.

Drainage Area.—167 square miles.

Gage.—Bristol automatic.

Channel.—Slightly shifting.

Discharge Measurements.—Made by wading, except during high water, when they are made from flume.

Diversions.—One small ditch diverts water above the station.

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5		38	50 50	45 45	188	345	865	1040	250 251	125	98	56 56	50
6		36	50	45	174	305	787	990	235	136	90	56	50
7		32	50	50	160	286	787	865	251	115	90		45
8		36	50	. 50	160	268	905	787	367	98	90	62 62	45 45
9	•	36	55	50	147	268	1180	713	305	98	90	62	45
10		36	60	50	147	325	1420	713	268	90	90	62	
11		33	60	50	174	492	1820	713	268	82	90	50	45
12		34	55	50	235	713	1940	713	251	82	82	45	40
13		37	55	55	268	990	1700	713	235	82	82	62	40
14		37	50	60	305	1220	1480	578	188	98	82 82	62 62	40 40
15	••	37	50	60	305	1120	1540	610	188	90	82 82	62	40
16	•	37	50	65	268	1220	1640	578	188	90	82 82	66	
17	•	35	55	60	235	1320	1940	492	174	82		62	38
18	••••••	38	55	65	235	1320			160	82 82	82 82		38
19		38	50				2000	440				62	36
20		40	50 50	55	235 286	990	2430	367	147	82	82	66	36
21		40		55		750	2000	367	147	75	75	66	35
22		38	50	55	390	643	1880	345	136	75	75	66	38
23		32	45 45	65	390 390	578	1940	345 325	136	68	75	66	36
24		32 32	45	65 68	367	677 865	1940 1820	305	125 136	75 75	68. 68	65 65	40
25													36
26 26		35	45	80	390	945	1640	325	125	90	68	60	36
	•••••	40	50	80	466	825	1700	578	160	188	68	60	38
27 28	••••••	40	45	70	610	713	1420	1640	160	136	68	60	35
29	<b>-</b>	45	45	85	750	905	1380	1180	136	115	62	55	30
• •	•••••	45	•••••	90	787 750	905	1380 1280	713	136	106	62	55	30
31		45 50	•	80	750	990		578 492	136	115	62	55	35
			1.400	85	0015	1120			125	0001	62	1000	35
	otal	1166 37.6	1420	1883	9315	22909	46774	21700	6480	3001	2524	1800	1247
	ın		50.7	60.7	310	739	1560	700	209 390	100	81.4	60	40.2
	·	50	60	90	787	1320	2430	1640		188	115	66	50
Min		32	45	45	90	268	787	305	125	68	62	45	35
Acr	e-ft.		2820		18400	45400	92800	43000	12900	5950	5000	3570	2470
	MOLE	.—Dis	cnarge	estn	nated,	Jan. I	to Marc	:n 24; J	NOV. IZ	to De	U. 31.		

TD:	ainage					River no		gote fo			Level.	
Day	Jan.	Feb.	Mar.	April		June	July		Sept.	Oct.	Nov.	Dec.
		45	57	105	830	1700	1360	610	152	91	198	Dec.
		45	60	110	680	1760	1260	680	152	139	198	•
3	. 35	45	60	115	645	1760	1160	754	139	139	198	•••••
4	. 35	48	60	102	645	1950	1120	645	126	114	198	•••••
5	. 35	48	65	114	949	1880	1080	577	126	102	182	•••••
		48	70	102	1360	2080	949	577	152	152	167	•••••
7	0.0	48	70	91	1820	2020	908	545	167	215	152	•••••
0	0.0	50	70	102	1950	2300	949	515	139	458	152	•••••
•		50	75	152	2300	2300	949	458	250	545	139	•••••
		50	75	198	2380	2460	949	486	515	545	152	
		50	80	250	2300	2960	908	430	357	792	152	•••••
12	. 37	50	90	232	1760	2700	908	380	334	717	139	•••••
		50 50	80	250	1760	2540	908	430		545		•••••
									290		102	•••••
14		50	80	167	1640	2540 2540	869 754	458	250	577	102	•••••
15		50	85	290	1410			458	232	486	102	•••••
16		50	85	290	1260	2380	990	430	215	430	102	•••••
17		55	85	380	1310	2300	830	405	198	405	102	••••
18		55	90	430	1210	2380	792	334	182	380	102	•
19		55	90	458	1360	2540	680	290	182	357	102	•••••
20		55	90	380	1520	2540	610	270	152	312	102	•••••
21	. 39	55	100	380	1210	2460	610	270	139	290	102	*******
22		55	110	380	1210	2300	610	250	126	290	100	•••••
23		55	110	486	1260	2300	610	232	126	270	100	•••••
24:		55	110	515	1360	2020	645	215	126	270	95	•••••
25		55	105	645	1460	1820	645	215	114	250	95	•
26		55	110	680	1460	1700	610	215	114	250	90	
27		57	100	680	1520	1640	-545	215	102	250	90	
28		57	100	792	1580	1700	545	198	91	250	85	
29		57	95	1080	1760	1640	486	182	91	232	85	
30	. 43		95	990	1880	1520	486	182	80	215	80	
31	. 45		95		1820		577	182		198		*******
Total	1188	1498	2637	10951	45609	64730	25302	12088	5419	10266	3765	
Mean	38.3	51.7	85.1	365	1470	2160	816	390	181	331	126	
Max		57	110	1080	2380	2960	1360	754	515	792	198	
Min	. 35	45	57	91	645	1520	486	182	80	91	80	•
Acre-ft		2970		21700	90400			24000 1		20400	7500	
						rges are				second		
						arge est					•	

			Disc	harg	e of L	s Pinos	. Creek	near C	rtiz fo	r 1915.			
	Drains	ge	Area,	167	Square	Miles.		de, 8,10			Sec	Level	
Day	Jan		Feb.		April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	12		18	18	35	410	829	166	66	23	19	16	Dec.
2	13		20	18	45	313	888	156	60	23	19	16	
3	1		īš	18	60	251	649	146	48	23	19	12	•
4	1		16	18	65	215	517	156	42	27	19	12	•
5	1		16	18	75	203	487	146	42	37	19	12	••••••
	1		ī2	20	71	191	487	146	48	23	19	12	••••••
7	1		12	2ŏ	61	168	502	118	60	19	16	16	•••••
8	10		14	2ŏ	61	168	564	100	86	16	iš	19	
9	1	4	14	20	61	215	598	86	79	16	16	19	••••••
10	1	5	14	20	61	300	632	72	60	16	16	<b>19</b>	•
	1		14	20	71	395	666	72	60	16	16	12	
12	1		14	2ŏ	112	700	598	72	54	16	16	10	•
13	1	4	14	20	157	901	517	100	48	16	19	10	••••••
14	1:	2	14	25	203	918	444	772	42	16	19	23	••••••
15	1		14	25	239	840	430	66	48	16	19	27	•
16	1		16	25	180	865	444	54	37	19	23	27	•
4.5	1		16	25	157	900	458	54	32	19	19	27	•
10	1		16	25	145	710	487	48	27	19	19	27	******
19	1		16	20	168	517	532	42	27	19	19	32	•••••
0.0	1		16	2ŏ	227	416	487	42	27	19	19	27	
• -	ī		16	20	340	351	430	42	32	19	19	23	•••••
00	ī:		16	25	381	351	416	42	27	19	19		
~~	1		18	25	354	458	408	37	27			23	•
0.4	13		18	25	354	632	377	37	27	19 19	19	23	•••••
25	13		18	30	367	615	338	37	48		19	23	••••••
26	î		18	30	470	517	312	196	66	19 19	19 19	23	••••••
• ~	i		18	30	596	430	274	351	42	19		20	•••••
28	1		18	35	665	487	238	186	32		19	20	•
	i		10	35	665	598	206	127	37	19	19	20	•
•	1			30	630	632	186	93	27	19	19	20	
	2	ň .		35		718		86	23	19	19	20	••
Tot			441	735	7076	15385	14396				_19		•
Mean.			15.8	23.7	236	496	480	3148 102	1381	588	575	590	•••••
Max			20	35	665	918	888	351	44.5 86	19.6	18.5		•
Min	1		12	18	35	168	186	37		37	23	32	•
Acre-			878	1460		30500	28600		23	16	16	10	•••••
		-						6270	2740	1170	1140	1170	•
L	ischar	50 G	estima	ited,	Januar	y 1st-A	April 15	ith; No	vembe	r 23-30.			

Day	DI	ainage	Area.	187 1		<b>TF11</b>							
oay.							WILLEAD	18, 8,10	DO TEST	A DOVE	30a	Level,	
4 -		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
			•••••	•••••	75	581	825	288	80	24	20	64	
		•••••	•••••	••••••	75	517	810	264	88	24	44	64	
		•••••		•	80	458	812	252	142	24	28	57	
	·		•••••		80	<b>532</b>	815	228	88	20	24	57	
	•••••		•	•••••	85	791	800	216	72	20	20	50	
<u>6</u>	•••••	•••••	•••••	•••••	85	1130	820	205	80	28	38	50	
	•••••		•••••		80	1270	785	183	123	28	44		
	•••••	•	•••••		85	1380	773	172	96	24	80		
		•••••			95	1430	832	172	57	96	162		
0					110	1500	852	162	57	114	152		
					110	1320	832	183	50	57	301		
	<b>-</b>				- 120	1160	773	152	44	50	264	********	
			4	·	120	1150	773	152	57	38	183		*
	•••••				125	1070	735	152	64	28	216	*******	
					136	872	698	162	80	28	183		••••
					146	782	662	216	64	24	152	•••••	•
7.					196	805	627	152	50	24	152	••••••	
8					250	833	610	123	44	24	132	••••••	•
ý					250	895	576	96	38	24	114	••••••	••••
^					216	880	542	88	38	24	96	•	•
-					216	753	510	105	33	20	96	*******	
•			•••••		250	812	480	88	28	20		•••••	•
•			••••••		325	860	450	88	28		88	******	•
4					430	980	422	123	28 28	20	88		
_			•	••••••	548	1050	394	96		20	88	••••	•
			•••••		564	970	366	80	28	20	80	•••••	•
ė.			•		548	917	340	72	50	18	80	•••••	••••
ė ·					666	920	327		38	18	88	•••••	
Ā ·		•	•••••	•	848	945	314	80	33	18	80		
À		•••••	•	•	754	930	314	88	28	18	64	•••••	
		•••••	•	•	104	878	314	96	33	18	64	•	
		•••••			7668		10000	105	28	•••••	64		
	tal					29371	18869	4639	1667	913	3285	*******	•••••
<b>Lea</b> r		•••••		•••••	256	947	629	150	53.8	30.4	106	*******	•
ſax.			•••••	•	848	1500	852	288	142	114	301	*******	
Iin		•		••••••	75	458	314	72	28	18	20		
cre							37400	9220	3310	1810	8520	•	
7	IInle	ss oth	erwise	note	d, all d	ischarg	es are	n cubi	c fast	202 45-			•
	Diac	harge	estima	ited.	April 1	-14, Jur	A 18-26	Tular	19 14	her nec	ona.		

### SAN ANTONIO RIVER NEAR ORTIZ.

Location.—One-fourth mile above mouth of Los Pinos Creek.

Records Available.—January 1 to October 30, 1915.

Discharge Measurements.—Made by wading.

Accuracy.—Results are based on discharge measurements and estimates, so can be considered only fair.

# UTE CREEK NEAR FORT GARLAND.

This station is located 1 mile northeast of Fort Garland. A 10-foot Cippoletti weir was used to obtain the discharge.

Data furnished by the Trinchera Irrigation District.

# SANGRE DE CRISTO CREEK NEAR FORT GARLAND.

This station is located 1 mile east of Fort Garland and 600 feet above the headgate of the Garland canal. A Cippoletti weir was used to obtain the discharge.

Discharge of San Antonio River near Ortiz for 1915.

Data furnished by the Trinchera Irrigation District.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1			2	20	80	40	5	15	6	5	•	•	
2			2	30	75	40	5	15	6	5			

1				2	20	80	40	5	15	6	5		******
2				2	30	75	40	5	15	6	5		
3				2	40	70	40	5	10	6	5		
Ä				. 2	43	69	35	3	ĩŏ	ĕ	5		
- 3	•••••	••••••		2	43	65	35	3	10	ž	5	•	· ····•
9	•••••	•	•••••	4				Š		,	õ	•••••	•••••
6	•••••			Z	43	60	35	Ų	12	6	. 5		
7			•	2	43	55	35	Ų	12	6	4		*******
8				2	48	55	40	Ų	15	4	4	••	• • • • • • • • • • • • • • • • • • • •
9				2	43	60	40	0	12	4	4		
10				3.	43	70	40	0	10	4	4		
11				3	50	75	45	0	10	4	4		
12				3	60	100	35	0	8	4	4		
13				3	55	150	30 .	Ō	Ř	Ä	5		
14				3	65	150	25	ň	Ř	ā	Š.		
15			********	3	75	125	25	ň	Ř	ā	5	*******	
16		•••••	1	3	60	125	25	ž	8	5	ĕ		
17		••••••	<b>†</b>	7	60	125	20	2	8	5	5		
	••••	•••••	1	*	55	100	20	6	8	5		•	
18		•••••	ī	4				Z			5	••••	
19		• • • • • • • • • • • • • • • • • • • •	1	4	65	90	20	z	8	5	5		•••••
20			1	4	74	80	20	3	8	5	5		
21			1	4	100	70	20	3	8	5	5		
22			1	4	125	70	20	3	8	5	5		
23			1	4	110	75	15	4	7	5	5		
24			- 1	5	110	80	15	Ē	7	5	5		*********
	•••••	•••••	÷	5	115	80	15	ř	÷	5	5	•••••	
25	•••••	•••••	Ţ					25	- 1		5		
26	*******	•••••	1	5	130	75	10	35	10	5	5	•••••	•••••
27	******	•••••	1	5	140	60	10	75	8	5	5		• • • • • • • • • • • • • • • • • • • •
28	•••••		1	5	150	60	10	30	7	5	5		•
29				5	150	50	` 8	25	7	5	5		
30				5	150	50	8	20	6	5	5		
31			•••••	5		50		20	6		5		
				405					004		150	•••	
	Total	•••••	13	107	2290	2499	776	257	284	150	150	•••••	•••••
Me	ean		1	3.5	76.8	80.6	25.0	8.3	9.2	5	4.8	•••••	******
Ma			1	5	150	150	40	75	15	6	6		
Mi			ī	2	20	50	Ř	.0	6	4	4		******
	re-ft.		26	215	4540	496Ŭ	1540	510	566	298	295		
a		*******	20	~ 10	1010	2000	1010				-00		

# Discharge of Ute Creek near Fort Garland for 1916.

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		•			10	38	56	30	36	20	10		
2	*******			•••••			56	30	36	•••••	•	•••••	
3					14	36	48	30	34	20		•	
4					15		48	30	32	20			
Ē					14	35	56	28	30		10		
ž			•••••	•	16		48	26	28			•••••	
2				••••••	10		48	26	26		•		•
7	******		•	******						•			
8	•			•••••	14	72	48	. 26	24	20		•••••	
9							48	26	22		10		
10					14	94	*******	32	22				
11						96		32	22				
12			•	•	22	74	66	40					
13			•	•••••		72	68	36	22				
	•					14			20	15		••••••	
14			••••••		•••••		64	•	20	19		•••••	
15	•••••		*******	•		62	60			•••••			
16						54	58		20	•			
17				-	20	50	50	36	20				
18		********		16			62	40					
19					22	42	52	44	20	12			
	••••••	••••••	•	4.4	22	42	48	40	20		•••••		••••
20	•	•	•	14		44							
21			•		22		40	36	20				
2 <b>2</b>						46	48	36	22	•••••			
23								36	` 20				*******
24					30		40	32		••			
25				•			38	32	20	10			
26				11	38	48	38	30				********	
	•	••••		11	00		90						
27			•••••		• • • • • • • • • • • • • • • • • • • •	48		30	20	•			
28		•••••	· · · · · · · · ·	11	•		38	28	20	•••••		••••••	
29				11	42		38	26					
30						56	36	24	20	10			
31					••••••			22	20			•••••	

# Discharge of Sangre de Cristo Creek near Fort Garland for 1916.

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					31	82	48	8	12	4	2	•	
2			*******	••••••		82	46	6	$\bar{1}\bar{2}$	4			
~					27	72	44	š	16	ā			
3	•••••	•••••	• • • • • • • • • • • • • • • • • • • •					ž	16	4			•••••
3	•••••				19	81	40	9		3	2		•••••
Þ	•••••				17	95	48	6	12	3	4		•••••
6	••••••	•			36	116	42	- 6	12		•		•
7					16	127	40	6	12				
8					28	140	38	6	10	•••••			•
9					26	140	34	•	7	•••••	2		
10					31	150	30	6	6	3			
11					40	160			6				
12					48	140	30	22	6				
13			•••••	•••••••	44	122	26	16	6				
14		•••••			42	114	24		š.				
15		•••••		21		102	22	12	6	3			
	•••••		••••••	21	•	99	22		6	U			
16	•	•		•••••					•	•	••	••••	•••••
17	•••••		•	•	40	93	22		6	••••			
18					58	82	22	18	6				
19					64	77	22	12	6				
20	••				48	77	18	12	6	3			
21					54	82	18	10	6	•••••		•	
22					58	75	15	. 10	7				
23						72	14	10	• 5				
24					70	66	14	10	5	•••••			
25				•	76	64	14	ĩŏ	5	2	••••••		•
				18	77	62	12	iŏ	5	-	•••••		
26	•••••	••••		24	72	58	12	10	5	••••••			•
27	·····	•••••		26	78	58	10	10	5		•	••••••	
28		•••••											•
29				28	82	56	8	10	5		•	*******	
30				21	88	54	8	10	4	2		•	
31			•		•	50	•	10	4				

The following data were furnished by B. F. Tipton, Manager of the Baca Grant:

### NORTH CRESTONE CREEK.

April 13 to September 18, meter station ½-mile below Crestone.

August 6 to September 6, 3-ft. rectangular weir at same point.

September 6 to end of season, 3-ft. rectangular weir used one mile above Crestone.

### SOUTH CRESTONE CREEK.

June 26 to September 2, meter station 1½ miles above Crestone Branch of D. & R. G. Railroad.

September 2 to November 10, weir station at same point.

# WILLOW CREEK.

May 22 to August 28, meter station 1½ miles above Crestone Branch of D. & R. G. Railroad.

August 28 to November 10, weir station at same point.

## SPANISH CREEK.

June 18 to August 28, meter station ½ mile below Crestone Branch of D. & R. G. Railroad.

August 28 to November 3, weir station at same point.

# COTTONWOOD CREEK.

May 11 to July 28, meter station 1 mile below Crestone Branch of D. & R. G. Railroad.

July 28 to August 27, meter station 2 miles below railroad.

August 27 to 30, weir station 2 miles below railroad.

# DEADMAN CREEK.

June 25 to September.8, meter station at mouth of canyon, 2 miles below east boundary of Baca Grant.

September 8 to November 3, weir station at same point.

# Discharge of North Crestone Creek at Crestone for 1915.

Da	ıy	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	*******	•••••	•••••	•	•	17.0	•••••	•••••	•••••	•••••		••••••	*******
2	••••••		•••••	*******	•••••	14.0		******	*******	•••••	3.3	*******	******
3	•••••	•••••	••••••	*******	••		•••••	•••••	******	*******	*******	******	
- 1	•••••	•••••	•••••	•	••••••	8.0		•••••	•••••	******			
5	•••••		••••	•	•	•	28.0	•	******	•••••	2.7	2.9	******
5		•••••	•	•••••	•	••		66.0	•••••	2.1		•••••	
7	••••••		•••••	•••••	•••••		•••••	••••••	16.0	2.2	******		******
8	•••••	•••••	•	•	•••••			•••••	••••••	•••••		3.2	•
. 9	•••••	•••••	•••••	•••••	•		•	*******	*******	******	2.8	*******	
10	*******	•••••	******	•••••	••••	•		******	******	•••••		*******	•••••
11 12	••••••	•••••	•••••	•	•••••	•		*******	•	*******	2.8	•••••	
13		•••••	••••••	•••••		23.0	101	90.0	•••••	*******	•••••	•••••	•••••
14		••••••	••••••	•••••	2.8	52.0	*******	29.0	12.4	•••••	•••••		*******
15			••••	*******	•	92.U	•	*******	12.2	*******		•••••	
16		•••••	•••••	•••••	•••••		•	••••••	••••••	•••••	2.8 2.7	•••••	
17		*******	•	••••••		•		•••••	******	*******	Z. 1	*******	•••••
18		•••••	•	•	5.0	•		•••••	•••••	•••••	2.8	•••••	•
19		•••••		•••••	5.0	•••••	*******	•••••	•	•••••	2.0	*******	
20		•	•	•••••	4.4				•	••••••	******	•••••	
21			•••••	•	5.5		•••••		••••••	••••••		•	
22		••	•••••	•••••	6.7	22.0	**	•	•	*******	******	•••••	
23		••••••	•	••••••	6.7		••		*******	4.5	3.6	•	
24			•		6.7	•••••	•••••		*******			•••••	
25			•••••			*******	•••••	••	*******	•••••	3.3	•	•
26			•	*******	•			*******	*******		2.9	••••••	•••••
27			•	•••••				211	•••••	•		•	
28	*******		•••••	•••••	•••••	•	••		•	•	3.1	•	•••••
29			•••••	•••••	14.0	10.0	*******	*******	*******	•••••		******	
30		•••••	<b>******</b>	••	27.0		•••••		•		3.3	••-	
31	••••••		••••••	•		••••••	••••••	25.0	*******	••••••			*******
91		••••••	••••••	•	••••••	********	•	20.0		•••••	•	•	••••••

# Discharge of South Crestone Creek near Crestone for 1915. Drainage Area, ....... Square Eilles Altitude, 8,300 Feet Above Sea Level.

Day	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		•••••			-							0.6	
2					•••••			*******	5.9	*******			
3				••••••	••••••	•••••	•	10.0	6.1	1.9	1.3	*******	*******
ĭ			••••••	•••••	•	•••••			5.2			0.6	
Ē		•••••	*******	•••••				•••••	4.3	•	1.2		
ä		•••••		•••••	••••••	•••••	••	19.0	4.2	*******	1.2	0.6	••••••
9	•	••••••		••••••	••••••			13.0				0.0	•
1	••••••	*******				•	· ••••••	13.0	4.1	2.1	1.1		
8	•	•••••	******	•••••	•••••	•••••		•				0.6	
. 9	•••••	*******	•••••	******	*******		******	******	•••••		1.2		
10		••••				•••••			6.0	1.8	******	0.6	
11		•••••			•••••	•	*******		6.0	1.6		******	
12					*******		·		5.8		1.1		
13	*******	******	*******		*******		••••••	11.0	6.0	1.6	1.2	******	•
14		*******	•		*******			10.0	5.5	1.6	0.9	*******	•
15			******							1.6			
16	******	******				*******		11.0	4.5	1.5	0.9		
17								10.0	4.5	1.5			
18							4	******	4.8	1.4	1.2	******	
19		*******	*******		••••••				4.8			•••••	
20		********		*******	*******			8.5		1.4	0.9	*******	
21			*******	*******			*******		4.8		0.8		
22								8.7		1.3	0.8		
23		•••••	•	*******	••••••				•	1.3		•••••	••••••
24			•••••	*******		•••••		9.4	•••••	1.3		,	
25	•••••		•		*******		••••••		••••••		0.8		•
	•		•••••	•••••	•••••	•	18.0	•			0.8		•
26	•••••	•••••	•••••			•	10.0	114	2.3		0.8		•••••
27	•	*******	•••••			•	•	114	2.3				•
28	•••••	••••	•	•••••	••-		••••••				0.7	•••••	
29	•••••		•••••	•••••	•	•••••	100	30.0		1.5	0.7		•••••
30	•••••		*******	•••••	******	••••	16.0	16.0		•••••	•••••		•••••
31			•••••	••	•••••	•••••	·	7.9		•••••	•	******	••

# Discharge of Willow Creek at 1.5 Miles Above Crestone Branch D. & R. G. Bailroad for 1915.

# Altitude, 8,438 Peet Above Sea Level.

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		•	•••••	•••••	•••••			26.0		4.3	8.0	1.3	•••••
2	•		•	•	•••••			•••••	16.0	4.4	*******		•••••
3	•••••						*******	27.0	20.0	*******	2.6		•••••
4					******	•••••		*******	16.0	5.2	•••••	1.2	•••••
5	•••••	•	•••••	•••••	•••••			•	13.0	*******	2.5		
6	•			••••••		*******	******	87.0	12.0	*********	********	1.2	•
7	•••••	••-	•••••	•	·		•	28.0	20.0	4.5	2.2	********	•••••
8	••		••••••	•••••		•••••	*******	******	•••••	******		1.3	•••••
. 9	•		•	•		•••••		•		3.0	2.8		••••
10	•	•	•••••		••••	•••••	••••••	•	19.0	8.8	*******	1.3	•••••
11	•	•	•••••		••	•••••		•••••	18.0	3.2		*******	•••••
12	•••••		*******	•		•••••	•••••	•	17.0		2.1	••••	•••••
13	•••••		•	•••••		•••••	•••••	28.0	20.0	8.1	2.1	•••••	
14 15	•••••		•••••	•••••	•	•••••	•••••	<b>25</b> .0	14.0	2.9 2.8	1.9	•••••	•
		······	******	•••••	•••••	•••••		900	17.0	2.8	1.8	*******	
16 17		•	•••••	•••••	•••••	••		30.0	17.0 15.0	2.7		•••••	•
18			•••••	•••••	••	•••••		25.0	16.0	2.7	1.8	•••••	••••••
19			•	•••••		••••••	•	*******	17.0			•	•
20		•••••	••••			••••••	•	29.0		2.7	1.8	•••••	
21				•	•				15.0	2.7		•	
22				•••••		2.7	*******	23.0	-	2.7	1.8		••••••
23		•		••••	••••••		•		15.0	2.7	1.0	•	••••••
24		•••••	•••••	••••••		*******	•••••	27.0	14.0	2.7	••••••		*******
25				•		••••••	•••••			2.5	1.6	*******	
26					•	•	43.0	*******	•		1.5		
27					•	••••••		154	8.5	8.1			
28			•	•••••	••••••	•	•••••		4.8	8.1	1.5		
29					•••••	•••••	•••••	45.0	7.0	0.1		*******	*******
30			•		••••••		*******	30.0	•••••	••••••			
31				********				25.0	*******	••••••			
31	*****	•••••	******	•••••	*******	• • • • • • • • • • • • • • • • • • • •		~0.0	******	•••••			

# Discharge of Spanish Creek at 0.5 Mile Below Crestone Branch D. & R. G. Bailroad for 1915.

# Drainage Area, ....... Square Miles. Altitude, 7,900 Peet Above Sea Level.

		_	•		-								
Da	y	Jan.	Feb.	Mar.	Ápril	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1								*******		0.6			
2								*******	3.4				•••••
3				•		•••••				0.8			
4	•••••		•	•••••	•		••••••	•••••		0.7			
	•	•		•	•••••	•		******		0.7	•••••	•••••	•
5	•••••			•	•••••			••••••	•••••	• • • • • • • • • • • • • • • • • • • •	•		
6		******		•••••		•••••		16.0		0.8	0.6	*******	
7		********			******				•	0.9			
8						*******	•••••						
ğ								•					
10		*******	•	•	•		•	••••••		0.6			
	•••••				*******		•	•		0.0	******	•	
11	•••••	•	*******		******	•	*******		3.8	•			
12							•••••	•••••	•				
13			*******					7.4			0.5		
14				••••				•••••		0.6			
15					•••••					0.5			
16												•	
17									3.2				
18				•••••	•		17.0						
19					*		11.0				*******	*******	******
	·		<i></i>			•••••		100				•••••	
20	•				·····		*******	10.0					
21			•		•••••		•••••			0.3			
2 <b>2</b>										0.2	•••••	•••••	
2 <b>3</b>				•••••									•••••
24									2.5			*******	
25							26.0						
26							-,						
27			••••••					53.0			0.2	•	•••••
		•••••		•	•		•	. 00.0		•••••	0.2		*******
28		••	•••••	•••••		•		•	•	••••••	•••••	•	•••••
29	••••••		•••••				•		•			*******	•••••
30			•••••			•	******	••••			0.2		

Discharge of Cottonwood Creek	Below Crestone	Branch D. & B.	G. Bailroad for 1915.
Altitude	. 7.750 Peet Ab	ove Ses Level.	

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	•	•••••	•••••	•••••	*******		•••••			•••••		•••••	•
2	••••••	•••••	•••••	••••••		*******	*******		24.0	•		<b>-</b>	
3	••••••	•••••		******		*******		<b>31</b> .0	8.0			•••••	•
5		•••••	•••••	•••••	•••••	****	14.0		9.4				
6		•	•••••	•••••			10.0	******	7.4	•			•
7		•	•••••	•••••	•	*******		•••••	7.3	•••••		•••••	
8		•••••	•••••	•••••	*******	*******	•	*******	6.0	•	•••••		******
ŝ			••••••	•••••	*******	******	*******	•••••	•	•	•••••		
10			•••••		•••••	*******				• • • • • • • • • • • • • • • • • • • •		•••••	•••••
11		•••••	•••••	•••••			••••	*******	6.7		· · · · · · · · ·	•	
12		•••••	•••••	••••••	******	2.5	*******	*******	7.2	•	••••••	•••••	
13		•••••	•	•	•••••	•••••			6.2	•	••••••		
14		•	•	•••••	•	•••••	•••••	•••••	6.5	•		•••••	*******
15		•••••	•	•		104	•••••	•••••	6.0	•	•••••	*******	
16			*******	•••••	•	12.4	•	•••••	*******	•	••••••		•
17		*******	*******	******	•	•	*******			•	•••••	•••••	•••••
18			••••••	••••••	•••••	*******	47.0	26.0	6.0	••••••		•••••	•
19			•••••	*******	•	******	47.0	••••••	5.0	•••••	••••••	•••••	
20		********	••••••	•		•••••	•	•	4.0	•		••••••	•••••
21		*******	•••••		*******			•	9.0		••		•
22			*******	••••••	•	7.4	•••••	•••••	3.6		•	······	•
23			*******		•		*******	*******	*******	•••••		•••••	
24			•••••	•••••	*******	9.2	*******		• 0	•••••		•••••	•••••
25	•		•••••	•,			••••	9.9	3.2		•••••	•	
26			*******	*******	*******	•••••	66.0	*******	*******	•	••••••		•
27		*******	*******	•••••	*******	•			*******	•		••••••	
28		*******	*******	*******	*******	******	•••••					•	
29			*******	*******	*******	9.1		36.0	••••••	•	•	********	•••••
30			*******	*******	••••••	J. 1	•••••	31.0	0.0	•••••	••••••	*******	•••••
31			*******		•	••••••		33.0				•••••	•••••
					*******	•••••	*******	98.V	*****	•••••	••••••	•••••	•

# Discharge of Deadman Creek at 2 Miles Below Bast Boundary Baca Grant for 1915.

										•			
	ay	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		*******	•	••••••	•••••	•••••	******						•••••
2			•		•••••	•••••	•		•	*******			
4		•••••	•		•••••	•••••		•••••		•••••		2.0	
		•	•	•••••	•	******	•	•	15.0				•••••
Ę	•	•	••••••	•••••	•••••	•••••		•	•••••			•••••	•••••
7	,	******	•••••	*******	****	******	•••••		•••••	*******	3.0	*******	*******
É		•	••••••	•	•••••	••••••	•					*******	•••••
Ş		•••••	•••••	•••••	•	•	*******	•••••	••••••	3.2		*******	•••••
10		••••••	•	••••••		•••••			******	3.5			•••••
11		••••••	•	•••••	•	•	•••••			2.3			
12		•••••	•••••	•	•••••	••••••	*******	*******	12.0	******	*******	*******	******
13		•••••	•••••	•	•••••	•••••	•						
14		•••••	•••••	••••	•••••	•	•••••		12.0		2.7	*******	••••••
16		•••••	•••••	•	•••••	•			•	•••••		******	
16		••••••	•••••	•••••		•••••	•••••		•••••	<b>3</b> .5			*******
17			•	•	•••••	•••••	•••••	22.0	•••••	*******	•••••	*******	******
18			••	•	•	•••••	••••••	•		•••••	*******	******	•••••
19		•••••	••••••	•••••	•••••		•		10.0	••••	*******	******	•••••
20		••	•••••		•	•••••	••••••		******	******	•••••	*******	••••••
21		******	•••••	••••••	•••••	•••••	*******		8.5	•••••		******	•••••
22		*******	•••••	•	•	•••••	•		•		2.5	******	
23			•••••		••••••	••••••	•		•	2.5			
24		•	•	•	•••••	•		19.0		•••••	*******	*******	•••••
25					•••••	•			<b>!</b> ,	•••••	•••••	•	
26		•••••	•••••	•	•••••	•••••	92.0	•	•••••	•••••		******	
27		•	••••••	•••••	•••••	••••••	••••••	•••••		•••••		•••••	•••••
28		•	•	•	•	•••••	•	•	8.4		2.0	******	•••••
29			*******			•		•••••	••••••			*******	•••••
30		••••••	•••••				••••••	10.0		••••	•••••	*******	*******
31		•	••••••	•••••		••••		19.0	••••••	•••••	******	******	
3.1		*******	*******	*******	*******								

# SAN JUAN DRAINAGE

### SAN JUAN RIVER AT ARBOLES.

Location.—At Arboles, Colo., a quarter of a mile above the mouth of Piedra River, near the center of T. 32 N., R. 5 W.

Records Available.—1895 to 1899; August 21, 1910, to November 30, 1914.

Drainage Area.—1,394 square miles.

Gage.—Chain gage.

Channel.—Probably permanent.

Discharge Measurements.—Made from car and cable and by wading. Winter Flow.—Severe ice effect.

Diversions.—There are court decrees for the diversion of 23 second-feet between Arboles and the station at Pagosa Springs, and 61 second-feet from intervening tributaries.

Flood Discharge.—Two severe floods have occurred on the San Juan since the station has been maintained. The maximum stage of the flood, September 6, 1909, although very high, was less than that of October 1, 1911, when the river rose 17 feet, with a maximum discharge of about 40,000 second-feet.

Co-operation.—Station maintained by the State Engineer of New Mexico, by whom records were furnished.

# NAVAJO RIVER AT EDITH.

Location.—Six miles northeast of Lumberton, N. Mex., at highway bridge on road from Lumberton to Edith, one-fourth mile east of Edith, short distance north of the New Mexico-Colorado State line, near southwestern corner of T. 33 N., R. 1 E., about 5 miles southwest and downstream from the confluence of Navajo and Little Navajo Rivers. A small tributary from the north enters Navajo River about one-fourth mile below the station.

Records Available.—September 21, 1912, to November 30, 1914.

Drainage Area.—Not measured.

Gage.—Verital staff.

Channel.—Permanent at low stages, but shifting during high.

Discharge Measurements.—At low stages made by wading; at high stages made from bridge.

Winter Flow.—Greatly affected by ice.

Diversions.—Considerable water is diverted above this station for irrigation.

Accuracy.—Estimates of daily discharge considered good.

Co-operation.—Station maintained by State Engineer of New Mexico, by whom the records were furnished.

								t Arbol					
	Dr	ainage	Area,	1,394	Square	Miles.	Altitu	<b>40, 6,00</b>	D Poot	Above	Sea	Level.	
Day		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
•		165	170	188	980	3670	2950	2500	1020	285	370	125	140
2	•••••	166	168	195	1370	2230	3670	1970	815	275	215	145	165
3		167	166	213	1540	1930	3600	1820	605	215	275	140	200
4		168	164	213	1700	2170	2730	2900	575	250	230	150	125
5			161	247	1660	1620	2290	1880	575	405	240	145	165
			159	240	<b>25</b> 00	1700	1900	2050	575	240	220	140	200
			166	232	2050	1560	1770	1660	815	175	310	130	165
			172	261	1500	1410	2130	1500	745	195	260	175	190
	• • • • • • • • • • • • • • • • • • • •		178	261	1410	1280	2720	1370	630	190	800	140	175
	•		174	289	1570	1240		1350	550	170	275	125	170
			176	244	1290	1660	3970	1450	455	170	275	175	110
			177	289	1560	2490	4650	1440	455	175	150	175	120
	•		179	290	1660	3900	8450	1350	415	165	175	165	135
	•••••		180	290	1320	3900	2950	1280	330	175	170	160	150
	••		180	820	1920	3450	3150	1240	350	165	175	115	170
			179	362	2110	3600	3280	1040	310	175	175	110	110
	•••••	4 2 4	180	407	3380	3670	3770	1020	365	175	195	110	110
	•••••	400	182	852	2720	3820	3870	875	275	190	175	125	109
19 20			183 180	370 370	2300 1820	3460 3300	4280 4350	715 720	255	190	195 175	125 215	109 109
21	••••		182	352	2420	8000	3970	900	175 275	140 175	215	255	108
22	•••••	400	184	520	2000	2360	4200	760	195	140	150	255 240	108
	•	440	189	630	1880	2350	4050	715	240	205	175	160	108
24	••••••		188	700	1820	2950	8750	1120	195	160	175	125	108
	•••••	100	198	720	1770	2300	3550	1150	250	310	195	110	107
0.0	•••••	104	184	900	1770	2630	3020	5650	380	5200	175		107
27		4.04	202	975	1870	2990	3100	5850	250	8610	175		106
28		4.00	188	960	2110	3750	2900	2610	240	1690	165	110	106
29		4 4 6		940	2420	3140	2620	1750	220	390	170		105
	*********	400	********	850	4720	2630	2630	1450	405	425	165		105
31		167	•••••	875		2420		1230	315	•••••	195		104
	เก	163	178	453	1970	2700	3300	1720	427	548	210		132
	c	. 176	202	975	4720	8900	465.0	5850	1020	5200	370		200
Min		. 148	159	188	980	1240	1770	715	175	140	150		104
Acre-ft10000			9870	27900	117000	166000	196000	106000	26300	32600	12900	8740	8180

Note.—From January 1st to March 12th and December 17 to 31 discharges were estimated from current meter measurements and the observer's notes.

Discharge of Mavajo River at Edith for 1915. Altitude, 7,100 Feet Above Sea Level.													
Day	7	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		35	40	67	208	692	572	447	193	55	48	43	39
2		35	40	69	260	475	892	420	164	55	43	43	89
3		35	40	71	299	428	755	350	178	55	43	48	39
4		35	41	73	384	362	522	435	187	68	43	43	39
5	*******	35	41	74	452	340	522	385	137	76	43	43	39
6		35	42	76	475	340	452	317	164	61	43	43	39
7		35	42	78	406	299	384	297	137	55	48	43	39
8		34	43	80	384	299	428	337	242	55	43	40	39
9		34	48	82	406	294	600	297	137	55	43	40	89
10		34	44	84	406	362	755	257	114	48	43	40	39
11		34	44	85	362	522	820	297	54	48	43	40	39
12	•••••	84	44	87	406	600	820	276	114	48	43	40	39
13		34	45	89	428	692	692	240	94	43	43	40	39
14		34	45	91	452	755	600	257	48	43	43	40	89
15	•••••	84	46	93	475	723	522	229	94	48	48	40	39
16	•••••	34	46	95	475	728	629	272	94	48	43	40	39
17	••••••	34	46	96	498	787	723	800	187	48	48	40	89
18	•	84	47	98	522	820	629	270	94	43	48	40	89
19		34	49	100	452	723	820	337	103	48	48	40	39
20	•	34	51	102	428	723	787	267	84	43	43	40	39
21	•	35	52	104	452	660	723	222	76	48	43	40	39
22	•••••	35	54	106	884	600	787	196	76	43	43	89	89
23	•	36	56	108	428	572	787	179	38	48	48	89	89
24	•••••	36	58	109	406	572	748	278	23	48	43	89	39
25	••••••	37	60	111	340	723	653	275	61	76	43	39	89
26 27	•••••	37	62	113	384	629	563	677	76	84	48	39	39
28	•••••	37	63	193	406	522	558	1050	68	55	43	39	39
29		38	65	224	428	600	554	528	26	48	48	89	39
29 30	•••••	38 39	*******	224 260	547	547	550	302	83	43	43	39	39
81	******	39	•••••	208	755	600	520	241	48	48	48	39	89
			400		404	498	0.45	224	68		43	********	39
Ma.	an	0.4	482 65	111 260	424 755	564	645	337	101	51.5	48	40.4	89
Mi			40	260 67		299	892	1050	23	84	48	43	39
		2170	2680	6840	208 25200	820 34700	384 38400	179	242	48	48	89	89
AC	TY-1					02100	00100	20700	6230	3060	2640	2400	2400

Unless otherwise noted, all discharges are in cubic feet per second.

Note.—From Jan. 1 to March 26 and Nov. 11 to Dec. 31, gage heights affected by ice, and discharges for January, February, and December were estimated from ourrent meter measurements and observers notes.

# PIEDRA RIVER AT ARBOLES.

Location.—At the railroad bridge at Arboles, Colo., in sec. 16, T. 32 N., R. 5 W., 1 mile above the junction with the San Juan River. No tributaries between station and mouth.

Records Available.—June 19, 1895, to September 30, 1899; August 21, 1910, to November 30, 1914.

Drainage Area.—650 square miles.

Gage.—Chain gage.

Channel.—Practically permanent except during high water.

Discharge Measurements.—Made from the bridge during high water and by wading at ordinary stages.

Diversions.—There are court decrees for diversions of 18 second-feet from Piedra River in Colorado and 52 second-feet from Colorado tributaries.

Co-operation.—Station maintained by the State Engineer of New Mexico.

### LOS PINOS RIVER NEAR IGNACIO.

Location.—At the highway bridge near Ignacio Indian Agency, about sec. 8, T. 33 N., R. 7 W., New Mexico principal meridian, 1 mile north from Ignacio. Nearest tributary is a small stream that enters from the west 2 miles below.

Records Available.—April 22, 1899, to October 31, 1903; September 1, 1910, to November 30, 1914.

Drainage Area.—450 square miles.

Gage.—Chain gage.

Channel.—Shifting.

Discharge Measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter Flow.-No data.

Diversions.—A number of ditches divert water above the station for irrigation.

Co-operation.—Maintained by State Engineer of New Mexico, by whom the records were furnished.

	Discharge	of	Piedra	River at	Arboles	for	1915.		
Drainage A	Lrea, 650 Sq1	MAIN	Miles.	Altitud	e. 6.000 :	Peet	Above	Sea	Level

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	92	97	247	800	3000	1930	1280	480	135	275	100	95
2	90	99	257	970	3120	2270	1060	400	195	215	125	110
3	. 88	101	268	1240	1700	2170	1010	840	145	195	100	110
4	87	103	278	790	1530	1610	1040	310	125	255	135	95
5	86	105	288	1610	1390	1430	980	280	170	215	110	105
<u>6</u>	83	108	299	2240	1350	1530	1030	340	150	250	115	95
7		110	309	1660	1220	1050	920	360	125	200	120	125
8	80	112	320	1610	1110	950	875	510	150	275	115	100
_9		114	830	1240	1010	1280	765	250	125	250	115	70
10		116	340	1420	1110	1620	760	188	125	235	115	70
11		118	351	1430	1370	2190	730	200	105	155	125	85
12		120	361	1310	1840	2400	740	200	100	135	95	95
13		122	371	1880	2190	2520	645	195	110	150	110	95
14		124	382	1790	2690	1710	625	180	120	145	125	80
15		127	392	1980	2490	2040	580	170	125	135	85	95
16		129	402	1930	2460	1980	450	175	135	135	125	95
17		131	413	2350	2630	2370	450	170	125	135	125	75
18		133	423	2460	2400	2140	380	165	135	125	105	85
19		143	434	2580	2040	2300	350	150	125	125	110	95
20	. 72	154	444	2840	1880	2400	825	170	110	145	120	85 80
21	73	164	454	2400	1610	2240	325	145	125	155	105 105	75
22	76	174	465	2280	1150	2080	280	135	115	185 120	105	70
23		185	475	2080	1420	2520	340	15 <b>5</b> 120	120 100	115	120	79
24 25	0.0	195 206	485 496	2080 1740	1570 1780	1960 1810	360 535	170	240	125	110	79
96	0.4	216	506	1740	1510	1540	1380	230	1790	120	90	78
9.7	0.0	226	625	1840	1570	1570	2140	210	950	125	105	78
90	00	237	540	1770	1740	1460	1160	165	420	145	120	77
90	0.1		890	2080	1670	1470	875	145	360	135	120	76
9.0	0.9	•	800	4140	1570	1350	710	140	385	125	65	76
91	Q.E.	•	800		1640		580	160		125		75
Mean	70.0	142	434	1880	1800	1860	764	227	241	167	111	87.2
Max.	0.5	237	890	4140	3120	2520	2140	510	1790	275	135	125
Min.	0.5	97	249	7790	1010	950	280	120	100	115	65	70
Acre-ft		7870	26700	112000	111000	111000	47000	13900	14400	10300	6590	5860

	Dra	inage				Pinos Miles.	Miver I	10ar Ig 10, 6,48	nacio i O Peet	or 1918 Above	Sea	Level.	
Day		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		82	62	153	355	1470	1980	1480	330	15	250	34	81
2		79	64	159	420	1220	2180	1190	220	17	205	58	81
3		76	65	166	520	940	2080	1200	165	20	185	61	73
4		73	67	172	600	860	1550	1120	105	24	160	48	73
5	•••••	70	69	179	750	845	1320	1100	70	26	142	48	83
6	•••••	68	70	185	1010	840	1180	1160	60	28	125	52	74
7		65	72	192	845	770	925	1040	145	27	113	86	69
8	•••••	62	74	198	805	770	920	830	280	24	96	73	69
9	•••••	59	76	205	680	650	1290	775	150	23	77	64	69
10	•••••	56	<b>ร่</b> รั	211	610	720	1630	750	100	20	73	87	67
4.4	•••••	53	79	218	665	810	2160	760	75	21	73	67	56
10		51	80	224	745	1160	2460	765	70	19	70	63	57
13	•••••	48	82	231	835	1520	2050	740	50	19	67	61	58
14		45	84	237	930	1880	1770	715	42	19	64	65	73
15	•••••	42	86	244	1090	1860	1790	670	35	21	60	61	73
4.0		39	87	250	1150	1920	1920	605	35	20	59	61	76
17		37	89	257	1080	2080	2410	500	47	20	61	74	77
10	•••••	38	91	263	1160	1970	2260	425	29	20	63	60	60
40		40	92	270	1040	1690	2640	380	24	21	60	67	63
20	•••••	42	94	276	1100	1550	2520	375	23	23	74	61	67
20 21		43	100	283	1140	1310	2430	875	19	23	95	63	81
22		45	107	289	1220	1160	2410	315	18	23 21	93	77	81
23			114	296	1100	1140	2500	375	19	19	89	86	80
23		47		302		1240		320	17	21	81	85	80
		48	120		1040		2430	365		245	59	85	79
25		50	127	309	960	1440	2320		17	1120			79
	• • • • • •	52	133	316	940	1410 1280	2180	700 1200	18 19		54	70 89	78
27		54	140	322	930		2040			560	51	77	
		55	146	380	1120	1350	1910	925	17	410	55		79
	•••••	57	•	440	1310	1550	1770	730	17	360	50	77	80
		58		410	1760	1400	1610	565	17	310	37	79	81
31		60	Δ1	950	000	1670	1050	420	16	110	32		82
Mean		54.6	91	259	930	1310	1950	738	72.7	117	89.4	68	73.5
Max		82	146	440	1760	2080	2640	1480	330	1120	250	89	88
Min		37	62	153	355	650	920	315	16	15	32	34	56
Acre-		3360		15900	55400	80300	116000	45400	4470	6970	5500	4040	4520
τ	Unles	s oth	erwise	note	d, all	discha	rges are	in cub	ic feet	per se	cond.		

### ANIMAS RIVER AT DURANGO.

Location.—Located opposite the San Juan Water & Power Co.'s sub-station, about one-fourth mile above Lightner Creek.

Records Available.—From June 20, 1901, to December 31, 1905; January 1, 1910, to December 31, 1910; January 1, 1912, to November 30, 1914, at a point above Lightner Creek; January 1, 1911, to December 31, 1911, below Lightner Creek.

Drainage Area.—694 square miles.

Gage.—Automatic recording gage.

Channel.—Liable to shift during high water.

Discharge Measurements.—Made from car and cable.

Winter Flow.—Little if any backwater from ice during the winter months.

Diversions.—Water is diverted above the station for irrigation.

Co-operation.—Station maintained by the State Engineer of New Mexico.

Discharge of Animas River at Durango for 1915.

Drainage Area, 694 Square Miles. Altitude, 6,550 Feet Above Sea Level.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	220	185	165	560	2380	3300	3020	910	330	560	280	240
2	000	185	165	590	1820	3790	2400	780	330	490	280	245
3		170	170	740	1520	3650	2330	750	315	460	280	255
4	000	165	175	850	1390	2730	<b>2</b> 290	685	330	420	280	260
5	000	155	175	950	1320	2100	2300	620	340	395	300	280
6	000	155	170	940	1250	1810	2730	610	330	385	310	255
7	000	170	170	910	1140	1700	2260	720	320	360	350	285
8	010	170	170	885	1120	1750	2130	810	310	350	310	250
9	000	170	170	850	1170	2200	1750	750	310	330	290	250
10	185	185	175	800	1280	3000	1910	650	300	325	280	255
11	105	· 185	175	825	1560	3820	1880	615	280	320	280	255
12	195	190	175	970	2170	4410	2060	610	280	320	285	210
13	200	185	175	1120	2920	3820	1970	595	280	310	290	<b>200</b>
14	. <b>20</b> 0	155	180	1220	3760	3260	1850	575	280	310	285	200
15	200	155	200	1300	3470	3400	1800	575	280	310	285	200
16	200	165	230	1220	3410	3470	1720	530	265	310	280	200
17	200	170	245	1120	3730	<b>39</b> 00	1400	530	260	300	265	190
18	200	165	265	1100	3470	3930	1360	530	260	285	245	190
19	200	155	260	1170	2770	3990	1240	515	260	280	240	190
20	. 20 <b>0</b>	160	270	1330	2260	4280	1200	455	260	280	240	195
21	200	175	270	1500	1970	4130	1210	455	260	285	250	195
22	205	160	280	1460	1850	4430	1170	420	260	285	255	200
23	210	170	310	1360	1870	4430	1170	400	260	280	250	200
24	210	170	420	1240	2200	4200	1150	375	280	280	260	200
25	210	170	490	1210	2620	4050	1150	385	505	280	245	200
26	220	170	480	1240	2300	3820	1170	385	1090	280	245	200
27	180	170	570	1380	2210	3610	1630	365	800	280	225	175
28	185	160	575	1800	2470	3400	1400	360	650	280	225	150
29			600	2220	2890	3260	1150	360	610	280	220	135
30			570	3130	2500	3050	1020	355	575	280	220	160
31		••••	530		2900		930	330		280		170
Mean		169	290	1200	2250	3420	1700	549	374	329	268	213
Max		190	600	3130	3760	4430	3020	910	1090	560	350	285
Min		155	165	560	1120	1700	930	330	260	280	135	135
Acre-ft			17800		138000	204000	105000			20200	16000	18100

# NORTH AND SOUTH PLATTE DRAINAGES.

### MIDDLE FORK SOUTH PLATTE RIVER AT ALMA.

Location.—At foot-bridge above the mouth of Buckskin Creek. Records Available.—May 1, 1916, to August 15, 1916.

Gage.—Vertical staff fastened to foot-bridge.

Diversions.—Above all diversions on the stream.

Co-operation.—Station maintained by the Van Sant-Houghton Engineering Co., from whom the records were obtained.

# MIDDLE FORK SOUTH PLATTE RIVER AT FAIRPLAY.

Location.—Located at highway bridge in town of Fairplay.

Records Available.—May 1, 1916, to October 31, 1916.

Drainage Area.—82.3 square miles.

Channel.—Rough, but probably permanent.

Gage.—Vertical staff gage.

Records furnished by the Van Sant-Houghton Engineering Co.

# Discharge of Middle Fork South Platte River at Alma for 1916. Drainage Area, 23.7 Square Miles. Altitude, 10,285 Feet Above Sea Level.

Day	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1			•••••		•••••	17.5	41.2	49.0	137	`		••••••	•••••
z		•••••	•••••	•••••	•••••	17.5	49.0	35.5	58.8			•••••	•••••
3	•••••		•••••	••••	••••••	17.5	49.0	35.5	49.0	• • • • • • • • • • • • • • • • • • • •	•••••	•••••	••••
4			•••••	•••••	•••••	17.5	49.0	30.5	58.8		•••••	•••••	
5	•••••	••••	•••••	•••••	•••••	17.5	68.5	25.5	166	•••••	•••••		
- 6			•••••	•••••	······	17.5	49.0	25.5	68.5	•••••			• • • • • • • • • • • • • • • • • • • •
7	•••••	•••••	•••••	•••••		21.5	35.5	25.5	35.5		•••••	•••••	•••••
8			• • • • • • • • • • • • • • • • • • • •	•••••		17.5	35.5	25.5	30.5			••••	•••••
9	•••••		•	•••••	••••••	25.5	49.0	35.5	30.5	•••••	•	•••••	
10	••		•••••			30.5	108	30.5	30.5	•			•••••
11			•••••	•••••		21.5	88.2	35.5	25.5	•••••		•••••	
12			••••••		••••••	21.5	108	49.0	25.5	• • • • • • • • • • • • • • • • • • • •	•••••		
13	••••		•			25.5	137	35.5	35.5				•••••
14	•••••					30.5	108	30.5	108	•••••	••		
15	•••••			•••••	•••••	35.5	88.2	30.5	49	••••	•••••	•••••	
16	•				•••••	30.5	108	35.5				` <b></b>	******
17				•••••	•	17.5	108	42.2	•••••	••••	•	••••	
18				••••	•••••	17.5	108	85.5	••••••	•••••	•••••	•••••	•••••
19				•••••		15.2	108	35.5	••••	•	•••••		
20			••••		•••••	17.5	108	25.5	••••••	•••••		•	•••••
21				•••••	••••••	17.5	68.5	17.5	•••••		•••••	•••••	•••••
22			•••••	••••••		17.5	49.0	17.5	•••••		•••••		•••••
23		•••••		······	•••••	7.2	49.0	17.5	•••••	•••••	•••••	•••••	•••••
24		•	•••••	••••••		17.5	49.0	17.5			•••••	•••••	•••••
25			•••••	•••••	•••••	21.5	49.0	17.5	•••••		•	•••••	•
26	•	•••••		•••••	••••••	17.5	49.0	17.5			•	•••••	
27		•••••	•••••	•••••	•••••	17.5	49.0	25.5	•••••	•••••		•••••	•••••
28			•••••		•	25.5	108	25.5			•••••	•••••	•
29			•••••		•••••	25.5	58.8	25.5	•••••		•	•	*******
30		•	•••••	•••••		35.5	58.8	88.2	•	•	•••••		
31		•••••	•	•	•••••	49.0		108		•••••	•	•	*******
		•	••••••	•••••	•••••	684	2191	1051	909				•••••
		•••••	•••••	•	•••••	22.1	73	34	33.9	••••••	•	•••••	••••••
		•••••	•		•••••	49	137	108		•••••	•••••		•
		••	•••••	••	••••••	7.2	35.5	17.5	2222	••••	•••••		
Acı	re-ft.	•	•			1360	4340	2080	1800				•••••

# Discharge of Middle Fork of South Flatte River at Fairplay for 1916. Drainage Area, 82.3 Square Miles. Altitude, 9,900 Feet Above Sea Level.

Day	•	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct	Nov.	Dec.
						51	182	254	388	85	53	•••••	
		•••••		•••••	•••••	51	182	224	254	77	53		
3		•••••				51	190	224	203	77	51	•	
4				••		51	285	224	216	74	51		******
5	•••••		•••••		•••••	51	236	190	423	72	51		•
6	•••••		•••••	•••••	•••••	55	165	182	216	72	51		•
7		•••••	•••••	•	•	108	136	182	190	64	51	•	•••••
8		•••••	•••••	•••••		120	165	216	190	64	51	•	
. 9	•	•••••	••••••	•	•	124	203	224	175	64	51	•••••	•••••
10		•	•••••	•	••••••	148	254	216	148	77	51	•••••	•••••
11		•••••	•••••	•••••	•	148	301	182	129	88	51		•••••
12		•		•••••	•••••	136	423	254	148	91	51	•••••	******
18	•••••	•••••		••••••	*******	136	503	190	190	88	51		
14	•••••		•••••	•	••	124	423	190	254	81	51		
15		•••••		•••••	•	104	301	175	190	72	51	• • • • • • • • • • • • • • • • • • • •	
16		•	•••••	•	•••••	77	365	175	175	72	53	•••••	
17		•••••				88	365	203	136	68	53	•••••	•••••
18	•	•		•••••	•••••	88	457	190	129	64	51	• • • • • • • • • • • • • • • • • • • •	•••••
19	•••••	•••••	*******	•••••	*******	91	423	175	124	68	48	•••••	
20		•	•	•	*******	91	423	155	114	64	35	•••••	*******
21		•	•	•••••	•	88	285	155	114	62	33	•••••	*******
22		•	•••••		•••••	96	254	175	104	62	43	•••••	•••••
23		•••••	•			81	190	175	101	62	49	*****	•••••
24		•••••	•••••	•	•••••	88	190	136	101	62	46	••••••	•
25		•••••	••••	••	•••••	104	190	129	101	62	51	••••••	•••••
26		••••••	•••••		•	108	285	129	91	60	51	•••••	
27		•••••	•••••		•••••	96	301	182	91	57	43	••••••	•
28			•••••	•		104	301	175	88	57	46	•••••	•••••
29			•	•	•••••	108	301	148	85	57	51	•••••	•••••
30		•••••			••••••	136	273	457	85	57	43		
31		•••••	••••		•••••	155	0550	388	85	0000	46		•••••
		•••••	••••••	•	•	3057	8552	6274	5038	2075	1506		•
Me	<b>a</b> n	•••••	•••••	•••••	*******	98,6	285	202	163	69.2	48.6	•	•••••
IVL8		•••••	•••••	••••••	•	155	457	457	423	91	53	•	•••••
WIII	Π		•	•	•••••	51	136	129	85	57	88	•••••	•••••
Ac	re-It.	•	•••••			6060	17000	12400	10000	4120	2990		

Unless otherwise noted, all discharges are in cubic feet per second.

### NORTH FORK OF SOUTH PLATTE RIVER AT GRANT.

Location.—At Grant postoffice, in sec. 9, T. 7 S., R. 74 W., in the Pike National Forest, 250 feet above the mouth of Geneva Creek.

Records Available.—July 18, 1910, to November 9, 1916.

Drainage Area.—51 square miles.

Gage.—Vertical staff.

.Channel.—Practically permanent.

Discharge Measurements.—Made from footbridge and by wading.

Winter Flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Diversions.—There are court decrees for diversions 5.5 second-feet from the North Fork above the station, and there are decrees for diversions of 24 second-feet from the tributaries entering above.

Accuracy.—Though the channel is somewhat shifting, sufficient measurements were obtained to make estimates reliable.

Co-operation.—Station maintained in co-operation with the United States Geological Survey.

# SOUTH FORK OF SOUTH PLATTE RIVER AT LAKE GEORGE.

Location.—At highway bridge in sec. 19, T. 12 S., R. 71 W., one-fourth mile below Lake George, in the Pike National Forest, about 2 miles above the mouth of Caylor Gulch; no tributary between the outlet of the lake and the station.

Records Available.—October 22, 1910, to November 13, 1916.

Drainage Area.—1,070 square miles.

Gage.—Automatic recording gage installed in 1911, reading to the

same datum as the original staff gage.

Channel.—Conditions in the channel will remain unchanged as long as the control for the station—a 2-foot timber-crib dam 50 feet below the gage—remains permanent.

Discharge Measurements.—Made from bridge during high water

and by wading at ordinary stages.

Winter Flow.—Ice causes backwater during the winter months and

measurements are made to determine the flow.

Regulation.—The discharge at the station is regulated to some extent by the Antero Reservoir, located about 35 miles above, and by Lake George.

Diversions.—There are court decrees for diversions of 1,076 second-feet from South Fork above this station and for diversions of 1,816 second-feet from tributaries entering above.

Accuracy.—Results are considered fair.

Co-operation.—Station mainttined in co-operation with United States Forest Service and the United States Geological Survey.

	_						th Platt	e Hive	r at G	rant I	191	5. Famal	
	D	rainag	o Ares				Altitud	,					_
Da	y	Jan.	Feb.	Mar.	April	May	June		Aug.	Sept.	Oct.	Nov.	Dec.
1	·				7	25	99	67	26	14	20	7	
2					9	24	106	66	23	13	19	5	
3					15	21	74	66	20	14	20	7	
4					8	20	74	58	21	14	19	7	••••
5					16	16	68	58	20	13	16	7	
6					6	14	47	59	23	13	14	7	
7		****			6	19	75	53	26	12	.14	7	
Ř					12	19	66	49	37	13	13	7	
9					14	31	62	47	33	12	11	7	
10					22	29	86	47	32	11	13	8	
īĭ					22	32	106	47	29	10	13		
12				••••••	20	49	113	46	24	īĭ	7		
13			••••••	•	16	68	99	43	23	10	7		
14				•	21	65	70	45	28	īŏ	12		
15			•		16	54	8ŏ	43	30	īĭ	10		8
16					îĭ	58	78	41	20	12	īŏ		•
17			•	•••••	11	64	92	39	20	13	īž		
18		•••••		••••••	25	42	92	38	22	12	12		
				••••••	12	42	92	38	21	13	12	•••••	
19		•••••		•••••	14	36	92	36	20	12	12	•••••	
20	•		•		17	37	86	33	20	10	11		
21	••••		•••••	••••••	16		106	41	20	10	12	•••••	******
22	•••••	•••••	•••••	•		44		30	20	9	11	••••••	
23	••			•	11	50	92		19	10	10		•
24		•••••	•••••	•	10	62	86	33 32				•••••	
25	•••••		•••••	•	. 8	78	92		20	24	9		••
26			•••••		16	72	86	32	19	26	9	•••••	
27		*******		•••••	16	60	86	33	16	16	<u>7</u>		•
28		•••••		••••••	20	59	78	32	16	16	7	•••••	
29	•••••	• • • • • • • • • • • • • • • • • • • •	•••••		22	65	70	32	14	21	. 8	•••••	
30				•	35	72	73	28	13	21	10		
31					•••••	86		26	14	•••••	8	•••••	•••••
			•••••		451	1413	2526	1338	689	406	868	69	•••••
Me	an				15.1	45.6	84.2	43.2	22.2	13.5	11.9	6.90	******
	x				35	86	113	67	37	26	20		
Mi					6	14	47	26	13	9	7	******	*******
Ac	re-ft.				898	2800	5010	2660	1360	803	732	137	

Unless otherwise noted, all discharges are in cubic feet per second.

Discharge	of 1	Forth	Fork	South	Platte	River	at	Grant	for	1916.	
Drainage Area	a. 49	Squa	re Mi	les. A	ltitude	8.566	Pes	t Abov	e Se	a Level.	

Day	1	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	•••••				<sup>-</sup> 16	28	74	51	33	17	9	7	
2	*******	*******			12	30	74	46	25	17	9	7	*******
3					8	27	74	43	23	16	8	ż	
4					13	28	78	41	30	12	7	11	
5					ii	33	80	43	29	12	ż	- 1	•••••
6				********	îî	30	68	41	32	12	ۈ		
7				•	16	47	62	41	30	12	12	<u> </u>	
ė			•••••		12	55	62	43					
9		•••••	6.3	•••••					30	12	. 8	. 8	******
10		•••••	0.3		8	64	68	41	27	12	11	10	
		••••			. 9	66	72	41	25	14	7		
11	•••••			•••••	14	66	69	41	22	16	7		
12				•	13	68	79	41	25	16	7		
13					13	70	79	33	49	16	7		
14					12	66	79	33	33	16	7		*******
15	*******			10	12	57	73	32	30	14	9		9
16				19	14	52	73	32	27	12	11	********	-
17				14	16	47	73	33	25	12	12		
18				13	16	47	73	27	23	12	11	*******	
19			********	12	16	47	73	30	23	12	- 6	•	
20				14	17	<b>52</b>	70	30	23	12		•••••	•••••
21				14	14	51	67	27	22	14	7		
22		•		12	17	49	61	27			8		
23			•	11	19	46			19	9	9		•••••
							56	25	19	. 9	9	•••••	
24	•	•••••		13	23	46	56	23	22	14	, 9	•	
25			•	14	25	52	67	23	19	9	9		
26		•••••		14	30	52	56	23	19	9	9		
27		••		12	33	52	59	23	19	9	8	•	
28		•••••		12	41	57	53	23	19	9	8	*********	*******
29				10	41	59	<b>53</b>	23	19	9	8	********	*******
30				12	30	66	53	41	17	9	ž		
31				13		70		36	19	•	÷	•	•
T	otal			219	532	1580	2034	1057	787	374	262		
	an			12.9	17.7	51.0	67.8	34.1	25.4	12.5			•••••
	K				41	70	80	51	49		8.45	•••••	•••••
	l			•••••	18	27	53	23	17	17	12	•••••	
			••••••	434	1050	3140	4030	2100		9	6	•••••	
ACT	e-ft.		••••••	104	1090	9140	4090	4100	1560	744	520		

# Discharge of South Fork South Platte River at Lake George for 1915. Drainage Area, 1070 Square Miles. Altitude, 7,963 Feet Above Sea Level.

								, .,.			** 500	TIGATI	<b></b>
Da	•	Jan.	Feb.		April	May	June	July		Sept.	Oct.	Nov.	Dec.
1	•	•••••			•••••			206	130	130	340	36	
2	*******	•••••	22	22		······································	130	174	81	104	295	43	
3								159	104	81	257	52	
4						130		159	104	92	276		*
5					•••••••	100		159				43	
õ		•••••							159	81	240	61	
6			22	28	144	•••••	******	159	240	52	295	52	
7				•		• • • • • • • • • • • • • • • • • • • •	223	159	295	71	276	61	********
8			16			130		130	366	61	223	61	
9					********			117	479	43	257	52	•••••
10			22	•	159	130	•	117					
		•••••	44		199	190	•••••		479	52	257	43	•••••
11	•••••			•			190	92	<b>3</b> 91	52	257		
12				28	******			92	295	28	190		
13				-,	159			92	318	43	190	*******	
14				,		104		81	276	36	240		•••••
15 15		•••••	16	••••••	•••••	101	223	144	276			•••••	•••••
16										28	276	•••••	•
	••••••		• • • • • • • • • • • • • • • • • • • •		********	•••••	240	117	71	43	295		• • • • • • • • • • • • • • • • • • • •
17				•	159		223	43	257	52	257	•	
18							174	22	240	36	240		*********
19			22		130	81	206	52	206	43	257		• • • • • • • • • • • • • • • • • • • •
20							223	104	206	28		•••••	
											240	•••••	• • • • • • • • • • • • • • • • • • • •
21	•••••	•••••	•	•	*******	••••••	257	159	190	43	206	•••••	
22		• • • • • • • • • • • • • • • • • • • •			••••••		240	43	130	36	92		
23			28			•	174	61	144	52	28		
24					130		190	81	159	104	52		
25							340	104	174	104	71		
26					144	104	295	117	190			•	•
				•	111	104				240	43	•••••	•••••
27	•••••	•••••	28			******	240	223	174	420	28		•••••
28		•	•••••			104	223	295	117	257	43		
29				28		•••••	223	257	130	276	52	*******	••••••
30					144		223	223	144	318	52		
31		*******	•••••			•••••		190	130	910	61	•••••	•••••
			•••••	*******		•	4007						
3-1	LOFFI			•	•	••	4237	4131	6655	3006	5886	504	
Мe	an						223	133	215	100	190	50.4	
Ma	x			•••••			340	295	479	420	340		
							130	22	71	28	28		
			•••••			*******	8180	8180	13200		11700	1000	
-10													
	Unl	ess ot	nerwis	e note	ed, all	dischar	ges are	in cu	bic fee	t per	second	ī.	

Discharge of South Fork South	Platte River at Lake George for 1916.
Drainage Area, 1070 Square Miles	L. Altitude, 7.963 Feet Above See Level.

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct	Nov.	Dec.
1					56	56	26	140	548	109	280	75	
2				•••••	56	83	26	148	456	104	272	62	******
3		21		•••••	56	125	80	130	293	91	272	60	
4	•••••	*******			56	300	70	146	208	85	264	62	
5				•••••	56	223	106	168	169	79	248	5 <b>6</b>	
6	••••	•••••			5 <b>6</b>	176	140	190	208	83	252	50	
7	•••••	18	•		5 <b>6</b>	103	140	203	237	83	260	84	•
8	•••••	18	••		56	103	128	168	215	75	256	26	•
. 9	•••••	•••••	•••••	48	56	93	116	247	205	71	<b>25</b> 2	27	
10		******	•	48	56	93	140	247	192	64	252	32	
11		•••••	13	64	56	88	196	•••••	157	66	252	39	
12		•	••	73	56	80	264	•	145	91	252	37	•••••
13	•••••	13		93	56	76	285	373	160	198	248	34	
14		•••••	16	103	56	72	265	304	260	240	248	•••••	•••••
15	•	12	•	132	56	68	230	264	418	252	<b>26</b> 0	******	
16	•••••	•	•••••	93	56	64	230	247	310	248	268	••••••	•
17		•••••		103	60	60	230	264	268	244	260		******
18		•••••	21	103	64	56	197	247	237	244	260	******	•••••
19		•••••	•••••	125	64	64	197	196	212	237	252	•••••	•
20			*******	125	60	64	214	196	178	233	248	•••••	•
21		14	•	137	60	137	230	182	182	222	240	•••••	
22		•••••	••••••	113 93	5 <b>6</b> 56	191 176	197 140	182	182	222	237	•	
23		•••••	•••••	83	5 <b>6</b>	113		188 166	224	224	240		
24 25		•••••	•••••	56	5 <b>6</b>	83	107 87	138	198 163	233 230	237 205	•••••	•••••
26		•		56	60	56	97	128	140	222	208 56	•••••	
27		•••••		56	64	30	117	166	140	222	16	•••••	•••••
28		••••••	•••••	56	64	13	130	219	140	248	16	•••••	•••••
29		•••••	••••••	56	64	36	145	205	125	264	18	•••••	•••••
30		•••••		56	56	30	130	212	111	276	50	•	
31					- •	30		531	109		75 €	•	
	otal			1909	1736	2937	4610		6780	5260	#537 P	594	•••••
	an		es To	83.0	57.9	94.7	1548	214	219	175	6537 2 211-5	45.7	•••••
Ma			_		64	300	285 m	531	543	276	2800		•••••
	n	•			56	13	26	128	109	64	15		•••••
	e-ft.	•••••	•	3790	3440	5820	9160	12800	13500	10400	18000	1180	••••••
ACI	6-1L	•		9190			0100	12300	10000	10400	10000	1190	

# NORTH FORK OF SOUTH PLATTE AT SOUTH PLATTE.

Location.—In sec. 25, T. 7 S., R. 70 W., one-third mile above South Platte. No tributary between station and mouth at South Platte.

Records Available.—January 4, 1909, to September 30, 1910; April 1, 1913, to November 8, 1916.

Drainage Area.—450 square miles.

Gage.—Inclined staff whose datum has remained unchanged.

Channel.—Somewhat shifting.

Discharge Measurements.—Made from car and cable during high and medium stages, and by wading at low stages.

Winter Flow.—Ice causes backwater and discharge measurements are made to determine the flow.

Diversions.—There are court decrees for diversions of 20 second-feet from North Fork between Grant and South Platte, and 62 second-feet from intervening tributaries, exclusive of Geneva Creek. There are also a number of small ice and fish ponds which divert small amounts of water at various times.

Accuracy.—Records considered good.

Co-operation.—Station maintained in co-operation with the United States Geological Survey.

#### SOUTH PLATTE RIVER AT SOUTH PLATTE.

Location.—In sec. 25, T. 7 S., R. 70 W., in the Pike National Forest, three-fourths of a mile east of South Platte; about 300 feet below junction of the North and South forks; no tributary between the forks and the station, and none for several miles below.

Records Available.—March 28, 1902, to November 7, 1916.

Drainage Area.—2,610 square miles.

Gage.—An automatic recording gage.

Channel.—Shifting.

Discharge Measurements.—Made from car and cable during high water, and by wading at low stages.

Winter Flow.—Ice causes backwater during a portion of the winter

months and measurements are made to determine the flow.

Regulation.—The flow is regulated to a certain extent by the Cheesman Reservoir, which is on the South Fork about 20 miles above the forks.

Diversions.—Lake Cheesman has a storage decree for 80,000 acrefeet and the Antero Reservoir for 46,000 acre-feet on the South Fork, South Platte, besides numerous decrees for meadow irrigation.

Accuracy.—Although the channel is shifting, sufficient discharge measurements have been obtained to enable fair estimates of discharge to

be made.

Co-operation.—Station maintained in co-operation with the United States Geological Survey.

Discharge of North Fork South Platte River at South Platte for 1915.

Drainage Area, 450 Square Miles. Altitude, 6,097 Feet Above Sea Level. Day Jan. Feb. Mar. April May June July Aug. 440 191 Sept. Oct. Nov. Dec. 70 ..... 175 ...... ----- $\bar{2}1$ ...... ..... .~.... \*\*\*\*\*\*\* ..... ....... ..... -----..... ...... ..... ...... ..... ..... ...... ...... ..... ...... -----. ...... ..... Total ...... 5397 12138 ..... -----Mean.... 75.2 ----------Max. .... ..... ..... ..... Acre-ft. ...... 10700 24100 40000 16500 10900 

Unless otherwise noted, all discharges are in cubic feet per second Dec. 14 to Dec. 31, inc., estimated.

Discharge of	f Morth Fork	South Pla	tte River at	South Pl	atte for	l916.
Drainage Ares	a. 450 Sanare	Miles. A	ltitude, 6.097	Feet Al	DOVE SEE	Level

Day	7	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	•••••				83	134	403	231	312	145	82	66	
2			·		83	183	348	231	246	129	82	66	
3					92	157	312	202	202	123	82	59	
4			•		75	170	348	202	231	112	82	55	
5					112	183	348	202	312	112	85	61	
6	••••				92	202	312	188	312	112	80	56	
7					67	246	278	196	278	112	85	43	
8	•••••				46	134	246	202	231	112	70	33	
9		····			67	330	278	216	231	112	87	•••••	
10				•••••	75	422	312	202	216	112	87		
11				•••••	75	442	366	216	202	134	87		
12			•		92	384	330	216	188	145	76		
13					112	312	403	216	246	162	72		
14					112	348	392	183	330	145	76	<del>-</del>	
15					102	246	362	178	246	138	136		
16					112	246	370	178	216	123	98	<del>-</del>	50
17					112	246	377	188	188	1.12	123		
18				•••••	123	231	366	188	175	112	102		
19					123	216	366	178	162	112	100		
20				83	12 <b>3</b>	246	330	. 152	175	112	85		
21				102	112	278	312	157	175	112	85		
22	••••			83	102	312	295	152	157	112	85		
23			•••••	83	112	312	312	152	145	112	98		
24		· · · · · · · · ·	,	75	134	272	278	145	157	112	80		
25				46	145	298	278	134	162	102	94		
26				59	157	366	262	138	162	96	100		
27				92	170	326	262	138	157	92	100		
28				75	183	<b>3</b> 05	262	134	157	92	100		
29				75	157	319	262	134	145	92	91		
30				67	157	298	246	202	152	92	76		
31				75		384		295	162		76		
	<b>r</b> otal		1457	1575	3307	8548	9616	5746	6430	3490	2762	439	*******
	an	49.6	50.2	50.8	110	276	321	185	207	116	89.1		
	x				183	442	403	295	380	162	136		
Mi					46	184	246	134	145	92	70		******
Acı	re-ft.	3050	2890	3120	<b>6</b> 550	17000	19100	11400	12700	6900	5480		*******
									- 1				

# Discharge of South Platte River at South Platte for 1915. Drainage Area, 2,610 Square Miles. Altitude, 8,097 Feet Above Sea Level.

	DE	THE P	ALVE,	2,010	nd mura		MALLOT C II	ue, 0,0	9/ I 96	E ADO	-	TAAAT	,
Day		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1 .					139	972	1040	950	706	370	432	252	174
					150	860	1090	860	642	330	515	252	150
8.			••••••		162	838	1200	882	557	391	452	235	139
4				·	150	794	1340	1040	536	664	432	235	162
					162	816	1450	816	432	706	432	235	174
6.					150	794	1340	706	432	642	452	252	150
					174	794	1250	664	452	642	310	270	150
					203	838	1320	642	685	599	235	270	139
	•••••				891	928	1270	685	642	599	310	290	150
			•		412	928	1290	620	578	578	432	270	150
	•••••				432	950	1290	642	557	578	452	252	150
					412	995	1320	578	620	536	452	162	128
					473	1040	1180	557	620	950	452	118	128
	••••				557	1130	1160	473	642	950	473	96	150
		•••••	•••••	77	642	1130	1180	452	642	370	515	365	150
	•••••			64	642	1130	1160	452	578	270	515	212	128
				72	642	1110	1160	452	330	252	494	217	145
				83	664	1130	1130	391	310	235	473	161	162
					706	995	1130	685	270	252	473	185	139
	•				685	995	1200	664	290	219	412	203	139
	••••		•••••		728	972	1110	750	270	203	370	188	188
	•••••				706	1020	1130	794	270	188	412	188	188
	•••••			83	794	950	1160	816	290	235	412	174	162
	•••••		<b>-</b>	146	728	928	1130	664	350	252	310	174	174
		••••	•••••	104	816	972	1180	728	350	219	270	162	139
	•			64	860	1020	1110	728	330	412	290	150	174
27	•••••			118		1020	1090	882	310	252	310	188	150
				128	838	950	1020	882	391	203	310	118	150
				139	882	972	1020	860	370	252	290	162	174
				128	1040	972	995	816	391	350	290	162	203
31 .				139		995		794	350		270		174
				3472		29938	35445	21925	14193	12770	12247	6198	4833
		•••••		112		966	1180	707	458	426	395	207	156
					1040	1130	1450	1040	706	950	515	365	203
						794	995	391	270	188	235	96	128
Acr	e-ft			6890	32100	59400	70200	43500	28200	25300	24300	12300	9590

Unless otherwise noted, all discharges are in cubic feet per second.

Discharge of South Platte River at South Platte for 1916.
Drainage Area, 2,610 Square Miles. Altitude, 6,097 Feet Above Sea Level.

Day		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.				74	182	252	438	408	980	347	121	69	
2				32	182	278	530	471	1000	347	110	64	
3.				53	182	265	645	714	1080	327	110	67	
4 .				80	171	332	834	691	1030	288	110	71	
5.				108	182	525	906	622	956	252	98	71	******
6.				108	193	620	882	668	810	252	492	74	
7.				88	193	581	786	714	762	234	738	78	
8.				55	182	562	810	738	738	218	146		
9.				55	216	562	882	762	691	218	121	•••••	
10 .			136	76	216	581	1000	762	691	218	134		
11 .				76	216	562	956	810	668	269	121		
12 .				69	228	544	931	786	645	269	110		•••••
13 .				76	240	525	1000	645	645	269	121		
14 .				76	252	507	1030	762	600	327	121	•••••	
			•••••	62	240	472	1080	762	556	347	173		
			*******	69	228	454	1080	622	622	327	121		184
		•••••	<b>-</b>	69	216	472	980	600	668	269	146		*******
			•••••	.76	228	438	906	556	668	<b>252</b>	160		
		133	••	62	228	421	714	578	691	234	146		
				304	216	472	691	556	645	218	134		•••••
				360	216	562	668	492	645	234	134		
				375	216	640	600	460	600	202	146		•
	· <del></del> -	<b>-</b>	•••••	332	216	740	556	429	578	202	134	•••••	•
				291	216	700	534	408	534	160	121	•••••	•••••
		•	•	252	228	640	513	408	556	110	60	•	
~-			•••••	240	240	600	471	556	534	110	110	•••••	•••••
				228	252	544	.408	534	513	98	110		.,
				228	278	489	388	534	429	98	110		•••••
			•	216	278	454	408	612	388	110	103		
~ ~			•	216	278	438	408	691	408	134	88	•	•••••
			•	204		438		834	368		74	•••••	•••••
	otal		404	4560	6609	15670	22035	19185	20699	6940	4723		••••••
		118	124	147	220	505	734	619	668	231	152	·	•••••
			•••••	375	278	740	1080	834	1080	347	738	•••••	••
		7000	7100	32	171	252	388	408	368	98	74	•••••	
ACT		7260	7130	9040		31100	43700	38100	41100	13700	9350	•	•••••
	IInl	Agg At	harwis	a not	IIo ha	digaha	room or	a in au	hia fa	at nam	gacond	1	

#### SOUTH PLATTE RIVER AT DENVER.

Location.—Between the 15th Street and 16th Street bridges in Den ver, about 500 feet below the mouth of Cherry Creek.

Records Available.—May 7, 1895, to December 31, 1916.

Drainage Area.—3.840 square miles.

Gage.—Automatic and chain gages. The chain gage was replaced by a slope gage November 9, 1916.

Channel.—Shifting.

Discharge Measurements.—Made from 15th Street or 19th Street bridges, or by wading.

Winter Flow.—The flow at this point is seldom affected by ice.

Diversions.—There are decrees for diversions of 1,922 second-feet from the South Platte between this station and South Platte and 5,988 second-feet from tributaries.

# SOUTH PLATTE RIVER NEAR KERSEY.

Location.—At highway bridge in sec. 9, T. 5 N., R. 64 W., 134 miles north of Kersey, 2 miles below the entrance of Lone Tree Creek, an intermittent stream and 3 miles below the mouth of the Cache la Poudre River.

Records Available.—April 27, 1901, to October 31, 1903; March 1, 1905, to November 30, 1912; January 1, 1914, to December 31, 1916.

Drainage Area.—9,500 square miles.

Gage.—A chain gage, placed in the fall of 1906 in each of the two channels in which the river flows. These gages were referred to a datum slightly different from that of the original gage. During the past two years either one or the other of these gages have been stolen at various times, and a breakwater placed to protect the bridge has caused one channel to become practically dry during low and medium stages. Results have, therefore, been based largely on one gage.

Channel.—Shifting.

Discharge Measurements.—Made from bridge at high water and by wading at low water.

Winter Flow.—Ice causes slight backwater for a few days during the winter.

Diversions.—Between this station and Denver there are court decrees for diversions of 3,764 second-feet from the South Platte, and 17,000 second-feet from intervening tributaries, besides numerous flood water decrees.

Accuracy.—The channel is extremely shifting and results cannot be considered better than fair.

Discharge of South Platte River at Denver for 1915.

Drainage Area, 3,840 Square Miles. Altitude, 5,240 Peet Above Sea Level.

Day	7	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		224	184	180	638	1740	577	624	218	205	445	154	240
2			197	165	975	1650	760	624	214	166	590	150	210
3		238	150	190	1340	1600	900	594	210	166	585	171	222
4	•		184	240	1290	1560	1470	594	170	290	480	215	230
5			197	193	1340	1520	1830	686	158	405	430	272	240
6			224	190	1290	1520	2020	480	135	405	425	308	235
7		160	254	200	1380	1380	1970	345	185	310	420	280	230
8			224	185	1380	1520	1920	246	490	. 300	375	250	220
9			184	180	1470	1600	1880	222	890	315	370	290	222
10		210	210	160	1470	1520	1590	190	360	321	320	300	224
11			224	173	1420	1470	1540	153	275	360	415	305	224
12			240	173	1380	1470	1580	180	270	302	480	303	172
13			178	173	1340	1470	1440	175.	340	462	430	305	160
14		. 184	200	203	1290	1470	1480	175	590	845	423	235	172
15			130	203	1420	1380	1300	170	610	750	542	800	210
16			140	219	1470	1210	1280	310	1480	- 540	570	440	224
17		140	160	219	1560	1050	1140	305	880	490	510	280	197
18			185	219	1600	1050	1020	300	525	350	475	270	224
19			130	236	1520	1010	980	335	312	308	500	275	238
20		184	200	252	1340	1010	1000	330	298	275	475	290	224
21			197	219	1250	1010	940	325	315	800	400	260	286
22			210	252	1250	975	960	. 320	310	290	400	234	224
23			125	252	1250	938	900	360	300	282	375	238	254
24			175	270	1250	699	870	280	670	271	329	218	254
25			190	330	1880	699	876	255	635	240	266	224	254
26			193	396	2470	668	909	270	600	510	231	200	238
27			189	352	2270	638	812	310	445	580	215	206	- 269
28			215	287	1970	638	779	413	380	510	231	250	286
29				373	1970	608	812	440	375	505	231	197	254
30				419	1880	608	716	600	320	450	248	244	254
31		170		548		699	*******	325	265		199		210
	'otal	5828	5289	7651		36380	36251	10936	13225	11503	12385	7664	7101
	an		189	247	1480	1170	1210	353	427	383	400	255	229
	X		254	548	2470	1740	2020	686	1480	845	590	440	286
	l	140	125	160	638	608	577	153	135	166	199	150	
			10500			71500	72000	21700		22800	24600		
-10							rges ar						14100
	On	C 22 C	merwi	PG HOL	cu, all	GISCHA	TECR SI	e m cu	DIC TE	et per	=écon	a.	

Discharge	of South Platt	<b>e River at D</b> enver	for 1916.	
Drainage Area, 3,840	Square Miles.	Altitude, 5,240 P	eet Above Sea	Level.

Day	Jan.	Feb.	Mar.	April	May'	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	220	125	185	140	410	520	295	850	305	155	135	165
2	220	118	160	105	305	630	295	670	285	165	125	165
3	250	145	125	88	250	460	310	565	348	155	135	165
4	250	145	155	95	210	490	330	750	268	155	135	165
5	220	155	155	128	290	490	290	1190	268	155	135	165
6	220	165	155	128	430	410	270	600	220	155	135	155
7	250	205	135	140	410	410	270	600	190	900	155	155
8	250	268	100	152	325	345	300	500	178	500	165	135
9	250	235	130	165	325	388	320	348	178	190	155	125
10	250	190	130	140	540	460	480	370	155	178	145	145
	220	178	130	115	570	520	475	348	190	145	165	145
12	190	165	95	115	540	670	500	348	325	125	190	155
13	165	155	95	140	515	750	500	285	325	118	145	155
	165	155	115	165	660	750	565	710	268	135	165	145
	165	165	125	165	660	750	600	600	305	285	178	165
	165	165	115	165	370	885	565	445	348	305	165	178
17	145	200	115	152	<b>29</b> 5	710	500	500	285	205	205	165
	125	215	110	140	280	435	500	530	268	220	205	155
19	118	250	110	140	265	410	395	470	235	250	178	165
	135	205	220	128	412	520	500	395	220,		178	145
	145	190	318	115	780	555	445	370	190	178	178	145
	155	175	385	115	475	555	395	370	190	190	155	155
	165	190	435	95	630	490	325	348	190	178	165	145
	165	200	318	95	710	- 460	325	268	- 178	155	178	155
	165	175	410	88	590	460	305	235	165	145	178	135
	190	140	220	95	460	405	285	250	155	145	155	125
	165	140	220	140	345	380	250	250	155	145	165	118
	135	185	205	220	260	320	285	205	155	135	165	125
	135	140	165	255	245	335	250	165	155	155	165	125
	135	•	140	435	290	300	370	125	155	135	165	125
31			152	•••••	490	•••••	.800	145		135		185
Tot		5139	5628		13337	15263	12295	13805	6852	6370	4863	4601
Mean		177	182	145	430	509	397	445	228	205	162	148
	250	268	435	435	780	885	800	1190	348	900	205	178
Min.	118	118	95	, 88	210	300	250	125	155	118	125	118
Acre-	ft.11300	10200	11200	8630	26400	30300	24400	27400	13600	12600	9640	9100

Discharge of South Platte River near Kersey for 1915.

Drainage Area, 9,500 Square Miles. Altitude, 4,612 Feet Above Sea Level.

Da	y	Jan.	Feb.	·Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		660	645	630	805	4860	1640	600	400	262	1240	1180	755
2	••	660	700	630	865	4860	1500	575	370	205	1120	1180	760
3		660	750	630	930	4000	2130	800	330	175	950	1120	765
4		660	750	615	- 898	3130	2420	900	290	175	950	1130	770
5	~	660	725	615	1000	3260	3700	970	250	205	950	1130	775
6		630	700	600	930	4160	4000	970	230	240	950	1180	825
7		630	725	600	1000	4860	5220	880	230	240	950	1180	870
8		630	700	600	1090	4500	6430	680	200	240	950	1150	870
9		630	700	600	1000	4160	5800	480	250	240	950	1080	875
10		630	700	600	1000	4160	5410	400	400	240	950	1040	880
11		630	700	615	1090	4160	5220	320	500	240	950	1090	880
12		630	835	630	1000	3840	5600	270	350	262	845	1050	780
13		630	700	630	1000	3550	6430	270	310	262	845	890	785
14		630	700	630	968	3260	5220	270	280	262	845	895	790
15		630	700	630	930	3400	3060	200	400	285	1240	845	795
16		630	660	660	930	3260	1980	200	500	482	1760	850	800
17		615	680	700	1180	3000	1420	200	640	515	2220	900	720
18		615	700	750	1180	2750	1100	175	590	482	1930	1000	720
19		630	725	700	1280	4680	1070	160	798	482	1760	965	750
20		630	750	680	1240	5410	925	180	665	385	1760	930	725
21		630	750	660	1180	4500	1100	200	552	385	1600	970	730
22		575	750	660	1090	4500	1250	200	515	330	1450	970	805
23	•••••••	515	700	645	1280	3260	1200	200	515	330	1380	915	810
24		530	700	680	3130	3000	1070	200	450	285	1310	875	900
25		550	660	750	4160	2220	1350	200	515	308	1310	840	810
26	•••••	600	645	750	5410	2040	1300	250	665	385	1310	840	860
27		600	645	805	7840	1950	1000	325	708	708	1310	745	810
28		600	630	778	6220	2040	900	400	628	1000	1310	750	660
29		600		750	4680	1870	800	420	515	1060	1060	755	660
30	•••••	615		805	4160	139ŏ	77ŏ	370	450	1180	ĨŎŎŎ	755	770
31		615		805		1390		370	308		1180		730
7	otal1	9150	19725	20833	59466	107420	81015	12635	13804	11850	38335	29200	24435
Me	an	618	704	672	1980	3460	2700	408	445	395	1240	973	788
Ma:	x	660	835	805	7840	5410	6430	970	798	1180	2220	1180	900
Mir	1	515	630	. 600	805	1390	770	160	200	175	845	745	660
Acı	re-ft8	8000	39100	41300	118000	213000	161000	25100	27400			57900	48500
						charges							

Bischarge of South Flatte River near Kersey for 1916.

Drainage Area, 9,500 Square Miles. Altitude, 4,612 Feet Above Sea Level.

Day		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	
1 .		600		790	,710	110	135	135	780	134		860	875
0		672	********	790	710	160	122	110	735	134		775	875
		070		790	71ŏ	135	122	110	510	148		740	925
		635		830	710	122	122	102	480	148	******	780	875
-		672		830	710	95	122	95	510	161		780	825
6		750		870	635	95	122	95	780	134		700	825
7 .		750		790	635	85	122	90	780	120		700	825
		635		830	685	85	122	85	615	134		705	825
9 .		672	830	750	600	85	122	90	360	134		630	825
4.0		710	915	672	600	85	122	95	260	120	722	630	782
	•	672	915	635	600	85	122	122	185	134	680	630	782
1 <b>2</b> .		600	1000	672	565	85	160	160	132	134	680	635	660
13 .		440	1000	635	565	85	260	110	130	148	642	675	620
14 .		470	1000	600	5 <b>65</b>	110	260	95	165	161	680	680	660
15 .	<b>-</b>	532	1050	600	870	260	185	95	275	235	1040	725	660
16 .		565	1100	600	580	420	185	95	365	196	3030	<b>73</b> 0	660
17 .		532	1050	635	562	285	185	95	275	216	1750	815	660
18 .		500	100Q	672	632	160	260	102	235	<b>23</b> 5	1440	905	660
19 .		532	1050	635	660	185	420	95	161	255	1280	910	660
20 .		565	915	<b>63</b> 5	615	390	360	95	134	275	1130	915	660
21 .		565	915	565	535	2150	420	95	161	275	1230	825	660
22 .		600	915	500	475	2470	510	95	235	235	1230	740	740
<b>23</b> .			870	500	435	1580	420	95	196	235	1280	782	780
			870	532	365	1160	360	90	235	235	1130	925	740
			870	565	270	915	360	95	235		1130	925	740
			790	565	210	690	360	90	196		1040	925	700
		870	750	532	155	540	310	90	196	****	1040	925	700
<b>28</b> .			750	500	85	450	260	90	161		990	925	700
			790	532	80	450	202	95	148	*******	900	925	650
30 .				532	85	260	185	185	161			925	<b>6</b> 50
31 .				500		172		690	161		860		650
To	tal	17018	19345	20084	15514	13959	7017	3781	9952	4336	24759	23742	22849
Mea	n	630	921	648	517	450	234	122	321	181	1130	791	737
				870	870	2470	510	690	780			925	925
Min.				500	80	85	122	85	130			630	620
Acre	e-ft.	33700	38400	39800	30800	27700	13900	7500	19700		49100		
	IInl	egg of	herwis	a note	d all	dischar	ges are	in cub	ic feet	DAT SA	hron		

#### SOUTH PLATTE RIVER NEAR JULESBURG.

Location.—At highway bridge one mile south of Julesburg, about sec. 33, T. 12 N., R. 44 W. No important tributaries between this station and the Colorado-Nebraska State line a few miles below. All the tributaries for 100 miles or more above the station are intermittent.

Records Available.—April 2, 1902, to November 16, 1906; May 12, 1908, to November 30, 1912; April 8, 1914, to November 30, 1916.

Drainage Area.—20,600 square miles.

Gage.—When the station was re-established in 1908 a gage was placed in each of the two main channels; both gages read practically the same as the original gage on the lower bridge 2,000 feet below the present site. On May 5, 1915, six scales with open pulleys were placed on the bridge. The zeros of these scales were arranged so as to be at the same datum. These scales are numbered one to six, beginning at the south end of the bridge. Gages numbered one, two and three are over one channel.

Channel.—Shifting.

Discharge Measurements.—Made from bridge at high water and wading at low water stages.

Winter Flow.—Ice causes backwater during the winter months.

Diversions.—Between Kersey and Julesburg there are court decrees for diversions of 5,316 second-feet from the South Platte, and diversions of 1,240 second-feet from intervening tributaries, including Lodgepole Creek in Wyoming and Nebraska and Crow Creek in Wyoming, besides numerous flood decrees. Between the state line and mouth, diversions of 206 second-feet from the South Platte have been granted in Nebraska.

Accuracy.—Sufficient measurements have been made so that results can be considered good.

Co-operation.—During 1915 this station was maintained in co-operation with the State Engineer of Nebraska. During 1916 the station was maintained by the State Engineer of Colorado. The salary of the gage reader is paid by the Great Western Sugar Company.

Note.—Results for 1915 are based on gage readings taken on scales numbered one, two and three. In 1916 each main channel has been computed separately and the totals for the entire stream published.

#### TARRYALL CREEK NEAR JEFFERSON.

Location.—At Robbins ranch, in sec. 6, T. 9 S., R. 74 W., about 10 miles southeast of Jefferson. Rock Creek enters half a mile below.

Records Available.—June 27, 1914, to November 11, 1916.

Drainage Area.—223 square miles.

Gage.—Vertical staff.

Channel.—Slightly shifting.

Discharge Measurements.—Made by wading and from footbridge 400 feet down stream.

Winter Flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—There are court decrees for diversions of 314 second-feet from Tarryall Creek above the station and for 926 second-feet from tributaries entering above. The Boreas Ditch diverts a small amount of water from the Blue River to Tarryall Creek.

Accuracy.—Results fair.

Co-operation.—Records furnished by the United States Geological Survey.

# Discharge of South Platte River near Julesburg for 1915. Altitude, 3,469 Feet Above Sea Level

Da	У	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		<b>-</b>			350	2760	2020	135	80	350	420	750	1340
2					290	2620	8150	110	80	268	505	755	1330
3	••••		·		290	2760	3280	115	. 80	210	590	760	1140
4	•				268	2760	. 3020	142	80	172	710	645	1130
5					245	2760	2760	280	80	140	850	650	1130
6					245	2760	2760	200	80	120	1010	655	1210
7					505	2760	2760	170	100	115	.820	660	1120
8		•			1370	2510	2760	170	105	110	850	665	1110
9		<i>j</i>			1580	2510	8020	170	115	110	710	670	1190
10		•			1480	2760	3820	170	120	105	710	675	1100
11					1100	3020	3960	160	120	100	710	680	1090
12					935	<b>355</b> 0	4500	142	130	95	710	815	1080
13					935	3420	4360	128	130	90	710	820	1080
14	•••••		• • • • • • • • • • • • • • • • • • • •		1010	3280	4860	115	140	90	780	825	1070
15					1010	3280	4200	105	140	90	850	900	1060
16	•••••				1010	8020	4360	90	150	90	980	985	890
17					1010	3020	4200	85	160	90	850	990	745
18				792	1010	2760	3120	80	130	90	780	995	625
19	••••••			792	1010	3280	1930	80	110	90	710	1080	560
20			•••••	725	1010	3020	1540	80	100	90	710	1080	550
21				725	935	2760	1020	80	105	85	710	1260	725
22		•••••		725	1100	3020	1020	80	120	95	710	1260	850
23		•••••	••	665	1480	3020	525	80	210	110	780	1380	1010
24	•••••	•••••	•••••	605	1800	3280	400	80	350	140	930	1280	859
25	•		•	605	2030	3280	800	80	505	185	930	1360	930
26	••••	•••••	•••••	505	2390	4090	282	80	725	185	1010	1360	850
27	•••••	• • • • • • • • • • • • • • • • • • • •	•••••	505	2510	4360	248	80	725	210	850	1350	850
28	•••••			462	2760	4220	170	80	725	240	855	1450	850
29	•••••	•••••		420	2760	3280	150	80	725	275	860	1850	1010
80	••••		•••••	420	2760	2890	160	80	725	815	810	1340	1010
31_		••••••	*******	350		2640	_::::::	80	505	7722	815		850
	otal.		••••••	8296	37188	95450	71155	3557	7650	4455	24215	29445	80335
We	an			593	1240	3080	2370	115	247	148	781	982	979
Ma	<b>x</b>	•	••••		2760	4360	4500	230	725	850	1010	1450	1340
M.11	n				245	2510	150	80	. 80	85	480	645	550
ACI	re-It	•	•••••	16500	78800	189000	141000	7070	15200	8810	48000	58400	60200

# Discharge of South Flatte River near Julesburg for 1916. Altitude, 3,469 Feet Above Son Level.

	Day	7	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
•	1		. <b></b>		1060	78	56	56	36	28	48	87	176	
	2		·		1860	64	54	56	35	28	36	37	167	********
	3				1260	56	54	56	24	28	36	37	140	•••••
	4				1020	55	54	52	24	24	40	41	158	
	5				880	65	54	49	24	24	40	45	164	•••••
	6				797	77	54	41	24	24	36	41	170	
	7				709	77	48	41	16	24	81	41	177	
	8			· · · · · · · · · · · · · · · · · · ·	706	70	48	38	24	24	28	41	169	
	9				705	64	38	34	24	21	28	46	189	
	10				593	68	38	34	24	18	28	50	187	
	11				509	69	32_	38	26	24	31	51	196	
	12				418	64	32 ~	60	21	32	36	. 55	182	•••••
	13				354	64	36	88	21	32	37	63	163	
	14				262	62	36	72	26	28	41	69	149	
	15				221	62	36	66	28	24	42	83	165	
	16				189	62	46	50	28	22	41	121	196	
	17	•••••		•••••	154	62	50	44	28	19	38	106	215	
	18			******	175	62	50	46	28	19	38	93	212	
	19			•	143	54	51	47	84	22	38	78	233	
	20		•••••		109	46	58	52	48	23	38	81	269	
		•			70	50	106	56	36	48	34	109	292	• • • • • • • • • • • • • • • • • • • •
					72	54	191	66	30	37	84	141	244	•••••
	23				74	54	199	60	25	87	34	190	209	•
		•••••		1560	77	54	181	46	21	36	34	275	194	
				1400	85	54	158	45	19	33	34	805	207	•••••
				1240	85	54	143	45	25	34	35	297	232	•
			•••••	1180	96	46	112	45	25	34	34	185	226	•••••
		<b></b>		976	99	54	95	44	22	84	35	184	223	
		•••••		923	83	68	76	37	19	33	35	183	223	•
		•••••		•••••	70	62	68	37	22	36	39	175	223	•
-			······		70		56		25	45		175		••••••
			•••••	7279	12505	1831	2310	1501	812	895	1079	3435	5950	•
				••••••	403	61.0	74.5	50.0	26.2	28.9	36.0	111	198	
				•••••	1360	78	199	88	48	48	48	305	292	••••••
	Min.		•••••		70	46	32	84	16	18	28	37	132	
	Acr	e-ft.	••••	14400	24800	3630	4580	2980	1610	1780	2140	6820	11800	
		Unle	888 01	therwis	e note	d, all	dischar	ges are	in cu	bic fee	t per	secon	<b>d</b> .	

Discharge	of Tarryall C	reek near Jei	ferson for 1915.
Drainage Area, 223	Square Miles.	Altitude, 9.5	00 Feet Above Sea Level.

Dε	LY	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	•					31	54	52	24	28	49	23	~ 20
2			********			18	217	45	23	24	38	22	22
3				•••••		20	239	54	23	28	42	23	22
4		•••••		•	*******	20	320	59	18	28	38	23	22
5		*******	·,·····	••••••		18	175	84	22	26	32	23	· 23
6		•••••	•••••	•••••		28 28	147 196	78 42	22 29	26 23	31 27	23 29	26
8						59	85	35	130	23	26	28	28
9					*******	35	52	37	72	23	27	23	28
10					********	34	45	30	45	23	27	29	28
11					130	26	52	23	49	23	28	24	24
12			•••••	••••••	114	33	87	20	42	22	30	22	•
13		•••••	•	••••••	87	45 39	122	28 32	37 34	19 20	30 35	16 14	•••••
14 15		••••••	••••••	•••••	64 52	18	114 71	28	36	18	33	11	•••••
16					48	13	64	23	57	22	37	18	
17					46	17	87	23	76	23	29	18	
18					54	23	106	16	39	24	28	23	
19		•••••	•••••		52	45	98	16	35	23	26	23	•
20		•		••••••	43	56	98	20 22	31	22 22	27 27	23	-4
21 22			•••••	*******	41 42	76 <b>6</b> 1	138 138	18	30 30	22 22	26	24 23	•••••
23					35	47	147	23	34	20	24	23	
24					37	37	138	22	41	18	24	23	
25					39	35	147	28	39	32	24	23	
26					36	31	122	36	34	122	24	23	
27 28		••	`		35 41	33 28	98 98	156 130	34 28	39 28	23 23	23 23	
29					39	23	130	59	28	51	23	23	
30					48	31	78	39	30	76	23	22	
31						45		29	28		. 23		
	<b>Fotal</b>		••••••	••••	1083	1053	$\begin{smallmatrix} 3663\\122\end{smallmatrix}$	1307	1200	898	904	668	266
Me	an	••••••		••••••	54.1 130	34.0 76	320	42.2 156	38.7 130	$\frac{29.9}{122}$	29.2 49	22.3 29	24.2
Mi	n.,		:		35	13	45	16	18	18	23	11	
Ac	re-ft.				2150	2090	7260	2590	2380	1780	1800	1330	528
					. <b></b>		<b>-</b>		·	f 101			
	Three	· in a ma	DISC	narge	OI TAI	TYBII C	reek ne Altitud	Pr Jem	OLEON	IOL 19	10.	T1	
							Altituc	LB. J.DL	~	E ALDOV	e 25es.	LIEVEL	
n:		_											
Da	y	Jan.	Feb.		April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
ì	y	_	Feb.	Mar.	April 19	Мау 25	June 21	July 12	Aug. 312	Sept. 38	Oct. 15	Nov. 26	Dec.
	<b>у</b> 	Jan.	Feb.		April 19 23	May	June	July	Aug.	Sept.	Oct.	Nov.	
1 2 3 4	у 	Jan.	Feb.	Mar.	April 19 23 21 23	May 25 24 26 64	June 21 39 36 32	July 12 44 36 51	Aug. 312 110 80 190	Sept. 38 39 37 29	Oct.  15 16 13 16	Nov. 26 25 24 24	Dec.
1 2	y 	Jan.	Feb.	Mar.	April 19 23 21 23 21	May 25 24 26 64 59	June 21 39 36 32 71	July 12 44 36 51 43	Aug. 312 110 80 190 120	Sept. 38 39 37 29 37	Oct.  15 16 13 16 12	Nov. 26 25 24 24 26	Dec.
1 2 3 4	y 	Jan.	Feb.	Mar.	April 19 23 21 23 21 23 21	May 25 24 26 64 59	June 21 39 36 32 71 83	July 12 44 36 51 43 44	Aug. 312 110 80 190 120 120	Sept. 38 39 37 29 37 36	Oct.  15 16 13 16 12 16	Nov. 26 25 24 24 26 25	Dec.
1 2 3 4 5 6 7	y 	Jan.	Feb.	Mar.	April 19 23 21 23 21 21 21 22	May 25 24 26 64 59 37	June 21 39 36 32 71 83 68	July 12 44 36 51 43 44 36	Aug. 312 110 80 190 120 120 102	Sept. 38 39 37 29 37 36 44	Oct.  15 16 13 16 12	Nov. 26 25 24 24 26 25 25	Dec.
1 2 3 4	y 	Jan.	Feb.	Mar.	April 19 23 21 23 21 23 21	May 25 24 26 64 59	June 21 39 36 32 71 83	July 12 44 36 51 43 44	Aug. 312 110 80 190 120 120	Sept. 38 39 37 29 37 36	Oct.  15 16 13 16 12 16	Nov. 26 25 24 24 26 25 25 25 20	Dec.
1 2 3 4 5 6 7 8	y 	Jan.	Feb.	Mar.	April 19 23 21 23 21 21 21 22 19 21 22	May 25 24 26 64 59 37 32 26 28	June 21 39 36 32 71 83 68 71 68	July 12 444 36 51 43 44 36 23 12 23	Aug. 312 110 80 190 120 120 102 180 88	Sept. 38 39 37 29 37 36 44 36	Oct.  15 16 13 16 12 16 13 7 13	Nov. 26 25 24 24 26 25 25 20 23 24	Dec.
1 2 3 4 5 6 7 8 9 10	y 	Jan.	Feb.	Mar.	April 19 23 21 23 21 21 22 19 21 22 22	May 25 24 26 64 59 37 32 26 28	June 21 39 36 32 71 83 68 71 68 54	July 12 444 36 51 43 44 36 23 12 23 39	Aug. 312 110 80 190 120 120 102 180 88 71 62	Sept. 38 39 37 29 37 36 44 36 38 31 44	Oct.  15 16 13 16 12 16 13 7 13	Nov. 26 25 24 24 26 25 25 20 23	Dec.
1 2 3 4 5 6 7 8 9 10 11 12	y 	Jan.	Feb.	Mar.	April 19 23 21 23 21 21 21 22 19 21 22 22 24	May 254 2664 597 326 288 255	June 21 336 32 71 838 671 688 624 688	July 12 44 36 51 43 44 36 23 12 23 39 170	Aug. 312 110 80 190 120 120 102 180 88 71 62	Sept. 38 39 37 29 37 36 44 36 38 31 44 34	Oct.  15 16 13 16 12 16 13 7 13 16 10 8	Nov.  26 25 24 26 25 25 20 23 24 25	Dec.
1 2 3 4 5 6 7 8 9 10 11 12 13	y 	Jan.	Feb.	Mar.	April 19 23 21 23 21 21 21 22 22 24 25	May 254 266 649 377 322 268 256 256 24	June 21 39 36 32 71 83 68 71 68 62 54 68	July 12 44 36 51 43 44 36 23 12 23 39 170 110	Aug. 312 110 80 190 120 120 180 88 71 62 51	Sept. 38 39 37 29 37 36 44 36 38 31 44	Oct.  15 16 13 16 12 16 13 7 13	Nov. 26 25 24 24 26 25 25 20 23 24	Dec.
1 2 3 4 5 6 7 8 9 10 11 12	y	Jan.	Feb.	Mar.	April 19 23 21 23 21 22 19 21 22 22 24 25 24 23	May 254 264 659 337 326 228 226 41 39.	June 21 39 36 32 71 83 68 62 48 68 68	July 12 44 36 51 43 44 36 23 12 23 39 170 110 54 44	Aug. 312 110 80 190 120 102 180 88 71 62 51 94 94	Sept. 389 377 376 444 384 384 384 384 389	Oct. 15 16 13 16 12 16 13 7 13 16 10 8 9 12 32	Nov.  26 25 24 26 25 25 20 23 24 25	Dec.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	y	Jan.	Feb.	Mar.	April 19 23 21 22 22 22 24 25 24 23 21	May 25464 264 599 372 268 2264 213 924	June 21 39 368 71 688 671 682 624 628	July 12 44 36 51 43 44 36 23 39 170 110 54 44 50	Aug. 312 110 80 190 120 102 180 88 71 62 51 94 94 80 62	Sept. 397 397 297 3644 381 444 329 329 329	Oct. 15 16 13 16 12 16 13 16 13 16 13 16 10 8 9 12 32 36	Nov. 26 25 24 24 25 25 20 23 24 25	Dec.
12345678910112131451617	y	Jan.	Feb.	Mar.	April 19 23 21 22 22 22 24 23 21 24 24	May 25 24 26 59 37 26 28 26 21 39 211	June 21 39 36 32 71 83 68 62 68 48 25 36	July 12 44 36 51 43 44 36 23 39 170 110 54 44 50 62	Aug. 312 110 80 190 120 102 180 88 71 62 51 94 80 62 71	Sept. 389 379 377 237 344 344 326 329 328	Oct. 15 16 13 16 12 16 13 17 13 16 10 8 9 12 32 36 46	Nov. 26 25 24 24 26 25 25 20 23 24 25	Dec.
123456789111211314516178	y 	Jan.	Feb.	Mar.	April 19 23 21 21 22 19 21 22 24 25 24 23 21 21 21 22 21 22 24 25 24 21 21	May 25 24 266 59 37 26 26 26 21 36 21 13	June 21 39 36 32 71 83 71 63 62 54 62 25 368 48	July 12 44 36 51 43 44 36 52 23 12 23 170 110 54 44 50 62 41	Aug. 312 110 80 190 120 120 102 188 71 62 51 72	Sept. 389 377 297 364 444 326 329 328 344	Oct. 15 16 13 16 12 16 13 16 13 16 13 16 23 23 36 46 52	Nov. 26 25 24 24 24 26 25 20 23 24 25	Dec.
123456789 101123114 115617819	y	Jan.	Feb.	Mar	April 19 23 21 22 19 21 22 22 22 24 25 24 21 21 21	May 25 24 26 59 37 26 28 26 21 39 211	June 21 39 36 32 71 83 68 62 68 48 25 36	July 12 44 36 51 43 44 36 23 39 170 110 54 44 50 62	Aug. 312 110 80 120 120 120 120 180 881 71 62 51 94 80 62 71 72 64	Sept. 389 379 377 237 344 344 326 329 328	Oct. 15 16 13 16 12 16 13 17 13 16 10 8 9 12 32 36 46	Nov. 26 25 24 24 26 25 20 23 24 25	Dec.
123456789111211314516178	y	Jan.	Feb.	Mar.	April 19 23 21 22 19 21 22 22 24 25 24 21 21 21 21 21 21 21 21 21 21 21 19 19	May 25464 599 37 322 288 366 226 226 211 66 56 50	June 21 39 36 32 713 68 71 68 62 56 68 48 48 26 68 48 48	July 12 44 36 51 43 44 36 23 12 23 39 170 54 44 44 450 62 41 41	Aug. 312 110 800 120 120 120 120 162 51 80 62 71 72 64 68 58	Sept. 389337933644443326932844377226	Oct. 15 16 13 16 12 16 13 7 13 16 10 8 9 12 32 46 52 54 53 8	Nov. 26 25 24 24 24 26 25 20 23 24 25	Dec.
123345678910112 1121314516671892212	y	Jan.	Feb.	Mar.	April 19 23 21 22 22 19 22 22 24 25 24 21 19 19 22	May 25 246 659 322 268 224 1 1 6 5 6 6 5 9 2	June 21 39 36 32 71 68 71 68 62 54 68 48 48 48 48 48 44 41	July 12 44 36 51 43 44 36 23 170 110 44 50 62 41 41 41	Aug. 312 110 190 120 102 180 88 71 62 51 94 94 94 96 68 58	Sep 3 3 9 7 6 4 4 6 8 3 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Oct. 15 16 13 16 12 16 13 7 13 10 8 9 12 32 46 52 54 51 38	Nov. 26 25 24 24 26 25 20 23 24 25	Dec.
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#### GENEVA CREEK AT GRANT.

Location.—In the Pike National Forest, at highway bridge in sec. 9, T. 7 S., R. 74 W., at Grant postoffice; 300 feet above mouth of creek.

Records Available.—November 3, 1911, to November 8, 1916.

Drainage Area.—74 square miles.

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge Measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter Flow.—Ice causes backwater during the winter months. Discharge estimated from measurements.

Diversions.—There is a court decree for a diversion above this station for 1.0 second-feet from Geneva Creek and a provisional decree for 480 acre-feet.

Accuracy.—Results are considered good.

Co-operation.—Station maintained in co-operation with the United States Geological Survey.

#### CLEAR CREEK NEAR GOLDEN.

Location.—About 2 miles above Golden, in sec. 6, T. 4 S., R. 70 W., and a short distance below the headgate of the Golden ditch. The only tributary of importance between the station and the mouth is Ralston Creek, which enters about 12 miles below.

Records Available.—December 4, 1908, to December 31, 1909; June 8 to September 24, 1911; January 26, 1912, to November 7, 1916.

Drainage Area.—Approximately 380 square miles.

Gage.—Automatic recording gage, whose datum has remained unchanged.

Channel.—Slightly shifting.

Discharge Measurements.—Made from car and cable located near the gage.

Winter Flow.—Ice causes backwater during the winter months, but discharge measurements are made to determine the approximate winter flow.

Diversions.—Between Forks Creek and the station near Golden there is a court decree for a diversion of 26 second-feet by the Golden ditch.

Accuracy.—Conditions are favorable for accurate results, and the records should be reliable.

Co-operation.—Records were furnished by the United States Geological Survey.

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# SOUTH BOULDER CREEK NEAR ROLLINSVILLE.

Location.—At highway bridge in sec. 35, T. 1 S., R. 73 W., 1 mile west of Rollinsville, in the Pike National Forest. The nearest important tributary, Jennie Creek, enters 4 miles above.

Records Available.—September 10, 1910, to December 31, 1916.

Drainage Area.—39 square miles.

Gage.—Vertical staff.

Channel.—Fairly permanent.

Discharge Measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter Flow.—Ice causes backwater during the winter months. Flow estimated from measurements.

Diversions.—There are no court decrees for diversions above the station, and therefore it is probable that the records represent the natural run-off.

Accuracy.—Conditions are favorable for fairly accurate results and the estimates of discharge should be reliable.

Co-operation.—Records furnished by the United States Geological Survey.

### SOUTH BOULDER CREEK AT ELDORADO SPRINGS.

Location.—At the mouth of the canyon at Eldorado Springs, in sec. 30, T. 1 S., R. 70 W., 3 miles southwest of Marshall. No important tributaries within several miles.

Records Available.—May 15, 1895, to September 30, 1901; July 1, 1904, to November 30, 1916.

Drainage Area.—125 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Fairly permanent.

Discharge Measurements.—Made by wading.

Winter Flow.—Warm springs keeping channel open during the winter.

Diversions.—There are court decrees for diversions of 137 second-feet above the station and 1,658 second-feet below. There are also a number of flood-water decrees.

D	rainag	ohargo Area	, 39 8	quare	Miles.	Altitud					Level.	
<b>ay</b>	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
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******		********	6	īŏ	67	254	188	86	31	20	13	
• • • • • • • • • • • • • • • • • • • •			6	10	67	266	188	92	24	22	12	
•••••		•••••	7	10	98	277	188	67	21	22	13	
	• •••••		7	23	114	324	188	52	23	18	18	
	• • • • • • • • • • • • • • • • • • • •		7	26	140	348	188	53	21	16	23	
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			ż	35	242	266	168	44	22	$\tilde{2}\frac{1}{4}$	18	
			7	48	242	800	168	42	21	22	18	
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•			7	42	188	372	158	42	16	20	15	
**	·		7	46	168	472	114	32	15	20	12	
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			ŕ	53 55	149 149	472 422	114 114	32 32	16 15	16	19	
			ż	46	178	372	98	34	15	18 18	13 16	
******		•••••	ż	46	178	348	83	32	27	16	13	
			7	57	198	324	80	· 32	33	16	13	
			7	76	242	324	80	82	27	15	12	
•	• • • • • • • • • • • • • • • • • • • •	•	7	95	288	277	83	30	27	12	11	
•••••		•	7	114	242	254	80	30	29	13	10	
	• • • • • • • • • • • • • • • • • • • •	•	8 8	168	220	277	80	25	27	15	10	
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3X			8	168	288	472	266	92	39	27	23	٥.
n												
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re-ft.			413	2450	10400	18800	9900	2860	1400	1210	875	5
ere-ft.	Disc	charge	413 of 8	2450 outh <b>E</b>	10400	18800 Creek	9900 <b>near Z</b>	2860 <b>Jollins</b> v	1400 <b>fille f</b> o	1210 r <b>191</b>	875	5
ere-ft.	Disc	charge	413 of 5 , 39 8	2450 outh E quare	10400 Soulder	18800 Creek	9900 <b>near Z</b>	2860 <b>Jollins</b> v	1400 <b>fille f</b> o	1210 r <b>191</b>	875 <b>6.</b>	5 De
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D	Jan	Feb. 6 6 7 8 9	413 of 8 , 39 8 Mar. 9 10 10 10	2450 outh E quare April 19 21 19 19	10400 Soulder Miles. May 45 43 47 47 48	18800 <b>Creek</b> <b>Altitud</b> <b>June</b> 198 239 239 239 239	9900 near II le, 8,50 July 205 188 188 188 188	2860  collins:      Feet  Aug.  106 91 100 106 103	1400 7ille for Above Sept. 26 29 26 25 23	1210 r 191 Bea Oct. 17 17 17 17	875 <b>6. Level.</b> Nov.  19 19 19 19 17 17	De
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D Ay	Discring Jan. 8 8 9 10 10 9 9 10 9 9 10 9 9	Feb. 6 6 6 7 8 9 10 10 9 9	413 of 55 , 39 5 Mar. 9 10 10 10 10 10 10 10 10	2450 outh B quare April 19 21 19 19 19 19 19	10400 Boulder May 45 43 47 47 48 55 67 96 119 132	18800 Creek Altitude June 198 239 239 239 239 239 239 239 239	9900  near II  1e, 8,50  July 205 188 188 188 168 161 151 168 140 123	2860  collinsv G Feet  Aug.  106 91 100 106 103 100 85 76 63 58	1400 7111e for Above Sept. 26 29 26 25 23 21 21 21	1210 <b>Bea</b> Oct. 17 17 17 17 17 17 17	875 <b>6. Level.</b> Nov.  19 19 19 19 17 17	De
Day	Discrainage Jan.  8 8 9 10 10 9 9 9 10 9 9 9 10 9 9 8 8	Feb. 66678910010099999	413 of 5, 39 8 Mar. 9 10 10 10 10 10 11 11 12	2450 outh Equare April 19 21 19 19 19 19 19 19 20 19 23	10400 Boulder May 45 43 47 47 48 55 67 96 119 132 146	18800 Creek Ateitud June 198 239 239 239 239 239 239 239 239 239 239	9900  near M le, 8,50  July 205 188 188 188 161 151 163 140 123 117	2860  collinsy G Feet  Aug.  106 91 100 106 103 100 85 76 63 58 42	1400 7111e for Above Sept. 26 229 226 225 23 21 21 21 21 23	1210 <b>Bea</b> Oct. 17 17 17 17 17 17 17 17 17 17 17 17 17	875 6. Level. Nov. 19 19 19 19 18 17 17	De
Day	Discrainage Jan.  8 8 9 10 10 9 9 10 9 7	Charge Area 6 6 6 7 8 9 10 110 9 9 9 9 9 9	413 of 5 39 8 Mar. 9 10 10 10 10 10 12 14	2450  outh B  quare  April  19 21 19 19 19 19 19 19 20 19 23	10400 Soulder May 45 43 47 47 48 55 67 96 119 132 146 146	18800 Creek Atitud June 198 239 239 239 239 239 239 239 239	9900  near Mae, 8,50  July 205 188 188 168 151 161 163 140 123 117 106	2860  Collingue  G Peet  Aug.  106 91 100 106 103 100 85 76 63 58 42 50	1400 7111e for Above Sept. 26 29 26 223 23 21 21 21 21 23 23	1210 r 191 8ea Oct. 17 17 17 17 17 17 17 17 17 17	875 <b>6. Nov.</b> 19  19  19  17  17  15  16  14	De
Day	Jan. 8 8 9 10 10 9 9 10 9 9 7 7 7 7 7 7 7	Feb. 66 66 77 89 10 10 9 9 9 9 9 8	413 of 8 , 39 8 Mar. 9 10 10 10 10 12 12 12 18	2450 outh Bluare April 19 21 19 19 19 19 19 20 20 20 23 23	10400 Soulder May 45 43 47 47 48 55 67 96 119 132 146 146 132	18800 Creek Altitud June 198 239 239 239 239 239 239 239 239 239 239	9900  near II 1e, 8,50  July 205 188 188 188 161 151 161 123 117 106 103	2860  Collins of Peet  Aug.  106 91 100 106 103 100 85 76 63 58 42 50 48	1400 7111e for Above Sept. 26 29 26 25 23 21 21 21 21 23 23 20	1210 <b>P 191 Sea</b> Oct. 17 17 17 17 17 17 17 17 17 17 17 17 17	875 6. Level. Nov. 19 19 19 18 17 17 15 16 16 16	De
Day	Distrainage Jan.  8 8 9 10 10 9 9 10 7 7 7	Feb. 66 66 77 89 100 100 99 99 88 99	413 of 8 39 8 Mar. 9 10 10 10 10 12 12 14 14 14	2450 outh Buare April 19 21 19 19 19 19 20 19 23 23 23 23	10400 Soulder Niles. May 45 43 47 48 55 67 96 119 132 146 146 142 132	18800  Orsek Altitud  June  198 239 239 239 239 239 239 239 239 239 239	9900  mear II le, 8,50  July 205 188 188 168 151 161 168 140 123 117 106 103 91	2860  Collinsve Peet  Aug.  106 91 100 103 100 85 76 63 58 42 50 48 58	1400 7110 for Above Sept. 26 29 25 23 21 21 21 21 23 23 20 19	1210 <b>Sea</b> Oct. 17 17 17 17 17 17 17 17 17 17 17 17 17	875 6. Level. Nov. 19 19 19 19 17 17 15 16 16 14 13	De
D Ly	Discreting: Jan.  8 8 9 10 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 9 10 9 10 9 10 9 10 9 10 10 10 10 10 10 10 10 10 10 10 10 10	Feb. 66 66 77 89 10 10 9 9 9 9 9 8	413 of S , 39 8 Mar. 9 10 10 10 10 10 12 14 18 18 18 126	2450 outh Equare April 19 21 19 19 19 19 19 23 23 23 25	10400 Soulder May 45 47 47 47 48 67 91 91 132 146 132 132 132	18800  Creek Altitud  June 198 239 239 239 239 239 239 239 239 273 273 273 273	9900  mear II le, 8,50  July 205 188 188 165 151 161 123 117 106 103 911	2860 collins of Peet Aug. 106 91 100 106 103 100 85 76 63 58 42 50 48 53	1400 7111e for Above Sept. 26 29 26 25 23 21 21 21 21 23 20 19	1210 <b>Sea</b> Oct. 17 17 17 17 17 17 17 17 17 17	875 6. Level. Nov. 19 19 19 18 17 15 15 16 16 14 13	De
Day	Discreting: Jan.  8 8 9 10 10 9 9 9 9 9 7 7 7 7 8 7 7 7 8 7 7 7 7 8 7 7 7 7	Feb. 66677891001009999988999	413 of 8 39 8 Mar. 9 10 10 10 10 12 12 14 14 14	2450 outh Buare April 19 21 19 19 19 19 20 19 23 23 23 23	10400 Soulder Niles. May 45 43 47 48 55 67 96 119 132 146 146 142 132	18800  Orsek Altitud  June  198 239 239 239 239 239 239 239 239 239 239	9900  mear II le, 8,50  July 205 188 188 168 151 161 168 140 123 117 106 103 91	2860  Collinsve Peet  Aug.  106 91 100 103 100 85 76 63 58 42 50 48 58	1400 7110 for Above Sept. 26 29 25 23 21 21 21 21 23 23 20 19	1210 <b>Bea</b> Oct. 17 17 17 17 17 17 17 17 17 17 17 17 17	875 6. Level. Nov. 19 19 19 17 17 15 15 16 16 14 13 14 15	De
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D by	Discriment Jan	Feb. 6 6 6 7 8 9 10 10 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	413 of 5 39 8 Mar. 9 10 10 10 10 10 10 12 14 14 26 19 19 12 21 22 21	2450 outh Equare April 19 21 19 19 19 20 19 23 23 25 25 25 25 30	10400 Soulder May 45 43 47 48 55 67 96 119 132 132 132 132 108 91	18800  Orsek Altitud  June  198 239 239 239 239 239 239 239 239 239 239	9900  near 2 le, 8,50  July 205 188 188 168 161 151 161 106 103 91 100 100 100 100 79	2860  collinsverse Aug.  106 91 100 106 103 100 85 63 58 42 50 48 858 42 40 33	1400 7111e for Above Sept. 26 25 23 21 21 21 21 21 21 21 21 21 21 21 21 21	1210 <b>Bea</b> Oct. 17 17 17 17 17 17 17 17 17 17 17 17 20	875 6. Level. Nov. 19 19 19 19 18 17 15 15 16 16 14 13 14 15 16 17	De
Pe-ft.	Discrete Part	Feb. 666678999999999999999999999999999999999	413 of 8 39 8 Mar. 9 10 10 10 10 12 12 14 18 18 19 21 22 22	2450  outh Equare April 19 21 19 19 19 19 20 23 23 25 25 25 25 30 30 29	10400 coulder May 453 477 477 487 567 969 1132 1146 1132 1132 1132 1198 988 998	18800  Oreek Altitut June 198 239 239 239 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273	9900  mear M le, 8,50  July 205 188 188 188 161 151 168 140 123 117 100 94 106 100 79 58	2860  collinsveries	1400  **Ille for Above  Sept.  26  26  25  23  21  21  21  21  21  21  21  21  21	1210 <b>Rea</b> Oct. 17 17 17 17 17 17 17 17 17 17 17 17 20 20 21 20	875 6. Level. Nov. 19 19 19 19 17 17 17 15 16 16 14 13 14 15 16 17	De
Pe-ft.	Jan	Feb. 6667789100199999999999999999999999999999999	413 of 55 , 339 5 Mar. 9 10 10 10 10 12 12 12 14 22 22 21	2450 outh Equare April 19 21 19 19 19 19 20 23 23 25 25 25 25 20 30 30 39	10400 Boulder May 453 477 478 5567 966 1192 132 132 132 132 132 139 108 98	18800  Oreck Altitud  June  198 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  near 21 1e, 8,50  July 205 188 188 151 151 168 140 123 117 106 103 91 106 100 79 588	2860  collinsv G Feet  Aug.  106 91 100 106 31 00 85 76 63 42 50 48 48 48 42 40 33 48 42 40 33 42 30	1400  **Ille for Above  Sept.  26  29  26  25  23  21  21  21  21  21  27  20  19  17  17  17	1210 <b>Rea</b> Oct.  17 17 17 17 17 17 17 17 17 17 17 12 20 21 20 21	875 6. Level. Nov. 19 19 19 19 17 17 17 15 16 16 14 13 14 15 16 17 17 17 17	De
Day	Discrete Part	Feb. 66667789100100999999999999999999999999999999	413 of 55 , 39 5 Mar. 9 10 10 10 10 12 14 18 18 26 19 21 21 22 21 24	2450  outh Equare  April 19 19 19 19 19 19 23 23 25 25 25 25 30 30 30 30 31	10400 soulder May 453 447 448 556 67 96 119 132 1146 132 1129 108 98 98 98 98	18800  Oreck Altitut  June  198 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  near 31 1e, 8,50  July 205 188 188 168 151 168 140 123 117 100 94 100 79 58 58 60	2860  collinsver  G Feet  Aug.  106 103 1000 106 633 58 42 50 48 53 48 42 40 33 42 30 29	1400 rille for Above Sept. 26 26 25 23 23 21 21 21 21 23 20 19 17 17 17	1210 <b>Bea</b> Oct. 17 17 17 17 17 17 17 17 17 17 17 17 12 20 20 21 21 23	875 6. Level. Nov. 19 19 19 19 17 17 15 16 14 13 14 15 16 17 17 17 17	De
Day	Jan. 88 99 100 100 99 88 77 77 77 88 76 66 78 88 100 100 100 100 100 100 100 100 100	Feb. 66 78 9 100 100 99 99 99 99 99 99 99 99 99 99 99 99 9	413 of \$88 a. Mar. 9 9 100 100 1100 1100 1100 1100 1100 11	2450  outh Equare  April 19 21 19 19 19 19 20 23 23 25 25 25 25 25 30 30 30 31	10400 coulder riles.  May  453 447 448 555 67 966 1192 1146 1132 1132 1199 1088 988 988	18800  Oreck Altitud  June  198 239 239 239 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  near II 1e, 8,50  July 205 188 188 163 161 161 163 140 123 117 100 94 106 79 58 600 48	2860  collinsver G Feet  Aug.  106 91 100 106 63 100 48 58 42 50 48 48 42 30 33 48 49 33 48	1400  **Ille for Above  Sept.  26  26  23  23  21  21  21  23  20  19  17  17  17  17	1210 <b>Rea</b> Oct. 17 17 17 17 17 17 17 17 17 17 17 17 17	875 6. Level. Nov. 19 19 19 18 17 15 16 16 16 17 17 17 17 17 17 15 15	De
D	Jan. 88 99 100 100 99 88 77 77 77 88 76 66 78 88 100 100 100 100 100 100 100 100 100	Feb. 66667789100100999999999999999999999999999999	413 of 55 , 39 5 Mar. 9 10 10 10 10 12 14 18 18 26 19 21 21 22 21 24	2450  outh Equare  April 19 21 19 19 19 19 20 23 23 25 25 25 25 25 27 27 30 30 31 37	10400 Coulder May 453 477 478 5567 966 1192 1146 1146 1132 1132 1132 1199 988 988	18800  Oreck Altitut June 198 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  near 21 1e, 8,50  July 205 188 188 151 151 168 140 123 117 106 103 91 106 100 79 58 60 48 48	2860  collinsver  G Feet  Aug.  106 91 100 106 576 63 58 42 50 48 48 48 42 40 33 42 30 29 30 29	1400  **Ille for Above  Sept. 26 229 223 231 211 211 213 230 19 17 17 17 17 17 19	1210 <b>Res</b> (Cot. 177 177 177 177 177 177 177 177 172 172	875 6. Level. Nov. 19 19 19 19 17 17 15 16 16 16 17 17 17 17 17 15 16 16	De .
D	Jan. 88 9 100 100 100 100 100 100 100 100 100 1	Feb. 66678 99100199999889999999999999999999999999	413 of \$8 ar. 39 ar. 39 ar. 100 100 100 110 110 112 114 118 114 126 129 121 122 124 124 128 119 119 119 119 119 119 119 119 119 11	2450  outh Equare  April 19 19 19 19 19 20 19 23 23 25 25 25 25 25 27 40 40	10400 Coulder May 453 477 478 5567 966 1192 1146 1132 1132 1132 1199 988 988 988 988 119	18800  Oreck Altitud  June  198 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  near II 1e, 8,50  July 205 188 188 163 161 161 163 140 123 117 100 94 106 79 58 600 48	2860  collinsver G Feet  Aug.  106 91 100 106 63 100 48 58 42 50 48 48 42 30 33 48 49 33 48	1400  **Ille for Above  Sept.  26  26  23  23  21  21  21  23  20  19  17  17  17  17	1210 <b>R 191</b> <b>Sea</b> Oct. 17 17 17 17 17 17 17 17 17 17	875 6. Level. Nov. 19 19 19 19 18 17 15 16 16 16 17 17 17 17 17 17 17 17 15 16 14	De
D D D D D D D D D D D D D D D D D D D	Discrete Part	Feb. 66667891001009999999999999999999999999999999	413 of \$8 ar. 39 ar. Mar. 99 100 100 100 100 112 114 118 114 226 119 221 224 223 119 119 119 119	2450  outh In Image	10400 soulder May 453 457 477 478 5567 966 119 2132 1128 988 988 988 988 119 132 132 132 132 1332 1332 1332 1332	18800  Oreck Altitut  June  198 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  near 30 le, 8,50  July 205 188 188 168 151 168 140 123 117 100 94 100 79 58 58 60 48 48 48 50 53	2860  collinsverse and the second sec	1400 7111e for Above Sept. 269 265 233 231 211 221 221 221 271 271 271 271 271 27	1210 <b>Par</b> 191 <b>Sea</b> Oct. 177 177 177 177 177 177 177 17	875 6. Level. Nov. 19 19 19 19 18 17 17 15 16 16 14 13 14 15 16 17 17 17 17 17 17 17 17 17 17 17 17 17	De
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D Ay	Jan. 88 9 100 100 99 100 100 100 100 100 100 10	Feb. 66678 99100199998889999999999999999999999999	413 of \$8 ar. 39 ar. Mar. 100 100 100 100 112 114 114 114 114 114 114 114 114 114	2450  outh Equare  April 19 19 19 19 19 19 20 19 23 23 25 25 25 25 25 26 47 47 47	10400  Coulder May 453 477 478 5567 996 1192 1346 1462 1322 1322 1329 1088 988 988 988 1191 132 132 132 1346	18800  Oreck Altitut June  198 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  near 21 le, 8,50  July 205 188 188 151 161 168 140 123 117 106 103 91 106 100 79 58 60 48 50 53 58 58 68	2860  collinsv G Feet  Aug.  106 91 100 106 31 000 856 63 42 508 42 508 42 40 33 42 40 32 9 27 32 29 27	1400  **Ille for Above  Sept. 26 229 223 231 211 211 213 230 19 17 17 17 17 17 17 17 19 17 19 19	1210 <b>Rea</b> Oct. 17 17 17 17 17 17 17 17 17 17 120 25 20 21 21 21 21 21	875 6. Level. Nov. 19 19 19 19 18 17 15 16 16 16 17 17 17 17 17 17 17 17 17 17 17 17 17	De
D RAY	Distrainage Jan	Feb. 666789999999999999999999999999999999999	413 of \$8 mar	2450  outh In Ingress  April 19 19 19 19 19 19 23 23 25 25 25 26 30 30 30 30 31 37 40 42 47 47 39	10400  Soulder May 453 477 478 5567 969 1132 1146 1132 1132 1198 988 988 988 988 119 1132 1132 1146 1132 1146 1132 1146 1132 1146 1146 1146 1146 1146	18800  Oreck Altitut  June  198 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  near 30 le, 8,50  July 205 188 188 168 161 163 140 103 91 100 94 106 100 79 58 58 60 60 60 60 60 60 60 60 60 60 60 60 60	2860  collinsveries and some series and series are series and series and series and series and series are series and series are series and series and series are series are series and series are seri	1400 7111e for Above Sept. 269 265 233 231 211 233 200 119 117 117 117 117 117 119 119 117	1210 <b>Rea</b> Oct. 177 177 177 177 177 177 177 177 172 172	875 6. Level. Nov. 19 19 19 19 17 17 15 16 16 14 15 16 17 17 17 17 15 15 14 14 14 14	De
D Ay	Jan. 88 9 100 100 99 100 100 100 100 100 100 10	Feb. 66678 99100199999888810999999999999999999999	413 of \$8 ar. 99 99 100 100 100 110 110 110 110 110 1	2450  Outh In Image	10400  Coulder May 453 477 477 458 567 966 1192 11466 1132 1132 1139 988 988 988 998 918 1132 1132 1132 11466 1466 1466	18800  Oreck Altitut  June  198 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  near 20  le, 8,50  July 205 188 188 168 161 161 163 140 123 117 103 91 100 94 106 100 79 58 60 48 503 58 63 110	2860  Collinsy G Feet  Aug.  106 106 106 53 100 855 76 63 42 50 48 42 40 43 43 42 40 29 27 29 27 29 27 29 26	1400  **Ille for Above Sept. 26 29 26 23 23 21 21 21 21 21 27 17 17 17 17 17 17 17 17 17 17 17 17 17	1210 <b>Residual</b> (Cont.)  17  17  17  17  17  17  17  17  17  1	875 6. Level. Nov. 19 19 19 19 18 17 17 15 16 16 16 17 17 17 17 17 17 17 17 15 14 14 14 14 14 14 14 14 18	De
Day	Discrete Services Ser	Feb. 6667789100100999988899999999999999999999999	413 of \$8 mar. 39 mar. 99 100 1100 110 110 110 110 110 110 110	2450  outh I	10400 Roulder Wiles.  May 453 477 478 567 96 119 1322 1198 988 988 998 91322 1199 1322 1198 988 968 119 1322 1326 1466 1363	18800  Oreck Altitut  June  198 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  near 30 le, 8,50  July 205 188 188 188 168 151 168 140 123 117 100 94 100 79 58 58 60 48 48 48 60 53 58 60 120 3350	2860  collinsver  Greet  Aug.  106 103 1000 106 633 58 42 40 48 53 48 42 40 33 20 29 27 32 29 29 29 29 29 29 26 1661	1400 7111e for Above Sept. 269 266 223 231 211 233 200 199 177 177 177 177 179 199 177 177 179 199 177 17608	1210 <b>Par</b> 191 <b>Sea</b> Oct. 177 177 177 177 177 177 177 17	875 6. Level. Nov. 19 19 19 19 17 17 15 16 16 14 15 16 17 17 17 17 17 17 17 15 16 14 14 14 14 14 14 14 14 14 14 14 14 14	De-
D ay	Jan. 88 9 100 100 9 9 8 7 7 7 7 7 7 254 8.19	Feb. 66 78 9 110 199 99 99 99 99 99 99 99 99 99 99 99 99	413 of \$8	2450  Outh In Image	10400 coulder May 453 447 448 5567 966 1192 1322 1198 988 988 1192 1322 11466 1466 1466 1466 1466 1466 1466 1	18800  Oreck Altitud  June  198 239 239 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  mear M le, 8,50  July 205 188 188 161 151 168 140 100 94 106 100 94 106 79 58 60 60 48 48 53 58 63 110 120 3350	2860  collinsver  G Feet  Aug.  1061 107 1085 766 638 422 508 488 422 300 299 27 322 299 27 27 266 1661 53.6	1400 7111e for Above Sept. 269 265 233 231 211 221 233 230 199 17 17 17 17 17 19 19 19 17 17 17 19 19 19 17 17 17 18 19 19 17 17 18 19 19 19 17 17 18 19 19 19 19 19 19 19 19 19 19 19 19 19	1210 <b>R 191 Sea</b> Oct.  17  17  17  17  17  17  17  17  17  1	875 6. Level. Nov. 19 19 19 19 18 17 15 16 16 16 17 17 17 17 17 17 17 17 17 17 17 17 17	De-
Total ean	Jan. 88 9 100 100 9 9 8 7 7 7 7 7 7 254 8.19	Feb. 6667789100100999988899999999999999999999999	413 of \$8 mar. 39 mar. 99 100 1100 110 110 110 110 110 110 110	2450  Outh In Image   April   19   19   19   19   19   19   23   25   25   25   25   25   25   26   30   30   311   37   42   47   39   39   30   31   37   42   47   39   39   30   31   37   42   47   39   39   30   31   37   47   38   38   37   48   48   47   38   38   37   88   87   88   87   87	10400 Roulder Wiles.  May 453 477 478 567 96 119 1322 1198 988 988 998 91322 1199 1322 1198 988 968 119 1322 1326 1466 1363	18800  Oreck Altitut  June  198 239 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  near 20 le, 8,50  July 205 188 188 181 161 163 140 123 117 106 103 91 106 106 107 58 60 48 50 58 68 110 110 1350 108 3350 108 205	2860  Collinsy  G Feet  1061 1000 1063 1000 85576 633 542 503 482 420 420 429 229 229 229 229 229 229 229 229 229	1400  **Ille for Above Sept. 26 229 223 231 211 211 213 230 19 17 17 17 17 17 17 17 17 17 17 17 17 17	1210  T 191  Sea.  171 171 177 177 177 177 177 177 177 1	875 6. Level. Nov. 19 19 19 19 19 17 17 15 16 16 16 14 14 14 14 14 14 14 14 14 14 14 15 15 16 16 16 17 17 17 17 17 17 15 15 15 16 16 16 17 17 17 17 17 17 15 15 16 16 16 17 17 17 17 17 15 15 16 16 16 17 17 17 17 17 15 15 16 16 16 17 17 17 17 17 17 15 16 16 16 17 17 17 17 17 17 15 16 16 16 16 17 17 17 17 17 17 15 16 16 16 17 17 17 17 17 17 15 16 16 16 16 17 17 17 17 17 17 17 18 18 18 18 18	Dec
Total aan.	Jan. 88 9 10 10 9 9 10 9 8 8 7 7 7 7 8 8 8 10 10 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10	Feb. 66678 99100199999888999999999999999999999999	413 of \$8 ar. 99 9 100 100 100 110 110 110 110 110 11	2450 Outh Interpretation   April   19	10400  Coulder May 453 477 477 455 677 966 1192 11466 1132 1132 1119 988 988 998 918 1132 11466 1465 32635 1165 3460	18800  Oreck Altitud  June  198 239 239 239 239 239 273 273 273 273 273 273 273 273 273 273	9900  near 20 le, 8,50  July 205 188 188 181 161 163 140 123 117 100 94 106 100 79 58 60 48 50 3350 110 100 3350 48 6648	2860  Collinsy  G Feet  Aug.  1061 1000 1063 1000 85576 638 542 500 488 422 500 299 277 296 297 297 296 1661 53.66 3300	1400  **Ille for Above Sept. 26 29 26 23 23 21 21 21 21 21 27 17 17 17 17 17 17 17 17 17 17 17 17 17	1210 <b>R 191 Sea</b> Oct.  17  17  17  17  17  17  17  17  17  1	875 6. Level. Nov. 19 19 19 19 18 17 15 16 16 16 17 17 17 17 17 17 17 17 17 17 17 17 17	De

	-	Dis	charge	of Bo	uth Bo	ulder (	Aleien	Eldor	ado Sp	rings 1	or 191	5.	
<b>D</b>			Area,						00 Fee				•
Da	y	Jan.	Feb.	Mar.	April 28	May 276	June 465	July 288	Aug. 85	Sept.	Oct. 43	Nov.	Dec.
1 2	•••••				37	242	463	311	85	33	38	30 28	24 29
3					44	212	462	283	69	33	43	29	29
4					56	198	388	282	55	55	43	30	29
5				·	63	. 184	388	269	55	55	43	30	27
6					64	184	373	255	49	43	43	30	27
7		••••••		•••••	63	212	406	227	55	38	38	30	27
8	•	•••••			65	227	382	226	105	33	33	80	27
9 10	•	•••••	•	•	74 64	242 242	455 562	201 207	116	43	33	33	27
11		••••••	•	••••••	77	259	620	199	90 73	33 33	33 33	29	27
12			••••••	•	76	275	680	207	73	33	33	24 24	27 27
13					82	359	528	193	59	. 33	33	24	16
14					85	425	426	207	69	33	33	24	25
15					130	360	366	193	77	33	49	24	19
16					134	359	359	179	69	38	55	29	19
17					130	358	421	166	62	33	55	29	19
18		•••••	•		130	404	379	152	55	29	55	29	28
19	······				135	316	418	152	55	29	55	27	24
20		••••••	•	.:	126	295	566	152	55	25	43	27	$\bar{2}\bar{4}$
21					132	295	516	127	55	25	43	21	22
22		••••••		•	, 144	-258	447	127	49	25	43	80	22
23 24			•••••		153 167	274 273	465 399	127	55	25	38	30	22
24 25		•••••	••••••		230	336	399 419	116 105	. 55 . 55	25	25	30	22
25 26					258	357	396	105	43	33 85	13	16	22
27			•••••	•	288	315	376	105	43	49	9	19	22
28			••••••	19	244	273	334	105	38	43	9	36	22
29	••••••	******	•••••	19	261	275	290	105	38	43	9	24 24	22
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Unless otherwise noted, all discharges are in cubic feet per second. Note.—Discharge of Community Canal included.

# BOULDER CREEK AT ORODELL.

Location.—At Orodell Station in sec. 27, T. 1 N., R. 71 W., just above the mouth of Four-Mile Creek.

Records Available.—March 18, 1907, to November 26, 1914; February 27 to December 12, 1916. From May 14, 1895, to December 20, 1909, a station was maintained about 1 mile below the present site, chiefly by the State Engineer. The records at the two points are not directly comparable, as some water is diverted for irrigation between.

Drainage Area.—108 square miles.

Gage.—Automatic recording gage installed by the Colorado Power Company.

Channel.—Shifts in extreme high water.

Discharge Measurements.—Made from car and cable.

Winter Flow.—Ice causes backwater during the winter months and during that period discharge measurements are made to determine the flow.

Diversions.—There are no diversions from Boulder Creek above the station, but there are court decrees for diversions of 165 second-feet from tributaries entering above. Below the station there are decrees for diversions of 2,871 second-feet from Boulder Creek.

Co-operation.—Station maintained in co-operation with the Colorado Power Co.

#### ST. VRAIN CREEK AT LYONS.

Location.—Three-fourths of a mile below Lyons, in sec. 17, T. 3 N., R. 70 W., one-fourth mile below the junction of North and South St. Vrain Creeks and just below Stone Canyon.

Records Available.—August 1, 1887, to October 31, 1890; June 13, 1895, to October 31, 1903; July 1, 1904, to December 31, 1916.

Drainage Area.—209 square miles.

Gage.—Inclined staff gage installed August 9, 1909, at practically the same datum as the inclined staff gage used from 1895 to 1903. It is not known whether the gage used prior to 1895 was located at the present site.

Channel.—Permanent.

Discharge Measurements.—Made from car and cable.

Winter Flow.—Ice causes very little backwater at this station.

Diversions.—There are court decrees for the diversion of 166 second-feet from the St. Vrain and tributaries above the station. Below there are court decrees for 1632 second-feet from St. Vrain Creek and floodwater diversions of 190,000 acre-feet.

Co-operation.—Station maintained in co-operation with the Great Western Sugar Co.

	Dr	ainag	Di Ares	scharge, 108	re of E Equare	loulder Miles.	Creek Altitu	at Oro	iell for B <b>Feet</b>	1916. Above	Sea	Level,	
Da		Jan.	Feb.	-	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	•		1.00.	96	70			370	195	90	31	38	31
2				87	70			265	153	87	31	34	28
3 4		••••••		117 96	62	•		265 285	180 166	70 49	28 31	34 31	26 28
5				94	55 62			305	195	52	31	28	28
6				92	55			305	180	55	31	28	28
7				90	55			285	180	49	24	28	26
8 9		••••••	••••••	87 84	38 62	•••••	•	245 245	195 180	38 34	31 28	26 22	31 26
10				82	87			285	166	38	28	34	24
īĭ				80	62			305	166	49	28	43	26
12				78	96	•		265	166	49	28	45	26
13		••••••	•••••	62	62		•••••	228 210	180	62 78	28 28	47 49	•
14 15				55 55	.49 43			228	166 153	70	43	55	
16				- 55	62			180	140	ŻŎ	31	55	
17				55	62		395	228	140	34	31	62	
18			•	62	70	•••••	395	228	140	43	34	55	•••••
19 20		•••••	•••••••	78 87	70 78		395 370	228 228	140 128	43 38	34 28	43 62	
21				87	70		370	195	117	43	28	55	
22				96	62		245	180	117	38	30	49	
23			••••••	96	87		245	185	117	28	31	49	
24			••••••	96 96	96 106		285 325	190 196	117 114	28 34	32 34	49 49	•
25 26				92	106		370	202	110	34	38	49	
27			117	89	106		348	208	107	38	43	34	
28			87	86	117	•••••	370	213	103	34	43	38	•
29			96	82 78	117 117	••••	395 395	218 223	100 97	38 34	34 38	31 31	•••••
30 31				74	111	••••••	390	228	94	94	34	01	•••••
	rotal			2564	2254		4903	7421	4502	1447	992	1253	328
	an		•••••	82.7	75.1		350	239	145	48.2	32.0	41.8	27.3
Ma	<b>x</b>	••••••		117 55	117 43	•••••		370 180	195 94	90 28	43 24	62 22	•
Act	n re-ft.			5080	4470		9720	14700	8920	2870	1970	2490	650
AC	. 0-10.	••••••											000
						t. Vrai			ons for	r 1915.			•
							- 7444					T1	
	Dr	ainag	e Ares	L, 209	Square	Miles.	Altitu	40, 5,34	l9 Peet				
Da		<b>ainag</b> Jan.	Feb.	•	<b>Square</b> April	Miles. May	Altitu June	July	Aug.	Above Sept.	Oct.	Nov.	Dec.
1		_		•	April 40	<b>May</b> 390	June 390	July 461	Aug. 185	Above Sept. 99	Oct. 138	Nov. 57	15
1 2		Jan.	Feb.	Mar.	April 40 40	May 390 346	June 390 436	July 461 436	Aug. 185 185	Above Sept. 99 91	Oct. 138 118	Nov. 57 57	15 18
1		Jan.	Feb.	Mar.	April 40 40 57	May 390 346 291	June 390 436 390	July 461 436 436	Aug. 185 185 160	Above Sept. 99 91 99	Oct. 138 118 118	Nov. 57	15
1 2 3 4 5		Jan.	Feb.	Mar.	April 40 40 57 63 69	May 390 346 291 274 291	June 390 436 390 390 346	July 461 436 436 390 390	Aug. 185 185 160 160 138	Above Sept. 99 91 99 185 185	Oct. 138 118 118 118 118	Nov. 57 57 57 57 57	15 18 18 22 25
1 2 3 4 5 6		Jan.	Feb.	Mar.	April 40 40 57 63 69 69	May 390 346 291 274 291 308	June 390 436 390 390 346 346	July 461 436 436 390 390 413	Aug. 185 185 160 160 138 138	Above Sept. 99 91 99 185 185 185	Oct. 138 118 118 118 118 99	Nov. 57 57 57 57 57 57	15 18 18 22 25 25
1 2 3 4 5 6 7		Jan.	Feb.	Mar.	April 40 40 57 63 69 69	May 390 346 291 274 291 308 327	June 390 436 390 390 346 346 346	July 461 436 436 390 390 413 346	Aug. 185 185 160 160 138 138	Above Sept. 99 91 99 185 185 138 108	Oct. 138 118 118 118 118 99 99	Nov. 57 57 57 57 57 57 57	15 18 18 22 25 25 25
1 2 3 4 5 6 7 8		Jan.	Feb.	Mar.	April 40 40 57 63 69 69 138 138	May 390 346 291 274 291 308 327 390	June 390 436 390 390 346 346 346 390	July 461 436 436 390 390 413 346 346	Aug. 185 185 160 160 138 138 149 212	Above Sept. 99 91 99 185 185 185	Oct. 138 118 118 118 118 99 99	Nov. 57 57 57 57 57 57	15 18 18 22 25 25 25 30
1 2 3 4 5 6 7		Jan.	Feb.	Mar.	April 40 40 57 63 69 69	May 390 346 291 274 291 308 327	June 390 436 390 390 346 346 346	July 461 436 436 390 390 413 346	Aug. 185 185 160 160 138 138 149 212 242 212	Above Sept. 99 91 99 185 185 138 108 138 160 128	Oct. 138 118 118 118 118 99 99 91 83	Nov. 57 57 57 57 57 57 57 51 57	15 18 22 25 25 25 25 25 25
1 2 3 4 5 6 7 8 9 10 11		Jan.	Feb.	Mar.	April 40 40 57 63 69 138 138 138 118	May 390 346 291 274 291 308 327 390 390 368	June 390 436 390 346 346 346 346 346 346 3670	July 461 436 436 390 413 346 346 327 346 346	Aug. 185 185 160 160 138 138 149 212 212 185	Above Sept. 99 91 99 185 185 138 108 138 160 128 128	Oct. 138 118 118 118 118 99 99 91 83 83	Nov. 57 57 57 57 57 51 51 57 45	15 18 122 25 225 225 225 25 25 25 25 25
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1 2 3 4 5 6 7 8 9 10 11 12 13		Jan.	Feb.	Mar.	April 40 40 57 63 69 69 138 138 118 128 128 138	May 390 346 291 274 291 308 327 390 390 368	June 390 436 390 346 346 346 346 346 346 3670	July 461 436 436 390 413 346 346 327 346 346	Aug. 185 185 160 160 138 138 149 212 212 185	Above Sept. 99 91 99 185 185 138 108 138 160 128 128	Oct. 138 118 118 118 118 99 99 91 83 83	Nov. 57 57 57 57 57 51 51 57 45	15 18 122 25 225 225 225 25 25 25 25 25
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	y	Jan.	Feb.	Mar.	April 40 40 57 63 69 69 138 138 128 138 128 242 242 242 212	May 390 346 291 390 368 346 390 368 346 390 3027 3091 3091	June 390 436 390 346 346 346 390 540 670 540 413 390 346 486 670	July 461 436 4390 390 413 346 346 346 346 327 246 258 274 244	Aug. 185 1860 1388 149 212 212 185 1609 1388 1499 212 212 185 1609 1499 1600	Above Sept. 99 91 185 185 138 108 128 118 128 118 99 99 99	Oct. 138 118 118 118 118 99 99 91 83 69 69 138 118 99	Nov. 57 57 57 57 57 57 57 57 57 45 25 22 35 51 40 45	15 18 18 22 25 25 25 25 25 25 25 25 25 25 25 25
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<b>D</b> 1	scharge of E	t. Vrain	Creek at Lyon	15 for 1916.	
Drainage Area	, 209 Square	Miles.	Altitude, 5,340	Feet Above	Sea Level.

Day		Jan.	Feb.	Mar.		May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	<b></b>				30	138	390	436	308	138	35	83	18
2					25	138	868	390	242	128	35	83	18
3 .			•••••		25	160	346	390	242	118	35	83	22
4 .				•	22	160	346	890	242	118	35	76	25
5.	<b></b> -			•••••	30	212	890	390	227	108	35	69	25
6 .		· · · · · · · · · ·	•	•••••	25	<b>2</b> 12	390	846	212	128	35	63	25
7	<b>.</b>	********			15	242	327	327	212	118	35	51	12
8.	<b></b>			•••••	18	258	327	346	212	108	45	45	12
		•		••••	25	258	890	308	185	99	35/		12
10				30	25	308	413	486	185	118	25	57	12
	<i>-</i>			25	45	291	413	436	172	138	25	57	12
				30	45	308	436	346	185	108	35	18	18
				35	83	327	486	308	185	118	. 30	12	22
			•••••	30	69	846	486	308	212	99	25	25	18
			•••••	35	83	308	436	291	212	99	198	45	18
			•	35	91	274	436	308	212	88	99	51	25
			•	35	99	242	486	274	198	69	108	57	18
	<b>-</b>			40	128	242	513	291	172	69	118	45	18
19			******	40	83	242	540	274	160	57	118	51	18
20				.45	69	461	540	242	160	57	91	51	22
				57	69	513	461	227	160	57	91	35	18
				45	83	390	436	212	149	57	99	45	18
				40	91	327	890	212	118	51	99	35	18
				40	91	274	486	212	118	51	91	35	18
			•	25	118	274	436	227	99	51	83	25	18
				25	118	274	436	212	99	45	91	35	18
	<del></del> -		••••	25	108	242	436	242	118	45	91	35	15
				35	118	242	436	227	99	51	99	15	12
				25	149	149	486	212	99	45	99	18	12
	• <b>-</b>		•	30	188	308	461	291	83	40	99	15	12
31				30		346	*******	486	138	*******	91		10
				757	2118	8466	12823	9647	5415	2571	2230	1365	539
			•••••	34.4	70.6	273	427	311	175	85.7	71.9	45.3	17.4
				••••	149	513	540	486	308	138	198	83	25
Min			•••••		15	138	327	212	83	40	25	12	10
Acr	e-ft.			1500	4200	16800	25400	19100	10800	5100	4420	2700	1070
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# CACHE LA POUDRE RIVER AT MOUTH OF CANON, NEAR FORT COLLINS.

Location.—In sec. 15, T. 8 N., R. 70 W., three miles below the intake of the Fort Collins waterworks, 12 miles above Fort Collins; half a mile above mouth of Lewstone Creek.

Records Available.—March 15, 1884, to October 15, 1901; February 3, 1910, to November 14, 1916.

Drainage Area.—1,060 square miles.

Gage.—An automatic recording gage installed November 30, 1909. No information available concerning the gage used 1884 to 1901.

Channel.—Permanent.

Discharge Measurements.—Made from car and cable.

Winter Flow.—Ice causes backwater during the winter months.

Regulation.—The flow is regulated by the Chambers Lake and Halligan Reservoirs and by ditches diverting water from the headwaters of the Laramie and Grand Rivers and Michigan Creek across the divide.

Diversions.—There are court decrees for the diversion of 614 secondfeet above this station.

#### CACHE LA POUDRE RIVER AT MOUTH.

Location.—About three miles below Greeley and one-half mile above mouth.

Records Available.—March 24, 1903, to October 31, 1903; July 20, 1904, to November 30, 1904; February 1, 1914, to December 11, 1916.

Gage.—The vertical staff gage used since 1914 was replaced April 4, 1916, by a slope gage on the right bank directly opposite the old gage, but reading 2.50 feet lower. A Bristol automatic gage was also installed on this date.

Discharge Measurements.—By wading at low stages and from highway bridge about one mile above at high stages.

Diversions.—Below all diversions on this stream.

Accuracy.—Low water measurements are good, but high water measurements are subject to error on account of poor conditions at the highway bridge.

Co-operation.—During 1916, station was maintained in co-operation with the Colorado Experiment Station.

Discharge of Cache la Foudre River at Mouth of Canon for 1915.

Drainage Area, 1,080 Square Miles. Altitude, 5,070 Feet Above Sea Level.

Day	7	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
• 1						460	1300	1245	255	235	145	90	102
2						350	1660	1245	255	235	115	90	102
3						350	1300	1190	255	278	115	145	130
4						350	1245	1140	255	325	115	198	130
5						350	1190	1090	278	350	115	215	115
6		<b></b>				300	1090	1190	255	325	102	215	102
7		7			145	255	1040	1090	300	325	102	255	102
Ř.					162	255	1090	900	350	325	102	235	80
9					180	235	1190	810	400	350	90	255	90
10		•••••			162	255	1660	855	350	255	90	255	80
īi					145	278	1920	855	300	198	90	255	70
12					145	300	2200	855	300	162	90	215	115
13					180	520	1415	810	278	180	90	235	90
14					255	810	1190	770	278	180	90.	215	80
15					278	730	1300	730	278	180	102	180	
16					350	660	1245	695	300	180	162	145	******
17					350	810	1535	-625	278	180	145	162	
18					400	900	1535	555	255	145	145	130	
19		•••••			400	730	2060	490	300	130	130	102	
20					400	590	2200	490	325	115	130	102	•
21					400	590	1790	460	300	115	130	90	
22				*******	430	460	1790	400	278	115	130	90	
23					460	520	1920	400	255	115	130	80	
24		•••••	*******		460	660	1855	400	255	115	130	80	
25					400	900	1920	375	255	130	130	70	
26					460	990	1790	350	255	235	115	55	•
27			•••••		400	900	1415	350	255	215	115	62	
28					<b>~35</b> 0	810	1300	375	198	180	115	62	
29					350	810	1190	350	180	180	115	62	******
30		*******			520	990	1300	300	198	180	115	90	•••••
31						1190		300	235		102		•••••
1					7782	18308	45635	21690	8509	6233	3592	4435	1388
			·		324	591	1521	700	274	208	116	148	99.1
Ma:	x				520	1190	2200	1245	400	350	162	255	130
Mir	ı				145	235	1040	300	180	115	90	55	70
Acı	re-ft.	•••••			15400	36300	90400	43000	16800	12400	7180	8810	2750

Unless otherwise noted, all discharges are in cubic feet per second.

B.y		Jan.	Feb.		April	Miles May	June	<b>ude, 5,</b> July	Aug.	Sept.		Nov.	Dec
~ <b>,</b>	••••			********	70	358	1720	1300	695	375	145	80	
					70	391	1600	1040	555	350	145	80	
	••••				62	424	1540	1040	490	300	130	90	
••••	••••	•		•••••	62 62	457 490	1660 1990	990 945	695 695-	300 325	115 115	90	
•••••	••••	•••••	••••••	•	62	523	1790	990	590	350	130	80 70	•
•••••					70	555	1540	945	555	350	145	80	
					7Ŏ	625	1480	945	490	400	130	55	
					70	695	1660	945	460	430	115	55	
					80	770	2060	945	460	490	115	80	
		••••	•••••		102	900	1920	945	430	490	115	80	
	•••		•••••	62	115	990	1790	855	350	375	130	102	••••
		•••••	•••••	62	130	1140	1660	730	350	400	115	62 40	
	•••		••••••	55 50	145 162	1140 990	1920 2060	730 730	375 375	375 300	102 102	40	
	•••			40	198	900	2060	810	325	240	102		
				55	180	810	2130	855	325	180	90		
				55	180	770	2130	770	300	145	130	*******	
				62	180	730	1920	660	325	162	145	•••••	
				62	180	810	1540	660	300	162	115		
	•	•••••		62	180	855	1480	590	300	145	130	•••••	
•		•	••••••	55 62	162	855	1540	520	278	115	115		•
•			••••••	70	162 185	810 900	1360 1480	490 490	255 278	115 115	102 102	•	••••
	•••	••••••	••••••	70	208	1040	1600	430	278	130	90	••••••	•
	•••			7Ŏ	231	1190	1600	400	278	145	102		
	···			62	254	1040	1480	400	300	145	102		
				62	277	1140	1480	430	278	145	102	•••••	
•		•••••	••••••	55	300	1190	1480	430	278	162	90	` <b></b>	
••••	•••		•	55	325	1240	1420	555	278	162	80	•••••	••••
			•••••	70	4504	1540	£1000	810	375	#0#O	80	1044	
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¥	••						1700 2130						
X					325	1540	2130	1300	695	490	145		••••
x n re-f	 t. ra	inage	Area,	2370 Lrge of	325 62 8980 f Cach Square	1540 358 52100 te la Pe	2130 1360 101000 pudre B	1300 400 46400 <b>iver at</b> 1 <b>de, 4,6</b>	695 255 24400	490 115 15600 1 for 1 t Abov	145 80 7010 1915. Ve Sea	2070	
e-f	 t. <b>ra</b>	inage Jan.	<b>Disch</b> i <b>Area,</b> Feb.	2370 Lrge of 	325 62 8980 <b>Cach</b> <b>Square</b> April	1540 358 52100 10 la Po May	2130 1360 101000 pudre B Altitu June	1300 400 46400 <b>iver at</b> ide, <b>4,6</b> July	695 255 24400 <b>Mouth</b> <b>84 Fee</b> Aug.	490 115 15600 1 for 1 t Abov Sept.	145 80 7010 1 <b>915.</b> <b>7e Sea</b> Oct.	2070 Level.	Dec
e-f	 t. <b>ra</b>	inage	Dischi Area,	2370 Lrge of Mar.	325 62 8980 <b>Cach</b> <b>Square</b> April 146	1540 358 52100 e la Pe May 122	2130 1360 101000 pudre B Altitu June 41	1300 400 46400 <b>iver at</b> i <b>de, 4,6</b> July 39	695 255 24400 <b>Mouth</b> <b>84 Fee</b> Aug. 70	490 115 15600 for 1 t Abov Sept. 59	145 80 7010 1 <b>915.</b> <b>Ye Sea</b> Oct. 254	2070  Level. Nov. 224	Dec 13
r e-f	 t. <b>ra</b>	inage Jan.	Dischi Area, Feb.	2370 Lrge of 	325 62 8980 <b>Cach</b> <b>Square</b> April	1540 358 52100 10 la Po May	2130 1360 101000 pudre B Altitu June	1300 400 46400 <b>iver at</b> ide, <b>4,6</b> July	695 255 24400 <b>Mouth</b> <b>84 Fee</b> Aug.	490 115 15600 1 for 1 t Abov Sept.	145 80 7010 1 <b>915.</b> <b>7e Sea</b> Oct.	2070 Level.	Dec 13 12
re-f	 Ta	inage Jan.	<b>Disch</b> i <b>Area,</b> Feb.	2370	325 62 8980 <b>Cach</b> <b>Square</b> April 146 138 146 122	1540 358 52100 16 la Pe 16 May 122 134	2130 1360 101000 Dudre B. Altitu June 41 46 57 57	1300 400 46400 <b>iver at</b> ide, 4,6 July 39 41	695 255 24400 <b>Mouth</b> <b>64 Fee</b> Aug. 70 63	490 115 15600 for 1 t Abov Sept. 59 49 49	145 80 7010 1915. 70 Sea Oct. 254 224	2070 Level. Nov. 224 214 224 234	Dec 13 12 12 11
re-f	 Ta	inage Jan.	Dischi Area, Feb.	2370	325 62 8980 <b>Cach</b> Square April 146 138 146 122 122	1540 358 52100 te la Pe May 122 134 110 110	2130 1360 101000 cudre B. Altitr June 41 46 57 57 78	1300 400 46400 <b>iver at</b> 1de, 4,6 July 39 41 39 41 46	695 255 24400 <b>Mouth</b> <b>84 Fee</b> Aug. 70 63 60 57 60	490 115 15600 for 1 t Abov Sept. 59 49 49 49	145 80 7010 1915. Fe Sea Oct. 254 224 205 187 187	2070 Level. Nov. 224 214 224 234 244	Dec 13 12 12 11
xnre-f	 Ta	inage Jan.	Dischi Area, Feb.	2370	325 62 8980 <b>Cach</b> <b>Square</b> April 146 138 146 122 122	1540 358 52100 10 la Po 10 Miles May 122 134 110 110 105 122	2130 1360 101000 Dudre B. Altitr June 41 46 57 57 78 90	1800 400 46400 <b>iver at</b> 1de, 4,6 July 39 41 39 41 46 46	695 255 24400 <b>Mouth</b> 64 <b>Pee</b> Aug. 70 63 60 57 60 54	490 115 15600 <b>for 1</b> <b>t Abov</b> Sept. 59 49 49 49 54	145 80 7010 1915. Fe Sea Oct. 254 224 205 187 187	2070 Level. Nov. 224 214 224 234 244 234	Dec 13 12 12 11
xnre-f	 t.	inage Jan.	Dischi Area, Feb.	2370  Arge of Mar.	325 62 8980 <b>Cach</b> <b>Square</b> April 146 138 146 122 122 108	1540 358 52100 16 la Pe 122 134 110 110 105 122 122	2130 1360 101000 Dudre B. Altitu June 41 46 57 57 78 90 127	1300 400 46400 <b>iver at</b> 1de, 4,6 July 39 41 39 41 46 46 41	695 255 24400 <b>Mouth</b> <b>84 Fee</b> Aug. 70 63 60 57 60 54 51	490 115 15600 1 for 1 4 Abov Sept. 59 49 49 49 54 49	145 80 7010 1915. Fe Sea Oct. 254 224 205 187 187 205	2070  Level. Nov. 224 214 224 234 234 234 205	Dec 13 12 12 11
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y	 <b>Pra</b>	inage	Dischi Area, Feb.	2370	325 62 8980 <b>Cach</b> <b>Square</b> April 146 138 146 122 108 146 138 138 122 214 214 201 212	1540 358 52100 10 la Pc 122 134 110 110 122 122 116 105 100 100 95 90 122	2130 1360 101000 Dudre R. Altitu June 46 57 78 90 127 154 140 140 202 325 154 78	1300 46400 1ver at 1de, 4,6 July 39 41 46 46 41 41 41 41 41 41 44 41 44	695 24400 <b>Mouth 84 Pee</b> Aug. 70 60 57 60 54 51 41 41 41 44 41 44	490 1115 150 15 15 15 15 15 15 15 15 15 15 15 15 15	145 80 7010 1915. Ye Sea Oct. 254 224 2205 187 187 187 187 187 187 187 187 187 187	2070  Level. Nov. 224 214 234 205 196 187 196 187 170 170 154	Dec 13 12 12 11 11 11
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x	 <b>Pra</b>	inage	Dischi Area, Feb.	2370 Arge of	\$\frac{325}{62}\$ \$980  Clack  Square  April 148 146 122 108 138 138 122 154 205 102 102 102	1540 358 52100 May 122 134 110 110 1105 122 122 122 116 105 105 100 100 100 100 100 100 100 100	2130 1360 101000 Dudre R. Altitu June 46 57 78 90 127 140 140 202 2325 154 78 84 44	1300 46400 1400 1400 1400 1400 1400 1400 1	695 2450 2450 Mouth 64 Pec 63 60 57 60 541 411 411 414 414 414 414 414 414 414	490 1115 150 150 1 <b>for 1</b> <b>t Abov</b> Sept. Sept. 549 49 49 54 49 54 49 54 59 65 65 689 108 977	145 7010 7010 1915. 70 Sea Oct. 254 205 187 187 1205 187 205 187 205 187 378 378 368	2070  Level. Nov. 224 224 234 234 234 234 234 234 234 234	Dec 13 12 12 11 11 11 11 11 11 11 11 11 11 11
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TO TO THE STATE OF	T	inage Jan.	Dischi Area, Feb.	2370  Arge on 1  Mar.  138 146 138 146 146 146 146 146 146 146	325 8980 C Cach Square April 146 122 102 108 138 138 124 214 205 777 89 108 214 205	1540 358 52100 1 1a P 12110 110 1105 122 116 100 100 90 100 259 100 259 100 259 100 259 100 259 100 259 100 259 100 259 100 259 259 259 259 259 259 259 259 259 259	2130 1360 101000 Dudre R. June 46 57 78 90 127 154 147 140 140 202 325 154 44 44 48 54 54 63	1300 46400 1400 1400 1400 1400 1400 1400 1	695 2450 uthe 2550 uthe 40 uthe 60 560 560 560 560 560 560 560 560 560 5	490 1115 150 PO 150 PO	145 7010 1915. Sea. 2544 2057 1877 1875 1205 1877 1205 1877 1205 1877 1205 1205 1205 1205 1205 1205 1205 1205	2070  Level. Nov. 224 214 224 2344 237 196 187 170 170 170 170 170 170 170 170 170 17	Dec 13 12 12 11 11 11
yy	T	Jaq.	Dischi Area, Feb.	2370 Mar.  Mar.  138 146 146 148 138	325 628 8980 C Cach Square April 146 122 108 146 122 108 146 122 108 146 122 108 146 122 108 146 122 108 146 122 108 122 108 122 108 122 108 122 108 122 108 122 108 122 108 122 108 122 108 108 108 108 108 108 108 108 108 108	1540 358 52100 May 122 134 110 110 1105 122 122 122 122 126 105 100 100 100 127 105 105 100 100 129 147 105 105 105 105 105 105 105 105 105 105	2130 1360 101000 Dudre Ta. Altitude June 46 57 78 90 127 147 140 140 202 325 154 41 44 48 54 63 57 46	1300 46400 46400 Iver at 108, 4,6 39 411 39 416 46 41 411 411 416 441 411 416 46 46 46 46 46 46 46 46 46 46 46 46 46	695 2450 2450 2550 2440 260 260 260 260 260 260 260 260 260 26	190 1105 1105 1105 1105 1105 1105 1105 1	145 7010 7015. Fe Sea. 2245 2205 1887 1887 1887 1887 1887 1887 2057 1887 2057 1887 2057 1887 2444 2444 2444 2444 2444	2070  Level. Nov. 214 224 234 2344 2305 1967 1700 1700 1700 1700 1700 1770 162 162 164	Dec 13 12 12 11 11 11
y 	T	Jaq.	Dischi Area, Feb.	2370  Mar.  138 146 138 146 138 146 138 146 138 146 138 146 138 146 138	325 8980 C Cach Square April 146 122 108 138 138 122 102 102 102 102 102 102 102 102 102	1540 3583 52100 1a P 12110 110 1105 1222 116 1000 1000 95 900 1022 1475 1000 259 259 194 664 484 444	2130 1360 101000 Dudre R. June 46 57 78 90 127 154 140 140 202 325 154 44 44 48 54 54 63 57 46	1300 46400 46400 Iver at 39 41 39 41 46 46 41 41 41 41 41 41 41 41 41 41 41 41 41	69550 440 <b>Pe.</b> 763 607 564111 441 441 441 441 441 441 441 441 44	190 1115 115 115 115 115 115 115 115 115 1	145 7010 1015. 1915. 1915. 1915. 1915. 1916. 1916. 1917. 191	2070 Level. Nov. 224 224 2344 2345 196 1870 170 170 170 170 170 170 170 170 170 1	Dec 13 12 12 11 11 11
TO T		Jan.	Dischi Area, Feb.	2370 Mar.  Mar.  138 146 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138	325 8980 C Cach Square April 148 146 122 108 138 138 122 102 102 102 102 102 108 214 205 214 205 214 205 214 205 214 205 214 205 214 214 215 214 216 217 217 218 218 218 218 218 218 218 218 218 218	1540 358 52100 May 122 134 110 105 122 116 105 100 100 90 100 259 362 374 399 194 860 54 444 444	2130 1360 101000 Dudre R	1300 46400 1400 1400 1400 1400 1400 1400 1	69550 440 <b>Pe.</b>	1150 1150 1150 1150 1150 1150 1150 1150	145 7010 1015. 1915. 1915. 1915. 1915. 1915. 1915. 1915. 1915. 1916. 1917. 191	2070  Level. Nov. 2244 2344 2344 2345 1966 1877 1700 1548 1871 1700 1700 1700 1700 1700 1708 1871 1700 1708 1871 1700 1708 1871 1700 1708 1871 1708 1871 1708 1871 1708 1871 1708 1871 1708 1871 1708 1871 1708 1871 1708 1871 1708 1871 1708 1871 1708 1871 1871	Dec 133 12 12 12 11 11 11 11 11 11 11 11 11 11
y y		Jaq.	Dischi Area, Feb.	2370 Mar.  Mar.  138 146 146 122 130 146 1230 146 1286	325 628 8980 C Cach Square April 148 146 122 108 148 138 138 138 122 104 205 102 108 102 108 108 112 205 102 108 108 108 108 108 108 108 108 108 108	1540 358 52100 May 122 134 110 110 1105 122 122 122 122 122 123 105 100 95 100 100 123 147 105 105 105 105 105 105 105 105 105 105	2130 1360 101000 Dudre Ta. Altitude June 46 57 78 90 127 147 140 140 140 202 325 154 41 44 48 54 63 57 46 63 57 46 63 57 46 63 54 63 54 63 54 63 54 63 54 64 64 64 64 64 64 64 64 64 6	1300 46400 46400 1ver at 39 411 39 411 411 416 44 411 411 416 44 41 411 41	695 2450 <b>vto</b> 2550 <b>vto</b> 2440 <b>vto</b> 60765411 411441 4411441 4411441 3894214461 138511464 113855 11464113855 177	190 1115 115 115 115 115 115 115 115 115 1	145 7010 1015. 90 Set. 4422057 1222057	2070  Level. Nov. 214 224 234 2344 2305 1967 1700 1700 1700 1700 1700 1700 1700 17	Dec 133 122 121 121 121 121 121 121 121 121
Total	ra.	Jan.	Dischi Area, Feb.	2370 Mar.  Mar.  138 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138 146 138	325 8980 C Cach Square April 146 122 108 138 146 138 122 102 214 205 214 205 216 239 277 89 214 239 277 122 239 277 122 243 244 244 244 244 244 244 244 244 2	1540 358 52100 110 110 110 110 110 110 105 122 116 100 100 90 100 259 259 147 100 259 259 194 86 60 548 444 444 441 4236	2130 1360 101000 Dudre R. June 46 57 78 90 127 154 140 140 202 325 154 44 44 48 54 63 57 63 63 64 63 63 64 63 64 64 64 64 64 64 64 64 64 64 64 64 64	1300 46400 1400 1400 1400 1400 1400 1400 1	62550 uthe 7630607060706070607060706070607060706070	490 1115 15 OF TOTAL SEPTEMBER OF THE SE	1450 70 15. ea	2070 Level. Nov. 224 224 224 2344 236 186 1870 170 170 170 170 170 170 170 170 178 162 154 138 138 5483	Dec 133 12 12 11 11 11 11 11 11 11 11 11 11 11
y 	t.	Jan.	Dischi Area, Feb.	2370 Mar.  Mar.  138 146 146 122 130 146 1230 146 1286	325 628 8980 C Cach Square April 148 146 122 108 148 138 138 138 122 104 205 102 108 102 108 108 112 205 102 108 108 108 108 108 108 108 108 108 108	1540 358 52100 May 122 134 110 110 1105 122 122 122 122 122 123 105 100 95 100 100 123 147 105 105 105 105 105 105 105 105 105 105	2130 1360 101000 Dudre Ta. Altitude June 46 57 78 90 127 147 140 140 140 202 325 154 41 44 48 54 63 57 46 63 57 46 63 57 46 63 54 63 54 63 54 63 54 63 54 64 64 64 64 64 64 64 64 64 6	1300 46400 46400 1ver at 39 411 39 411 411 416 44 411 411 416 44 41 411 41	695 2450 <b>vto</b> 2550 <b>vto</b> 2440 <b>vto</b> 60765411 411441 4411441 4411441 3894214461 138511464 113855 11464113855 177	190 1115 115 115 115 115 115 115 115 115 1	145 7010 1015. 90 Set. 4422057 1222057	2070  Level. Nov. 214 224 234 2344 2305 1967 1700 1700 1700 1700 1700 1700 1700 17	Dec   18   18   18   18   18   18   18   1

Discharge of Cache la Poudre River at Mouth for 1916.

Drainage Area, ....... Square Miles. Altitude, 4,664 Feet Above Sea Level.

D۶	ıy	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		••••	• • • • • • • • • • • • • • • • • • • •			34	· 40	46	306	40	123	172	158
2						32	58	46	194	46	116	172	158
3	•••••	••••				32	52	40	165	46	95	172	158
4			•••••		123	34	52	40	144	40	95	172	158
5	•••••				116	32	55	40	130	40	95	172	158
6				<b>-</b>	102	32	59	37	. 123	40	109	1,65	144
7				,	102	32	62	34	123	40	144	158	130
8	••				95	34	66	37	70	40	179	165	123
9	•••••	•••••	•••••		95	34	70	37	46	40	194	165	130
10				·····	88	34	74	46	46	46	202	165	130
11	******		,		88	34	78	70	40	52	194	165	123
12					82	34	82	95	40	52	179	151	128
13	•	•••••			82	37	130	58	46	. 58	172	130	123
14	·	•••••			82	70	82	46	40	64	165	144	116,
15					82	88	70	40	40	76	297	158	116
16					76	70	82	40	37	64	297	151	123
17					88	64	95	40	46	64	234	165	123
18					151	52	151	40	46	88	218	172	130
19				<b>-</b>	151	40	210	40	40	109	210	172	137
20					130	52	165	37	87	102	7202	172	137
21	••••				116	202	137	37	52	102	202	165	180
22					109	562	137	37	40	95	202	158	130
23					116	361	130	37	40	95	202	158	137
24		<b>.</b>			88	234	144	37	40	95	210	179	137
25					52	179	137	37	40	95	210	172	137
26					37	144	151	37	40	95	210	158	123
27					32	102	151	37	46	95	210	165	102
28					32	88	151	37	40	102	202	165	130
29	•••••				32	82	130	37	40	123	194	158	130
30					32	64	76	165	40	116	186	158	130
31					•••••	46	•••••	400	46		172		137
	Total				2379	2935	3077	1807	2223	2160	5720	4894	4121
	an				88.1	94.7	108	58.3	71.7	72.0	184	163	158
Ma	.x					562	210	400	306	123	297	179	102
Mi			*******			32	40	34	37	40	95	130	
	re-ft.				4720	5820	6130	3580	4410	4280	11300	9700	8180
								-300				• •	

# NORTH PLATTE RIVER NEAR NORTH GATE, COLO.

Location.—In sec. 11, T. 11 N., R. 80 W., at highway bridge on Interstate Highway, 6 miles south of Colorado-Wyoming line and 6 miles northwest of North Gate, in Jackson County. Three small tributaries, Camp, Three-Mile, and Six-Mile Creeks, enter North Platte between station and state line. These have very little flow except spring run-off.

Drainage Area.—1,440 square miles.

Records Available.—May 23, 1915, to November 8, 1916.

Gage.—Vertical staff located at downstream side of center pier.

Discharge Measurements.—Made from two-span bridge during high water, and by wading at low stages.

Channel and Control.—Channel composed of sand, gravel, and small boulders; control located 200 feet downstream at small rapids which shift slightly. Banks not liable to overflow.

Ice.—Discharge relation seriously affected by ice; observations dis-

continued during winter months.

Diversions.—There are court decrees for diversions of 3,060 second-feet from the North Platte and tributaries in Colorado.

Regulation.—None.

Accuracy.—Results excellent.

Co-operation.—Station maintained by the United States Geological Survey, from whom records were obtained.

#### LARAMIE RIVER AT GLENDEVEY.

Location.—At highway bridge one-eighth mile west of Glendevey in sec. 36, T. 10 N., R. 76 W., in the Medicine Bow National Forest; Mc-Intyre Creek enters a short distance below and Nunn Creek above.

Records Available.—June 24, 1904, to October 31, 1905; August 18, 1910, to October 17, 1916.

Drainage Area.—102 square miles.

Gage.—Automatic gage installed by the State Engineer November 17, 1910, replaced vertical staff previously used. The datum of the gages has remained constant.

Channel.—Permanent.

Discharge Measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter Flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 65 second-feet from Laramie River above the station and for 749 second-feet from tributaries entering above. Of this latter amount 688 second-feet are for diversion into the Cache la Poudre basin.

Accuracy.—Conditions are favorable for excellent results, and the estimates should be reliable.

Discharge of North Flatte River near North Gate for 1915.

Drainage Area, 1,440 Square Miles. Altitude, 7,600 Feet Above Sea Level.

Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		******	******		•••••	•••••	785	710	187	115	179	160	
2	*******		******			·····	985	635	187	107		156	•••••
8	•••••	••••				······	785	635	187	117	164	152	
4	•••••	•••••				•••••	1020	710	187	117	164	160	•••••
5	•••••		•••••	•	•••••	•	945	672	187	156	206	160	
6	•••••	•••••	•	•••••		•	945	598	148	153	216	160	
7	•••••			•••••	••••••	••••••	905 865	560 522	187 187	139 157	206 179	158 179	•
9	•••••		*******	•••••	•••••	•	710	485	290	201	175	197	•••••
10			•	•••••	•••••••		748	522	290	168	179	183	
11		•••••	••••••	•••••			905	382	235	139	175	197	•
12		•••••	•			•••••	945	320	187	129	206	221	•
12			•••••	••••		•••••	1020	350	187	183	221	221	
14	•	•					945	320	187	187	206	*******	•
15				••••••			785	320	187	201	221	*******	•••••
16						*******	672	350	187	187	257		
17							635	290	192	171	326		
Ī8							710	290	171	160	320		
19	•••••						985	235	156	164	262		
20							1260	235	197	136	246		•••••
21					·····		1180	187	179	136	225	******	•
22	•••••		•••••	•••••		•••••	1060	187	148	142	211		
23	******	••••	•••••		•	485	1020	148	168	129	201	•••••	•••••
24	•••••	•		•••••	••	415	1060	187	164	120	197		•••••
25	•••••		•••••	•••••	······	415	1020	187	225	123	187	*******	•
26	•••••	•	•••••	•••••		320	1020	211	197	183	179	•••••	•••••
27	********		•••••		••••••	382	945	285	164	274	175	•••••	•••••
28 29		•••••	••••••	•••••	••••••	485 485	865 785	235 235	148 123	284 268	179 171	•••••	
30		•		•••••	•••••	415	710	235	117	230	175	•••••	•••••
21		•	•••••		•	450		211	112		168	•••••	
	tal		•	•••••	••••••	3852	27220	11399	5668	4976	6340	2077	•
	an		•••••••	*******	••••••	428	907	368	183	166	205	178	********
	AX					,	1260	719	290	284	326	221	••••••
	n					/	635	148	112	107	164	152	
	re-ft.		********			7640	54000	22600	11300	9880	12600	4120	•••••
	Unl	ess ot	herwis	e note	d, all	discha	rges ar	e in cu	ibic fe	et per	secon	đ.	

		-				<b>m</b> 1-44-	<b>-</b>			-4- 4-	- 1010		
	Diai	nage	Area,	1,440	north : erange	Platte : Miles.	Altit	10ar M 1de, 7,6	orth G 800 Pe	ste Io st Abo	Ae Bei L Tatr	Leve	L
Da	y	Jan.	Feb.	Mar	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					_	1200	1100	1040	719	381	260	298	
2		•••••	••••••			995	1150	995	678	824	269	260	•••••
3		•••••	•••••	•		1040 850	1100 1100	945 898	678 678	279 260	293 303	274 274	••••
3						898	1200	805	719	250	324	269	••••••
`6						1040	1260	719	760	246	324	223	
7						1260	1320	719	898	250	324	186	
8	•••••		••••••	•••••	•••••	1380	1200	678	898	241	329	180	
9 10		•••••				1620	1200	678	850	228 352	381 387	•••••	•••••
11	••••••		••••••		640 898	1860 1980	1380 1620	760 898	850 850	532	358		
12				· •	4040	1740	1860	760	850	532	342	••••••	
13					005	1440	1740	690	898	468	324		•••••
14	•••••				805	1500	1860	602	898	408	298		
15			•	•••••	760	1500	1860	602	53 <b>2</b>	824	829		
16 17			•••••	•••••	850	1320	1860	678	500	324	342 329	•••••	••••••
18			••••••		0.45	1200 1040	1860 1980	602 602	500 468	298 279	324	•••••	
19			••••••	********	4000	898	1980	602	408	269	308		
20					000	898	1980	567	381	250	308		
21					0.00	1200	1860	582	352	246	324		···/
22						1440	1740	500	352	241	438	•	•••••
23	•					1500	1380	468	324	246	462	•••••	•••••
24		•				1150	1150	438	298	265	432	•	•••••
25 26		•			1000	805 805	1150 1150	381 408	298 293	280 285	352 352	••••••	•
27			••-		1 2 4 4	898.	1150	468	293 293	288 288	342		
28			*******		4 - 4 -	805	1150	532	293	288	319		
29					4010	898	1150	602	293	288	303	•••••	
30	••••••				1740	945	1100	678	298	288	298		
31	m - 4 - 3		•••••			1040		719	852	******	298	1004	
		•••••				37145	43590	20516	17449	9210 307	10376 835	1964	*******
			•••••	•	1050 1740	1200 1980	1450 1980	662 1040	563 898	582	462	•••••	••••••
	n			••••••		805	1100	381	298	241	260		
						73800	86300	40700		18300			
			Disc	harra	of La	ramie I	River a	t Glan	dever	for 19	15.		
	Dı	rainac		_		ramie I			-			Leval.	
			re Are	a, 102	Square	Miles.	Altiti	ıde,	Pee	Abov	• Sea		<b>D</b>
Da		<b>raina</b> Jan.	<b>Feb.</b>	<b>Mar</b>	<b>Square</b> April	Miles. May	Altitu June	ıde,	Fee	Sept.	Oct.	Nov.	Dec.
1		Jan.	Feb.	Mar.	Square April	May 66	Altitu June 498	July 172	Fee Aug. 33	<b>Abov</b> Sept. <b>3</b> 3	o <b>Sea</b> Oct. 48	Nov. 33	Dec.
			<b>Feb.</b>	<b>Mar</b>	Square April	Miles. May	June 498 521 242	ıde,	Fee	Sept.	Oct.	Nov.	Dec.
1 2		Jan.	Feb.	Mar.	Square April	May 66 66	June 498 521 242	July 172 156	Fee Aug. 33 33	Sept. 33 33	Oct. 48 48	Nov. 33 26 26 19	
1 2 3 4 5		Jan.	Feb.	Mar.	Square April	May 66 66 66 66 66	<b>Altitu</b> June 498 521 242 261 242	July 172 156 140 140 126	Aug. 33 33 33 48	Sept. 33 33 40 57	Oct. 48 48 48 40 40	Nov. 33 26 26 19	
1 2 3		Jan.	Feb.	Mar	Square April	May 66 66 66 66 57	June 498 521 242 261 242 242	July 172 156 140 140 126 112	Aug. 33 33 38 38 48 40	Sept. 33 33 40 57 48 33	Oct. 48 48 48 40 40	Nov. 33 26 26 19 19	
1 2 3 4 5		Jan.	Feb.	Mar.	Square April	May 66 66 66 66 57 57 57	June 498 521 242 261 242 242 206	July 172 156 140 140 126 112	Aug. 38 38 38 48 40 38	Sept. 33 33 40 57 48 33 33	Oct. 48 48 48 40 40 33	Nov. 33 26 26 19 19 19	
1 2 3 4 5 6 7 8		Jan.	Feb.	Mar.	Square April	May 66 66 66 66 57 57 57	June 498 521 242 261 242 242 206 242	July 172 156 140 126 112 112	Aug. 38 38 38 48 40 38 57	Sept. 33 33 40 57 48 33 33 33	Oct. 48 48 48 40 40 43 33 33	Nov. 33 26 26 19 19 19	
1 2 3 4 5 6 7 8 9		Jan.	Feb.	Mar.	Square April	May 66 66 66 66 57 57 57 57	June 498 521 242 261 2442 206 242 261	July 172 156 140 140 126 112 112 100 87	Aug. 38 38 38 48 40 38	Sept. 33 33 40 57 48 33 33 33 33	Oct. 48 48 48 40 40 33 33 33	Nov. 33 26 26 19 19 19 19	
1 2 3 4 5 6 7 8		Jan.	Feb.	Mar.	Square April	May 66 66 66 66 57 57 57	June 498 521 242 261 242 242 206 242	July 172 156 140 126 112 112	Aug. 33 33 38 48 40 38 57	Sept. 33 33 40 57 48 33 33 33	Oct. 48 48 48 40 40 43 33 33	Nov. 33 26 26 19 19 19	
1 2 3 4 5 6 7 8 9 10 11 12		Jan.	Feb.	Mar	Square April	May 66 66 66 66 57 57 57 66 100 140	June 498 521 242 261 242 206 242 261 320 320 406	July 172 156 140 140 126 112 100 87 87 87	Aug. 33 33 33 33 48 40 38 57 57 48 48	Sept. 33 33 40 57 48 33 33 33 48	Oct. 48 48 48 40 40 40 33 33 33 33 33 48	Nov. 33 26 29 19 19 19 19	
1 2 3 4 5 6 7 8 9 10 11 12 -		Jan.	Feb.	Mar	Square . April	May 66 66 66 66 66 67 57 57 57 66 100 149 261	June 498 521 242 261 242 206 242 261 320 363 406 242	July 172 156 140 126 112 112 100 87 87 87	Aug. 33 33 33 48 40 38 57 57 48 48 48 40	Sept. 333 40 57 48 333 333 40 48 48	Oct. 48 48 49 40 40 33 33 33 33 48 48	Nov. 33 26 26 19 19 19 19 19 40 48	
12345678910111 112-134		Jan.	Feb.	Mar	Square . April	May 66 66 66 57 57 57 66 100 140 189 261 300	June 498 521 242 242 242 242 261 320 363 406 242 206	July 172 156 140 140 122 112 112 112 100 87 87 87 100 100	Aug. 33 33 33 33 33 33 33 33 33 33 33 33 33	Sept. 33 33 40 57 48 48 40	Oct. 48 48 48 40 40 33 33 33 33 48 48 33	Nov. 33 26 26 19 19 19 19 19 33 44 48	
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Discharge	of	Laramie	River	at	Glendevey	for	1916.
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Da	У	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1						114	360	180	70	42	60		
2					<b>.</b>	102	824	166	70	36	60		
3						80	324	152	80	42	60		
4						80	360	126	80	42	60		
5						114	378	139	80	31	70		
6						166	342	114	80	36	80		
7		/				223	306	114	80	31	80		
8						238	324	114	80	31	86		
9						223	378	102	80	42	42		
10						208	397	102	80	102	51		
11					60	208	378	91	80	60	42		
12					51	208	378	91	60	70	36		
13					51	194	378	80	42	60	36		
14				•	. 42	194	342	80	42	51	36		
15					51	194	289	80	42	42	42		
16					42	180	272	80	51	36	42		
17					51	152	289	80	70	31	42		
18					60	139	289	8ŏ	ŻŎ	31			
19			•••••	•••••	60	152	289	80	51	36	•••••	********	
20		*******			42	194	255	80	42	31	••••••	*********	••••
21					51	208	255	80	42	36			
22					60	194	208	80	36	42			•••••
23					70	180	180	80	36	42			•
24					80	238	180	80	36	51			•••••
25	••••••				102	25.2	180	80	36	42	•		
26	•••••		•••••	••••••	126	255	180	80	42	36	•	•••••	<b>*</b>
27	••••••			•	139	238	180	80	51	31	•		•
28		•••••		••••••	166	289	166	80	42	42	•		
29		••••	•••••••		180	306	208	80	31	60	•••••		
30		•••••	•••••	•••••	139	360	208	60	42	60	••••		
31		••••••			199	378	408	60	60	60	•••••		
	rotal		•••••	•••••	1623	6261	8597	2971	1784	1325	875		
		••••••	•••••	•••••		202						•	•
	an	••••••		•••••	81.2	378	287 397	95.8 180	57.5 80	44.2 102	51.5	••••••	•
	n	•	······	•	••••••				31		•••••	••••••	
			•	••••••	3220	19400	166	60		31	1740	•	
AC	re-ft.	•				12400	17100	5890	3540	2630	1740	•	•
	Unle	ess oth	erwise	noted	. all d	lischar	res are	in cubi	c feet	per sec	cond.		

# LARAMIE RIVER NEAR JELM, WYO.

Location.—At highway bridge in sec. 15, T. 12 N., R. 77 W., 4 miles south of Jelm postoffice, one-fourth mile below the Colorado-Wyoming line.

Records Available.—May 7, 1911, to November 19, 1916. From June 22, 1904, to October 31, 1905, a station was maintained at Decker's ranch, half a mile south of the state line. The records at the two stations are practically comparable as there are no tributaries nor diversions of any amount between.

Drainage Area.—293 square miles.

Gage.—In 1911 an automatic recording gage was installed. This is referred to the same datum as the vertical staff used at first.

Channel.—Practically permanent.

Discharge Measurements.—Made from bridge.

Winter Flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Between this station and that at Glendevey, Colo., there are court decrees for diversions of 236 second-feet from Laramie River and 204 second-feet from intervening tributaries. These diversions are all in Colorado.

Accuracy.—Conditions are favorable for accurate results, and the estimates should be excellent.

	Disc	oharge ainas	of La	ramie , 293 i	River Square	at Bos Miles.	well's : Altitu	Ranch de,	near J Feet	elm, W	yo., fo	or 1915 <b>Leve</b> l	<b>5.</b>
Da		Jan.	Feb.	-	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1						350	839	231	67	49	. 88	58	••
2		•••••		•••••	•	198 150	984 578	231 231	67 67	49 67	88 78	58 67	
3						136	516	250	78	78	67	67	
5					******	136	488	198	67	67	67	67	
6		•••••		•		110	488		67	58	58 49	67 67	••••••
7		•		•		110 110	459 459	182 165	78 88	49 67	67	67	•••••
8						136	459	182	88	78	67	67	
10						198	578	165	78	67	49	67	
11	•	•••••	••	••••••		214	646	165	67	49	49	67	•
12		•••••	- <del>:</del>	•		309 404	682 547	150 123	67 78	49 58	49 58	67 88	
13 14				····· <del>/</del> ·		547	432	110	88	58	. 58	78	
15				7		432	459	110	88	67	67	88	•
16				••		459	432	123	88	67	67	99	
17			••		•••••	488 432	488 459	99 78	78 67	67 67	67 78	. 99	
18 19		•	4	••••••		330	350	78	78	49	. 78	110	
20					136	289	547	78	88	49	78		
21					150	269	350	78	88	41	88	•	
22			•		182	269	377	78	78	49 58	88 99	•	
23 24		•••••		*******	165 165	309 309	404 488	78 88	67 67	58	88		
2 <del>4</del> 25					150	830	459	67	67	67	67		
26			••-		165	350	269	67	67	99	58		·
27	•	••••••		•	165	377	309	67	78	. 78 78	58		
28			•••••	•	198 214	289 377	269 250	67 78	67 58	78	58 67		
29 30					488	488	250	78	49	88	67		
31						516		78	49				***
	otal				2178	9421	14315	3987	2267	1903	2132	1436	
Me	an		•		198 488	304 547	477 984	129 250	73.1 88	63.4 99	68.8 99	75.6 110	
Ma	x n				136	110	250	67	49	41	49	58	
	e-ft.					18700	28400	7930	4490	3770	4230	2850	
									_				_
	Disc	Se were											
		merg o	OI TH	ramie	RIVOT BIVOT	Miles	Well'S	Banch	near J	elm, V	770., 1	or 191 Tevel	<b>5.</b>
D	· Dı	rainag	o Ares	., 293 1	Square	Miles.	Altitu	ide,	Peet	<b>A</b> bo▼	e Sea	Level.	_
Da:	' <b>D</b> 1	Jan.	Feb.	<b>, 293 1</b> Mar.	<b>Square</b> April	Miles. May	Altitu June 1050	July	near J Feet Aug. 145	Sept.	<b>Vyo., 1</b> • Sea. Oct. 80	Level. Nov.	Dec.
Da:	y 	rainag	o Ares	., 293 1	Square	May 185 185	June 1050 990	July 330 310	Aug. 145 110	Sept. 90 70	Oct. 80 100	Nov.	_
1	y 	Jan.	Feb.	Mar. 	April 80 80 80	May 185 185 170	June 1050 990 880	July 330 310 250	Aug. 145 110 110	Sept. 90 70 60	Oct. 80 100 110	Nov.	Dec.
. 2	y 	Jan.	Feb.	Mar.	April 80 80 80 80 60	May 185 185 170 200	June 1050 990 880 930	July 330 310 250 215	Aug. 145 110 110 110	Sept. 90 70 60	Oct. 80 100 110 110	Nov.	Dec.
1 2 3 4 5	y 	Jan.	Feb.	Mar.	April 80 80 80 80 60	May 185 185 170 200 215	June 1050 990 880 930 1050	July 330 310 250 215 215	Aug. 145 110 110 110 120	Sept. 90 70 60	Oct. 80 100 110	Nov.	Dec.
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# YAMPA AND WHITE DRAINAGES

# YAMPA RIVER AT YAMPA.

Location.—On the bridge connecting the town of Yampa with the Denver and Salt Lake Railroad station.

Records Available.—May 17, 1910, to December 6, 1915.

Drainage Area.—52 square miles.

Gage.—Chain gage.

Channel.—Shifting during high water.

Discharge Measurements.—Made from the highway bridge.

Winter Flow.—Ice causes backwater and the records are discontinued during the winter months.

Diversions.—There are court decrees for diversions of 258 second-feet from the headwater streams above Yampa.

### YAMPA RIVER AT STEAMBOAT SPRINGS.

Location.—This station was moved from the lower steel bridge to the Fifth Street bridge at Steamboat Springs on April 26, 1915. It is about one-quarter mile below Spring Creek and one-half mile above Soda Creek.

Records Available.—May 3, 1904, to October 31, 1906; March 1, 1910, to November 30, 1916.

Drainage Area.—500 square miles.

Gage.—Automatic recording gage and vertical staff gage.

Channel.—Practically permanent.

Discharge Measurements.—Made from highway bridge.

Winter Flow.—Hot springs above keep the river practically open

during the winter months.

Diversions.—There are court decrees for diversions of 115 second-feet from the Yampa River between Yampa and Steamboat Springs, and diversions of 231 second-feet from intervening tributaries. There are decrees for 258 second-feet above Yampa.

# YAMPA RIVER AT CRAIG.

Location.—One mile south of Craig on steel bridge on road to Hamilton, Colo., a short distance below the mouth of Fortification Creek, the nearest tributary.

Records Available.—May 25, 1901, to September 4, 1902; April 30,

1904, to October 31, 1906; April 1, 1910, to November 13, 1916.

Drainage Area.—1,730 square miles.

Gage.—Chain gage.

Channel.—Slightly shifting.

Discharge Measurements.—Made from highway bridge.

Diversions.—There are court decrees for diversions of 238 second-feet from Yampa River between this station and Steamboat Springs, and 411 second-feet from intervening tributaries exclusive of a conditional decree for 587 second-feet from the North Fork of Elkhead Creek.

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		D	ischar	ge of	Yampı	<b>River</b>							
	D	rainag	e Area	, 500	Square	Miles.	Altitu	de, 6,61	D Pee	* Abov	· 50&	Level.	
Da	y	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	<b>-</b>					922	2570	840	270	140	100	155	•
2				÷	405	965	2410	725	230	140	125	155	
3					405 380	880 880	2260 2650	585 405	190 810	140 140	172 155	172 172	
5					310	1010	2730	380	310	125	140	172	
6					346	1250	2490	355	380	155	210	172	
7					382	1700	2260	355	460	125	250	172	
8					418	1900	2410	380	832	112	250	155	
9			•••••		454	2040	2820	355	380	140	250	155	
10					490	2260	2980	355	380	880	250	155	
11			•	•	552	2110	2570	405	270	250	250 245	155 12 <b>5</b>	•
12 13			••••••	••••••	655 800	2110 2040	2570 2650	332 270	210 230	210 172	245	125	
14				270	922	1700	2490	250	332	140	245	125	
15				250	1010	1350	2410	230	270	125	245	125	
16				310	1100	1100	2410	210	230	125	240	112	
17			*******	405	1200	1010	2340	230	355	112	240	112	
18				490	1150	922	2260	250	290	112	240	140	
19				520	1100	965	2110	280	250	125	235	125	•
20	•			690	840	1100	1970	190	210	125	235	125	
21		· ·······	<b>-</b>	762	840	1850	1700	155	210	140 172	235 235	125 140	•
22		·		690	1060	1350	1400 1250	125 155	210 172	190	230	112	
23 24		• •	•	1100 880	1150 1200	1250 1350	1200	190	190	210	210	112	
25				490	1350	1700	1100	155	190	172	210	112	
26				332	1400	1700	1060	140	190	- 140	210	112	
27				355	1520	1520	880	172	210	125	210	112	
28			•••••	460	1640	1700	840	310		112	230	112	•
29				490	1640	1760	800	250	172	112	172	112	·····
30		• • • • • • • • • • • • • • • • • • • •	•••••	432	1250	2040	840	270	155	125	190	112	•••••
31		•••••	••••••	405	00074	2340 46274	60430	310 9564	155 7933	4591	155 6609	4065	•••••
		••••••		9331 518		1490	2010	309	256	153	213	136	
Ms	76.11			010	4 4 4 4	2340	2980	840	460	380	250	172	
M	n				310	880	800	125	155	112	100	112	
Ac	re-ft.			18500		91600		19000			13100	8100	
			•	Discha	ree of	Yampa	Biver	at Cra	ie for	1915.			
	<b>T</b>	-4											
	Dr	RIDAGO	Area,	, 1,730	Zaupe	• Miles		ude, 6,	185 Pe	et Abo	To Set	r Teas	le .
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Discharge of Yampa River at Craig for 1916.

Drainage Area, 1,730 Square Miles. Altitude, 6,185 Feet Above Sea Level.

Day		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1						4570	6100	2130	830	290	370	500	
2						4280	6530	2130	780	290	290	455	******
3						5170	5990	2280	780	370	730	500	
		•••••			*******	4100	6310	2000	730	290	730	500	
	•	••••	•••••		•••••	4380	5680	1800	830	290	830	410	******
<u>6</u>		••••	•••••	•••••	•••••	·6100	5680	1680	730	220	780	500	•••••
_		•••••	•••••	•••••	*******	6970	6100	1680	1210	250	830	500	
	••••	•••••	••••••	•••••	*******	8220	5470	1500	1040	250	1380	455	••••
		•••••	•••••	•••••	••••••	. 8450	5470	1740	830	370	935	410	•••••
4 4		•••••	••••••	•••••	••••••	9410	6200 6200	1560 1380	830 830	370	1210	455	••••
10		••••••	••••••	•••••	•••••	8930 7300	6200	1320	590	545 590	1040 880	370 330	•••••
10		••••••	••••••	••••••	••••••	6200	6100	1260	935	545	880	370	•••••
4.4						6100	6200	1100	935	370	1040	910	•••••
4 2			••••••			5570	6100	990	830	370	990		•••••
10						4970	5680	1100	830	330	880		•
						4970	5680	990	635	330	730		
10						4100	5680	830	590	290	730	********	
4.0					*******	3640	5880	830	500	220	830		*******
20						3550	5880	680	500	290	780		•••••
21						4670	5780	680	370	250	730		•••••
22					*******	5070	5370	635	410	220	830		
					4480	5270	4300	730	410	220	830		
			••		5170	5070	4870	590	410	290	680		
		•••••		•••••	5170	4480	4480	545	370	220	680	•••••	
					6200	4570	4380	500	330	410	455	••••	
		•••••			6200	4480	4100	500	330	250	500	•	•••••
		•••••	•••••	•••••	7530	4380	4000	545	330	250	500		•
		•••••	•••••	•••••	7640	3820	3820	680	290	250	455		••••
0.1		•••••	*******	•••••	6530	5070	3730	680	290	250	455 455		
		•••••	•••••	•••••	48086	4970	1 6 9 0 6 0	830	290	9480	23385	5755	•
Tota		•••••	•••••	•••••	48920	168830	163960	35895 1160	19595 632	316	754	443	•
Mean.			•••••		••••••	5450 9410	5470 6530	2280	1210	590	1380		
Max Min	••••		•••••	••••••	•••••	4100	3730	500	290	220	290	•	•••••
Acre-1		•••••	•••••	•••••	97000	335000	325000	71300	38900	18800	46400	11400	
WOLG.I		•••••			91000	999999	049000	11000	00000	10000	*0*00	TITUU	•••••

# YAMPA RIVER NEAR MAYBELL.

Location.—At highway bridge about three miles above Maybell in sec. 2, T. 6 N., R. 95 W. Nearest tributary, Deception Creek, enters about one mile below.

Records Available.—April 24 to November 12, 1916. From April 17, 1904, to October 31, 1905, and from June 12, 1910, to November 30, 1912, a station was maintained at the Thornburg bridge, about nine miles below Maybell. The present station was established April 25, 1916.

Gage.—Chain gage located on highway bridge.

Channel.—Probably permanent.

Winter Flow.—Station discontinued during the winter months.

Diversions.—Between this station and Craig there are decrees for diversions of 131 second-feet from the Yampa River and 3,269 second-feet from intervening tributaries.

Co-operation.—Station maintained in co-operation with the United States Geological Survey.

# SODA CREEK AT STEAMBOAT SPRINGS.

Location.—At the Main Street Bridge at Steamboat Springs, below all tributaries, the nearest being a small creek that enters from the east about 2 miles above.

Records Available.—June 8, 1910, to August 31, 1911; April 24, 1913, to November 30, 1916.

Drainage Area.—47 square miles.

Gage.—Chain gage.

Channel.—Practically permanent.

Discharge Measurements.—Made from highway bridge.

# ELK RIVER AT HINMAN PARK.

Location.—At Hinman Park just above the mouth of South Fork and 8 miles above Clark.

Records Available.—May 25, 1912, to November 30, 1916.

Drainage Area.—61 square miles.

Gage.—Bristol automatic gage.

Channel.—Rough, but permanent.

Discharge Measurements.—Made from cable and car.

Winter Flow.—Ice causes backwater. Station discontinued during the winter months.

Co-operation.—Station is maintained by the State Engineer in co-operation with the Elk River Irrigation & Construction Co.

# Discharge of Yampa River at Maybell for 1916.

Da	у	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1						5620	7190	2960	815	461	351	504	
2						4360	7420	2810	704	479	356	473	
3		•••••				4360	6960	2660	740	402	345	461	
4						3800	6730	2380	704	356	1230	443	
5						4360	7190	2000	740	325	852	443	
6	•••••					5840	7890	1880	890	384	726	413	
7			•			7420	6960	1760	1010	384	860	419	•••••
8		•••••	•	••	••••••	9890	5620	1650	1140	356	1140	425	•
. 9	••	•••••		•		10400	5620	1650	970	356	1430	419	
10	••••	•••••	••••••	•••••		11500	5180	1650	.890	437	1240	413	•••••
11		•	•••••	•••••	••	11500	6730	1650	890	852	1050	384	
12		•••••	•••••	•••••	••••••	9910	6960	1540	815	668	875	356	•••••
13	•••••	••••••		••••••		8370	6960	1430	778	600	815	•	********
14			••••••	•••••	•	8130	6960	1180	852 1050	485	778	•••••	
15 16				•••••		6730 5400	7420 6500	1050 970	890	384 367	740 748	•••••	•••••
17				••••••	•	4360	6060	890	740	379	815	•••••	•••••
18					•	3980	6280	890	668	384	. 815	•••••	
19						3620	6280	890	740	379	830		•••••
20		••••••	••••••		••••••	3980	6280	852	600	362	890	•••••	•
21		•••••	•	••••••	•	5180	5840	740	523	356	704		•••••
22	•••••	•••••	•••••	••••••		6500	5180	668	485	362	654		•
23			•			6280	4360	634	473	345	614		
24			•••••		3980	5180	3820	600	449	356	600		••••••
25					4980	5180	3280	568	419	362	607		*******
26				•••••	5970	6060	3620	568	407	367	588		••••••
27		*******	*******		6960	5620	3620	568	384	402	568		
28					7890	5180	3280	600	362	362	535		
29					8610	5620	3280	600	379	356	523		*******
30					8370	6060	3280	970	402	356	485		•••••
31		•••••				<b>650</b> 0		704	479		504	•	•
7	l'otal.				46760		172750	39962	21388	12378	23268	5153	••
	an			<b>-</b>	6680	6340	5760	1290	690	413	751		••••••
	X				8610	11500		2960	1140	852	1430		•••••
	n			•	3980	3620	3280	568	362	329	345	•••••	******
AC	re-ft.	•••••	•••••	•••••		<b>390</b> 000		79300	42400	24600	46200	*******	
	Unle	ess otl	herwis	e note	d, all d	lischar	ges are	in cubi	c feet	per se	cond.		

	_							mboat 5					
_		_			-	Miles.		le, 6,680					
Day	_	Jan.	Feb.		April	May	June	July A		-	Oct.	Nov	
1 2		••••••				207 155	273 381	.46 .38	3 3	1 1	3 3		
3		••••••	•••••		*******	129	255	35	3	1	4		
4		••••••	••••••			107	129	35	3	2	3		
6		*******		•••••		98 <b>73</b>	168 <b>129</b>	31 27	3 3	2 2	3 3		
7						73	107	23	ã	2	3		
8		······				73	118	20	3.5		3		
10		•••••			•	89 129	194 309	17 14	3.5 3.5		3 3		
11						129	273	10	3.0	2	3		
12	•••••					181	207	10	2.5	2	3	12	
13 14	•					237 222	207 155	8 8	2 2	2.5 3	3 3		
15				······		222	181	8	2	3	4		 3
16					<i>'</i>	237	222	7	2	3	4		
17 18		•••••	•••••		•	273 237	237 168	6	2 2	3	4		
19						181	181	5.5	2	3 3	4		
20						107	207	5	2 2	2.5	4		5.5
21						89	168	4.5	2	2.5		.5 8	.5
22 23		······································				89 107	194 168	4	2 2	$\frac{2.5}{2.5}$			į.5
24			•••••		•	142	181	4	2	2.5 3	3 3		
25			••••••		129	129	155	4	2	3	3		
$\begin{array}{c} 26 \\ 27 \end{array}$		•••••			118 129	129 129	107 118	3.5 - 3.5	2 2	3.5	3		
28					142	107	73	3.5	2	4	3 3	.5	
29					168	118	59	3.5	1.5	3		.5	
30 31		••••••	•••••		291	118 181	• 49	3	1	3	4	.5 8	·
	otal				977	4497	5373	400	72.5	76.0	1	07 16	.5
Mea	an				163	145	179	12.9	2.3			.5	5.4
	ж			••••••	291	273	381	46	3.5	4	5		
	n e-ft.	•••••			118 1940	$\begin{array}{c} 73 \\ 8920 \end{array}$	49 10700	793	141	149	215	32	
												341	
		1	Discha	mar of		Creek							
								mboat <b>S</b> J					
	D							mboat <b>5</b> ] ie, 6,680				Level	•
Day				, 47 5		Miles.		ie, 6,680	Peet	Above		<b>Level</b> Nov.	
Day	y	rainag	e Area	<b>Mar.</b>	<b>quare</b> April 50	Miles. May 138	Altitud June 303	<b>1e, 6,680</b> July <i>A</i> 116	Feet Lug. 5	Above Sept. 5	<b>Sea</b> Oct. 6	Nov	Dec.
1 2	y 	Jan.	Feb.	Mar.	quare April 50 54	Miles. May 138 130	<b>Altitu</b> o  June  303  285	July A 116 102	Feet Lug. 5	Above Sept. 5	<b>5ea</b> Oct. 6	Nov	Dec.
•	y 	Jan.	Feb.	<b>Mar.</b>	<b>quare</b> April 50	Miles. May 138	Altitud June 303	July A 116 102 96	Feet Lug. 5 5 5	Above Sept. 5 5 5	<b>Sea</b> Oct. 6 6	Nov	Dec.
1 2 3 4 5	y  	Jan.	Feb.	Mar.	April 50 54 50 50 50	May 138 130 102 102 102	<b>Altitue</b> June 303 285 267 276 294	July A 116 102 96 78 73	Feet ug. 5 5 5 5	Above Sept.  5 5 5 5 6	<b>Sea.</b> Oct. 6 6 6 6	Nov	Dec.
1 2	y   	Jan.	Feb.	Mar.	April 50 54 50 50 50 50 50	May 138 130 102 102 123 123	June 303 285 267 276 294 242	July A 116 102 96 78 73 68	Feet ug. 5 5 5 5 5	Above Sept. 5 5 5 6 6	<b>500</b> . Oct. 666666666666666666	Nov	Dec.
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1 2 3 4 5 6 7 8 9	y   	Jan.	Feb.	Mar.	April 50 54 50 50 50 50 50	May 138 130 102 102 123 123	Altitue 303 285 267 276 294 242	July A 116 102 96 78 73 68	Feet ug. 5 5 5 5 5	Above Sept. 5 5 5 6 6	<b>500</b> . Oct. 666666666666666666	Nov.	Dec.
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1 2 3 4 5 6 7 8 9	y 	Jan.	Feb.	Mar.	April 50 54 50 50 50 50 50 50 50 50 68	May 138 130 102 102 123 123 170 285 322 234 258	June 303 285 267 276 294 242 226 234 226 234 226	July A 116 102 96 78 73 68 58 54 50 46 42	<b>Peet 1ug.</b> 555555555555555555555555555555555555	Above Sept. 5 5 5 6 6 6 5 5 5	<b>508.</b> Oct. 666666666666666666666666666666666666	Nov	Dec.
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1 2 3 4 5 6 7 8 9 10 11 12 13 14	y	Jan.	Feb.	Mar	April 50 54 50 50 50 50 50 50 46 50 68 73 73 84	Miles.  May  138 130 102 102 123 170 285 322 234 258 242 162	June 303 285 267 294 242 226 234 226 235 267 258 312	July A 116 102 96 78 73 68 58 54 54 42 38 28 26	Pestus. 555555555555555555555555555555555555	<b>Above</b> Sept. 5555666555555555555555555555555555555	<b>Sea.</b> Oct. 6666666666666688	Nov	Dec.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	y	Jan.	Feb.	Mar	April 50 54 50 50 50 50 50 50 68 73 73 84 90	Miles.  May 138 130 102 102 123 123 123 285 322 234 242 162 146	June 303 285 267 276 294 226 234 226 235 267 276 242	July A 116 102 96 78 73 68 58 54 50 46 42 38 28 22 23	Pes. 555555555555555555555555555555555555	<b>▲bove</b> Sept. 5555666655555555555555555555555555555	<b>Sea.</b> Oct. 6666666666668889	Nov	Dec.
1 2 3 4 5 6 7 8 9 10 11 12 13 14	y	Jan.	Feb.	Mar	April 50 54 50 50 50 50 50 50 46 50 68 73 73 84	Miles.  May  138 130 102 102 123 170 285 322 234 258 242 162	June 303 285 267 294 242 226 234 226 235 267 258 312	July A 116 102 96 78 73 68 58 54 54 42 38 28 26	Pestus. 555555555555555555555555555555555555	<b>Above</b> Sept. 5555666555555555555555555555555555555	<b>Sea.</b> Oct. 6666666666666688	Nov	Dec.
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123456789901112314566789901111232222222222222222222222222222222		Jan.	Feb.	18 13 15 200 500 500 50 42 338 338 38 38 42 46 671	April 50 50 50 50 50 50 50 68 73 84 96 96 84 73 84 178 186 2102 194 178	Miles.  May	June 303 285 267 276 294 242 226 234 226 258 312 276 258 258 258 214 170 170 146 123	July A 116 102 968 783 688 554 564 428 228 228 188 133 133 139 666666666666666666666666666	Pet s 66666666666666666666666666666666666	<b>▲ bove</b> Sept. 5555566665555555555555555666666666666	<b>Sea</b> Oct. 666666666666666666666666666666666666	Nov.	Dec.
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123445678910112341567891011234222344111111111111111111111111111	y	Jan.	Feb.	18 18 18 18 18 18 18 18 18 18 18 18 18 1	April 50 50 50 50 50 50 50 68 73 84 96 84 73 84 102 102 102 103 186 210 194 178	Miles.  May	June 303 285 267 276 242 226 234 226 267 276 285 212 276 258 258 258 258 213 138 123 138 123 138 222 170 146 123 132 162 162 162 170 146 123 123 123 123	July A 116 102 968 783 688 584 506 66 66 66 66 66 66 66 66 66 66 66 66 6	Pet 8. 55555555555555555555555555555555555	<b>▲ bove</b> Sept. 555566665555555555555555666 22	<b>Sea</b> . 1 66666666666666666666666666666666666	Nov.	Dec.
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	D	rainag	o Ares	r, 61 m	quare	ALLIES.		10.0, 7,50	U L'est	ABOV	o mer	Level.	•
ау		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	. 1
١						270	340	465	100	68	68	68	
3			•••••				340	465	100	68	68		
				••••			322	420	83	68	76		
••••		•			•••••		322	442	92	68	76		
		•••••		•••••			304	400	92	68	68		
		••••••	•	•••••		010	304 270	570 515	92 83	68 68	76		
		•		•••••		240	322	340	92	68	83 83	54 54	
						240	570	322	92	54	92	54	
				*******		0.70	655	340	100	54	100		
						070	745	287	83	68	100		
		********				040	625	270	83	100	110	47	
						360	400	255	83	54	76	54	
							380	240	68	47	68	61	
•						442	380	212	68	54	68	68	
•	••••	•••••	••••	•••••	140	420	465	199	76	54	83	68	
		•••••			140	465	542	186	76	54	83	76	
		•••••	•		162	442	515	162	83	.76	83	83	
		•••••	••••••	•	186 186	304 270	685 685	130 120	83 76	68	68 83	. 70	
		•••••			212	240	625	120	68	76 83	76	70	•
				••••••	186	240	625	120	68	83	6.8	70 88	
					162	304	625	120	68	83	61	83	:
					162	380	598	120	76	76	83	. 89	
					151	380	655	120	68	7 <b>6</b>	76	83	
					162	340	655	120	68	61	76	66	
٠					212	. 304	598	162	68	54	68	76	
				•••••	270	304	515	151	61	68	68	76	
				•••••	340	340	442	140	54	76	76	83	
•	•••	•••••		••••••	420	340	465	180	61	76	76	70	
+01	•••	•		••••••	3091	340 9349	14974	110 7753	68 2433	2039	9408	9005	•
itti		•••••	,	••••••	206	802	499	250	78	68	2408 78	200 <b>5</b> 67	
X	••				420	490	745	570	100	100	110	89	-
n	•		•••••		140	162	270	ĭiŏ	54	47	61	47	:
re-f					6130			15400	4830	4040	4780	3980	
3		ainag	Disc	harge	of B	k Œive		inman 1 de, 7,800	Park fo	or 1916	. ·		
	Dr		Disc Area	harge	of H	k Œive Miles.	r at H	inman 1 de, 7,800	Park fo	or 1916 <b>Above</b>	Sea :		I
y	Dr.	<b>ainag</b> Jan.	Disc Area Feb.	harge , 61 Sq Mar.	of El luare April	k Clive Miles. May	r at Hi Altitu	inman I de, 7,800 July	Park for Poet Aug.	or 1916 <b>Above</b> Sept.	6. <b>Sea</b> :	Level. Nov.	_
y	Dr.	ainage	Disc Area	harge , 61 Sq Mar.	of El luare April	k Rive Miles. May 210	at Hitu Altitu June 725	inman I de, 7,800 July 620	Park for Post Aug.	or 1916 Above Sept. 70	3. Sea : Oct. 93	Level. Nov. 57	_
y	Dr.	<b>ainag</b> Jan.	Disc Area Feb.	harge , 61 Sq Mar.	of El	May 210 225	June 725	inman I de, 7,800 July 620 620	Park for Feet Aug.  152 128	n 1916 Above Sept. 70 63	Sea : Oct. 93 128	Level. Nov.	_
	Dr	<b>ainag</b> Jan.	Disc Area Feb.	harge , 61 Sq Mar.	of El luare April	May 210 225	June 725 780 845	inman I de, 7,800 July 620 620 595	Park for Peet Aug. 152 128 115	or 1916 Above Sept. 70	3. Sea : Oct. 93	<b>Level.</b> Nov. 57 57	•
	Dr	ainage Jan.	Disc Area Feb.	Mar.	of El luare April	May 210 225 260	June 725	inman I de, 7,800 July 620 620	Park for Feet Aug.  152 128	Sept. 70 63 63	Sea : Oct. 93 128 115 140 115	Nov. 57 57 63	•
	Dr	ainage Jan.	Disc Area Feb.	Mar.	of El	May 210 225 260 295 348 400	June 725 780 845 945 980 868	inman 1 de, 7,800 July 620 620 595 502 480 480	Park for Feet Aug. 152 128 115 128 128 140	Sept. 70 63 63 70 63 70	Oct. 93 128 115 140 115 104	Nov. 57 57 63 63 63 63	
	<b>Dr</b>	ainage	Disc Area Feb.	harge , 61 Sq Mar.	of El	May 210 225 260 295 348 400 348	Tat E: Altitu June 725 780 845 945 980 888 945	inman 1 de, 7,800 July 620 620 595 502 480 480 460	Park for Feet Aug.  152 128 115 128 128 140 115	Sept. 70 63 63 70 63 70 63	Oct. 93 128 115 140 115 104 104	Nov. 57 57 63 63 63 63 63	
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	<b>Dr</b>	ainage	Disc. Area	harge, 61 Sq Mar.	of Elipare	May 210 225 260 295 348 400 348 312 295	June 725 780 845 945 980 868 945 945	July 620 620 595 502 480 460 460 460	Park for Feet Aug. 152 128 115 128 140 115 115 115	T 1916 Above Sept. 70 63 70 63 70 63 85	Oct. 93 128 115 140 115 104 104 93	Nov. 57 57 63 63 63 63 63 63	
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	<b>Dr</b>	ainage	Disc.	oharge , 61 Sq Mar.	of Bi	k @ive Miles.  May 210 225 260 295 348 400 348 312 295 295	June 725 780 845 945 980 9868 945 980 1080 1160	July 620 620 595 502 480 460 460 460 440	Park for Peet Aug.  152 128 115 128 140 115 115 115 104	Dr 1916 Above Sept. 70 63 70 63 70 63 85 140	Oct. 93 128 115 140 104 104 93 77	Nov. 57 63 63 63 63 63 63 63	
y	<b>Dr</b>	ainage	Disc.	oharge , 61 Sq Mar.	of Bi	May 210 225 265 248 400 348 312 295 295 236 382 525 595	T at E Altitu June 725 780 845 945 945 980 868 945 980 1080 1160 878	Inman I de, 7,800 July 620 620 595 502 480 460 460 460 400 382 348	Park for Feet Aug. 1528 128 128 140 115 115 115 115 115 104 165	Above Sept. 70 63 63 70 63 70 63 71 63 77 77	Oct. 93 128 115 140 115 104 104 104 104	Nov. 57 63 63 63 63 63 63 63 63	
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	<b>Dr</b>	ainage	Disco Area Feb.	charge, 61 Sq Mar.	of Eliquare	May 210 225 260 348 400 348 312 295 330 382 525 595 620 725	June 725 780 845 946 946 980 868 945 980 1080 1160 878 878 878 875 945	July 620 620 620 620 620 480 460 440 400 382 348 312 295	Park for Peet Aug. 152 128 128 128 115 115 115 115 128 128 128 128 140 93 165 260 128 93 93	Sept. 70 63 63 777 777 63 63 63 63 63	Oct. 93 128 115 140 104 104 93 77 77 104 104 104 104	Nov. 57 63 63 63 63 63 63 63 63 63 63 63 63 63	
	<b>Dr</b>	ainage	Disco Area Feb.	harge, 61 Sq Mar.	of Eliquare April	May 210 225 295 348 312 295 348 312 295 330 382 525 620 725	June 725 780 845 945 980 868 945 980 1160 878 845 945 1160 1020	July 620 595 502 480 480 460 460 400 382 330 312 295 278	Park for Feet Aug. 152 128 128 128 125 126 125 126 126 126 128 128 128 128 128 128 128 128 128 128	Sept. 70 63 70 63 85 140 77 77 63 63 63 63 63	Oct. 93 128 115 104 104 104 93 77 104 104 93 85 85 77 85	Nov. 577 633 633 633 633 633 633 637 57	
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y	<b>Dr</b>	ainage	Disco Area Feb.	harge, 61 Sq Mar.	of Bi	May 210 2250 295 348 400 348 312 295 295 620 725 670	June 725 780 845 945 980 868 945 980 1080 1160 878 878 845 945 945 945 945	July 620 620 620 480 460 440 400 312 295 242 242	Park for Feet Aug. 152 128 128 128 140 115 115 126 260 128 93 93 93 93 93	Sept. 70 63 70 63 85 140 77 77 63 63 63 63 65 65 65 75 7	93 128 115 1104 104 104 104 104 104 104 104 104 10	Nov. 577 63 63 63 63 63 63 63 63 65 7 57 57	
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## ELK RIVER NEAR CLARK.

Location.—At Kinney's ranch, 2 miles above Clark postoffice.

Records Available.—May 1, 1910, to September 30, 1916.

Drainage Area.—206 square miles.

Gage.—Chain gage.

Channel.—Rough but permanent.

Diversions.—There are court decrees for diversions of 4 second-feet from Elk River above this station and 25 second-feet from the tributaries entering above.

Co-operation.—The State Engineer maintains the station in co-operation with the Elk River Irrigation & Construction Co.

## ELK RIVER NEAR TRULL.

Location.—Two miles southwest of Trull postoffice on the road between Steamboat Springs and Hayden; below all tributaries; none above the station for several miles.

Records Available.—May 2, 1904, to August 16, 1906; May 1, 1910, to November 30, 1916.

Drainage Area.—415 square miles.

Gage.—Chain gage.

Channel.—Fairly permanent.

Discharge Measurements.-Made from highway bridge.

Diversions.—Between this station and that near Clark there are court decrees for diversions of 111 second-feet from Elk River and 62 second-feet from intervening tributaries. There are no decrees for diversions below the station.

#### MAD CREEK NEAR STEAMBOAT SPRINGS.

Location.—At highway bridge on road to Hahn's Peak, 6 miles Steamboat Springs.

Records Available.—July 1, 1912, to November 30, 1916.

Drainage Area.—40 square miles.

. Gage.—Vertical staff.

Channel.—Rough, but permanent.

- Discharge Measurements.—Made from bridge.

Winter Flow.—No data, as records were discontinued.

Discharge of Bik River near Clark for 1915.

	Dr	unage	Area,	206	Square	Miles.	Altitu	de, 7,30	DO Pee	t Abov	. 500	Level.	,
Da		Jan.	Feb.		April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	·					435	1180	605	142	142	88	88	200.
2						55 <b>5</b>	1362	555	184	168	102	88	
3				•••••		330	1215	530	168	199	95	82	
4						370	-1180	505	168	142	102	82	
5						458	1110	290	155	102	88	95	•••••
6			<b></b>			390	1250	216	142	102	102	88	******
7						480	1180	184	142	168	102	95	•••••
8						458	1480	142	142	168	95	102	
9						530	1325	184	142	155	102	102	
10						350	1008	142	142	184	102	95	*******
11						435	975	155	142	95	95	102	*******
12	•					412	1075	168	155	120	102	102	
13				•		880	1110	142	168	168	102	88	
· 14	******					1362	1180	142	184	233	88	88	
15	••••					1250	1008	168	168	142	95	82	
16						942	1075	142	95	111	82	95	********
17					505	1040	1440	168	142	142	88	88	••••••
18	••••				680	1040	1215	168	199	iii	95	102	•
19				********	605	942	1215	155	155	168	102	88	
20		*******			530	1325	1180	184	233	131	102	88	
21					680	530	910	199	199	168	76	88	•••••
22						458	1725	168	216	142	88	102	•••••
23				•••••	480	735	880	184	155	142	102	102	•••••
24						580	942	168		168	88		
25					530	820	942	168	199 184		88	111	••••
26					655	655	910	168	199	155 184	102	102 82	•••••
27	•••••		••••••		605	820	975						••••
28	•••••			••••••	1040	820 880	975	168	155	216	88	95	•••••
29				•••••	880	880	790	155	199	155	88	95	•••••
30		•••••						168	102	102	102		••••
31	•••••		•••••	••••••	505	790	1110	168	111	102	95	88	•
	Cotal	•••••			8780	1325	2000	168	142	4405	95		•••••
	an				6 ( 8 0	22457	33922	6827	5029	4485	2941	2807	·····
Mo	X	•				725	1131	220	162	150	95	94	•
MIS	n	••••••	·······			1362	1725	605	233	283	102	111	•••••
WII	re-ft.			•		330	790	142	95	95	76	82	••••
AC		•••••	•••••		17400		67300	13500		<b>89</b> 00	5830	5570	•
	Gag	e Heig	thts qu	ıestio	nable, .	July, A	ugust a	nd Sep	tember	r.			
	.,			Macha		W11- T		- 41	L	1010			
	Dre	linage	Area	ischs	rge of	Hik R	iver nes					T.arral	
Do	Dre		Area,	206 1	erarp	Miles.	Altitu	de, 7,30	O Fee	<b>≜</b> bov			
Da	<b>Dr</b> s		Area, Feb.	<b>206</b> 1 Mar.	April	Miles. May	Altitu June	<b>de, 7,30</b> July	O Fee	<b>≜ Abov</b> Sept.	Oct.	Level Nov.	
Da 1	<b>Dr</b> s		Area, Feb.	<b>206</b> 1 Mar.	April 62	May 650	Altitud June 1220	<b>de, 7,30</b> July 1420	Aug. 225	Sept. 132	Oct.		
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ur 7 de, (	r near Lititude,	Trull 6,650	for Fee	1915. <b>L</b> Above	Sea.	Level.	
		ıly A		Sept.	Oct.	Nov.	Dec.
10	880 1	025	1 <b>1</b> 5	74	160	105	•
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	l712 l500 1	875 100	125 115	95	148	105	
	1542	772	115	115	160	105	
7	1628	708	115	115	148	105	
	1542	645	115	115 135	125 125	115 125	•
	L340 L340	615 588	148 148	135	125	125	
	1460	615	148	135	125	125	
5	1670	532	125	115	125	125	
	1460	505	115	95	125	105 105	•
	15 <b>42</b> 1500	505 45 <b>5</b>	135 115	105 135	115 115	115	
	1460	430	135	105	115	115	
	1420	430	115	95	115	185	
	1420	360	115	95	125	148	
	1542	360	115	105	125 125	160 160	•
	1755 1870	300 245	105 115	148 148	135	160	
	1670 1670	245 215	115	105	125	160	
1	712	185	88	115	125	135	
	1670	215	88	115	125	135	
	1585	230	95	160	125 105	135 160	
	1755 1840	215 185	115 105	148 172	105	172	
	1798	148	105	172	95	185	
	1670	148	80	160	95	185	
	1628	148	80	172	95	185	•
	1542	148 148	68 68	185	105 105	185	
139	213 13		3466	3717	3837	4085	
	1574	450	112	124	124	136	
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10, (	or near Lititude,	6,650	Pee	Bept.		Level. Nov.	Dec.
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		420	340	148	230 280	148 148	•••••
		260 340	405 588	148 148	320	148	
			1030	135	480	172	
		180	340	160	708	172	
		220	340	405	560	172	•••••
		140	300	5 <b>32</b>	430 230	200 215	•••••••
	2540 2790	950 875	340 340	300 230	185	160	
	2500	772	480	200	185	172	
	2450	532	588	148	262	160	
	2400	805	280	148	245	172	•
	2500	772 675	172	125 125	300 300	160 185	
	2640 2790	675 615	185 200	148	300	172	
	2790 2740	480	148	148	300	200	
4	2500	430	215	135	340	215	•••••
	2300	382	200	125	262	185	•••••
	2210	405	148 135	135 105	230 230	215 230	
	1980 1840	340 340	160	125	262	230	
	1840	300	160	135	230	230	
3	1930	320	200	135	215	185	•
	1880	262	160	135	200	200 215	•••••
	L880	405 420	135 148	$135 \\ 125$	172 172	230	
	L880 L880	430 382	160	135	135	245	
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### ELK HEAD CREEK NEAR CRAIG.

Location.—One mile above the mouth at bridge on road between Steamboat Springs and Craig, the latter being 6 miles west. No tributary between the station and the mouth and none for several miles above.

Records Available.—April 27 to September 7, 1906; April 17, 1910, to October 31, 1916.

Drainage Area.—249 square miles.

Gage.—Chain gage.

Channel.—Practically permanent.

Diversions.—There are court decrees for diversions of 45 second-feet from Elk Head Creek above the station and 48 second-feet from tributaries entering above. In addition, there are conditional decrees for reservoir diversions of 177,000 acre-feet from Elk Head Creek and a diversion of 587 second-feet from the North Fork.

## FORTIFICATION CREEK AT CRAIG.

Location.—One-eighth mile east of Craig on the road to Hayden. No tributaries between the station and the mouth, and none for some distance above.

Records Available.—June 12, 1905, to July 30, 1906; March 5, 1910, to November 30, 1916.

Drainage Area.—256 square miles.

Gage.—Chain gage.

Channel.—Very shifting.

Discharge Measurements.—Made from bridge.

Diversions.—There are court decrees for diversions of 91 second-feet from Fortification Creek above the station and 20 second-feet from tributaries entering above. There is also a conditional decree for a diversion of 235,000 acre-feet from Fortification Creek.

#### WILLIAMS RIVER AT HAMILTON.

Location.—Near Hamilton, at highway bridge, on the road from Meeker to Craig. Morapos Creek, the nearest tributary, enters some distance below the station.

Records Available.—April 29, 1904, to October 31, 1906; April 15, 1910, to November 15, 1916.

Drainage Area.—341 square miles.

Gage.—Chain gage.

Channel.—Shifting.

Discharge Measurements.—Made from highway bridge.

Diversions.—There are court decrees for diversions of 40 second-feet from Williams River above the station, and 7 second-feet below. There are also decrees for diversions of 87 second-feet from tributaries entering above.

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Tottean	Dr	ainag Jan.	Feb.	icharge, 248   Mar.   M	April 156 233 251 190 1148 343 450 400 480 636 510 390 343 493 658 825 963 1090 1220 1240 825 663 653 653 653 653 653 653 653 653 65	May 552 636 26 26 26 26 26 26 26 26 26 26 26 26 26	June 480 410 390 372 314 296 260 260 260 165 198 1731 131 131 131 131 131 131 131 131 13	July 255 377 880 800 800 652 715 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1	7:00 Fee 4.55 7.00 7.00 7.00 7.00 7.00 7.00 7.00 7	Sept. 2.00 4.50 2.00 1.88 1.00 2.00 4.4.0 4.4 4.55 2.50 2.00 2.05 1.55 1.55 1.55 2.00 2.05 1.55 1.88 2.0 2.05 2.05 2.05 2.05 2.05 2.05 2.05	.6. Sea. 4.50 O 4.50 75.00 25.377 36.50 65.50 4 37.7 77.7 77.7 77.7 77.7 77.7 77.7 77	Level	De

Discharge (	of	<b>Portification</b>	Creek s	ıŧ	Oraig	for	1915.
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Day	•	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					122	327	72	0	0	. 0			
Ž					126	198	153	Ŏ	Ŏ	Ò			
3	-				108	153	198	Ō	Ō	Ó			
4					168	130	158	0	0	0			
5			,		126	108	148	0	0	0			
6					122	100	308	0	0	0			
7					122	92	284	Ó	0	Ō	•••••	<b></b>	
8					163	100	296	. 4	0	. 0			
. 9				·*	228	112	163	0	Ŏ	0		•••••	
10					163	126	158	2	Ñ	Ŏ			******
11		· ·······			173	100	144	Z	, v	Ŏ	•••••		
$\frac{12}{13}$	•••••	• ••••••	•	•••••	188	144 178	122 108	4	Ň	0	•	<b>}</b>	
13			••••••	•••••	233 260	228	84	3	V	0			
15		•	•••••		353	203	64	×	V	X	•••••	•••••	·····
16				•	340	163	40	X	ž	X			
17		• ••••••		126	314	144	44	X	Ň	ŏ	••••••		
76				135	208	144	33	X	ň	ŏ		•••••	••••••
19			•••••	135	244	130	30	ň	ň	ŏ			
20		·	********	122	260	100	27	ň	ň	ŏ	********	******	••••••
2 ĭ				112	278	84	2i	ŏ	ă	ň			
22				92	244	88	15	ŏ	Ŏ	Ŏ			
23				80	233	84	- 2	Ŏ	ď	Ŏ		*******	*******
44				193	173	80	Ō	Ŏ	Ŏ	Ò			
25				208	173	76	4	0	0	0			
26				153	188	72	2	0	47				
27				183	198	80	0	0	21	. 0			
28				278	255	61	0	Ō	6	. 0			
29		<b></b>		203	296	61	0	Ō	2	Q			
30			•••••	88	398	72	0	0	0	) 0	••••••	••••	
31_				72		76	0	.0	_0	. 0	•		
	otal			2180		3814	2678	16	_ 76				•
	ւn			145		123	89	ņ		.4 0			
	K			278		327	308	4	47	0	•••••	· · · · · · · ·	•
	l	,		. 72		61	5010	,0		Ň	•		•
Acr	e-ft.			4320	12800	7560	5310	32	151	. 0			•••••

•	Discharge of Fortification Creek at Craig for 1916.	
Drainage	Area, 256 Square Miles. Altitude, 6,185 Feet Above Sea 1	Level.

Day	7	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					79	178	112	3.0	0.0	4.5	0.1	9.0	
2	·				107	144	102	2.2	0.0	1.0	0.1	9.0	
3					161	155	. 83	2.2	0.0	0.4	42.0	10.0	
4					133	200	75	1.0	26.0	0.2	88	9.0	
5					138	296	88	0.5	21	0.1	52	6.0	
6					83	382	92	0.5	71	0.1	17	10.0	
7					79	420	75	0.5	45	0.1	155	7.5	
8.	••••••		•		67	438	67	0.5	19	0.1	71	10.0	
9		•	•••••		92	444	48	1.5	7.5	2.2	39	14.0	
10	•••••		•••••		167	456	68	3.0	4.5	6.0	17	15	
11	•••••			••	325	354	71	3.0	2.2	15.0	150	12	
12	•••••	•••••	•••••	•••••	296	296	59	1.5	1.0	7.5	30	12	
13	•••••		•••••	•	189	268	48	0.5	28.0	4.5	19	• 12	
14	••••	•••••	•••••	•••••	161	246	45	0.5	45	3.0	15	12	
15		•••••	•••••		240	224	42		• 19	1.5	12	12	• • • • • • • • • • • • • • • • • • • •
16			••••••		257	138	33	0.5	7.5	1.0	9.0	12	
17 18				•••••	262	107	26	0.5	6.0	0.2	7.5	12	
19		•••••	••••••		268	92 88	28	0.5	6.0	0.1	10.0	10	
20		•	•	706	· 246	97	23 17	0.0	3.0	0.1	10.0	10	•••••
21			•	658	117	224	14	0.0	1.5 1.5	0.1	9.0	10	•
22		•••••	•	558	133	286	9	0.0 0.0	1.5	0.1 0.1	9.0 12.0	10 10	•
23			•••••	444	240	200	6	0.0	1.0	0.1	9.0	10	•••••
24		•••••	•••••	420	308	128	6	0.0	0.5	0.1	0.9	18	•••••
25			•	150	360	122	1.5	0.0	0.5	0.1	6.0	8	•••••
26			•	107	415	117	3.0	0.0	0.4	0.1	6.0	Ř	
27			••••••	194	432	92	3.0	0.0	0.2	0.1	9.0	Ř	•••••
28				331	456	88	3.0	0.0	0.1	0.1	9.0	ě	
29			••••••	286	438	92	1.5	ŏ.ŏ	0.0	0.1	9.0	ě	
30				122	274	102	4.5	ŏ.ŏ	3.0	0.1	9.0	ğ	
31				-88		112	1.0	0.2	10.0		9.0		•
า	Cotal.		*******	4064	6723	6586	1248.5	22.1	331.9	48.7	848.7	299.5	•••••
	an			339	224	212	. 41.6	0.7	10.7	1.6	27.4	10.0	*********
	x		*******		456	456	112	3.0	71.0	15.0	155	15.0	
	n		••••••		67	88	1.5	0.0	0.0	0.1	0.1	6.0	•••••
Ac	re-ft			8060		13000	2480	43	658	95	1680	595	
	Tinle	aa otl		note	A 011 A	iachara	es are	in cubi	c foot				
	Jiii	, DD ULI	101 W 100		u, all u	racmer 8	os are	iii cubi	C Teef	Der per	conu.		

	Dr	ainage	Dis Area	oharge 341	of W	illiams Miles.	River :	at <b>Ha</b> m	ilton :	for 191 4 Abov	5. 'e Sea	Level	
Da		Jan.	Feb.		April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					98	640	420	178	81	81	52	34	•
2					105	890	620	178	81	81	52	34	•••••
3			•••••••		125 155	315 270	508 405	165 165	28 28	81 34	52 52	34 34	
5					145	270	890	155	28	42	52	84	
6					135	270	- 845	155	28	75	47	38	
7				••••	125	215	270	155 145	84 82	47 90	42 42	38 42	
8 9					145 155	240 270	345 455	125	52	42	42	52	
10					145	285	600	75	42	38	43	52	
11					135	405	600	75	38	84	42	68 63	
12 13		•••••	••••••	······	145 178	542 720	640 490	75 75	34 34	34 42	42 34	75	
14					255	765	390	63	31	52	38	75	
15					300	640	390	52	81	42	42	••••	
16		••			300	640	438	52 47	84 34	42 42	42 42		
17 18			*******		330 255	660 600	472 472	42	34	42	42		
19		*******	*******		360	525	525	42	84	42	42		
20					405	405	525	42	31	38	42	•	•
21				······	455	345	455	88	28 28	34 34	42 42		
22 23					472 390	315 <b>200</b>	420 390	88 34	28 28	84	42		
24					270	455	890	34	28	34	42		
25					330	472	360	84	34	42	42	••••••	
26 27			••••••	•	330	455	345	34 34	47 34	63 75	88 84		
28					390 <b>52</b> 5	420 420	315 255	31	81	75	34		
29					640	390	228	81	31	68	34	•••••	
30					878	420	202	31	81	58	34		•••••
31	Potol		•••••	······	8676	420 18479	12660	81 2431	31 1070	1388	34 1301	668	
Me	an				289	435	422	78.4	34.5	46.1	42.0	47.7	
Ma:	x			••••••	878	765	640	178	82	90	52		
Mir	n			······	98	215	202	81	28	31 2740	34 2580	1320	
AC	re-It.		•	•	17200	26700	25100	4820	2120	2140	2000	1020	•••••
			Dis	charge	of W	illiams	River :	at Ham	ilton :	for 191	8.		
_			e Arec	, 34Ī	Square	Miles.	Altit	nde, 6,4	00 Pe	et Tpo.	70 500	Level	L Tree
Da		<b>rainag</b> Jan.	e Arec	charge , 341 Mar.	<b>Squar</b> e April	May	Altit June	ude, 6,4 July	Aug.	et Abo Sept.	Oct.	Nov.	Dec.
Day	y 	Jan.	Feb.	, 341 Mar.	Square April 70	May 902	June 1280	nde, 6,4 July 458	00 Pe Aug. 180	st Abo Sept. 100	Oct. 70	Nov. 82	L. Dec.
	y 	Jan.	Feb.	Mar.	Square April 70 100	May 902 835	June 1280 1020	<b>nde, 6,4</b> July 458 405	Aug. 180 114	Sept. 100 94	Oct.	Nov.	Dec.
	y  	Jan.	Feb.	Mar.	Square April 70	May 902	June 1280	nde, 6,4 July 458	00 Pe Aug. 180	Sept. 100 94 70 64	Oct. 70 88 114 130	Nov. 82 82 82 82	Dec.
	y  	Jan.	Feb.	Mar.	April 70 100 94 100 88	May 902 835 390 440 625	June 1280 1020 1040 1070 1220	nde, 6,4 July 458 405 375 360 330	Aug. 180 114 189 178 148	Sept. 100 94 70 64 64	Oct. 70 88 114 130 107	Nov. 82 82 82 88 94	Dec.
1 2 3 4	y   	Jan.	Feb.	Mar.	April 70 100 94 100 88 76	May 902 835 390 440 625 925	June 1280 1020 -1040 1070 1220 790	nde, 6,4 July 458 405 375 360 330 285	Aug. 130 114 139 178 148 168	Sept. 100 94 70 64 64 64	Oct. 70 88 114 130 107 94	Nov. 82 82 82 88 94 100	Dec.
1 2 3 4	y   	Jan.	Feb.	Mar.	April 70 100 94 100 88 76	May 902 835 390 440 625 925 1330	June 1280 1020 -1040 1070 1220 790	nde, 6,4 July 458 405 375 360 330 285	Aug. 180 114 189 178 148	Sept. 100 94 70 64 64	Oct. 70 88 114 130 107	Nov. 82 82 82 88 94	Dec.
1 2 3 4	y    	Jan.	Feb.	Mar.	## Square	902 835 390 440 625 925 1330 1410 1780	June 1280 1020 -1040 1070 1220 -790 790 858 1020	458 405 375 360 330 285 272 260 260	Aug. 130 114 139 178 148 168 168 114	Sept. 100 94 70 64 64 64 64 114	Oct. 70 88 114 130 107 94 139 272	Nov. 82 82 82 88 94 100 88 88	Dec.
1 2 3 4 5 6 7 8 9	y   	Jan.	Feb.	Mar.	### ##################################	902 835 390 440 625 925 1330 1410 1780 1940	June 1280 1020 1040 1070 1220 790 790 858 1020 1120	458 405 375 360 330 285 272 260 458	Aug. 130 114 139 178 148 168 168 114 114	Sept. 100 94 70 64 64 64 64 114	Oct. 70 88 114 130 107 94 139 272 148 107	Nov. 82 82 82 88 94 100 88 88 88	Dec.
1 2 3 4 5 6 7 8 9 10	y 	Jan.	Feb.	Mar.	### ##################################	902 835 390 440 625 925 1330 1410 1780 1940 1440	June 1280 1020 1040 1070 1220 790 858 1020 1120 948	458 405 375 360 330 285 272 260 260 263 315	Aug. 130 114 139 178 148 168 168 114	Sept. 100 94 70 64 64 64 64 114	Oct. 70 88 114 130 107 94 139 272	Nov. 82 82 82 88 94 100 88 88	Dec.
1 2 3 4 5 6 7 8 9 10 11 12 13	y 	Jan.	Feb.	Mar.	April 70 100 94 100 88 76 76 76 76 148 148 158	902 835 890 440 625 925 1330 1410 1780 1940 1440 1300 1170	June 1280 1020 -1040 1070 1220 -790 790 858 1020 1120 948 970 1020	406, 6,4 July 458 405 3760 330 285 2760 458 315 248 235	Aug. 180 114 189 178 148 168 168 114 114 114 114 1168	Sept. 100 94 70 64 64 64 114 168 130 107	Oct. 70 88 114 130 107 94 139 272 148 107 158	Nov. 82 82 82 83 100 88 88 88 88 88 86	Dec.
1 2 3 4 5 6 7 8 9 10 11 12 13 14	y 	Jan.	Feb.	Mar.	## April	902 835 890 440 625 925 1330 1410 1780 1940 1300 1170 858	June 1280 1020 1040 1070 1220 790 858 1020 1120 948 970 1050	458 458 405 360 380 285 272 260 260 263 315 248 235	Aug. 180 114 189 178 168 168 114 114 114 114 235	Sept. 100 94 70 64 64 64 64 114 168 130 107 82	Oct. 70 88 114 130 107 94 139 272 148 107 158 139 180	Nov. 82 82 82 83 94 100 88 88 88 764 58	Dec.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	y	Jan.	Feb.	Mar.	## April	May 902 835 390 440 625 925 1330 1410 1940 1440 1170 858 835	June 1280 1020 1040 1070 1220 790 858 1020 1120 948 970 1020 1050 995	406, 6,4 July 458 405 3760 330 285 2760 458 315 248 235	Aug. 180 114 189 178 148 168 168 114 114 114 114 1168	Sept. 100 94 70 64 64 64 114 168 130 107	Oct. 70 88 114 130 107 94 139 272 148 107 158	Nov. 82 82 82 83 100 88 88 88 88 88 86	Dec.
1 2 3 4 5 6 7 8 9 10 11 12 13 14	y	Jan.	Feb.	Mar.	## April 70 100 100 888 76 76 76 76 148 148 158 158 168 178 178 168 178 178 178 178 178 178 178 178 178 17	902 835 890 440 625 925 1330 1410 1780 1940 1300 1170 858	June 1280 1020 1040 1070 790 790 7858 1020 1120 948 970 1020 1050 995	nde, 6,4 July 455 475 360 330 285 272 260 458 315 248 235 188 188 188	Aug. 180 1189 178 1488 168 114 114 114 114 235 122 9	Sept. 100 94 70 64 64 64 114 168 130 107 82 76 64 64 64	Oct. 70 88 114 130 107 94 139 272 148 107 158 139 180 107 107 94 88	Nov. 82 82 82 88 94 100 88 88 88 76 64 58	Dec.
1 2 3 4 5 6 7 8 9 10 11 2 13 14 15 17 17	y	Jan.	Feb.	130 139 139	## April 700 100 100 94 100 88 8 76 76 76 76 148 158 158 168 178 235	May 902 835 890 440 625 925 1330 1410 1740 1440 1470 858 565 475	June 1280 1020 1040 1079 790 790 780 858 1020 1120 948 970 1020 1050 995	nde, 6,4 July 405 405 375 360 3360 285 272 260 453 315 248 235 188 188 188	Aug. 180 114 189 178 148 168 114 114 114 114 114 114 114 112 114 114	Sept. 100 64 64 64 114 168 130 107 82 76 64 64 64 64 64 64 64 64 65 65 65 65 65 65 65 65 65 65 65 65 65	Oct. 70 88 114 130 107 94 139 272 148 107 158 139 180 107 107 94 88	Nov. 82 82 88 94 100 88 88 88 88 76 65 52	Dec.
1 2 3 4 5 6 7 8 9 0 11 12 13 14 15 16 17 19 19 19 19 19 19 19 19 19 19 19 19 19	y	Jan.	Feb.	130 139 139 139	## April 700 1000 888 766 766 766 766 148 148 158 158 158 158 158 158 158 158 158 15	May 902 835 890 440 1780 1780 1440 1300 1170 1558 835 475 405	June 1280 1020 1040 10790 790 858 1020 1120 948 970 1050 995 995 9470	nde, 6,4 July 405 376 360 330 285 272 260 260 245 215 248 188 188 188 188 188	Aug. 130 114 189 178 168 168 114 114 114 114 1168 235 127 107	Sept. 100 94 70 64 64 64 114 168 130 1077 82 76 64 64 64 55 8	Oct. 70 88 114 130 107 94 139 272 148 107 158 107 158 180 107 107	Nov. 82 82 82 88 81 100 88 88 88 86 64 552	Dec.
1 2 3 4 5 6 7 8 9 10 11 2 13 14 15 17 17	y	Jan.	Feb.	130 139 139	## April 700 100 100 94 100 88 8 76 76 76 76 148 158 158 168 178 235	May 902 835 890 440 625 925 1330 1410 1740 1440 1470 858 565 475	June 1280 1020 1040 1079 790 790 780 858 1020 1120 948 970 1020 1050 995	nde, 6,4 July 405 405 375 360 3360 285 272 260 453 315 248 235 188 188 188	Aug. 130 114 189 178 148 168 168 114 114 114 114 168 235 122 94 107	Sept. 100 94 70 64 64 64 114 130 107 76 64 64 64 64 64 64 65 65 65 65 65 65 65 65 65 65 65 65 65	Oct. 70 88 114 1307 94 139 158 107 107 94 8 100 130 114	Nov. 82 82 88 94 100 88 88 88 88 76 65 52	Dec.
1 2 3 4 5 6 7 8 9 0 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1	y	Jan.	Feb.	130 139 139 148 210	## April	May 902 835 890 625 9330 1410 1300 1170 858 645 405 645 725 795 858	Altitus June 1280 1020 -1040 1220 790 858 1020 1120 995 1020 995 948 948 948 948 948 948 948 948 948	nde, 6,4 July 458 3760 3360 3360 2856 272 260 2458 2356 238 188 188 188 188 168 122 76	Aug. 139 1748 1688 1688 1144 1114 1114 1114 1114 11	Sept. 100 94 764 64 64 114 168 130 782 764 64 64 58 58 552 552	Oct. 70 88 114 130 107 94 139 272 148 139 107 107 107 94 88 100 107	Nov. 82 82 88 94 94 94 95 88 88 88 88 88 88 88 88 88 88 88 88 88	Dec.
123445678901112314567890111221131456789011122123	y	Jan.	Feb.	130 139 139 130 130 130 130 130	April 700 100 100 100 100 100 100 100 100 100	May 902 835 890 440 625 925 1330 1410 1170 858 5475 475 790 858 512	June 1280 1020 1040 1070 1040 1070 1070 1070 1070 107	nde, 6,4 July 458 375 360 380 285 272 260 260 260 263 188 188 188 188 188 168 168 168 168 168	Aug. 180 114 189 148 168 168 114 114 114 1168 235 122 94 107 100 94 888 888	Sept. 100 94 70 64 64 64 64 114 168 130 107 64 64 64 64 64 64 65 65 65 65 65 65 65 65 65 65 65 65 65	Oct. 70 88 114 139 272 148 107 159 139 180 107 94 107 94 107 94 88	Nov. 82 82 82 84 100 88 88 88 76 64 55	Dec.
123345678990111231156799111222234		Jan.	Feb.	130 139 139 148 210	## April	May 902 835 890 625 9330 1410 1300 1170 858 645 405 645 725 795 858	Altitus June 1280 1020 -1040 1220 790 858 1020 1120 995 1020 995 948 948 948 948 948 948 948 948 948	nde, 6,4 July 458 3760 3360 3360 2856 272 260 2458 2356 238 188 188 188 188 168 122 76	Aug. 139 1748 1688 1688 1144 1114 1114 1114 1114 11	Sept. 100 94 764 64 64 114 168 130 782 764 64 64 58 58 552 552	Oct. 70 88 114 130 107 94 139 272 148 139 107 107 107 94 88 100 107	Nov. 82 82 88 94 94 94 95 88 88 88 88 88 88 88 88 88 88 88 88 88	Dec.
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SOUTH FORK OF LITTLE SNAKE RIVER AT GARDNER'S RANCH.

Location.—At Gardner's ranch, in sec. 28, T. 12 N., R. 86 W., 10 miles above Battle Creek. No important tributary between the station and the mouth.

Records Available.—May 8 to October 31, 1916.

Drainage Area.—46 square miles.

Gage.—Bristol automatic gage.

Channel.—Practically permanent.

Discharge Measurements.—From bridge.

Diversions.—There are decrees for diversions of 8 second-feet from the South Fork.

Co-operation.—The State Engineer maintains the station in co-operation with the Elk River Irrigation & Construction Co.

## MIDDLE FORK OF LITTLE SNAKE RIVER AT GARDNER'S RANCH.

Location.—At Gardner's ranch, in sec. 21, T. 12 N., R. 86 W., on the county road bridge, 10 miles above Battle Creek.

Records Available.—May 8 to October 31, 1916.

Drainage Area.—152 square miles.

Gage.—Bristol automatic gage.

Channel.—Practically permanent.

Discharge Measurements.—From bridge.

Co-operation.—The State Engineer maintains the station in co-operation with the Elk River Irrigation & Construction Co.

SLATER FORK OF LITTLE SNAKE RIVER, AT BAXTER'S RANCH, NEAR SLATER.

Location.—At Baxter's ranch, in sec. 22, T. 11 N., R. 89 W., 10 miles south of Slater.

Records Available.—May 6, 1912, to November 15, 1916.

Drainage Area.—80 square miles.

Gage.—Bristol automatic gage. Staff gage after July 8, 1916.

Channel.—Rough but permanent.

Discharge Measurements.—From bridge.

Diversions.—There are court decrees for diversions of 14 second-feet from Slater Creek, all below the station.

Co-operation.—The State Engineer maintains the station in co-operation with the Elk River Irrigation & Construction Co.

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## LITTLE SNAKE RIVER NEAR DIXON, WYO.

Location.—One mile west of Dixon, Wyo., in sec. 6, T. 12 N., R. 90 W. Nearest tributaries are Cottonwood Creek, which enters a short distance east of Dixon, and Willow Creek, which enters a mile or less downstream.

Records Available.—May 27, 1910, to November 30, 1916.

Drainage Area.—1,294 square miles.

Gage.—Chain gage.

Channel.—Slightly shifting during high water.

## SAVERY CREEK NEAR SAVERY, WYO.

Location.—At bridge on road about one-half mile southeast of Savery, Wyo., and about one and one-half miles above mouth.

Records Available.—May 1, 1915, to November 17, 1916.

Drainage Area.—Not measured.

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge Measurements.—Made from bridge at high water and by wading at low stages.

Winter Flow.—Records discontinued during the winter months.

Accuracy.—Records considered good.

## MUDDY CREEK NEAR BAGGS, WYO.

Location.—At road bridge, 1¼ miles northeast of Baggs, Wyo., and about 1 mile above mouth.

Records Available.—May 1, 1915, to August 10, 1916.

Drainage Area.—Not measured.

Gage.—Chain gage.

Channel.—Shifting.

Discharge Measurements.—Made from bridge and by wading.

Winter Flow.—Records discontinued during the winter months.

Accuracy.—Results fair.

Discharge	of Little	Snake Biv	er at Dizo	n, Wyoming,	for :	1915.
Drainage Area.	1.294 Sau	are Miles.	Altitude.	6.300 Feet Al	OVe !	Sea Level.

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	<b>-</b>		•			1230	2970	310	12	8	92	80	
3			*******		•••••	1230	2330	290	y	8	80	80	
4						1300	2158	270	10	40	60	80	
5						1230	1995	252	12	25	60	80	•••••
			•			1165	2075	235	10	40	80	80	
						1035	2158	218	9	70	80	80	
	<b>-</b>	•••••	•		•••••	1035	2035	165	10	50	80	80	
		•••••	•••••			1230	1995	150	15	40	70	80	
		••••	•		•	1405	2075	150	12	32	60	92	
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	••••		•••••			1405	1068	9	10	15	80	105	
		•••••	••••••	••		1440	945	9	9	15	80	92	
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		••	•••••		•	1475	828	9	9	25	80	120	
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2					485	1900	2410	485	90	100	110	205	
3		•••••			405	1520	2260	445	385	90	190	190	
Ă					425	2030	2360	385	365	70	238	175	
5				••••••	485	2260	2510	365	308	8ŏ	220	190	
6			••••••	••••••	405	3400	2410	290	665	160	190	160	
9	•••••			•••••								160	
7	••••	•••••	•		385	4160	2120	220	405	220	485		
8	•				365	3880	1940	220	238	90	735	160	
9	•				405	4230	1940		385	70	425	160	•
10					530	4370	2120	255	255	120	325	190	
11					810	3340	2310	205	190	160	530	190	
12					950	3160	2120	190	145	100	465	190	
13				575	890	3050	1980	190	145	90	325	190	
14				485	980	2780	1940	160	365	70	290	190	
15	•••••			465	1010	2030	1760	130	238	90	255	175	
16	•••••		••••••	465	1130	1850	1680	130	190	80	255	175	
			••••••				1680	130	205	80	255	175	
17	•••••			485	1130	1600							•••••
18				445	1300	1520	1640	110	175	80	238	175	•••••
19				<b>552</b>	1400	1600	1520	110	130	70	238	175	• • • • • • • • • • • • • • • • • • • •
30				760	1300	1800	1400	90	110	70	220	175	
21				1070	1440	2720	1200	90	110	70	220	175	
ž				860	1100	2660	1160	70	110	70	255	175	
z3				760	1520	2160	1010	70	110	70	255	175	
24				710	2080	1940	1230	70	90	70	238	175	
25				530	2410	2210	835	70	80	11ŏ	238	175	
26				508	3000	1980	785	40	80	100	255	175	
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28	•••••	<b>-</b>		620	3520	2030	688	50	70	90	255	175	•
29			<b>-</b>	688	3700	2120	665	90	70	90	255	175	
30				508	2310	2260	598	255	80	90	220	175	
31				425				160	160		220		
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	an			601	1320	2480	1660	189	198	96.7	282	178	
	x				3700	4370	2660	530	665	220	735	205	*******
Mi	n				365	1520	598	30	70	70	90	160	
	re-ft.			22600	78600	152000	98800	11600	12200	5750	17300	10600	
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Discharge of Savery Creek at Savery,   Wyo., for 1916.									52					
Discharge of Savery Creek at Savery, Wyo., for 1916.   Day   Jan.   Feb.   Mar.   April   May   June   July   Aug.   Sept.   Oct.   Nov.   Dec.   1	Μi	n				······································								
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ау	Jan.	Feb.	Mar.	April	May	June		Aug.	Sept.	Oct.	Nov.	I
	•••••	••••••			40	20	0.8	0	3.5	44	90	
•	•	•••••		•	40	21	0.8	2.2	3.8	40	77	
••••••	•	•••••	•	•••••	40	44	0.8	3.8	4.2	58	56	
	•	•••••	•••••	•••••	39	99	0.0	2.2	, 5	67	58	•
• •••••			••••••	•••••	40	122	0.8	1.5	4.2	77	32	
7	•		• • • • • • • • • • • • • • • • • • • •		38	125	2.2	0.8	4.2	87	15	
				•••••	28	147	2.2	0	3.5	99	12	
	•••••	••••••	•••••	•••••	30	90 58	1.5	0	3.8	102	12	•
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	•	••••••	•	•	40	30	4.2	0.8		72		•
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			•••••	•••••	24 26	27 38			Õ	54	6.5	
			•	••••••	26	40	1.5 0.8	0.8	0 0.8	52	5.8	
		•	•••••	•	22	40	1.5	1.5		46	3.5	
-	•••••	•	•	•	18	42	2.2	0.8	0	54	4.2	
	••••••	••••••		••••••	16	38	0.8	ő	ŏ	60 96	4.2	
	•••••	••••••	•••••	••••••	14	38	0.8	ő	ŏ		3.0	
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		••••••	••••••	*******	20	3.8	ŏ	ŏ	0	77	0	
	•	••••••	•	••••••	17	3.0	ŏ			96	0	
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Total			•••••••		23.8	38.2	1.0	0.7	39.7 1.3	2819	415.3	
	•••••		•		40	147	4.2	9.1		90.9	13.8	
ax			*******	•••••	14	0.8	7.2	3.8	5 0	179	90	
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in	•••••	······	••••••	••••••					70			
in cre-ft.				of Mu	1460	2279 eek at 1	65	44	78 <b>for 19</b> 1	5590	82Ĭ	
in cre-ft.	•••••			of Mu	1460	2279	65	44		5590		1
cre-ft.	Jan.	Disc	oharge	of Mu	1460 <b>ady C</b> r	2279 reek at 1	65 Baggs, July	44 <b>Wyo.,</b> : Aug.	<b>for 191</b> Sept.	5590 . <b>6.</b> Oct.	821	1
cre-ft.	Jan.	Disc Feb.	o <b>harge</b> Mar.	of Mu	1460 <b>ddy C</b> r May	2279  reck at 1  June 66 61	65 Baggs,	44 <b>Wyo.,</b> :	for 191 Sept.	5590 . <b>6.</b> Oct.	821 Nov.	
cre-ft.	Jan.	Disc Feb.	o <b>harge</b> Mar.	of Muc	1460 <b>idy C</b> x May 78 76 73	2279 Teek at I June 66	65 Baggs, July 0.2	44 <b>Wyo.,</b> : Aug. 40	for 191 Sept.	5590 . <b>6.</b> Oct.	821	
ay	Jan.	Disc	Mar.	of Muc April 83 64 62	1460 <b>idy C</b> x May 78 76 73	2279  reck at 1  June 66 61	55 Baggs, July 0.2 0.0 0.0	44 <b>Wyo.,</b> : Aug. 40 50 78	for 191 Sept.	5590 I.S. Oct.	821 Nov.	
ay	Jan.	Disc	harge Mar.	of Muc April 83 64	1460 <b>ady Cx</b> May  78  76  73  71  78	2279  Took at 1  June 66 61 44	65 Baggs, July 0.2 0.0 0.0	44 Wyo., : Aug. 40 50 78 106	for 191 Sept.	5590 <b>16.</b> Oct.	821 Nov.	
ay	Jan.	Disc	Mar.	of Muc April 83 64 62 61	1460  ddy Cx  May 78 76 73 71 78 76	2279  Seek at J  June 66 61 44 40	65 Baggs, July 0.2 0.0 0.0 0.2 1.0	44 Wyo., : Aug. 40 50 78 106 396	for 191 Sept. 	5590 I.S. Oct.	Nov.	
ay	Jan.	<b>Dis</b>	Mar.	of Muc April 83 64 62 61 54	1460  ddy Cx  May 78 76 73 71 78 76	2279  Took at 1  June 66 61 44 40 - 32 22	55 Baggs, July 0.2 0.0 0.0 0.2 1.0 1.0	44 Wyo., : Aug. 40 50 78 106 396 270	for 191 Sept. 	5590	821 Nov.	
ay	Jan.	Disc.	Mar.	of Mac April 83 64 62 61 54	1460 <b>ady Cx</b> May  78  76  73  71  78	2279  Teck at 1  June 66 61 44 40 - 32	55 July 0.2 0.0 0.0 0.2 1.0 1.0	44 Wyo., : Aug. 40 50 78 106 396 270 220	Sept.	5590 66. Oct.	Nov.	
ay	Jan.	Disc.	Mar.	April 83 64 62 61 54 44	1460 <b>ady Cx</b> May  78  76  73  71  78  76  74	2279  June 66 61 44 40 - 32 22 16 15	55 Baggs, July 0.2 0.0 0.0 0.2 1.0 1.0 1.0 0.8	44 Wyo., : Aug. 40 50 78 106 396 270 220 224	Sept.	5590 <b>16.</b> Oct. 	Nov.	
ay	Jan.	<b>Disc</b>	Mar.	of Muc April 83 64 62 61 54 52 44 46 50	1460  May 78 76 73 71 78 76 74	2279  Took at 1  June 66 61 44 40 32 22 16	55 Baggs, July 0.2 0.0 0.0 0.2 1.0 1.0 1.0 0.8	44 Wyo., : Aug. 40 50 78 106 396 270 220 412	Sept.	5590 A.G. Oct.	Nov.	
ay	Jan.	Disc.	Mar.	of Mu. April 83 64 62 61 54 52 44 46 50 52	1460  May Cx 78 76 73 71 78 76 74 78 80	2279  June 66 61 44 40 - 32 26 16 15	July 0.2 0.0 0.0 0.2 1.0 1.0 0.8 0.5 1.0	44 Wyo., : 40 50 78 106 396 270 220 224 412 99	Sept.	5590 16. Oct.	Nov.	
ay	Jan.	<b>Disc Feb.</b>	Mar.	of Muc April 83 64 62 61 54 52 44 46 50	1460  May 78 76 73 71 78 76 74	2279  June 66 61 44 40 322 26 16 15 10 6	55 Baggs, July 0.2 0.0 0.0 0.2 1.0 1.0 1.0 0.8	44 Wyo., : Aug. 50 78 106 396 270 220 224 412 99	Sept.	5590 A.G. Oct.	Nov.	
ay	Jan.	Disc.	Mar.	of Muc April 83 64 62 61 54 52 44 46 50 52	1460  May 78 78 76 73 71 78 76 74 80 82 85	2279  June 66 61 44 40 322 26 16 15 10 6	65 Baggs, July 0.2 0.0 0.0 0.2 1.0 1.0 0.8 0.5 1.0 0.8	44 Wyo., ; 400 500 78 106 396 270 220 224 412 99	Sept.	5590 18. Oct.	Nov.	
ay	Jan.	Disc	Mar.	of Mu April 83 64 62 61 54 52 44 46 50 52 52	1460  May Cx  78 76 73 71 78 76 74 78 80 82	2279  June 66 61 44 40 32 22 16 15	55 Baggs, July 0.2 0.0 0.0 0.2 1.0 1.0 0.8 0.5 1.0 0.8	Wyo., : Aug. 40 50 78 106 270 220 224 412 99	Sept.	5590 A.G. Oct.	Nov.	
ay	Jan.	Disc.	Mar	of Mu April 83 64 62 61 52 44 46 50 52 52 43	1460  ady Ox  May 78 76 73 71 78 76 74 78 78 80 82 85 87	2279  June 66 61 44 0 82 22 16 15 10 6 6 3 2.5	65 Baggs, July 0.2 0.0 0.0 0.2 1.0 1.0 0.8 0.5 1.0 0.8	44 Wyo.,: 40 50 78 106 396 270 224 412 99	Sept.	5590	Nov.	
ay	Jan.	<b>Dis</b>	Mar	of Mu. April 83 64 62 61 54 44 46 50 52 48 49 59 67	1460  Ady Cx  May 78 76 73 71 78 76 74 80 82 85 87 76 71	2279  June 66 44 40 32 22 15 10 6 6 3 2.5 1.0	July 0.2 0.0 0.0 0.2 1.0 1.0 0.8 0.5 0.5 0.5 1.0	44 Wyo., : 40 50 78 106 270 220 224 412 99	Sept.	5590 .e. Oct.	Nov.	
ay	Jan.	Dis	Mar	of Mu. April 83 64 62 61 54 52 44 650 52 48 49	1460  1460  May 78 78 78 71 78 76 74 73 74 73 74 76 82 85 87 76	2279  June 66 61 144 40 22 15 10 6 3 2.5 1.0 1.5	55 Baggs, July 0.2 0.0 0.0 0.2 1.0 1.0 0.8 0.5 1.0 0.8 0.5 0.5	44 Wyo., : 40 50 78 106 396 270 220 224 412 99	Sept.	5590	Nov.	
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WILLOW CREEK AT RYAN'S RANCH, NEAR BAGGS, WYO.

Location.—In Colorado, about sec. 26, T. 11 N., R. 90 W., 2 miles northeast of Ryan's ranch house and 22 miles southeast of Baggs, Wyo. No important tributary between the station and the mouth of Willow Creek.

Records Available.—May 4, 1912, to November 30, 1916.

Drainage Area.—Approximately 5 square miles.

Gage.—Bristol automatic gage.

Channel.—Small cobblestones, placed especially for the station.

Discharge Measurements.—Made from foot-bridge.

Co-operation.—Station maintained by the State Engineer in co-operation with the Elk River Irrigation & Construction Co.

## FOURMILE CREEK AT RANGER STATION, NEAR BAGGS, WYO.

Location.—In Colorado, at forest ranger station near Ryan's ranch, in sec. 9, T. 10 N., R. 90 W., 20 miles southeast of Baggs, Wyo.

Records Available.—May 1, 1912, to November 30, 1916.

Drainage Area.—Approximately 4 square miles.

Gage.—Bristol automatic gage.

Channel.—Probably permanent.

Discharge Measurements.—Made from foot-bridge.

Co-operation.—The State Engineer maintains the station in co-operation with the Elk River Irrigation & Construction Co.

 Discharge of Willow Oreck at Byan's Eanch for 1915.

 Drainage Area, 5.0 (Approx.) Square Miles.
 Altitude 8,000 Feet Above Sea Level.

 Day
 Jan. Feb. Mar. April May June
 July Aug. Sept. Oct. Nov. Dec.

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 34
 17
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3		•••••	•••••			13	22	17	1.8	5.8	7		
5	•••••			•••••		12	22	15	1.8	7	- 7	•••••	
9	•		•	••••••		10	22	15	1.8	, 7	5.8		••••••
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8		,	••••••	•	•	13 17	22	15	$\frac{2.5}{2.5}$	5.8	4.5	••••••	
9			••••••			22	22	13	2.5	2.5	4.5	•	
10						22	34	13	2.5	2.5	4.5		
ļĭ			•	•••••	•••••	24	42	12	1.8	1.8	7.0		•
12						27	51	10	1.1	2.5	4.5		•••••
13						38	27	8.5	1.8	1.8	5.8		
14			••••••		13	42	27	8.5	ĭ	2.5	4.5		
15					15	34	27	8.5	$2.\bar{5}$	4.5	4.5		
16					17	34	30	7	1.8	3.5	4.5		
17					13	27	34	7	1	2.5	5.8		
18					13	27	30	7	1.8	2.5	7		
19					17	27	34	13	1.8	2.5	8.5		•
20					17	22	34	10	1.8	1.8	10		
21					24	22	27	10	1	1.8	7		
22	· · · · · · · · ·				17	22	27	7	1	1.8	8.5		
23	••••••		•		17	20	27	<u>7</u>	2.5	1.8	7		
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25			•	••••••	13.	22	27	. 7	2.5	10	10	•••••	
$\frac{26}{27}$					17 17	22 22	24 22	4.5	2.5	12	8.5		• • • • • • • • • • • • • • • • • • • •
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30				•	30	22	17	5.8	2.5	8.5	3.5		••••••
31			••••••		•••	22		2.5	2.5	0.0	3.5 2.5	•••••	••••••
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•••		•	••••••			10	44	16	4.1	1.8	1.5	1.5	
•••	••••	••••				16	69	13	6.0	1.2	0.8	1.5	
	••••	•••••		·····		, 28	98	13	8.2	1.5	1.0	1.5	
•		•	•	•••••		44	69	16	10.0	1.8	1.8	1.2	
						52	38	16	8.2	1.5	28.0	1.2	
		• • • • • • • • • • • • • • • • • • • •				44	38	. 20	6.0	1.5	8.2	1.8	
	•					69	69	20	10.0	2.2	1.8	1.5	
•••			*******			52	88	16	10.0	2.2	2.2	1.5	•••
	••••				•	32	. 88	13	13.0	1.0	10.0	1.2	
				••		38	78	10	10.0	1.0	4.1	1.2	•••
•		•				32	78	10	16.0	1.2	2.2	1.2	
				•••••		24	78	10	8.2	1.5	1.8	1.2	
			•••••		•••••	13	69	10	6.0	1.8	1.8	1.2	
				•••••		13	78	10	6.0	1.8	1.8	1.2	•••
	••••					13	88	10	6.0	1.2	1.5	1.2	
				•••••		13	78	10	4.1	1.2	1.8	1.2	
		•				20	69	8.2	4.1	1.0	1.8	1.2	
	<b>-</b>		······			24	44	6.0	2.2	1.2	1.5	1.2	
					6.0	32	38	8.2	2.2	1.2	2.2	1.2	•••
					8.2	24	38	8.2	1.8	1.2	1.5	1.2	
		•••••			8.2	20	28	6.0	2.2	1.2	1.2	1.2	•••
					10.0	24	28	6.0	1.8	1.0	1.2	1.2	
					1.6	24	28	6.0	2.2	1.2	1.0	1.2	-
					16	20	28	6.0	2.2	1.2	1.8	1.2	
		••••••	*********		24	20	24	4.1	1.8	1.0	4.1	1.2	
					28	24	20	8.2	1.5	1.2	2.2	1.2	
					- 20	28	20	8.2	1.5	1.2	1.8	1.2	
					13	32	24	10.0	1.8	1.5	1.2	1.2	
						44	*******	6.0	2.2		1.2		
					149.4	847.2	1619	348.1	169.4	42.5	96.0	38.4	
					14.9	27.3	54	11.2	5.5	1.4	3.1	1.28	
x.						69	98	24.0	16.0	2.2	28.0	1.8	
n.						8.2	20	4.1	1.5	1.0	1.2	1.2	•••
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							3210	683					
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y	ina	Jan.	Discha va, 4 (Feb.	rge of (approximate)	Pour-1 x.) Squ April	May 20 13 13 13 13 13 20 20 28 28 24 20 20 20	June 16 28 20 20 28 28 28 28 28 28 28 28 28 28 28 28 28	1titude July 6.5 6.5 5 5 5 5 5 2.5 2.5 2.5 2.5 2.5	r Statis , 7,800 Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	1915. Above Oct. 1.5 2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 2 1.5 1.5 2 2 1.5 1.5	Sea Le Nov.	D
y	ina	Jan.	Discha ea, 4 (Feb.	rge of (approximate)	Pour-I x.) Squ April 	May 20 13 13 13 13 13 13 20 20 28 28 24 20 20 13	June 16 28 20 28 28 28 28 20 13 13 13 8 8 8 8 8 8 8 8 8 8 8 8	July 6.5 6.5 5 5 5 5 5 5 2.5 2.5 2.5 2.5 2.5 2.5 2	F Statis 7,800 Aug. 1.5 1.5 1.5 1.5 1.5 1.2 1.2 1.2 1.2 1.5 1.5	Sept. 1 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	1915. Above Oct. 1.5 2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	Sea Le Nov.	
<b>y</b>	ina	Jan.	Disoha ea, 4 ( Feb.	rge of (approx Mar.	Four-1 Squ April	May 20 13 13 13 13 13 20 20 28 28 28 24 20 20 20 13 x	June 16 28 20 20 28 38 28 20 20 13 13 13 8 8 8 8 8 8 8 8	Panger July 6.5 6.5 6.5 5 5 5 5 2.5 2.5 2.5 2.5 2.5 2.5 2.5	r Statis, 7,900 Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	Sept. 1 1.2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1915. Above Oct. 1.5 2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	Ses Id	D
y	ina	Jan.	Disoha ea, 4 ( Feb.	rge of (approx Mar.	Four-1 x.) Squ April	May 20 13 13 13 13 20 20 28 28 28 22 4 20 20 21 3 8 8	June 16 28 20 28 28 28 28 20 13 13 8 8 8 8 8 8 8 6.5	July 6.5 6.5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	F Static, 7,800  Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	Sept. 1 1.2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sea Le Nov.	D
	ina	Jan.	Disoha ea, 4 ( Feb.	rge of (approx Mar.	Pour-I x.) Squ April 	May 20 13 13 13 13 13 13 20 20 20 20 20 20 20 20 20 20 20 20 20	June 16 28 28 28 28 20 13 13 8 8 8 8 8 6.5.5	Panger July 6.5 6.5 5.5 5.5 5.5 2.5 2.5 2.5 2.5 2	* Statis* ** 7,800  Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1 1.2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Ses Le	
	ina	Jan.	Disoha 0a, 4 ( Feb.	rge of (approximate)	Four-J Squ April	May 20 13 13 13 13 20 20 28 28 28 22 4 20 20 13 x 8 8 8 8	June 16 28 38 28 28 28 28 28 28 28 28 6.5 6.5 6.5	July 6.5 6.5 5 5 5 5 5 5 5 5 5 2 .5 5 2 .5 2 .	Fisher 7,800  Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	Sept. 1 1.2 1.5 2.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sea Le Nov.	
	ina	Jan.	Disoha ca, 4 (	rge of (approx Mar.	Four-I x.) Squ April 	May 20 13 13 13 13 13 13 20 20 28 28 28 24 20 20 13 × × 8 8 8 8 13	June 16 288 28 28 28 28 20 13 13 8 8 8 8 8 6 6 5 6 6 5 8	Panger 1titude July 6.5 6.5 5.5 5.5 2.5 2.5 2.5 2.5 2.5 1.5 1.5 1.5 2.5 2.5	* Statis* 7,800  Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1 1.2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sea Le Nov.	
	ina	Jan.	Disoha 100 A 1 (100 A 100 A 1	rge of (approximate)	Four-J Squ April	May 20 13 13 13 13 13 13 13 13 13 13 13 13 13	June 16 28 28 28 28 28 20 21 3 13 8 8 8 8 8 6 6 5 6 6 5 5 8 8	Tenger July 6.5 6.5 8 5 5 5 5 5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.	Fatable 7,800 Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1 1.2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Ses Id	
	ina	Jan.	Disoha •a, 4 ( Feb.	rge of (approx Mar.	Four-I x.) Equ April	May 20 13 13 13 13 13 20 20 28 28 28 22 4 20 20 13 x 8 8 8 13 13 13 13	June 16 28 20 22 28 28 28 28 20 13 13 8 8 8 8 6.5 6.5 6.5 8 8 8 8	July 6.5 6.5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	F Station 7,800 Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sea Le Nov.	
	ina	Jan.	Disoha ca, 4 ( Feb.	rge of (approx Mar.	Pour-I x.) Squ April	May 20 13 13 13 13 13 20 20 28 28 24 20 20 13 × 8 8 8 13 13 13 13 13 13 13 13 13 13 13 13 13	June 16 28 28 28 28 20 13 11 3 8 8 8 8 8 8 6 6 5 6 6 5 8 8 8 8 5	Panger 1ttude July 6.5 6.5 5.5 5.5 2.5 2.5 2.5 2.5 2.5 2.5 1.5 1.5 1.5 1.5 1.5 1.5	* Statis* * 7,800  Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.2 1.2 1.2 1.5 1.5 1.5 1.1 1.1 1.1 1.1 1.1	Sept. 1 1 1.2 2.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sea Le Nov.	
	ina	Jan.	Disoha ea, 4 ( Feb.	rge of (eppro)	Four-J Squ April	May 20 13 13 13 13 20 28 28 28 22 4 20 20 13 x 8 8 8 13 13 13 13 13 13 13 13 13 13 13 13 13	June 16 28 20 20 28 28 28 28 28 28 28 6.5 6.5 6.5 6.5 6.5	1titude July 6.5 6.5 5.5 5.5 5.5 5.5 2.5 2.5 2.5 2	* Static * 7,800 Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1.5.2.5.5.1.5.5.1.5.1.5.1.5.1.5.2.1.5.1.5	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Ses Le Nov.	
	ina	Jan.	Disoha da, 4 (Feb.	rge of (approx Mar.	Four-I x.) Squ April	May 20 13 13 13 13 20 20 28 28 28 22 20 20 21 3 x 8 8 8 8 13 13 13 13 13 13 13 13 13 13 13 13 13	June 16 28 28 28 28 28 20 13 13 8 8 8 8 6.5 6.5 5 6.5 6.5 6.5	July 6.5 6.5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	* Statis. * 7,800  Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1 1.2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sea Le Nov.	
	ina	Jan.	Disoha 0a, 4 ( Feb.	rge of (approx Mar.	Four-J Squ April	May 20 13 13 13 13 13 13 13 13 13 13 13 13 13	June 16 28 20 20 28 28 28 28 28 28 28 6.5 6.5 6.5 6.5 6.5	Panger July 6.5 6.5 5.5 5.5 2.5 2.5 2.5 2.5 2.5 2.5 1.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2	* Statis* 7,800  Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1.5.2.5.5.1.5.5.1.5.1.5.1.5.1.5.2.1.5.1.5	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sea Le Nov.	
	ina	Jan.	Disoha 0a, 4 ( Feb.	rge of (approx Mar.	Four-J Squ April	May 20 13 13 13 13 20 20 28 28 28 24 20 20 13 × × × 8 8 8 13 13 13 13 13 13 13 13 13 13 13 13 13	June 16 28 20 20 28 28 28 28 20 20 13 13 8 8 8 8 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5	Pangel  Ititude  July 6.5 6.55 5.5 5.5 2.6 2.5 2.5 2.5 2.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1	* Static. ** 7,800  Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1 1.2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sea Le Nov.	
	al	Jan.	Disoha da, 4 (	rge of (eppro)	Four-I square April	May 20 13 13 13 13 13 13 13 13 13 13 13 13 13	June 16 28 28 28 28 28 28 28 20 13 13 13 8 8 8 8 8 6 6 5 6 6 6 5 6 6 6 5 6 6 6 5 6 6 6 5 6 6 6 5 6 6 6 5 6 6 6 5 6 6 6 5 6 6 6 6 5 6 6 6 5 6 6 6 6 5 6 6 6 6 5 6 6 6 6 5 6 6 6 6 5 6 6 6 6 5 6	Panger July 6.5 6.5 5.5 5.5 5.5 2.5 2.5 2.5 2.5 2	* Statis* 7,800  Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1 1.2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sea Le Nov.	
rot	ina	Jan.	Disoha da, 4 (	rge of (eppro)	Four-J Squ April	May 20 13 13 13 13 20 28 28 28 22 4 20 20 20 13 x 8 8 8 13 13 13 13 13 13 13 13 13 15 06 16	June 16 28 20 20 28 38 28 28 28 28 28 28 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5	Pangel July 6.5 6.5 5.5 5.5 5.5 5.5 2.5 2.5 2.5 2	* Static. ** 7,800  Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1 1.2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sea Le Nov.	
rot	ina	Jan.	Disoha da, 4 (	rge of (approx Mar.	Four-I square April	May 20 13 13 13 13 13 13 13 13 13 13 13 13 13	June 16 28 28 28 28 28 28 28 20 13 13 13 8 8 8 8 8 6 6 5 6 6 6 5 6 6 6 5 6 6 6 5 6 6 6 5 6 6 6 5 6 6 6 5 6 6 6 5 6 6 6 5 6 6 6 6 5 6 6 6 5 6 6 6 6 5 6 6 6 6 5 6 6 6 6 5 6 6 6 6 5 6 6 6 6 5 6	Panger July 6.5 6.5 5.5 5.5 5.5 2.5 2.5 2.5 2.5 2	* Statis* 7,800  Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1 1.2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sea Le Nov.	
rot san	ina	Jan.	Disoha da, 4 (	rge of (approx Mar.	Four-J Squ April	May 20 13 13 13 13 20 28 28 28 22 4 20 20 20 13 x 8 8 8 13 13 13 13 13 13 13 13 13 15 06 16	June 16 28 20 20 28 38 28 28 28 28 28 28 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5	1titude  July 6.55 6.55 5.55 5.55 2.55 2.55 2.55 1.55 1.55 1	* Static. ** 7,800  Aug. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sept. 1 1.2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1915. Above Oct. 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.	Sea Le Nov.	

Discharge of Four-Mile Creek at Ranger Station for 1916.

Drainage Area, 4 (Approx.) Square Miles. Altitude, 7,800 Peet Above Sea Level.

Day	7	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		*******				13	24	3.8	0.8	2.0	2.5	2.5	
2					*******	13	20	3.8	1.0	1.5	3.8	2.5	
3	******					16	20	2.5	2.0	1.5	3.8	3.8	
4	<b>-</b>					24	20	1.5	8.0	1.5	2.5	5.0	
5				•••••		44	20	1.2	• 10	2.0	2.5	1.5	
6				*******		62	16	1.2	8	2.5	6.5	1.5	
7				*******		49	13	1.2	3.8	1.5	16.0	1.5	
8						49	13	1.5	3.8	1.5	8	1.5	
9						62	20	5.0	3.8	3.8	5	1.5	
10						44	20	3.8	3.8	3.8	6.5	1.2	
11						33	16	2.5	3.8	2.5	10.0	1.2	
12						38	16	1.5	3.8	2.5	6.5	1.2	
13		•				33	16	0.8	8.0	2.0	8.0	1.2	
14						20	16	0.8	5.0	2.0	6.5	1.2	
15			•••••			· 13	13	0.5	3.8	2.5	5.0	1.2	•••••
16						13	. 13	0.8	2.5	2.0	2.5	1.2	•••••
17					•••••	13	1.3	0.5	2.5	2.0	3.8	1.2	•••••
18		•••••				13	10	0.5	2.5	1.5	2.5	1.2	•••••
19						16	10	0.5	2.0	1.5	3.8	1.2	
20						20	8	0.8	2.0	1.5	3.8	1.2	
21	******		•••••	•••••		49	8	0.8	1.5	1.5	3.8	1.2	••
22					10	38	6.5	1.0	. 1.5	. 2.0	2.5	1.2	
23		•••••	*******	••••••	13	28	6.5	1.0	2.0	2.0	2.0	1.2	******
24		•	••••••		16	28	6.5	1.0	2.5	2.0	5.0	1.2	
25	•••••			•••••	24	20	5.0	1.2	3.8	2.0	3.8	1.2	
26			•	<del>-</del>	33	16	3.8	1.2	2.5	2.5	3.8	1.2	•
27	,	•••••	•••••	·····	33	16	3.8	1.2	2.5	2.0	3.8	1.2	•
28		•••••		••••••	44	20	3.8	1.5	2.5	1.5	2.5	1.2	
29		••••	······		24	20	3.8	2.0	3.8	2.5	2.0	1.2	
30	•••••		•	•••••	16	24	5.0	1.2	5.0	2.5	2.5	1.2	
		•••••	••••••	•		24	900 7	0.8	2.5	*******	2.5	*******	******
	'otal			•	213	871	369.7	47.6	111.0	62.1	143.7	46.5	******
					23.7	28.1 62	$\substack{12.3\\24}$	1.5	3.6	2.1.	4.6	1.6	•••••
				•••••	•••••	13		5.0	10.0	3.8	16.0	5.0	•
	1	••••••	•	•	422	1730	3.8 732	0.5 92	0.8	1.5	2.0	1.2	•••••
Acr	e-ft.		•••••		422	1130	132	92	221	123	283	95	••••••

Unless otherwise noted, all discharges are in cubic feet per second.

## NORTH FORK OF WHITE RIVER AT BUFORD.

Location.—At Genier's ranch,  $1\frac{1}{2}$  miles above Buford, about sec. 3, T. 1 S., R. 91 W. No important tributary between the station and the mouth of South Fork. The gage and foot-bridge at Genier's ranch went out on May 27th, and was re-established on June 26th on the private road bridge at Buford P. O.,  $1\frac{1}{2}$  miles below.

Records Available.—May 24, 1910, to December 7, 1915.

Drainage Area.—240 square miles.

Gage.—Vertical staff.

Channel.—Practically permanent.

Discharge Measurements.—Made from private road bridge.

Diversions.—There is a court decree for a diversion of 1.6 second-feet from the North Fork above the station, but none below. There are also decrees for diversions of 33 second-feet from tributaries entering above the station.

#### SOUTH FORK OF WHITE RIVER NEAR BUFORD.

Location.—At Shepherd's ranch, 7 miles above Buford, about sec. 7, T. 2 S., R. 90 W. Nearest tributary a small creek that enters from the east just below the station.

Records Available.—July 25, 1903, to October 31, 1906, station maintained by the United States Geological Survey; June 1, 1910, to November 30, 1915.

Drainage Area.—148 square miles.

Gage.—Vertical staff.

Channel.—Fairly permanent.

Discharge Measurements.—Made from highway bridge during high water and by wading at ordinary stages.

Winter Flow.—Ice causes backwater and records are discontinued during the winter months.

Diversions.—There are no court decrees for diversions from the South Fork above the station, but below there is a decree for 5.4 second-feet. There is a decree for a diversion of 9.2 second-feet from tributaries entering above the station.

Discharge of Worth Fork White River at Buford for 1915.

Drainage Area, 240 Square Miles. Altitude, 7,000 Feet Above Sea Level.

Day		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.					180	345	615	510	210	165	195	150	180
•					180	345	615	460	210	165	195	150	210
3 .					180	345	560	460	195	165	195	150	210
4 .					195	345	485	410	195	165	180	150	210
5.					210	365	510	410	195	165	180	150	210
6.	<b>.</b>				210	365	510	410	195	165	180	150	210
7.	<b></b>				210	365	460	365	<b>2</b> 10	165	180	210	210
8.					210	365	510	345	228	165	180	180	*******
					245	410	58 <b>8</b>	325	210	180	180	180	******
					210	410	730	825		180	180	195	******
					228	435	670	305	195	180	180	<b>2</b> 10	•••••
			<b></b>		245	615	<b>67</b> 0	285	195	180	180	195	
					325	435	588	285	180	180	180	180	
				•••••	365	615	560	285	180	180	180	180	••••
				•••••	365	535	560	245	180	180	180	165	•••••
					388	485	588	245	180	180	180	165	
					435	535	730	245	180	180	180	165	
					510	670	615	245	180	180	180	165	
				•••••	730	670	700	245	180	180	180	180	*******
	<b>-</b>				615	615	760	245	180	180	180	180	•••••
	<b>-</b>		<b>-</b>	165	588	615	700	228	180	180	180	180	•••••
			•••••	165	460	615	700	210	180	180	180	180	•••••
	•		•••••	165	435	460	<b>70</b> 0	228	180	180	180	180	•••••
			· · · · · · · · · · · · · · · · · · ·	165	435	510	700	210	180	180	180	180	•••••
			······	165	435	510	642	210	180	228	180	180	••••
	·		••••••	165	410	460	588	228	180	210	180	180	•••••
		• • • • • • • • • • • • • • • • • • • •		165	410	460	588	228	180	210	180	180	• • • • • • • • • • • • • • • • • • • •
			•••••	165	388	410	588	245	165	228	180	210	
	••••	•	•••••	165	396	460	535	228	165	210	165	210	•
				165	365	535	510	210	165	195	165	210	•••••
		•••••		165	10507	485	10075	210	165	E 4 0 1	150 5565	E 9 4 0	1 4 4 0
				1815	10527	14790	18275	9085	5798	5481		5340	1440
		•••••		165	351	477 670	610	293	187	188	180	178	206
			••••••	165	730 180		760	510	228	228	195	210	210
Min.				165		345 29300	460 36200	210	165	165	150	150	180
ACT	9-IT.	•		3600	20900	49300	30200	18000	11500	10900	11100	10600	2860

## Discharge of South Fork White River near Buford for 1915. Drainage Area, 148 Square Miles. Altitude, 7,200 Feet Above Sea Level.

Day	•	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	•••••		*******		110	375	755	507	125	110	110	95	•••••
2			********		110	840	728	435	125	110	110	95	
3					110	318	674	364	125	110	110	95	
4	•				125	248	594	352	125	110	110	95	•
5	<b></b>		·····		125	237	544	329	125	110	110	95	
6	•••••	•••••		••	135	214	519	329	135	110	110	95	
7	•••••	··· <b>·</b> ····			118		495	806	168	110	110	95	
	•	•••••	•••••		125	237	495	306	168	110	110	95	
					125	237	594	283	145	125	110	95	······•
	•			•••••	118	237	918	260	145	125	110	95	
- 0		•••••	•••••		125	237	1072	260	145	110	110	110	•••••
12	•	•	••••••	•••••	125	260	1180	287	125	110	110	110	
4.4			••••••	•	125	352	932	214	125	125	110	110	•••••
		•••••			110	435	755	214	125	118	110	110	
		•••••	•••••	•	125	594	782	191	125	110	118	95	
			•••••		156	660	796	191	125	110	125	95	
4 6		••••••	•••••	••••••	168	582 495	904	168	125 125	110 110	110	110	•••••
7.5				•••••	168		960	168	125	110	110	95	
			•••••		180 191	495	918	168 168	125	110	110	110	
54		••••••	••••••		214	447 423	904 850	168	125	110	110 110	110	
			•••••	•••••	214	387	809	145	125	110	110	95 95	
				•••••	214	387	796	145	135	118	110	95 95	
57			••••••	••••••	191	423	768	145	145	125	110	95	•••••
					191	447	728	145	125	125	110	95	•••••
- A					168	447	701	145	125	125	110	95	
0.7					180	423	688	145	125	125	110	95	
0.0					248	447	620	145	110	125	110	110	
0.0					306	447	594	145	110	110	110	110	
90					375	471	556	125	110	110	110	110	
A 2						634	*******	125	110		110		
					4975		22579	7028	4001	8436	3433	3000	
					166	392	753	227	134	114	111	100	
					375	660	1130	507	168	125	125	110	
Min					110	214	495	125	110	110	110	95	
Acre					9870	24100	44800	13900	7940	6820	6820	<b>59</b> 50	
					A. all	dischar	ges are						•••••

Unless otherwise noted, all discharges are in cubic feet per second.

## WHITE RIVER NEAR MEEKER.

Location.—At the Rees ranch, 3½ miles east of Meeker, in sec. 24, T. 1 N., R. 93 W. Nearest tributary above is Curtis Creek; nearest below is Sulphur Creek. Station moved from Van Cleave's to Rees' ranch October 20, 1913.

Records Available.—May 7, 1910, to November 30, 1916. From April 12, 1904, to October 31, 1906, a station was maintained 2.5 miles below this point by the United States Geological Survey.

Drainage Area.—634 square miles. Gage.—Automatic recording gage. Channel.—Practically permanent.

Discharge Measurements.—Made from private road bridge.

Diversions.—There are court decrees for diversions of 186 second-feet from White River above the station and 59 second-feet from tributaries entering above. Below there are decrees for diversions of 198 second-feet from White River.

Note.—Station moved to get above the head of the Meeker Power Canal. Diversion started during winter of 1912-1913.

1913 records prior to October 20 corrected for the diversion. Average diversion about 90 second-feet.

	Dre	.ine.ee	Di	sohar	of T	White I	River ne Altitu	ar Me	ker fo	r 1915		Level	
Da		_			_								
Da:	•	Jan.	red.	Mar.	April 275	May 1020	June 1110	800	Aug. 290	Sept. 310	Oct. 350	Nov. 330	Dec. 370
2					290	930	1365	760	275	310	350	330	370
8		······································			290	800	1060	760	275	380	330	330	370
5		••••	••••••	•••••	290	720	1110	680	275	380	330	330	370
ä					275 260	645 645	1020 1065	610 610	275 290	330 310	330 330	330 330	330 330
7					275	610	930	540	290	310	330	330	330
8			•••••		330	610	930	540	290	830	330	290	330
. 9		•••••	•••••	••••••	350	610	1110	540	810	830	330	275	350
10 11			••••••	••••••	350 395	745 755	1420 1600	480 450	290 290	330 330	330 330	310 350	370 330
12		•••••			420	960	1660	420	290	330	330	395	330
13			••••••	********	510	845	1365	420	310	210	330	420	350
14	•••••				575	1110	1110	420	310	830	. 330	310.	350
15		••••••	•••••		610	1180	1110	450	290	990	300	310	350
16 17		•••••	•••••	•••••	680 645	1170 1120	1110 1310	. 450 395	290 290	330 330	370 370	330 330	380 290
18		······································	•••••	•••••	575	1150	1420	370	290	830	330	330	330
19					760	1130	1420	350	290	290	350	350	370
20					760	1010	1480	350	290	290	350	350	370
21	*******		•••••		840	970	1810	310	290	290	350	370	510
22 23		•••••	•	330	840	840	1310	290	275	310	350	350	480
23 24		···•		330 350	760 <b>6</b> 80	840 885	1310 1310	275 290	260 290	330 330	850 350	330 330	450 420
25				870	680	980	. 1210	275	310	370	330	310	370
26		•••••		350	680	930	1210	275	330	370	330	330	480
27	•••••			350	840	885	1065	290	330	350	330	330	370
28		•••••		290	840	840	975	310	830	370	330	275	370
29 30				290 290	1020 1065	840 840	840 840	290 290	310	370 350	350 350	290 310	450 420
31				275	1000	975	010	310	310 310	350	330	310	510
	<b>Potal</b>				17160	27540	36085	13600	9145	9860	10580	9885	11750
Me	<b>e</b> n			322	572	888	1203	439	295	329	340	330	379
Ma	<b>x</b>		•	370	1065	1180	1660	800	330	370	370	420	510
Aci	n re-ft.		••••••	275 6400	260 34000	610	840 71 <b>600</b>	275	260	290	330	275 1960 <del>0</del>	290
	1 <b>6</b> -1 t.		••••••	0100	34000	94000	11000	21000	19100	19000	20300	10000	20000
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12345678901123415667890112322234567890111234156789011123223345678901112322334567890111232233456789011123223345678901112322334567890111232233456789011123223345678901112322334567890111232233456789011123223345678901112322334567890111232233456789011123223345678901112322334567890111232233456789011123223345678901112322334567890111111111111111111111111111111111111	y	Jan.	Feb.	Mar	April 420 395 395 395 395 395 395 396 450 480 480 510 540 575 610 645 790 870 871 8870 1280	May 952 870 11380 1670 12280 2280 2280 2280 1990 1490 1180 1080 1380 1380 1440 1610 1280 1380 1440 1490	June 1920 1850 1990 1990 1990 1992 2130 2200 2280 2280 2280 2280 2280 1990 1860 1670 1670 1860 1670	July 1440 1280 1180 1080 1080 910 952 910 870 830 850 750 680 645 645 6610 6610 25017	Aug. 5755 575 6710 6100 6800 6800 5400 5540 5540 4800 5400 4200 4220 4220 4220 3955 3770 395 16022	Sept. 3700 3700 3700 3700 3700 3700 4200 4200 4200 4200 4200 4200 4200 4	Oct. 450 480 510 575 480 610 615 610 610 645 610 575 540 480 420 395 420 3930 3300 15775	Nov. 360 350 350 370 370 370 370 370 370 370 370 370 37	
12 3 4 5 6 7 8 9 10 1 12 3 4 4 5 6 7 8 9 10 1 12 3 4 4 5 6 7 8 9 10 1 12 3 2 2 2 3 4 4 5 6 7 8 9 10 11 12 3 2 2 2 3 4 5 6 7 8 9 10 11 12 3 2 2 3 3 4 5 6 7 8 9 10 11 12 11 11 11 11 11 11 11 11 11 11 11	y  Cotal  An  re-ft.	Jan.	Feb.	Mar	April 420 3956 3956 3956 3956 3956 3956 3956 3956	May 952 870 830 870 1180 1280 2280 2280 2280 1290 1670 1180 1080 1380 1380 1330 1440 1490 1280 1380 1440 1280 1490 1280 892 892 892 892 892	June 1920 1860 1920 1920 1920 2130 22200 22200 22360 2240 2250 2440 2280 1670 1860 1670 1860 1670 1860 1670 1860 1670 1860 1670 1860 1670 2688	July 1440 1280 11800 10800 10800 1910 9910 9952 9870 9910 87750 6805 6410 5755 6800 6110 625017 1440 49600	Aug. 5755 5756 6100 6100 6800 6800 5400 5400 5100 4800 4200 4200 4200 4200 3956 3957 7550 31800	Sept. 3700 3700 3700 3700 3700 3700 4200 3700 4200 4200 4200 4200 4200 4200 4200 4	Oct. 4500 4500 5716 4800 5716 610 645 610 645 610 645 610 645 420 420 420 420 420 420 330 330 330 330 330 330 330 330 330 3	Nov. 350 350 350 370 370 370 370 370 370 370 370 370 37	

Alamosa, Rio Grande at	227
Alamora Pivar ahova Tarraca Pasarvoir	
Description	232
Mean daily discharge	
Alamosa River below Terrace Reservoir—	200
Description	996
Mean daily discharge	
Alma, Middle Fork South Platte River at	zbz
Animas River at Durango—	
Description	
Mean daily discharge	
Appropriations for State Engineer's Office	
Appropriations of Water, claims for	19
Arboles—	
Piedra River at	249
San Juan River at	247
Area Irrigated, see Water Commissioners' reports for each district-	
Division 1, 1915	65
Division 1, 1916	
Division 2, 1915	
Division 2, 1916	
Division 3, 1915	
Division 3, 1916	
Division 4, 1915	
Division 4, 1916	
Division 5, 1915	
Division 5, 1916	123
Arkansas River near Boone—	
Description	158
Mean daily discharge	159
Arkansas River at Canon City—	
Description	155
Mean daily discharge	156
Arkansas River at Granite—	
Description	152
Mean daily discharge	
Arkansas River at Holly—	
Description	164
Mean daily discharge	
Arkansas River near La Junta—	100
Description	161
Mean daily discharge	
Arkansas River near Nepesta—	104
Description	150
- · · · · · · · · · · · · · · · · · · ·	
Mean daily discharge	TOO
Arkansas River at Pueblo—	
Description	
Mean daily discharge	157
Arkansas River at Salida—	
Description	
Mean daily discharge	
Arrow, Fraser River near	183
Aspen—	
Roaring Fork at	
	198
Castle Creek near	201
Maroon Creek near (upper)	204
Maroon Creek near (lower)	204
B	_
Balances turned back	10
	10
Baggs, Wyoming— Willow Creek at Ryan's Ranch near	205
Muddy Creek at Ryan's Ranch near	
Four Mile Creek at Ranger Station near	940

Pi	age
Baxter's Ranch, Slater Fork of Little Snake River near Slater at	
Description	186
Mean daily discharge	
Boone, Arkansas River near	158
Boulder Creek at Orodell—	
Description	
Mean daily discharge	
Buford—	101
North Fork of White River at	307
South Fork of White River near	308
Cache la Poudre River at mouth—	
Description	275
Mean daily discharge	
Cache la Poudre River at mouth near Fort Collins—	
Description	
Mean daily discharge	
Canon City, Arkansas River at	155
Description	222
Mean daily discharge	
Capulin, La Jara Creek near	
Castle Creek near Aspen—	
Description	
Mean daily discharge	203
Description	167
Mean daily discharge	
Chalk Creek (lower station) near St. Elmo—	
Description	
Mean daily discharge	
Clark, Elk River near	269
Description	266
Mean daily discharge	
Comparison of velocity determinations, table of	
Concrete rating flume	
Cone, V. M., report on Venturi Flume	138
Description	238
Mean daily discharge	
Contents, table of	
Cost of improvements to canals and reservoirs—	
Division 1, 1915	
Division 2, 1915	
Division 2, 1916	
Division 3, 1915	
Division 3, 1916	
Division 4, 1915	
Division 4, 1916	
Division 5, 1915	10
Cost of repairs to canals and reservoirs—	
Division 1, 1915	38
Division 1, 1916	
Division 2, 1915	
Division 2, 1916	
Division 3, 1916	
Division 4, 1915	
Division 4, 1916	
Division 5, 1915	114

Cost of superintendence of canals and reservoirs—	age
Division 1, 1915	88
• Division 1, 1916	48
Division 2, 1915	56
Division 2, 1916	
Division 3, 1915	
Division 3, 1916	
Division 4, 1915	
Division 4, 1916	
Division 5, 1915	114
Cottonwood Creek-	
Description	243
Mean daily discharge	246
Cottonwood Creek near Buena Vista—	
Description	164
Mean daily discharge	166
Craig—	
Elk Head Creek near	
Fortification Creek at	293
Craig—	
Yampa at, Description	282
Creede—	
Rio Grande at Thirty-mile Bridge near	
Rio Grande near (Wason)	224
<b>D</b>	
Deadman Creek-	
Description	249
Mean daily discharge	
Decrees on record, number of	
Decrees, publication of	
Decrees, water right	
Del Norte, Rio Grande near	
Delta, Uncompander River near	
Denver, South Platte River at	
Dillon—	403
Blue River at	106
Snake River at	
Ten-Mile Creek at	
Discharge measurements omitted	
Distribution of fees	10
Division Engineer, Div. No. 1, suggested removal to Greeley	50 T0
Division Engineer, Div. No. 1, suggested removal to Greeley	19
Division Engineers, expenses of	
Division Engineers' Recommendations	_
	119
Division Engineers, reports of—	27
Division 1, 1915	
Division 2, 1915	
Division 8, 1915	
Division 3, 1916	
Division 4, 1915	96
Division 5, 1916	115
Division Engineers, salaries of	110
Dixon, Wyo., Little Snake River near	
Durango, Animas River at	201
3	
Eagle River at Eagle—	
Description	192
Mean daily discharge	
Eagle River at Redcliff—	
Description	192
Mean daily discharge	

East Elk Creek near New Castle— Pa	age
Description	
Mean daily discharge	213
East Fork Arkansas River near Leadville—	
Description	149
Mean daily discharge	150
East River at Almont—	010
Description	
Mean daily discharge	
Elk Head Creek near Craig—	209
Description	903
Mean daily discharge	
Elk River near Clark—	
Description	289
Mean daily discharge	
Elk River at Hinman Park—	
Description	286
Mean daily discharge	288
Elk River near Trull—	
Description	
Mean daily discharge	
Employes, list of officers and	
Evaporation, depth in inches, table of	
Evaporation from Colorado reservoirs	
Evaporation, losses from stream-bed reservoirs	
Evaporation records available	
Evaporation records, factors involved	
Evaporation, table of monthly percentages of	120
<b> </b>	
Fairplay, Middle Fork South Platte River at	252
Fees received in State Treasurer's Office, distribution of	
Financial	
Ford runabout, cost of operating	
Fort Collins, Cache la Poudre River at mouth of canon near	274
Fort Garland—	
Sangre de Cristo Creek near	
White Creek near	241
Fortification Creek at Craig—  Description	909
Mean daily discharge	293
Four-Mile Creek at Ranger Station near Baggs, Wyoming—	290
Description	905
Mean daily discharge	
Fraser River near Arrow—	
Description	183
Mean daily discharge	
Fruita, Grand River near	180
Frying Pan Creek at Norrie-	
Description	207
Mean daily discharge	208
Frying Pan Creek near Thomasville—	
Description	209
Mean daily discharge	210
Funds—	
Auto, purchase of	
Chief Hydrographer's salary	•
Clerk's salary	
Deputy State Engineer's salary	
Division Engineers' expense	
Division Engineers' salaries	
Duo diaman no la mer	
Draftsman, salary	. 12
File Clerk's salary	. 12 . 12
File Clerk's salary Hydrographers' expenses	. 12 . 12 . 12
File Clerk's salary	. 12 . 12 . 12

State's Engineer's salary	Page 11
Stenographic services	
Travelling expenses, Chief Hydrographer	
Travelling and contingent expense, State Engineer and Deputies	
	•
<b>G</b>	
Gardner's Ranch—	
South Fork of Little Snake River at	
Middle Fork of Little Snake River at	. <b>2</b> 97
Geneva Creek at Grant—	
Description	. 266
Mean daily discharge	267
Glendevey, Laramie River at	278
Glenwood Springs-	
Grand River at	177
Roaring Fork at	
Golden, Clear Creek near	
Grand Lake, North Fork of Grand River at	
Grand Mesa Waters Users' Association	
Grand River near Fruita—  Description	100
Mean daily discharge	182
Grand 1917 of the Gronwood Springs	
Description	
Mean daily discharge	179
Grand River near Kremmling-	
Description	
Mean daily discharge	178
Grand River at Palisades—	
Description	180
Mean daily discharge	181
Grand River at Sulphur Springs—	
Description	174
Mean daily discharge	
Granite, Arkansas River at	
Grant, Geneva Creek at	
Grant, North Fork South Platte River at	
Grand Valley project	
Gunnison River near Gunnison—	100
Description	914
Mean daily discharge	
mean dany discharge	410
<b>E</b>	
Hamilton, Williams River at	293
Headgates, order to Commissioner of District 33	84
Hinman Park, Elk River at	286
Holly, Arkansas River at	164
Homestead Creek near Red Cliff—	
Description	195
Mean daily discharge	
Hydrographic Department	
	140
I	
Ignacio, Los Pinos River near	249
Improvements to canals and reservoirs, cost of, see Commissioners' or	
Division Engineers' reports.	
Indexing, water right decrees	14
Introduction	7
Irrigation development	8
Irrigation securities	7
<b>.</b>	
Jefferson, Tarryall Creek near	262
Jelm, Wyo., Laramie River at	900
Julesburg, South Platte River near	
	403
K	
Kersey, South Platte River at	
Kremmling, Grand River near	177

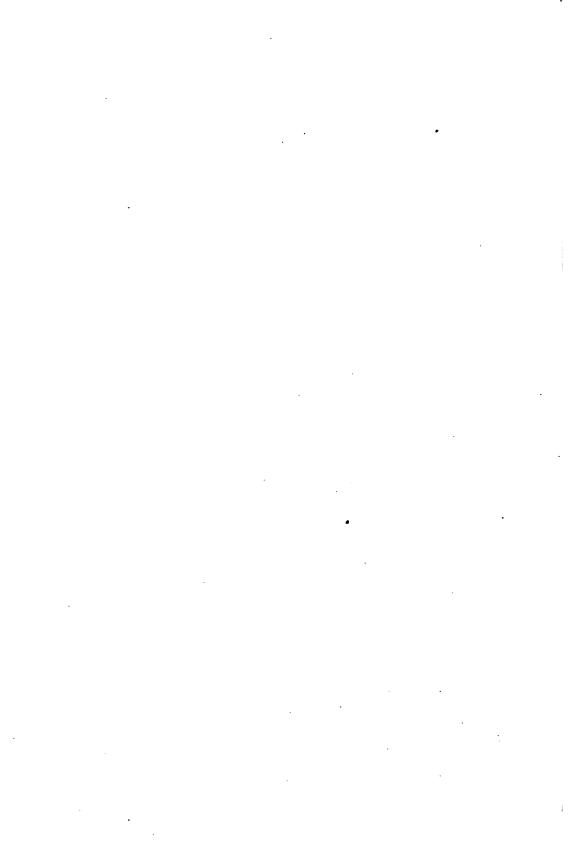
<b>L</b>	Page
Lake George, South Fork of South Platte River at	254
La Jara Creek near Capulin—	
Description	236
Mean daily discharge	237
Læ Junta, Arkansas River near	161
Lamar, Arkansas River at	161
Laramie River at Glendevey— .	
Description	278
Mean daily discharge279,	280
Lamarie River near Jelm, Wyoming—	
Description	
Mean daily discharge	281
Leadville—	
Tennessee Fork near	
East Fork Arkansas River near	
Letter of transmittal	2
Little Snake River near Dixon, Wyoming-	
Description	
Mean daily discharge	
Little Snake River, Middle Fork of, at Gardner's Ranch	
Little Snake River, Slater Fork of, at Baxter's Ranch near Slater	
Little Snake River, South Fork of, at Gardner's Ranch	
Los Pinos River near Ignacio—	280
Description	940
Mean daily discharge	
Los Pinos Creek near Ortez—	200
Description	928
Mean daily discharge	
Lyons, St. Vrain Creek at	
Dyons, St. Train Crook at	212
×	
Mad Creek near Steamboat Springs-	
Description	229
Mean daily discharge	
Maroon Creek near Aspen—	
Description	204
Mean daily discharge	
Maroon Creek near Aspen (lower station)-	
Description	204
Mean daily discharge	206
Maybell, Yampa River at	285
Meeker, White River near	809
Middle Fork of Little Snake River at Gardner's Ranch—	
Description	
Mean daily discharge	. <b>299</b>
Middle Fork South Platte River at Alma—	
Description	
Mean daily discharge	. 252
Middle Fork South Platte River at Fairplay—	
Description	
Mean daily discharge	. 253
Miner, J. H., report of	
	. 238
Monthly percentages of evaporation, table of	
Montrose, Uncompander River at	. 218
Muddy Creek near Baggs, Wyoming—	9.0-
Description	
mean daily discharge	. out
x	
Navajo River at Edith—	
Description	
Mean daily discharge	
Nepesta, Arkansas River near	
RIATE CASTIA MAST WIF CYCAF MAST	710

Norrie— Pag	;e
North Fork of Frying Pan Creek near 20	96
Frying Pan Creek at	07
North Crestone Creek—	
Description24	
Mean daily discharge 24	14
North Fork of Frying Pan Creek near Norrie-	
Description 20	)6
Mean daily discharge 20	)7
North Fork of Grand River at Grand Lake.	
Description	
Mean daily discharge	( 5
North Fork South Platte River at Grant— Description	- 0
Mean daily discharge	) 2
Description	5.0
Mean daily discharge	
North Fork of White River at Buford—	,,,
Description	07
Mean daily discharge	
O	,,
Officials in charge of water distribution	4
Orodell, Boulder Creek at	
Ortiz—	. 4
Los Pinos Creek near	3 8
San Antonio River near	
Ouray—	
Canon Creek at	22
Uncompangre River at	
Uncompangre River below 21	
p	
Palisades, Grand River at	RA
Parshall, Williams Fork near	
Piedra River at Arboles—	-
Description	49
Mean daily discharge	
Poncha—	
South Fork of Arkansas River at 17	70
Poncha Creek at	70
Poncha Creek at Poncha—	
Description	
Mean daily discharge 17	
Pueblo, Arkansas River at	55
Purgatoire River at Trinidad—	
Description17	
Mean daily discharge	
Pyle, Fred D., report on Uncompangre Valley project86, 10	υI
Ranger Station near Baggs, Wyo., Four-Mile Creek at	
Records available, evaporation	27
Red Cliff— Eagle River at	
Homestead Creek near	
Turkey Creek at	90
Report, biennial, chapters not printed	9
Report, biennial, copies of	8
Reports of Water Commissioners, unreliable	
Reservoirs, canacities of see Division Engineers' reports	
Reservoir decrees, number of	16
Reservoirs, evaporation losses from stream-bed	
Reservoirs, storage in, see Division Engineers' reports.	
Rio Grande at Alamosa—	
Description	27
Mean daily discharge	

Rio Grande near Creede (Wason)— Pa	age
Description	224
Mean daily discharge	226
Rio Grande near Del Norte—	
Description	227
Mean daily discharge	228
Rio Grande near Lobatos—	
Description	230
Mean daily discharge	231
Rio Grande at Thirty-Mile Bridge near Creede—	
Description	224
Mean daily discharge	225
Roaring Fork at Aspen—	
Description	198
Mean daily discharge	199
Roaring Fork below Aspen—	
Description	198
Mean daily discharge	200
Roaring Fork at Glenwood Springs-	
Description	201
Mean daily discharge	202
Rollinsville, South Boulder Creek at	
Ryan's Ranch near Baggs, Wyo., Willow Creek at	305
<b>s</b>	
<del>-</del>	
Salida, Arkansas River at	152
San Antonio River near Ortiz—	
Description	
Mean daily discharge	241
San Juan River at Arboles—	
Description	247
Mean daily discharge	248
Sangre de Cristo Creek near Fort Garland— ,	
Description	
Mean daily discharge	242
Saguache Creek near Saguache	
Description	233
Mean daily discharge	234
Savery Creek near Savery, Wyoming—	
Description	301
Mean daily discharge	
Scholl, Williams Fork near	183
Slater Fork of Little Snake River at Baxter's Ranch near Slater-	
Description	297
Mean daily discharge	300
Snake River at Dillon-	
Description	
Mean daily discharge	190
Soda Creek at Steamboat—	
Description	
Mean daily discharge	287
South Boulder Creek at Eldorado Springs—	
Description	
Mean daily discharge	271
South Boulder Creek near Rollinsville—	
Description	
Mean daily discharge	270
South Crestone Creek-	
Description	243
Mean daily discharge	244
South Fork of Arkansas River at Poncha-	
Description	
Mean daily discharge	171
South Fork of Little Snake River at Gardner's Ranch—	
Description	
	942

South Fork of South Digita Diver at Lake Conver-	age
South Fork of South Platte River at Lake George—  Description	
Mean daily discharge	
	200
Description	990
Mean daily discharge	434
Description	900
Mean daily discharge	
South Platte, North Fork of South Platte River at	
South Platte River at Denver—	250
Description	950
Mean daily discharge260,	
South Platte River near Julesburg—	. 401
Description	969
Mean daily discharge	
South Platte River at Kersey—	201
Description	950
Mean daily discharge	
South Platte River at South Platte—	404
Description	957
Mean daily discharge	203
Description	949
Mean daily discharge	
State Engineers of Colorado, list of	
Steamboat Springs, Mad Creek near.	
Steamboat Springs, Mad Creek near	
Steamboat Springs, Soua Creek at	
St. Elmo—	. 404
Chalk Creek (upper station) near	101
Chalk Creek (lower station) near	
St. Vrain Creek at Lyons—	. 101
Description	075
	07/
Mean daily discharge	
Storage of water in stream-bed reservoirs	124
Storage of water in stream-bed reservoirs	. 124 . 174
Storage of water in stream-bed reservoirs	. 124 . 174
Storage of water in stream-bed reservoirs  Sulphur Springs, Grand River at  Superintendence of canals and reservoirs, cost of, see Division Engin reports.	. 124 . 174 eers
Storage of water in stream-bed reservoirs  Sulphur Springs, Grand River at  Superintendence of canals and reservoirs, cost of, see Division Engin reports.  T  Table of depths in inches of evaporation	. 124 . 174 eers
Storage of water in stream-bed reservoirs	. 124 . 174 eers
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 125
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 125
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 123 . 263 . 264
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 123 . 263 . 264
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 125 . 265 . 264 . 21
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 12: . 26: . 26: . 21: . 21:
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 12: . 26: . 26: . 21: . 21:
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 123 . 263 . 264 . 214 . 215 . 189
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 123 . 263 . 264 . 214 . 215 . 189
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 12 . 26 . 26 . 21 . 21 . 183 . 191
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 12 . 26 . 26 . 21 . 21 . 183 . 191
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 125 . 263 . 263 . 211 . 211 . 183 . 191 . 144 . 153
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 263 . 264 . 211 . 211 . 183 . 191 . 143 . 153
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 263 . 264 . 211 . 211 . 183 . 191 . 143 . 153
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 121 . 263 . 26 . 21 . 21 . 189 . 155 23 23 209
Storage of water in stream-bed reservoirs  Sulphur Springs, Grand River at.  Superintendence of canals and reservoirs, cost of, see Division Engin reports.  Table of depths in inches of evaporation  Table of monthly percentages of evaporation  Tarryall Creek near Jefferson—  Description  Mean daily discharge  Taylor River at Almont—  Description  Mean daily discharge  Ten-Mile Creek at Dillon—  Description  Mean daily discharge  Tennessee Fork near Leadville—  Description  Mean daily discharge  Terrace Reservoir—  Alamosa River above  Alamosa River below  Thomasville, Frying Pan Creek near.  Transmittal, letter of  Trinidad, Purgatoire River at.	. 124 . 174 eers . 135 . 126 . 263 . 26 . 211 . 211 . 183 . 191 . 153 . 230 . 209
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 126 . 263 . 26 . 211 . 211 . 183 . 191 . 153 . 230 . 209
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 126 . 263 . 264 . 211 . 215 . 153 . 230 . 209 
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 126 . 263 . 264 . 211 . 215 . 153 . 230 . 209 
Storage of water in stream-bed reservoirs	. 124 . 174 eers . 135 . 12: . 26: . 26: . 21: . 21: . 183 . 191 . 15: . 23: . 20: . 20: 
Storage of water in stream-bed reservoirs.  Sulphur Springs, Grand River at.  Superintendence of canals and reservoirs, cost of, see Division Engin reports.  Table of depths in inches of evaporation.  Table of monthly percentages of evaporation.  Tarryall Creek near Jefferson—  Description  Mean daily discharge  Taylor River at Almont—  Description  Mean daily discharge  Ten-Mile Creek at Dillon—  Description  Mean daily discharge  Tennessee Fork near Leadville—  Description  Mean daily discharge  Terrace Reservoir—  Alamosa River above  Alamosa River below  Thomasville, Frying Pan Creek near.  Transmittal, letter of  Trinidad, Purgatoire River at.  Trulk, Elk River near  Turkey Creek at Red Cliff—  Description  Mean daily discharge	. 124 . 174 eers . 135 . 12: . 26: . 26: . 21: . 21: . 18: . 19: . 15: . 23: . 20: . 20: 
Storage of water in stream-bed reservoirs Sulphur Springs, Grand River at. Superintendence of canals and reservoirs, cost of, see Division Engin reports.  Table of depths in inches of evaporation. Table of monthly percentages of evaporation. Tarryall Creek near Jefferson—  Description Mean daily discharge  Taylor River at Almont— Description Mean daily discharge  Ten-Mile Creek at Dillon— Description Mean daily discharge  Tennessee Fork near Leadville— Description Mean daily discharge  Terrace Reservoir— Alamosa River above Alamosa River below  Thomasville, Frying Pan Creek near.  Transmittal, letter of Trinidad, Purgatoire River at. Trulk, Elk River near  Turkey Creek at Red Cliff— Description Mean daily discharge  Uncompangre River near Delta—	. 124 . 174 eers . 138 . 127 . 263 . 26 . 21 . 21 . 183 . 191 . 153 . 233 . 203 
Storage of water in stream-bed reservoirs.  Sulphur Springs, Grand River at.  Superintendence of canals and reservoirs, cost of, see Division Engin reports.  Table of depths in inches of evaporation.  Table of monthly percentages of evaporation.  Tarryall Creek near Jefferson—  Description  Mean daily discharge  Taylor River at Almont—  Description  Mean daily discharge  Ten-Mile Creek at Dillon—  Description  Mean daily discharge  Tennessee Fork near Leadville—  Description  Mean daily discharge  Terrace Reservoir—  Alamosa River above  Alamosa River below  Thomasville, Frying Pan Creek near.  Transmittal, letter of  Trinidad, Purgatoire River at.  Trulk, Elk River near  Turkey Creek at Red Cliff—  Description  Mean daily discharge	. 124 . 174 eers . 135 . 123 . 263 . 26 . 211 . 211 . 183 . 191 . 153 . 230 209 

Uncompangre River at Montrose—	Page
Description	
Mean daily discharge	. 220
Uncompangre River at Ouray—	
Description	
Mean daily discharge	. 217
Uncompangre River below Ouray—	
Description	
Mean daily discharge	
Uncompangre Valley project	, 101
Ute Creek near Fort Garland—	
Description	
Mean daily discharge	. 242
· •	
Velocity determinations, table of	
Velocity determinations, vertical	. 145
Venturi Flume-	
Developments	
Discharge curves	
Patent applied for	. 143
Plans of139,	
Vertical velocity determinations, conclusions from tests	. 147
lacktriangledown	
Water, claims for appropriations of	. 19
Water Commissioners' ditch reports, Division No. 1	
Water Commissioners, list of	. 5
Water Commissioners' reports, Division No. 1, abstracts from	. 32
Water Commissioners' reports, District No. 3	. 31
Water Commissioners, recommendations as to appointment of	. 58
Water Commissioners, reservoir reports, Division No. 1	
Water distribution, list of officials in charge of	
Water divisions and districts, map of	. 26
Water right decrees	. 14
Weekly reports of Water Commissioners, see Division Engineers' reports	3.
Williams Fork near Parshall-	
Description	186
Mean daily discharge	187
Williams Fork near Scholl—	
Description	
Mean daily discharge	185
Williams River at Hamilton—	
Description	293
Mean discharge	296
Willow Creek—	
Description	243
Mean daily discharge	
Willow Creek at Ryan's Ranch, near Baggs, Wyoming-	
Description	305
Mean daily discharge305,	
White River near Meeker—	
Description	309
Mean daily discharge	310
White River, North Fork of, at Buford	307
White River, South Fork of, near Buford	
<b>T</b>	
Yampa River at Craig—	
Description	282
Mean daily discharge	
Yampa River near Maybell—	
Description	285
Mean daily discharge	
Yampa River at Steamboat Springs—	_ • •
Description	282
Mean daily discharge	
Yampa River at Yampa—	
Description	282
Mean daily discharge	



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