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1952

STATE OF COLORADO
ENGINEERING DEPARTMENT
DENVER

Durango, Colorado.
February 17-1952

SUBJECT:

Mr. M. C. Hinderlider,
State Engineer
Denver, Colorado.

Dear Sir:

This is to submit for your approval the annual report of Division Engineer, Irrigation Divison Number Seven for the year 1952.

Respectfully yours,
J. R. Williams
J. R. Williams
Division Engineer.

Annual Report for 1952

Irrigation Division Number 7

By J. R. Williams,
Irr. Division Engineer.

After two consequetive years of deficient water supply, 1950 and 1951, it was a distinct relief to enter 1952 with adequate ground moisture in the farming and grazing areas and with a big snow cover in the mountains.

More than average precipitation commenced in November, continued thru December and January with probably the heaviest precipitation on record occuring during the last two months mentioned. By April 1st. the accumulated snow and water content at several snow courses on San Juan, Animas and Dolores River Watersheds was as follows:

Table 1

Drainage and Snow Course	Snow Depth	Water Content	Years Record	Average Water Content	1952 Percent of Average Water Content
San Juan & Animas					
Upper San Juan	142.3	58.6	16	33.6	174
Granite Peaks	29.5	9.7	11	6.7	145
Cascade	67.1	23.5	16	11.1	212
Silverton	45.7	14.3	16	4.7	304
Average	71.2	26.5	16	14.0	190
Dolores River					
Rico	51.2	20.4	16	8.1	252
Trout Lake	70.3	22.7	16	11.5	197
Lizard Head	81.5	30.0	16	19.5	154
Average	67.6	24.4	16	13.0	172

Table 2

Winter Precipitation and Departure from Normal.

Weather Bureau Station		Monthly Precipitation and Departure in Inches					
		November	December	January	February	March	Total
Cascade	Amt.	3.32	7.93	5.89	2.76	5.36	25.26
	Dep.	1.50	5.44	3.09	- 0.18	1.94	11.79
Vallecito Dam	Amt.	1.91	7.27	5.34	0.50	2.86	17.88
	Dep.	0.70	5.35	1.91	- 1.35	0.46	7.07
Silverton	Amt.	2.16	5.26	3.77	1.18	2.13	14.50
	Dep.	0.88	3.56	1.99	- 0.66	- 0.51	5.26
Wolf Creek Pass	Amt.	7.35	16.01	11.21	4.20	9.44	48.21
	Dep.	4.33	11.07	4.73	- 1.81	2.05	20.36
Rico	Amt.	2.04	6.36	3.48	1.30	2.10	15.28
	Dep.	0.53	4.29	1.03	- 1.45	- 0.72	3.68
Trout Lake	Amt.	3.34	6.50	3.68	2.52	3.11	18.95
	Dep.	1.76	4.33	1.68	- 0.13	- 0.16	7.48

The most excessive amounts of snow fell on Wolf Creek Pass. Total measured or recorded snowfall at the Maintenance Highway Camp, where the Weather Bureau record is obtained, for the November-March period was 559 inches or forty six and one half f eet. The greatest amount on the ground at any time was 196 ins. or 16.3 feet on January 22. As shown in Table 1 on April 1st. at the snow course the water content of accumulated snow was 58.6 inches. This compares with a total Weather Bureau record of 48.21 inches precipitation. There was some snowfall in October. Total recorded moisture was 3.14 inches.

The departure from average or the relation of winter moisture to the average for the stations shown above was 166 percent. This nearly coincides with the measured water content on the snow courses as of April 1st. when the relation to average was 172 percent.

The summer rainfall was below average with noticeable deficiencies in August and September and with a total blank or no measurable rainfall at any station for October.

It has been predicted that low or deficient moisture in October is indicative of a deficient water supply for the next year.

Table 3

Monthly Precipitation and Departure

April- October 1952

W.Bureau Station		Month: April	May	June	July	Aug.	Sept.	Oct.	Total
Cascade	Amt.	3.15	——	1.73	1.97	1.61	2.64	0/00	* 11.10
	Dep.	0.69	——	0.48	- .75	-1.36	- .18	-2.85	- 3.97
Cortez	Amt.	2.64	0.41	0.50	1.30	0.52	1.31	0.00	6.68
	Dep.	1.28	-0.49	-0.16	-0.22	-1.16	-0.34	-1.52	- 2.61
Dolores	Amt.	3.04	0.59	0.75	1.43	0.80	1.42	0.00	8.03
	Dep.	1.33	-0.54	-0.03	-0.35	-1.04	-0.96	-1.79	- 3.38
Durango	Amt.	3.06	0.32	1.54	2.38	2.92	——	0.00	* 10.22
	Dep	1.61	- .81	0.67	0.43	0.78	——	-1.87	0.81
Ft. Lewis	Amt.	2.72	0.20	2.03	2.22	1.23	1.28	0.00	9.68
	Dep:	1.34	- .88	1.17	0.09	- .99	- .63	-1.75	- 1.65
Mancos	Amt.	2.71	0.25	0.74	3.69	1.08	0.88	0.00	9.35
	Dep.:	.95	-1.01	- .07	1.78	- .93	- .64	-1.60	- 1.52
Vallecito	Amt:	2.18	0.97	2.46	3.46	2.50	1.66	0.00	13.23
Dam	Dep.:	0.28	- .39	1.38	1.65	- .28	- .62	-2.14	- .12

* Some record missing.

Temperatures were generally average or above during the growing season. Frost free period was from last week of May to October 7. A period of 137 days which is about two weeks longer than the average. The usual freeze in June was escaped. As a matter of interest it can be here recorded and predicted that when there is a heavy snow cover in the mountains, the late spring freeze does not occur. It seems to take a dry cold to freeze things badly. Then there was a good rain storm the first week of June which was a favorable occurrence. More than average rainfall was experienced during June and July.

Stream Flow.

Owing to the great amount of snow cover on the water sheds there was speculation as to total runoff and predictions of floods. The stream flow from snow melt for the April - July period was about as the snow deposit indicated in relation to average. Owing to the weather conditions that governed the rate of melt there were no excessive floods. In fact no major floods have ever resulted in this area from snow melt alone. All have been the result of rain on the snow or rain in itself. Stream flow was better than

average thru out the summer but was not sufficent to meet requirements for irrigation in the late summer and fall.

Use of Water.

The total reported diversions from natural flow was 460,500 acre feet which was about 70,000 a.f. more than diverted in 1951. A large part of the stream flow was not diverted in 1952 while in 1951 every drop was diver ted or stored.

A total of 70,500 acre feet was used from storage. This amount was 6,470 a.f. less than was used in 1951.

The total carry over or amount left in storage on November 1 was approximately 90,000 acre feet. In 1951 there remained 38,250 a.f. on the same date.

There were 84,198 acres irrigated from storage reservoirs. This total includes lands receiving supplemental water and lands receiving total supply from storage.

Administration.

Because of more plentiful and lasting stream supply there were far less problems than in 1951. The late summer, being deficient in rainfall, caused stream flow to recede and the water ponds in farm areas to be exhausted and hence there was a critical period in September about stock and domestic water. A good rain on Sept. 23d. relieved most of the exigency. The dry weather in October brought about a similar situation which was not entirely relieved until well into November.

To obtain determination of flow in canals and to properly measure the flow therein, there were installed a large number of rating flumes, headgates and waste gates. All such flumes were of steel, set on concrete sills and with adequate concrete wing walls. The headgates and waste gates were also of steel with concrete walls, floor and wingwalls. Such permanent type off installations was obtained by insistence that this type was required as being satisfactory to the State Engineer, Division Engineer or Water Commissioner.

The largest number of such installations was made on ditches taking water from Pine River in District 31 where we have worried along with inadequate wood headgates and flumes since 1934. There were also several such flumes and headgates placed in District 33 and 34. There remain a number of ditches in District 34 on the Dolores River where new structures will be required.

Necessary engineering work and supervision was furnished by this office or by capable Water Commissioners. All construction work was done by owners of canals with the assitance of the brethren in the Department of Water Resources.

Crops.

Owing to reasons already explained, the grain and hay crops were much better than average. Pasture and forage was also good.

Tabulation of Water Commissioners Annual Ditch Reports.

Dist. No.	Amount Appropriated in S. F.	Capacity of Canals in S. F.	First Day Water Was Used From Nat. Stream	Last Day Water Was Used From Nat. Stream	Number of Days Water Used From Nat. Stream	Average Daily Amt. Used in S. F.
29	589	* 639				
30	652	972	Apr. 20	Nov. 15	230	239
31	723	914	May 14	Nov. 20	191	360
33	263	504	April 7	Oct. 31	208	61.5
34	868	1006	March 31	Oct. 31	215	320
69	93	82	April 14	Aug. 31	140	18.7
Total	3188	4117	March 31	Nov. 20	235	980

* Estimated by Division Engineer. No report by Water Commissioner.

Water Commissioners Annual Ditch Reports. (Continued)

Dist. No.	Number of Acre Feet Used From Nat. Stream	Total Number of Acres Irrigated
29	* 45,000	* 15,000
30	110,000	25,915
31	137,570	47,493
33	25,600	12,683
34	137,150	49,925
69	5,220	1,125
Total	460,540	152,141

* Estimated by Division Engineer.

Tabulated Statement of Water Commissioners Annual Reservoir Reports.

Dist. No.	Number of Reservoirs in Dist.	Area of High Water: Acres:	Capacity in Acre Feet	Maximum Amount in Storage	Date of Maximum Storage	Amount in Reservoirs Nov. 1 A.F.	Number of Acre Feet Used From Storage	Number of Acres Irrigated From Storage
29	5	*670	* 1500	* 1500			* 1400	* 1500
30	3	899	24460 **	24420 **	July 1	19110 **	240	200
31	2	3077	128050	113760	July10	54310	42740	35023
33	1	50	1200	1200	Apr.24	150	1150	740
34	9	1209	25510	25810	May 14	5180	34770 ***	46655
69	2	696	22640	22010	June 21	10900	196	80
Total	22	6601	203360	188500		89750	70496	84198

* Estimated by Division Engineer. No report by Water Commissioner.

** Includes capacity and water stored in Cascade Reservoir by Western Colo. Power Company.

*** Includes 11420 acre feet stored in Ground Hog Reservoir but used thru Main Canals in Dist. 34.

1952

PRELIMINARY REPORT

IRRIGATION DIVISION NUMBER 7

1952

Durango, Colo.
November 21-1952

Water Supply.

The heavy precipitation during the winter of 1951-52 presaged a good water year for 1952. The accumulated snow on the watersheds and as measured at the several stations on April 1st. was in many instances the greatest of record and also as much as two times the average. The following tables give some of the snow depths and water content.

San Juan River.

Date	Station	Snow Depth Ins.	Water Content Ins.	Average Water Content	Number Years of Record	Percent of Average
April 1	Upper San Juan	142.3	58.6	33.6	16	175
	Granite Peaks	29.5	9.7	6.7	11	145

Animas River

April 1	Cascade	67.1	23.5	11.1	16	212
	Silverton	45.7	14.3	4.7	16	306
	Spud Mtn.	98.9	32.8		1	
	Molas Lake	81.5	31.2			
	Howardsville	66.2	20.3			
	Mineral Cr.	78.8	20.8			
	Red Mtn.	110.2	44.0			
Average		78.3	26.7			

It is customary and interesting to compute or estimate the amount of water or runoff that will occur when there is a big snow depth on the watersheds. Independent estimates are made by this office which do not generally agree with estimates made by the Soil Conservation Service. On the Animas it was estimated that the total runoff at Durango for the April-

July period, would be about 709,000 acre feet. Estimates are based on past performance with a coefficient applied for the estimated ground absorption and assuming that average precipitation will occur during the snow melt period. The actual runoff at Durango was about 693,000 acre feet. The efficiency rating on this particular guess was 98.

For the Dolores River the average water content at three stations, Rico, Lizard Head and Trout Lake , was 24 ins. or about two times the sixteen year average for the same stations. The estimated total runoff was 561,000a.f. The measured runoff at Dolores was 447,000 a.f. The efficiency rating on this estimate was 80. There was a forty percent loss by ground absorption and evaporation on the watershed.

One snow measuring station in the La Plata Mountains at elev. 9700 feet gave on April ist. a snowdepth of 69.6" and water content of 28.4". This amount of water applied to 37 sq.mi. of drainage area with twenty percent loss indicated a total discharge at Hesperus of 46,000 a.f. Without correction for loss the total was 57,000. The measured discharge for April-July period was 58,000 a.f.

The snow surveys are of particlar value in relation to discharge of Pine and Vallecito Rivers into Vallecito Reservoir. The Bureau of Reclamation make estimates for operation of the reservoir and invite this office to submit an estimate. Their estimates are based on theoretical formulas in higher mathematics of which I know little about. Simple arithmetic and past records are sufficent for me. The Bureau estimate was a low of 350,000. A maximum of 400,000 and a mean of 375,000. My estimate was 332,000. Actual or computed total runoff was 308,000 a.f.

Big snow deposits on the watersheds always cause speculation as to probable flood peaks. Owing to the manner of thawing this past season there were no large flood peaks or extreme floods which seemed probable.

The maximum flood stage at Durango was about 8,500 s.f. which was about twenty percent in excess of the ordinary flood stage. At Dolores the maximum was 5,130 s.f. or just about average stage.

Records of water diversions from the natural streams have not as yet been received from the several water commissioners. Water was used later than usual, owing to a dry condition this fall. Recent snow and rain have caused a stop to irrigation. It is known, however, because of the general adequate supply, that more than the average amount of water was diverted from streams. Use of water from storage was less than in 1951. Carryover in storage as of Nov. 1 was about 72,000 acre feet as compared with about 25,000 a.f. carried over last year.

The following is a summary of reservoir operation for 1952.

Name of Reservoir	Capacity	Max. Amount Stored	Date	Outflow Measured	Amount in Storage Nov. 1
Vallecito	126,280	113,760	7/10	* 33,220	54,310
Jackson Gulch	9,990	9,990	6/23	5,710	4,160
Bauer Lakes	1,250	1,250	—	900	350
Webber	200	200	—	200	0
Summit System	5,245	5,540	6/15	5,200	500
Narraguinepp	8,580	8,580	5/7	7,370	500
Ground Hog	21,710	21,710	6/21 to 7/18	11,420	10.760
Florida	480	480	—	240	240
Red Mesa	1,200	1,200	—	900	300
Total of 5 res. in Dist. 29	Est. 1,500	1,500	—	Est.1,000	500
Total Active for Irrigation	176,435	164,210		66,160	71,620

The total number of acres irrigated from storage was about the same as in 1951 or 84,000 acres.

* Storage in Vallecito Reservoir was reduced from 113,760 a.f. on July 10 to 87,540 a.f. on Aug. 7th. when release of storage water for irrigation commenced.