Review - Poadre Valley Report
- Poudre Valley -

Purpose of the investigation: Use of water.
Division of the area - A, B, C. Describe valley.
Field work: 1. River measurements,
   2. Discharge of canals,
   3. Important laterals
   4. Water requirements of crops
   5. Absorption losses, canal terce.
   6. Mapping of crops
   7. Area, kinds of water
   8. Miscellaneous data.

1. River measurement — Common mouth — register record.
2. Method, rating flume, register, kinds installation
3. Important laterals — purpose
4. 30 Farms studied in detail, water requirement crops
5. Canal + reservoir losses
7. Water classification of irrigated area.
8. Survey of representative areas. 86% exclusive of the farm
   land devoted to canals, laterals, roadways, marginal water.

The Cache la Poudre valley — water shed 1900 sq mi.
86% of the irrigated lands of valley lie to the north of river.
First ditch from the river, later known as the Yeager ditch,
made 1860 by Sanderson, near Bellvue.
Railroads in 1870 important to development of valley, and also the establishment of the Union Colony. Hence Greeley, promote colonization through his NY Tribune. Greeley No. 3 and No. 2 ditches built. Discuss growth to present. 1870 1000 acres.

Briefly meteorology - 30 year record 1887 to 1917
Rainfall 15.04 in., max 22.48, Min 7.11
Temperature max 99.7, Absolute min 38.4
Evaporation max 17.30 in., Min 34.24 in.
Approx 73% rainfall Apr 15 & Sept 15
Range Greeley 103 to 45 - 148 degrees
H Collins, avg time between killing frost 144 days

Soils: Survey by Bureau of soils 1904. 16 types mapped
Principal type: Cob, fine sandy loam, Sausal sandy loam
H Collins loam. (a) residual soil, (b) alluvial soil
(c) heavy soil.

Water resources: Rivers, tributaries, fright, surface streams.
River at Comon station, Max 689,000 acre ft, Min 169,000
avg 320,000 acre ft. Avg date of high water: June 10, early
May 17, late as June 28. Peak 1550 to 5800, Min
flow 3000 cfs in winter.
With Poudre and Poudre Valley canals divert about
400,000 acre ft annually above Comon station.
Floods from floods from creeks, approximately about 40,000 acre-ft for average year. 15,000 acre-ft run off and 25,000 as return seepage, greater part intercepted and used before reaching river. Foreign water 75,000 acre-ft. The record of concentration includes the Poudre, North Poudre, and San Juan rivers. Foreign water is pumped about 5,000 acre-ft annually. Total amount of seepage return to river is about 110,000 acre-ft annually. During the summer months about 51,000 acre-ft is available to satisfy rights on lower rivers.

Summary, we have 340,000 acre-ft, river and tributaries:

\[
\begin{align*}
35,000 & \text{ foreign} \\
5,000 & \text{ pump} \\
13,200 & \text{ seepage} \\
84,000 & \text{ total, annual.}
\end{align*}
\]

Appropriations at this late date on river - no value. Demand on river in June close to 120,000 acre-ft, which is equivalent to approx 21,000 cfs. The river has failed to reach this discharge 18 years out of the 33 years covered by the records. To produce a surplus of 20,000 to 25,000 acre-ft would require 2500 cfs. and this only occurred 7 out of 33 years.

To Nov 1906. Water right decree Dist. No. 3 104 priority (1860).
Seepage Return: Seepage return important, explains return to Poudre very marked. (Unreadable text)
10 year period determined 152 sec. ft. can./month. See table III.
To arrive at these figures the total supply from all sources was determined by adding the discharge of the river at the lower station, discharge of all canals, less the water return to the river through sluices and waterway. Supply available, canals + North P. + Boudre 0. Total inflow from tributaries. Supply available - normal flow being amount of seepage - run-off from rains and waste - not accurate - Resulted in 182000 acre ft. annually, which is equivalent to a constant flow of 190 sec. ft. or about 36% of the total supply.

Drainage: No so important, many acres affected but not in any large area.

Exchange of Water: Reservoirs the key to system. 12 reservoirs built, 50000 acre ft. below canals, canals from exchange system developed to make use of these acres. 1916, about 55000 acre stored in these lower basins made available to their own distributing system. 14% take Claymore lake as example - owned & filled by P. U. & Lake Canal Co. outlet to river - Demand in late
reason heavy the canal may divert 15 to 20 sec. ft in addition to their appropriation. Like amount is turned from river rea. to river so that the net effect on the stream will find this amount reaching their headgate. The present exchange system developed from water stored in Long Pond. The exchange in some cases are very complex and affect several systems.

Beginning at lower end of river

| 1870 | Greeley No. 2 | Rights in order | Larimer & Weld, |
|      |               |                  | Larimer County, |
|      | North Poudre  |                  |                |

1871

Reo No. 5 + 6 - of the North Poudre are too low to serve their own lands. These outlet into the Larimer County. With the exception of Chambers Lake and Black Hollow the reservoir system of the Water Supply Co. Co is below their main distributing system. Their reservoir outlet in to the Larimer & Weld system on the river. Below the Lar. & Weld is Windsor Reo. which outlet into Greeley No. 2.

The greater majority of rights in Windsor Reo. are owned by farmers under the Larimer & Weld.

Example involving the big four -

North Poudre divert 100 sec. ft for 10 days in 1985 accept ft -

Windsor Reo. pays Greeley No. 2 1985 secure ft. to secure the Windsor rea. there is held in Reo No. an equal amount subject to call. This permit the North Poudre to
Use 1985 acre ft of water in their system and secured by an equal amount in Res No 6 which below their own system. When payment is demanded by the Windsor Res. the account is balance through the Water Supply and Storage systems. Such an exchange has resulted in nearly 6,000 acre ft transferred - Windsor Res. to Deekly No 2, 1985, Res No 6 to Farmer Co. 1885 acre ft, Long Pond to Farmer Weld 1985 acre ft.

Water administration became necessary in 1958 due to great development in irrigation systems in the late 70's. Early adjudicated rights in years, no knowledge as to duty, enlargements, and extensions have balanced in many cases. Duties - Armstrong.

Generally true that the first 25 rights on the river are satisfied throughout the season, 1/6 100 about three weeks in June. Return water has much to do with the time of elimination of the right, exchange also tends to influence this period. Ogilby lowest on river and jinie to a great many has water practically the entire time.

In 1916 Farmer Co. Res No 100 cut June 29, discharge at canyon 1470 sec. ft - The rights range to 1900 acre ft, aggregate 3,000 sec. ft.
Money value of water rights by transfer some years ago
Parts of Secs. 2-19 and 29 acquired by North P. $3,000 per second foot - Part of 17 at $2,500 - but part of 62 & 66 by South P at $1,500 per second foot. Recently the Missouri Hotel mill right was abandoned to the river at the rate of $2,000 per second foot.

Ratio of discharges for storage 14% in 1916 and 20% in 1917, midwinter year was the total available storage capacity used.

Management of the river
Storage periods -

Duty of the river avg available water supply, river and tributaries is 375,000 acre feet (includes foreign water) Area irrigated 225,000 acres, for the stream as a whole 1.67 acre feet per acre, or 433 acres per second foot. Storage and return waters make this possible. 1916 - Consumptive duty, exclusive of seepage, available 336,000 passed out in South P. 79,000 a.fr. net consumption 252,000 on 218,000 acres - Duty 1.18

1917 - Supply 608,000, 309,000 in South Platte, 299,000 a.fr. on 225,000 acres - Duty 1.33 - Avg. consumption duty about 1.25 acre feet per acre.
Canals - About 25 in number - cooperatives, great majority joint stock companies - two districts (PARK AVE & DAILY PONDER). Development before law came into effect. Short supply - rotation system. Generally a share of stock in a cooperative company represents a proportionate part of the water in the canal. Expenses met by taxpayers on the capital stock - over about 25¢ per acre.

Structures, diversion dams on river, headgates. Measurement mostly by weir & service laterals.

Most notable:

**Laramie and Wild Canal**

Began 1860 - 3 ac. ft. later enlarged to 16 ac. ft.

1878-9 - Laramie & Wild Irrig. Co. incorporated with $200,000 capital stock and rights sold.

4 shares of stock turned over for each water right at present time. Outstanding 1423 shares at $500 per one.

Values:
- 1880: 1 right or 4 shares $400
- 1882: $600
- 1883: $800
- 1917: $4500

Expenses met by assessment on capital stock:
- 1916: $5.00 per share, 1917 $12.50 per share.

Also revenue from carrying water & wood.

Current expenses avg. about 85¢ per acre irrigated.
This canal is 46 miles long, 750 sec. ft. cap. at upper end, 75 miles main lat.
Company controls only the main canal and authority ceases when water is turned into the main lat. These are operated individually. Reservoir water carried 1/4 sec. ft. at entrance and 72 sec. ft. at lateral—difference no loss and inequalities in distribution.
Office method of handling orders and regulation of reservoirs to meet the demand.

Larimer Co. Canal
Froelich 5' 2"
North Poudre

Absorption losses in Canals
Hard to determine — divisions
North Poudre, Poudre Valley & Larimer & Weld
Test Poudre Valley - 10.6 miles depth 3.5 (with 3)
variation of head did not exceed 0.1 ft.
36 hour period Upper 232,410 sec. ft., lower 226,000
loss 12.4 sec. ft. 1.17 sec. ft. per mile = 1/2"
loss per day per sq. ft. of wetted area 0.01 cubic ft.
North Poudre 3/4 %
Larimer & Weld 1/2%
It was assumed at the outset that the difference in
irrigation between head of main canal and head of lateral
would approximate the loss in main canal. If our
coverages are correct we have 77% loss in 1916 and
27% gain in 1917 - Questionable -

The main losses from canals are not
seen on page - but wastes and inequalities in
distribution - closer supervision would increase
period of flow in canal.

325

Farm irrigations
Frequent rapid irrigations
Flooding and slow flooding on nearly
75% of the entire area.
Run-off water from alfalfa and grain 2 to
15% - avg slightly under 6%.
Curve for flood and furrow irrigation
based on 284 irrigations (alfalfa and grain) 324 for
sugar beets, potatoes and other crops - furrow is
influenced greatly by rapid alternate rows.
Jackson-Allen low density 17 acres 16% acres - potatoes
Madera 9 1/4 acres 18% 1 acre - alfalfa
43 acres per day - about 12 acres of alfalfa.
See page 79 for dates of irrigation.
Reservoirs - Classes - built in the most Windsor Lake part during the 80's - some at low cost $1.09 per ac ft.
The majority of reservoirs have rather steep slopes - avg. cap. per foot of depth 130 acre ft.
C至此 embankments 10 to 40 ft. except in Tenn. Begin
420 acre ft cap. $36 per ac ft - cost $22,000

Total capacity of reservoirs in valley is over 150,000 acre ft
largest Windsor holds between 12,000 to 15,000 acre ft.

and as low as 5 acre ft.

Cost see page 80
Rate water is used from res. - page 91

Absorption from reservoirs