1935

COPY OF REPORT OF BEAR RIVER DISTRIBUTION

BY COLLINS T. CANNON

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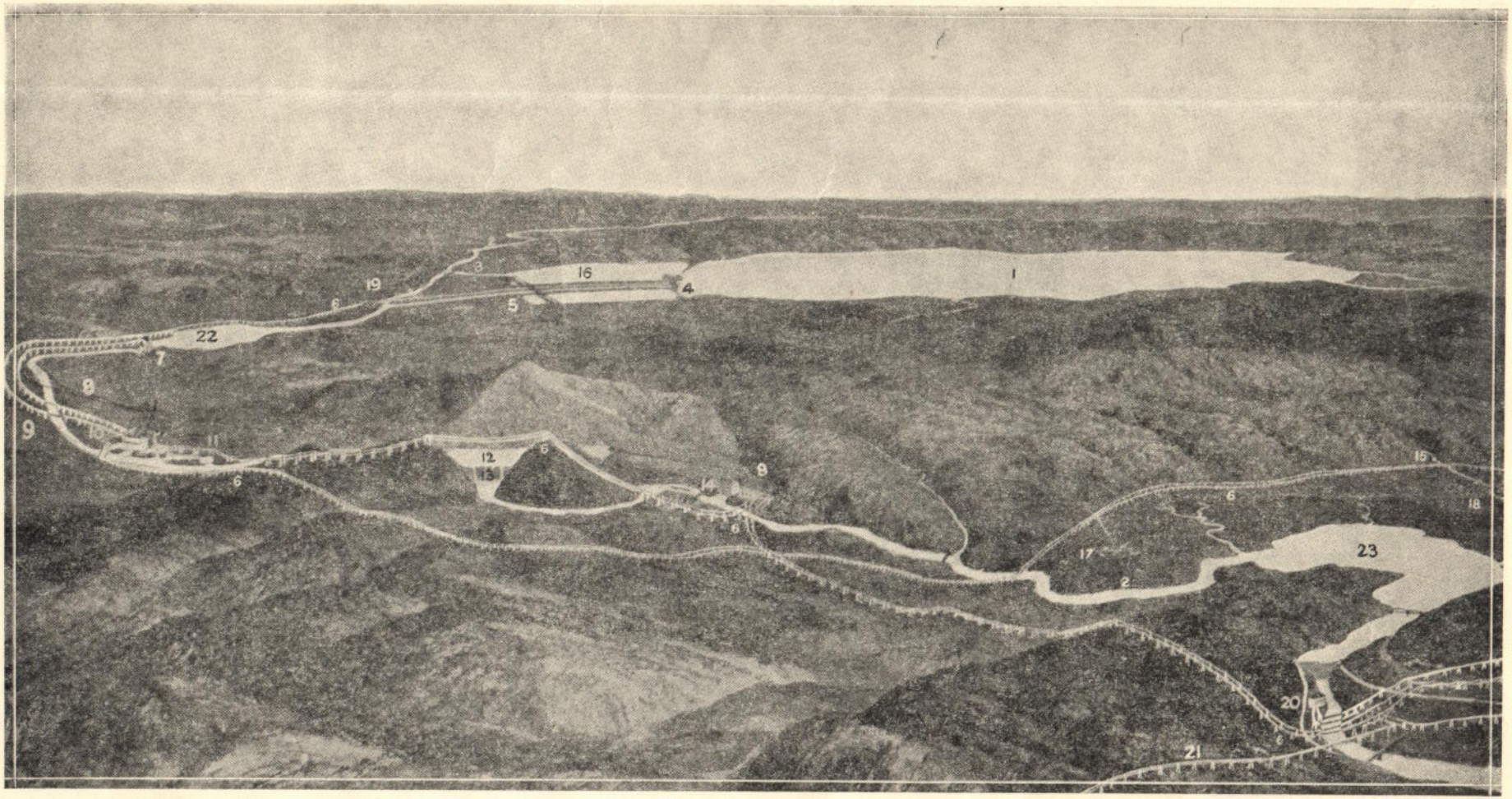

1 BEAR LAKE
2 BEAR RIVER
3 INLET CANAL
4 LIFTON PUMPING PLANT
5 OUTLET CANAL AND DYKE
6 BEAR RIVER TRANSMISSION SYSTEM
7 SODA POWER HOUSE
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23 CUTLER RESERVOIR

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Salt Lake City, Utah
December 20, 1935

Mr. T. H. Humpherys
State Engineer
Capitol Building
Salt Lake City, Utah

Dear Sir:

I submit a report of the use of water from the Bear River between Weston, Idaho, and the Cutler Reservoir.

My Commission commenced June 1, 1935, but I have included in this report certain Data covering the use of water in May, 1935, and also, for comparative purposes, certain Data covering the years 1931-32-33 and 34, the latter, as was the year 1935, a year of restricted use of water.

I acknowledge the valuable assistance rendered me in the preparation of this report by the 1934 Water Distribution Report of Bear River, by Water Commissioner E. J. Baird, the Engineering Staff of the Utah Power & Light Company and the Staff of A. B. Purton of the United States Geological Survey.

Respectfully,

Cecilia I. Cannon

WATER COMMISSIONER FOR THE
LOWER BEAR RIVER

Early in the year 1935, the irrigation prospects for the territory comprising 122,000 acres of Utah and Idaho lands in the Bear River Valley were very unfavorable. The snow cover on the watershed was below normal, the ground conditions owing to the previous years of drouth were not favorable for run-off, and the amount of water available for pumping from Bear Lake was the least in the history of the Bear River System. There was also the ever present fear among the irrigators of court action aimed to prevent the further lowering of Bear Lake by pumping.

As the irrigation season approached conditions improved materially. Precipitaion during the late months of Spring became normal, or very nearly so, and the snow covering, particularly on the Cache Valley Watershed had become such as to insure a reasonably late and prolonged run-off.

After the commencement of irrigation, all farmers were advised to use all the water possible on the land as a measure of protection against a deficiency of water which seemed bound to occur later in the season. This advise was followed to the fullest extent practicable.

Immediately following the appointment of the Commissioner, he visited all of the diversions in his jurisdiction and acquainted himself with the physical conditions and the operators of each.

As fast as the pumps in Cache Valley commenced operations, he rated the flows. This work was repeated a sufficient number of times, at varying stages of the River, to secure a figure representing an average rate of discharge. In order to account correctly for the amounts of water diverted by each pump, the KW per hour consumption of each motor was determined by the formula:

$$\frac{K \times 3600 \times Rev.}{t \times 1000} = K.\ W.\ per\ Hr. \qquad \frac{d}{K.\ W.\ per\ Hr.} = Hrs.\ of\ pumping$$

Where
K = Motor constant
Rev = Number of revolutions of Motor Disk
t = Time in Secs. of Revolution
d = Difference in Meter Readings in KW

Then: $\frac{Hrs.\ of\ Pumping}{24} \times$ Rate of Flow x 1.983 = A. F. diverted.

Each pump was visited at least weekly throughout the irrigation period. The operators thereof, were immediately advised of the amounts of the week's diversions.

At the two large diversions to the Utah-Idaho Sugar Company below Cutler, Constant Daily water stage recorders are in operation. Your Commissioner removed the record from these instruments weekly, the tabulations of these records are found on PLATES # VII and VIII. These records are sent to the Utah Power & Light Company and later to the United States Geological Survey, where they are incorporated in the Government's Water Supply Papers.

As the season progressed, it became evident, that in order to supply a sufficient amount of water to mature all growing crops, it would be necessary to curtail the use of storage water, for at the rate Bear Lake was being drawn down by pumping, all reserve would be exhausted before the end of the normal irrigation season. Accordingly at your instance, a meeting of the Idaho and Utah Water Commissioners and the Utah Power & Light Company's engineers was called for, July 15, 1935.

At this meeting the situation was gone over carefully and a policy was adopted to take effect immediately. This policy was to distribute sufficient water to each irrigator to mature his crops and at the same time to leave in Bear Lake the greatest amount of water possible for future use.

In the detailing of this policy the amount of water diverted for irrigation during the period July 16th to September 30, 1934, a period of restricted use, was the guide, and allotments were made to the various irrigators according to the best judgment of the Water Commissioner. To fill these allotments, an estimate of the probable yield of Bear River for the period July 16, to September 30, was made, the balance of the requirement to come from Bear Lake draw-down. These estimates indicated a yield of 65,000 Ac.Ft. from Bear River and a required draw-down of Bear Lake in elevation to 5902.5 yielding 77,000 Ac.Ft. net. PLATE IV shows the degree to which these estimates of yield were correct.

Immediately following the adoption of the policy of restricted use of water, each pump operator and an official of each irrigation company operating in the Utah Jurisdiction was notified verbally and also by letter of the amount of his allotment of water. Each was cautioned to plan his operation so that his water would be efficiently used.

It is very gratifying to be able to say that without exception the program was approved by the irrigators. Each one expressed a desire to adhere strictly to that program in the common interest of conserving the waters of Bear Lake.

It soon became evident that certain of the Small Pump Operators whose percentages of Root Crops were high, would require more water than their very limited allotments viz: .65 Ac.Ft. per acre. Upon satisfying your commissioner that these over-drafts were necessary, permission was granted to so draw. However, inspite of over-drafts by eleven (11) pump operators, the total allotment for the district comprising the Cache Valley pumps was not exceeded. Indeed, the entire jurisdiction diverted 4,000 Ac. Ft. less than was alloted. This result is shown on PLATES II and III.

The opinion is general in Cache Valley and as your commissioner is advised, also in Idaho that there has been a flagrant waste of water in North-eastern Boxelder County. Your Commissioner made it a matter of routime to visit many parts of this section to ascertain if this alleged condition was existing during 1935. Weekly visits were made to all Spills and Wasteways in that territory. Borrow Pit Waste was watched for and when found occuring was noted and the Canal officers were advised of the condition. Your Commissioner is pleased to report that in respect to the year 1935, the opinion as to flagrant waste is unfounded.

There was no Spillway waste observed whatsoever, during the season of pumping of Bear Lake except on the morning of July 5, when there was a measured waste of 10 S.F. at the South end of the West Hammond Canal. Borrow Pit Wastes in appreciable quantities were indeed rare.

The out-look for the 1936 irrigating year is, at this writing, discouraging. Watershed precipitation is below normal and practically the entire reserves from Bear Lake have been exhausted. But three times in the last eleven (11) years has the inflow into Bear Lake in the run-off season been as much as a minimum draw-down requirement using 1935, viz: 3.67' as a criterion. It seems safe, then, to predict a shortage of water for the year 1936.

The situation, however, is far from hopeless. The last two years experience has conclusively demonstrated that excellent crops can be produced in Northern Boxelder County with an amount of water far less than they have been accustomed to using for a generation. An average Ac. Ft. per Ac. diversion in that area for the years 1931-33 inclusive was 4.14', while the average Ac.Ft. per Ac. diversion for the years 1934-35 was 3.27'. It is the writer's opinion that if an assured supply amounting to 2.9' Ac.Ft. per Ac. at the diversion, or 2.4' at the farmer's head-gates were available, normal crop proceedure could be followed.

Your Commissioner recommends that proper publicity be given the conditions as they now appear, to the end that farmers may make plans to utilize in the best manner possible whatever water may be available.

Your Commissioner recommends that a long policy of conservation of the waters of Bear Lake be put into effect, that even in the event of an unusually heavy spring run-off into Bear Lake in successive years that the draft from the Lake by restricted to the bare needs.

Respectfully,

Collin I. Common

WATER COMMISSIONER FOR THE
LOWER BEAR RIVER

LIST OF PLATES

PLATE I

A tabulation showing the use of Irrigation Water by systems in the Lower Bear River Jurisdiction for the years 1934 and 1935.

PLATE II and PLATE III

Tabulations showing the extent to which Irrigators used "ALLOTTED WATER."

PLATE IV

An estimate of the water to be available from July 16 to September 30, 1935.

PLATE V

A tabulation showing the use of water from Cutler Reservoir by the Utah Idaho Sugar Company for the years 1931 to 1935 inclusive.

PLATE VI

A map showing the locations of diversions from Bear River ~~SMALL CACHE VALLEY PUMPS ON BEAR RIVER.~~

PLATE VII and PLATE VIII

Daily Gage Heights and Flows of West Side Canal and East Side (Hammond) Canal.

PLATE IX

Agraph showing elevations of Bear Lake 1932 to 1935 inclusive.

TABULATION SHOWING THE USE OF WATER FROM BEAR RIVER
FOR IRRIGATION
Between
WESTON, IDAHO and CUTLER DAM
Period May 1 to Oct. 31, 1935 compared with same period in 1934

NAME	ACRES	1935 DRAFT Ac.Ft.	1935 DRAFT AF per Ac.	1934 DRAFT Ac.Ft.	1934 DRAFT AF per Ac.
Benson B.Lake Irrig.Co.	813	1013	1.25	1044	1.29
J.L.Watterson		(Included in Benson B.Lake Irrig. Co.)			
W.H.Thain #1	125	130	1.04	124	.99
Heber Cronquist	276	187	.68	218	.79
J.Q.Adams	95	13	.14	40	.42
Abe Smith	185	310	1.68	192	1.04
H.W.Ballard	163	317	1.94	305	1.87
W.H.Thain # 2	98	188	1.92	192	1.96
Ballard-Munk	168	298	1.77	279	1.66
Thain-Hoffman	180	381	2.11	353	1.96
Jorgensen-Munk	150	230	1.53	203	1.35
Smithfield West Bench	521	445	.85	585	1.12
Joseph Buck	65	87	1.34	83	1.28
Wood Bros.	171	178	1.04	155	.91
Milton Bullen	150	75	.50	63	.42
Hill Irrigation Co.	245	354	1.44	350	1.43
Wood Irrigation Co.	201	262	1.30	249	1.24
J.E.Lower	20	23	1.15	19	.95
Vandyke-Simmons	93	98	1.05	123	1.32
W.D.Goodwin	149	127	.85	135	.91
Ed.M.Smith	30	32	1.07	41	1.37
Jonathan Smith	140	328	2.34	293	2.09
King Irrigation Co.	512	483	.94	719	1.41
Tom Griffiths	102	127	1.25	126	1.24
Marcus Rogers	60	44	.73	95	1.58
TOTAL SMALL PUMPS	4712	5730	1.21	5986	1.27
Cub River Irrig. Co.	14221	10934	.77	19395	1.36
Utah Idaho Sugar Co.	51320	171150	3.34	164520	3.21
GRAND TOTALS	70253	187814	2.68	189901	2.70

NOTE:- Acreages for SMALL PUMPS and CUB RIVER IRRIG. CO. were obtained from the Report of Geo.D.Clyde covering the benefits derived from Bear River Irrigation made in 1934. The acreage for the UTAH IDAHO SUGAR CO. is the amount for which water was scheduled and on which water was used during 1935.

BREAK-DOWN OF UTAH IDAHO SUGAR CO.DIVERSION

West Side Canal	42737	138680	3.25	134790	3.16
E.Side (Hammond) Canal	8583	32440	3.78	29730	3.47
TOTALS UTAH IDAHO SUGAR	51320	171120	3.34	164520	3.21

TABULATION SHOWING THE USE OF ALLOTTED WATER FROM BEAR RIVER
Between
WESTON, IDAHO and CUTLER DAM
Period July 15, 1935 to Sept.30, 1935

NAME	ACRES	ALLOTMENT Ac.Ft.	DRAFT Ac.Ft.	BALANCE Ac.Ft.	% USED OF ALLOTMENT
Benson B.Lake Irrig. Co.	813	529	551	- 22	104
W.H.Thain # 1	125	81	73	8	90
Heber Cronquist	276	179	88	91	49
J.Q.Adams	95	62	1	61	2
Abe Smith	185	120	131	- 11	109
H.W.Ballard	163	106	119	- 13	112
W.H.Thain # 2	98	64	79	- 15	123
Ballard-Munk	168	109	106	3	97
Thain-Hoffman	180	117	128	- 11	109
Jorgensen-Monk	150	97	103	- 6	106
Smithfield West Bench	521	339	319	20	94
Joseph Buck	65	42	42		100
Wood Bros.	171	111	100	11	90
Milton Bullen	150	98	18	80	18
Hill Irrigation Co.	245	159	183	- 24	115
Wood Irrigation Co.	201	131	154	- 23	118
J.E.Lower	20	13	15	- 2	115
Vandyke-Simmons	93	60	21	39	35
W.D.Goodwin	149	97	84	13	87
Ed.M.Smith	30	20	15	5	75
Jonathan Smith	140	91	111	- 20	122
King Irrigation Co.	512	333	288	45	87
Tom Griffiths	102	66	86	- 20	130
Marcus Rogers	60	39	9	30	23
TOTAL SMALL PUMPS	4712	3063	2824	239	92
Cub River Irrig. Co.	14221	9000	8884	116	99
Utah Idaho Sugar Co.	51320	80000	76710	3290	96
GRAND TOTALS	70253	92063	88418	3645	96

PLATE III

TABULATION SHOWING THE USE OF ALLOTTED WATER FROM BEAR RIVER
Between
OUTLET CANAL and WESTON, IDAHO
Period July 15, 1935 to Sept. 30, 1935

NAME	ACRES	ALLOTMENT Ac.Ft.	DRAFT Ac.Ft.	BALANCE Ac.Ft.	% USED OF ALLOTMENT
Riverdale Prior Rights	2715	4000	3734	266	93
Budge Land & Live Stock	1140	0000	1230	- 1230	
Johnson Bros.	220	0000	72	- 72	
Gentile Valley Canal	4036	4600	4427	173	96
Last Chance Canals	29000	24000	26472	2472	110
Twin Lakes Canal	[illegible]	10000	800	- 800	
West Cache Canal	14832	15000	17827	- 2827	119
TOTALS	51943	47600	54562	- 6962	114

PLATE IV

ESTIMATE OF BEAR RIVER YIELD AND BEAR LAKE DRAW-DOWN NECESSARY TO SUPPLY ALLOTMENTS MADE JULY 15, 1935 FOR PERIOD JULY 16, TO SEPT. 30, 1935

Elevation of Bear Lake July 15, 1935	5905.02		
Proposed Minimum Elevation of Bear Lake by pumping	5902.50		
Gross Lowering of Lake	2.52'@ 55,000 Ac. =		138,000 Ac. Ft.
Est. Apparent Loss (Evap. minus inflows)			61,000 Ac. Ft.
Est. Available for Irrigation			77,000 Ac. Ft.
Est. Bear River Yield			65,000 Ac. Ft.
Est. Total available for Irrigation			142,000 Ac. Ft.

APPROXIMATE YIELD OF BEAR RIVER AND BEAR LAKE PERIOD JULY 16, TO SEPT. 30, 1935

Elevation of Bear Lake July 15, 1935	5905.02		
Elevation of Bear Lake Sept. 30, 1935	5902.30		
	2.72' @ 55,000		149,500 Ac. Ft.
Apparent Loss (Evap. - Inflows)			61,500 Ac. Ft.
Bear Lake Yield			88,000 Ac. Ft.
Bear River Yield			55,000 Ac. Ft.
Used for Irrigation			143,000 Ac. Ft.

COMPARATIVE TABLE SHOWING THE USE OF WATER FOR IRRIGATION
From
CUTLER RESERVOIR
By
UTAH IDAHO SUGAR CO.
Period 1921 to 1935 incl.

YEAR	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	TOTALS	* AF per Ac.
				WEST SIDE CANAL				
1931	21400	36700	36300	34100	27700	14000	170200	3.98
1932	14300	31000	37500	36500	28400	19500	167200	3.92
1933	5570	37500	35700	39400	31400	21630	171200	4.01
1934	32130	26180	25990	26530	17350	6610	134790	3.16
1935	16350	33300	32100	27250	18800	10880	138680	3.24
				EAST SIDE (Hammond) CANAL				
1931	7320	8930	9780	9410	7620	3580	46640	5.44
1932	3840	7260	10000	9220	8090	4510	42920	5.00
1933	1160	9430	10200	10600	8920	6190	46410	5.41
1934	7070	5700	5880	5500	3630	1950	29730	3.47
1935	3690	7320	7500	6950	4340	2640	32440	3.78
				TOTAL UTAH IDAHO SUGAR CO.				
1931	28720	45630	46080	43510	35320	17580	216840	4.22
1932	18140	38260	47500	45720	36490	24010	210120	4.10
1933	6730	46840	45900	50000	40320	27820	217610	4.24
1934	39200	31880	31870	32030	20980	8560	164520	3.21
1935	20040	40620	39600	34200	23140	13520	171120	3.34

* Based on acreage for which water was scheduled in 1935. Previous years acreage was 500 to 800 acres greater. The exact amount is unknown.

Note:- The Data for the Years 1931-32 and 33 was furnished by the United States Geological Survey.

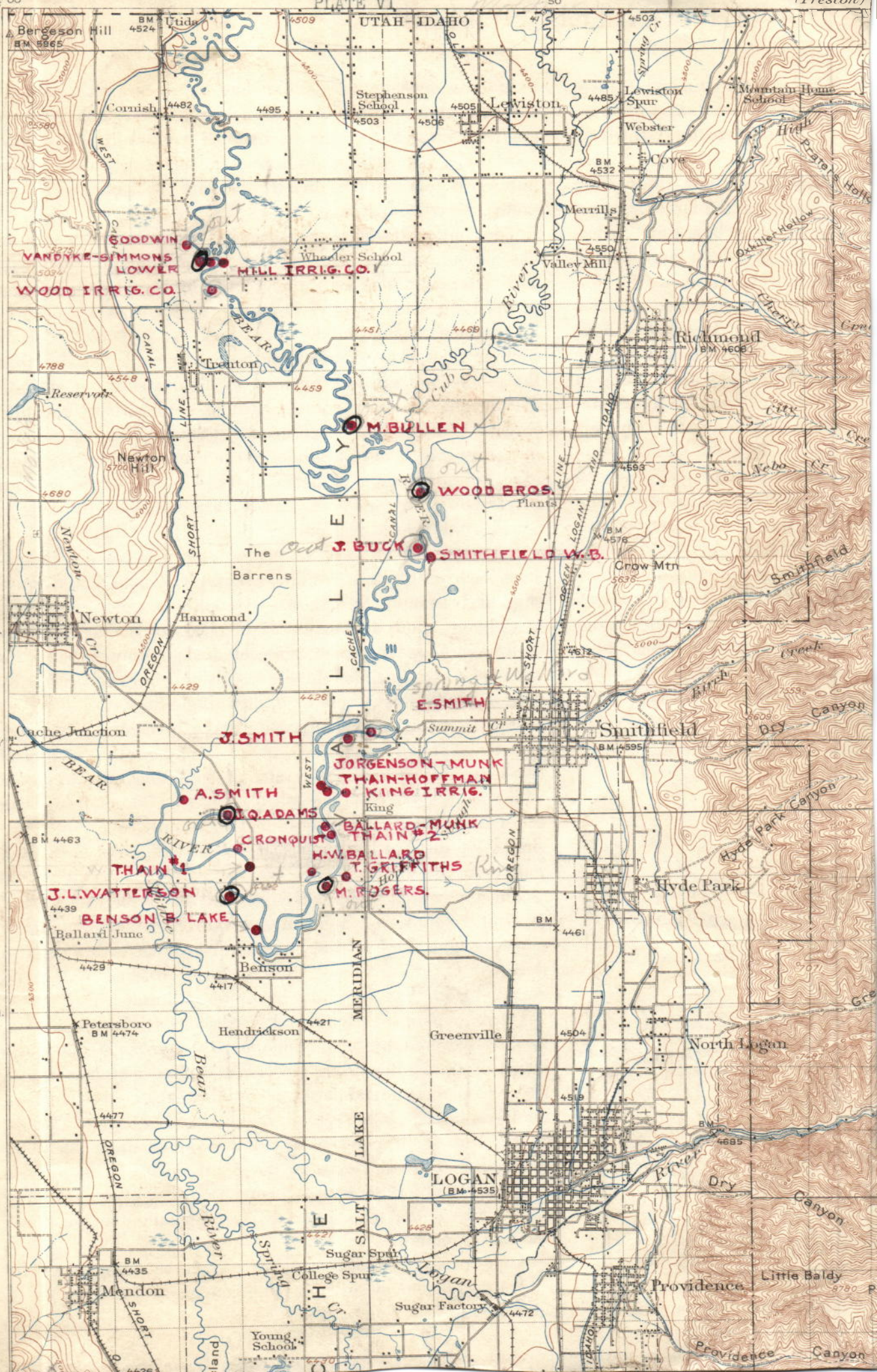
PLATE VI
(Preston)
112°00'
42°00'
50'
T.15 N.
T.14 N.
T.13 N.
T.12 N.
UTAH-IDAHO
Bergeson Hill
Utida
Cornish
Stephenson School
Lewiston
Lewiston Spur
Mountain Home School
Webster
Cove
Merrills
Wheeler School
Valley Mill
Richmond
Trenton
Reservoir
Newton Hill
Newton
Hammond
The Barrens
Plants
Crow Mtn
Smithfield
Cache Junction
Summit
Dry Canyon
Hyde Park Canyon
Hyde Park
King
Ballard June
Benson
Petersboro
Hendrickson
Greenville
North Logan
LOGAN
Sugar Spur
College Spur
Sugar Factory
Mendon
Providence
Little Baldy
Young School
Providence Canyon
GOODWIN
VANDYKE-SIMMONS
LOWER
MILL IRRIG. CO.
WOOD IRRIG. CO.
M. BULLEN
WOOD BROS.
J. BUCK
SMITHFIELD W.B.
E. SMITH
J. SMITH
JORGENSON-MUNK
THAIN-HOFFMAN
KING IRRIG.
A. SMITH
J.Q. ADAMS
BALLARD-MUNK
THAIN #2
C. RONQUIST
H.W. BALLARD
T. GRIFFITHS
THAIN #1
J.L. WATTERSON
M. ROGERS.
BENSON B. LAKE
BEAR RIVER
OREGON SHORT LINE
WEST CANAL
CACHE CANAL
OGDEN LOGAN AND IDAHO
SALT LAKE MERIDIAN
Bear River
Logan River
Spring Cr.
Cherry Cr.
Nebo Cr.
Birch Creek
Oxkiller Hollow
Prater's Hollow
Cub River
Summit Cr.
Spring Cr.
Newton Cr.
Cache Cr.
Cub River
Spring Cr.
Logan River
BM 5965
BM 4524
BM 4532
BM 4608
BM 4576
BM 4595
BM 4463
BM 4439
BM 4461
BM 4474
BM 4435
BM 4535
BM 4685
4509
4503
4482
4495
4505
4506
4485
4550
4451
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4504
4519
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4430
4426

PLATE VII

STATE OF UTAH
OFFICE OF STATE ENGINEER

Daily Discharge in Second Feet of WEST CANAL

at WHEELON for Period May 1 to Oct. 31 1935

Day	MAY GA.	MAY FLOW	JUNE GA.	JUNE FLOW	JULY GA.	JULY FLOW	AUG GA.	AUG FLOW	SEPT GA.	SEPT FLOW	OCT GA.	OCT FLOW
1	1.62	61	4.37	347	6.01	607	5.15	464	4.96	424	4.39	340
2	1.49	53	4.06	303	6.00	605	5.15	464	4.92	418	3.75	392
3	1.57	58	3.95	288	6.01	607	5.15	464	4.81	401	2.52	120
4	1.59	59	3.80	269	5.73	559	5.15	464	4.99	428	2.52	120
5	1.64	63	4.15	316	5.60	537	5.06	450	5.06	440	2.47	115
6	1.72	68	4.69	393	5.60	537	5.01	442	5.00	430	2.45	113
7	1.85	78	5.06	450	5.60	537	5.01	442	4.97	426	2.47	115
8	1.83	76	5.51	522	5.62	540	5.01	442	4.97	426	2.75	140
9	1.82	75	5.97	600	5.62	540	5.03	433	4.97	426	3.50	231
10	1.97	86	6.23	644	5.60	537	5.15	452	4.88	412	3.94	277
11	2.31	112	6.25	647	5.61	539	5.15	452	4.58	367	4.74	320
12	2.35	115	6.31	658	5.53	525	5.12	447	4.52	358	4.25	320
13	2.74	150	6.31	658	5.51	522	5.00	428	4.56	364	4.35	320
14	3.19	195	6.31	658	5.50	520	4.99	427	4.56	364	4.25	320
15	3.51	232	6.29	654	5.49	518	4.99	427	4.56	364	4.23	317
16	3.76	242	6.29	654	5.41	506	5.02	433	4.55	362	2.43	111
17	3.86	277	6.30	656	5.37	499	5.06	440	3.59	232	2.35	105
18	4.00	295	6.30	656	5.37	499	5.06	440	2.37	99	2.28	100
19	4.19	322	6.30	656	5.39	502	5.07	441	2.67	133	2.28	100
20	4.27	347	6.30	656	5.38	501	5.07	441	2.66	131	2.28	100
21	4.56	374	6.30	656	5.39	502	5.07	441	2.66	131	2.36	106
22	4.83	415	6.02	608	5.40	504	5.07	441	2.67	133	2.64	130
23	5.31	490	6.02	608	5.34	494	5.09	444	2.66	131	2.71	137
24	5.54	527	6.02	608	5.12	459	5.10	446	3.39	208	2.72	138
25	5.78	568	6.02	608	5.39	502	5.09	444	3.88	268	2.72	138
26	5.91	590	6.02	608	5.38	501	5.08	443	4.03	289	2.72	138
27	5.91	590	6.00	605	5.38	501	5.06	440	4.24	319	2.69	135
28	4.57	375	6.00	605	5.36	498	5.07	442	4.32	330	2.66	132
29	5.04	446	6.00	605	5.34	494	5.06	440	4.33	331	2.65	131
30	5.20	472	6.00	605	5.34	494	4.98	427	4.34	333	2.65	131
31	5.02	443			5.27	483	4.96	424			2.34	104
Mean Sec. Ft.		266		560		522		443		316		177
Total Ac. Ft.		1635		33330		32100		27250		18800		10880

TOTAL FOR _____ ACRE FEET

189 40

PLATE VIII

STATE OF UTAH

OFFICE OF STATE ENGINEER

PLATE VIII

Daily Discharge in Second Feet of EAST SIDE (Hammond) CANAL

at WHEELON for Period May 1 to Oct. 31 1935

Day	MAY		JUNE		JULY		AUG		SEPT		OCT	
	GA.	FLOW	GA.	FLOW	GA.	FLOW	GA.	FLOW	GA.	FLOW	GA.	FLOW
1	2.47	31	2.94	51	4.45	141	4.11	117	3.95	101	3.53	76
2	2.14	18	2.89	49	4.45	141	4.14	119	3.92	99	3.07	52
3	1.85	14	2.88	48	4.45	141	4.14	119	3.88	97	3.12	54
4	2.04	18	2.90	49	4.27	127	4.13	118	3.37	66	3.13	55
5	2.04	18	2.90	49	4.30	130	4.17	121	2.94	45	3.10	53
6	2.11	19	3.20	64	4.29	129	4.23	125	2.94	45	3.10	53
7	2.72	41	3.61	87	4.30	130	4.22	125	3.03	50	3.10	53
8	2.71	40	3.86	102	4.32	131	4.21	124	2.99	48	3.27	62
9	2.71	40	4.05	113	4.33	132	4.21	121	2.99	48	3.34	65
10	2.71	40	4.35	134	4.30	130	4.20	120	3.32	64	3.31	64
11	2.72	41	4.35	134	4.30	130	4.20	120	3.53	76	3.12	54
12	2.98	53	4.36	134	4.20	123	4.14	116	3.63	82	3.14	55
13	2.96	52	4.30	130	4.15	119	4.00	106	3.72	87	3.22	59
14	2.97	54	4.57	149	4.15	119	3.99	104	3.72	87	3.21	58
15	3.24	66	4.67	156	4.15	119	3.99	104	3.71	87	3.18	57
16	3.36	72	4.73	160	4.15	119	4.00	104	3.49	73	3.11	54
17	3.32	70	4.73	160	4.15	119	4.02	105	3.34	60	2.74	36
18	3.32	70	4.73	160	4.16	120	4.03	106	3.11	54	2.63	31
19	3.33	70	4.73	160	4.03	112	4.04	106	3.13	55	2.62	31
20	3.34	71	4.73	160	4.06	114	4.04	106	3.14	55	2.63	31
21	3.33	71	4.73	160	4.07	114	4.05	107	4.15	55	2.60	30
22	3.66	90	4.18	115	4.08	115	4.06	108	3.15	55	2.56	28
23	3.78	97	4.54	147	4.03	112	4.04	106	3.14	55	2.56	28
24	3.91	98	4.62	152	3.85	101	4.04	106	3.28	62	2.58	29
25	4.06	114	4.62	152	4.06	114	4.04	106	3.35	66	2.58	29
26	4.23	125	4.60	151	4.07	114	4.04	106	3.34	66	2.58	29
27	4.23	125	4.55	147	4.07	114	4.05	107	3.48	73	2.56	28
28	3.29	69	4.46	141	4.10	116	4.04	106	3.64	82	2.30	20
29	3.24	66	4.46	141	4.13	118	4.04	106	3.60	80	1.89	15
30	3.13	61	4.46	141	4.11	117	3.95	101	3.67	84	2.01	17
31	2.89	49			4.10	116	3.95	161			2.09	19
Mean Sec. Ft.		60		123		122		113		73		43
Total Ac. Ft.		3690		7320		7500		6950		4340		2640

TOTAL FOR _____ ACRE FEET