

REPORT ON
WATER MASTER SERVICE
ON
PIT RIVER IN BIG VALLEY
MODOC AND LASSEN COUNTIES
DURING SEASON OF 1933

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INTRODUCTION

Practically the same plan of supervising diversions from Pit River in Big Valley during the seasons of 1930, 1931 and 1933 was carried out during the 1933 season.

The agreement under which this water master service was accomplished during the 1933 season was signed by nearly all water users involved along Pit River following a meeting of water users held in Bieber on March 20, 1933. That meeting was called by the water users committee and was attended by Engineers Zander and Simpson of the Division. A copy of the "Agreement re Distribution of Waters of Pit River in Big Valley, During the 1933 Season" is attached with this report as the appendix.

The Big Valley Water Users Committee has been previously elected by the water users and its members during 1933 were:

Ward Kramer, Chairman

Ernest Babcock, Secretary

Roderick McArthur

Peter Gerig

Erle Gans

Regular monthly meetings of the water users committee was held on the last Saturday of each month at Bieber during the season. At these meetings the current problems of water distribution were discussed with the water master and general plans for the ensuing month's activities were outlined.

The water master was stationed at Bieber during May and June so as to be in close contact with the work of water distribution during the time when irrigation conditions were most critical. Later in the season when the water supply was sufficient only for stock watering requirements along the river and branching sloughs the water master visited the area frequently to adjust and regulate river dams and diversions to afford a more nearly equable distribution of the inadequate water supply.

CLIMATOLOGICAL DATA

Daily precipitation data, observed at the Bieber station, during the seasonal year ending September 30, 1933 is shown in Table 1 at the end of this report.

A comparison of total seasonal precipitation at Bieber since 1929 is shown in the following tabulation

<u>Season</u>	<u>Total Precipitation including snow as inches of water</u>
1929-30	16.47
1930-31	8.98
1931-32	14.77
1932-33	13.73

According to the seasonal total precipitation for 1932-33 of 13.73 inches no serious deficiency of irrigation water supply might be expected, however the peculiar occurrence of storms and the prevailing cold weather

caused a substantial deficiency in run-off resulting from precipitation, particularly during the latter part of May and June. The extended storm period occurring during the fore part of May yielded the only run-off to supply irrigation requirements in any magnitude during the entire season. To that storm alone can be attributed whatever hay crop yield that was made for the season. The storm was purely local and was confined to the watershed of Big Valley extending northward over the Stonecoal Valley and Happy Camp Mountain districts causing very heavy run-off from those areas.

Prevailing temperatures during April and May at the commencement of the normal growing season largely influenced the crop yields. In 1933 decidedly sub-normal temperatures prevailed during May as clearly indicated in the following tabulation comparing mean temperatures of April and May at Bieber during the four years of record:

: Temperature : Deg. Fahr.	: 1930		: 1931		: 1932		: 1933	
	: April	: May						
: Mean Maximum	: 63.6	: 67.5	: 65.4	: 77.4	: 61.2	: 71.4	: 61.7	: 61.8
: Mean Minimum	: 33.5	: 34.8	: 30.7	: 39.4	: 31.2	: 39.0	: 28.4	: 33.7
: MEAN	: 48.5	: 51.1	: 48.1	: 58.4	: 46.2	: 54.7	: 45.0	: 47.7

It is apparent that mean temperatures during May 1933 were seven to ten degrees lower than corresponding temperatures in the other years. This condition seriously effected hay production in two instances: first, the unusually low temperatures and high winds caused an unusually large loss of the snow crop by wind erosion and direct evaporation, with little or no melting into streams; and second, the normal rate of plant growth was so retarded that by the time growing weather occurred in June the rapidly diminishing water supply could not support the growth, with a consequent shortage of crop yield.

WATER SUPPLY

The water supply for the irrigated lands along Pit River in Big Valley during the 1933 season was recorded at the U. S. Geological Survey Stream Gaging Station on Pit River at the narrows about four miles below Canby at the lower end of Hot Springs Valley. The daily discharge passing this station for the 6 months period from April 1st to September 30th is given in Table 2 at the end of this report. That table is excerpted from the unpublished records of the U.S.G.S.

The records from the Canby station do not measure the entire contributory flow of Pit River entering Big Valley inasmuch as the intervening watershed of considerable magnitude yields substantial run-off, particularly during rainstorms ordinarily occurring during the irrigating season. Consequently there is no accurate measure of the actual water supply in Pit River entering Big Valley occurring during the rainy period in the fore part of May 1933. It is estimated, however that a flow in excess of 200 cubic feet per second passed over Lookout Dam and continued from about April 29th to about May 10th. After about May 20th when surface run-off ceased from the intervening watershed the records in Table 2 give a fair measure of the water supply entering Big Valley for the remaining portion of the season.

The irrigation water supply in Pit River entering Big Valley practically failed about the first of June. Thereafter the flow consisted entirely of seepage and return water from the lower irrigated areas in Hot Springs Valley. A small increase of flow occurred from about July 9th to about July 15th, caused by drainage water from the lands of the Hot Springs Valley Irrigation District when the river diverting dams in that area were opened at the commencement of the haying season. During the latter part of August, Pit River was practically dry at Canby and stock water was at a premium along Pit River in Big Valley;

relief came only when a small amount of return water reached through from the upstream irrigation district at the end of one of the rotation periods with released Big Sage Reservoir water.

A comparison of the annual total irrigation water supply entering Big Valley in Pit River during the past four years is shown in the following tabulation. In 1930 and 1931 the flow was measured at the Division's stream gaging station on Pit River in Cougar Neck, seven miles above Lookout, and in 1932 and 1933 it was measured at the U.S.G.S. station on Pit River four miles below Canby.

<u>Season from</u> <u>April 1st to September 30th</u>	<u>Total flow</u> <u>in Acre Feet</u>
1930	18,007
1931	1,784
1932	68,454
1933	9,580

WATER DISTRIBUTION

April

Prevailing cool and cloudy weather caused relatively small demands upon water for irrigation. One complete rotation of irrigation was accomplished during the month to cover practically the entire area of meadow hay lands usually irrigated from Pit River. By the end of the month channel storage had to be called upon to complete the rotation.

May

Channel storage through the valley was quickly replenished during the early part of May by the heavy run-off resulting from local rainstorms. The second rotation period was carried through without serious difficulty but was not started until about May 15th. Little or no channel storage was used to supply irrigation water because of the substantial inflow in the river.

The existence of the flood protection levees around the north and east sides of the new town of Nubieber, on the west side of the valley floor, seriously interferes with the natural drainage of the bottom lands on the west side of the valley. At one time, about the tenth of May the ordinary irrigation heads used north of the town levees on the Fox, Gerig (Knox), Holl and Walson lands accumulated against the town's north levee and made serious inroads upon the levee nearly overtopping the same. A complete inundation of the town by at least six inches of water was averted by the timely opening of certain irrigation control culverts through the new Great Northern Railroad grade at that point.

June

The second rotation period was completed by June 9th but only by drawing from channel storage behind Lockout Dam from June 6th to June 9th to finish the lower east side area.

The starting of the third rotation period was held until June 22nd to allow replenishment behind Lockout Dam. The amounts of water allowed for irrigation were limited by the water master both as to time of use and as to quantity diverted so that the rapidly diminishing supply could be made to reach as far as possible an equitable benefit. By the end of the month the entire available river channel storage above all dams was exhausted and the lower east side area received only a relatively small amount of water for irrigation. The plan for this third rotation cycle was to irrigate only those lower lying meadows on each ranch which could be readily irrigated with small heads of water.

July

The third rotation period was completed July 9th when all irrigation diversions ceased and the river dams were closed as tight as possible to retain whatever water remained for stock watering purposes.

Return and drainage water from upstream filled Lockout Dam by

July 11th, after which time a small head of water was allowed to continuously pass over the dam to maintain fresh water along the river downstream for stock watering purposes.

The 3-Corner Dam (near Lookout Dam) was partially opened on July 23rd to relieve the shortage of stock water on the ranches southeast of Lookout.

On July 29th the Roberts Reservoir (situated 2 miles north of Lookout) was opened by its owner, Harry Roberts of Lookout, and the water was allowed to flow through sloughs directly into the pond on Pit River formed by Lookout Dam. The watermaster arranged with the water users to allow the reservoir water to be rediverted above the Lookout Dam into the Oilar Ditch for use for stock water on the Oilar (Gooch) Swamp meadows. This plan worked fairly well except that the storage water was released at such a time when the channel storage level above Lookout had receded to about a foot below the flow level of the Oilar Ditch heading, and it was necessary to replenish a considerable amount of river channel storage before diversion could commence. Such a plan would have operated very well if the release had been timely while the water level above the river dam was high, during the middle of July.

August

The Roberts Reservoir outlet was closed on August 13th and immediately following a small head was allowed to pass over Lookout Dam to replenish and freshen the standing pools of stock water along the channel of Pit River below Lookout.

September

On September 3rd the Lookout Dam was partially closed to retain a small increase of return flow from Hot Springs Valley. The channel storage above the dam was used during September to regulate and equalize the flow into the lower area for stock watering purposes.

CROP PRODUCTION

Certain crop production reports are shown in Table 3, at the end of this report. These data were submitted by the water users and are their own estimates and measurements. In general it was observed that the crop yield along Pit River in Big Valley for the 1933 season averaged approximately 75% of an estimated normal.

A comparison of annual crop yields of alfalfa and meadow grass hays is shown in the following tabulation:

Hay Crop Yields - In Tons per Acre				
Crop	1930	1931	1932	1933
Alfalfa Hay	1.8	1.0	1.6	1.4
Meadow Hay	1.1	0.6	1.0	0.8
Water Supply	Approx. Normal	Approx 1/4 Normal	Nearly Normal	Approx. 1/2 Normal

DISCUSSION

The prevailing cooler temperatures and continued cloudiness during April and May in 1933 despite the attendant precipitation considerably retarded the commencement of plant growth and irrigation requirements were at a minimum. The consequent rapid growth during the warmer growing weather of June called for heavy irrigation heads. The water supply practically failed early in June and only by the diversion of the entire river channel storage above all dams were the lower level meadows partially irrigated.

The stock water supply for the area practically failed during August but it was replenished about the first of September by a small increase in flow from return water draining out of Hot Springs Valley.

Had there been a full irrigation head the latter part of June and the first week of July the hay crop yields would no doubt have been increased 50% over the actual production.

The methods, plans, and schedules of distribution of the water supply in Pit River for irrigation and stock watering purposes in Big Valley in general were found to be entirely satisfactory. It was clearly proved that the schedule of use as outlined in the proposed permanent agreement, as far as the present low flows are concerned, are not only practical but are considered satisfactory by the majority of water users. It is borne in mind that the distribution of irrigation and stock water in Big Valley is based entirely upon the concerted and comprehensive plans and methods which has been developed through long use and practice by the water users themselves. The activities of the Division's water master in carrying out these schedules has been mainly in furnishing a disinterested means for coordinating the individual demands for water to the end of preventing unnecessary waste of water, of assuring each water user of his apportionment of water, and of preventing unneighborly controversies and wasteful practices.

RECOMMENDATION

At the conclusion of the 1935 irrigation season it is more than ever apparent that some major storage supply to supplement the natural flow conditions during June and the remaining portion of the season is essentially necessary, if the hay crop production along Pit River in Big Valley is to be maintained on a substantial and reliable basis.

A constant flow of approximately 90 cubic feet per second should be maintained in the Pit River entering Big Valley during the growing season prior to July 10th. Thereafter the supply should be regulated to some amount equal to or less than that flow to accommodate the demands of the fall irrigation of cut over hay lands and of stock water until the advent of freezing weather. To accomplish this end some storage project must be completed along Pit River above Big Valley and below Hot Springs Valley.

FINANCIAL STATEMENT

The 1933 agreement for water distribution along Pit River in Big Valley provided for a charge of \$450.00 to be paid to the Division of Water Resources as the water users' share of the cost of water master service. That money was collected by the Big Valley Water Users Committee and submitted to the Division in due amount early in the season. The matters of assessments and individual payments were handled entirely by that committee. Assessments were based upon a uniform charge per each acre of irrigated land receiving water from Pit River.

TABLES

TABLE 1

Daily PRECIPITATION, in inches, at EIEBER, Elevation 4200,
for the seasonal year ending September 30, 1933

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.
1								.24 s				
2		.30				.15		T				
3				.19 s		.54 s		T				
4								T				
5		.08					T	.16				
6	.10						T	.20				
7	.58						T	.16				
8			.14 s					.08				
9								.09				
10								.58				
11					.10 s	.65		T				
12						.36 s		.10				
13												
14				.09 s	.03 s			T				
15					.09 s							
16	.05		T			.26		.10				
17			.22 s			.35 s	.38 s	.65				T
18			.10 s	.45 s			T	T				
19			.37 s	.17 s				T				
20								T				
21			.12 s	.12 s				.03			T	
22	.13						T	T				
23			.68 s	.63 s	.09 s		.28		T			
24		T					.27				T	.30
25			T									.12
26		T	T	.10 s		.16 s			T			
27			T	1.10 s								
28		T	.05 s	.18 s		.05						
29		.35		.29 s	--	.03	.25 s					
30		T			--		.10 s					
31		--	.10 s	.09 s	--		--		--	T		--
Total	.86	.73	1.78	3.39	.31	2.57	1.28	2.39	T	T	T	.42

s = Precipitation in form of snow

TOTAL for Season - 13.73

TABLE 2

Daily Discharge, in cubic feet per second, of PIT RIVER near CANBY - 1935 (Excerpted from unpublished U.S.G.S. Records)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Remarks
1	138			138	6	26	16	6.5	25				
2				106	12	22	13	6.5	22				
3				98	9	13	10	6	16				
4				114	8	8	8	4.5	14				
5				122	8	7	6	3.7	12				
6				116	8	7.5	6	3.0	11				
7				108	21	6.5	21	2.0	9.5				
8				91	133	7.5	55	1.4	8				
9				72	81	12	44	1.0	6				
10				40	94	11	38	1.7	5				
11				21	119	9.5	36	1.7	4.0				
12				21	114	9	28	1.7	3.0				
13				24	106	9	27	1.6	2.7				
14				20	133	10	24	1.4	2.4				
15				16	135	11	21	1.3	2.4				
16				14	138	15	21	1.0	2.4				
17				13	138	14	19	1.0	2.4				
18				13	130	14	18	.9	3.0				
19				9.5	119	16	16	.9	4.3				
20				9.5	119	18	13	.7	4.7				
21				5	108	18	11	.7	4.7				
22				4.3	94	16	8.5	.6	4.7				
23				4.0	84	16	7.5	.4	4.3				
24				3.7	101	14	6	.4	4.7				
25				7.	86	13	4.7	.3	4.7				
26				6.5	44	14	4.0	.4	4.7				
27				4.3	86	16	5	.3	4.7				
28				3.7	55	17	6	.3	6				
29				6.0	50	19	6	1.1	5.5				
30				8.0	40	17	6	6.5	3.7				
31				--	30	--	6	16	--				
Total				1216.5	2409	406.0	510.7	75.9	307.5				6 Mo. Period
Mean				40.6	77.7	13.5	16.5	2.45	8.92				26.3
Maximum				122	138	26	55	16	25				138
Minimum				3.7	6	6.5	4.0	.3	2.4				.3
Total													
Acre Feet:				2420	4780	803	1010	151	412				9580

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TABLE 3

CROP YIELDS IN BIG VALLEY
1933
On Lands Irrigated From Pit River
As Reported by Water Users

Name of Ranch	Crop	Acreage Reported	Total Yield		Yield per Acre	
			Tons	Sacks	Tons	Sacks
Antone Avilla	Alf. Hay	14	15		1.1	
	Mead. Hay	776	500		.6	
E. G. Babcock	Alf. Hay	35	60		1.7	
	Mead. Hay	280	150		.5	
	Barley	15		48		3.2
	Wheat	60		350		5.8
	Alf. Seed	12		10		.8
De Mange (Frank Iverson)	Mead. Hay	210	110		.5	
Peter Gerig	Mead. Hay	260	320		1.2	
James H. Holl	Alf. Hay	40	60	(Sub.irrig)	1.5	
	Mead. Hay	200	185		.9	
Elmer Jones	Mead. Hay	65	90		1.4	
G. L. Kramer	Alf. Hay	100	120	(Sub.irrig)	1.2	
	Mead. Hay	400	200		.5	
Oiler (H. M. Roberts)	Gr. Hay	30	30		1.0	
	Mead. Hay	500	500		1.0	

APPENDIX

AGREEMENT

Re Distribution of Waters of Pit River
in Big Valley, During the 1933 Season

WHEREAS, a proposed agreement entitled, "Agreement Determining Rights to Water and to the Use Thereof from Pit River in Big Valley, Modoc and Lassen Counties, California", was presented at a meeting of the various owners of water rights on said Pit River at Bieber on March 20, 1933, and

WHEREAS, the parties hereunto subscribed desire water master service on said Pit River during the 1933 season, and desire a demonstration of the plan of distribution contained in said agreement,

NOW THEREFORE IT IS HEREBY AGREED by and between each and every party hereunto subscribed and among all of said parties, that the Division of Water Resources of the Department of Public Works of the State of California may undertake to distribute the waters of said Pit River in Big Valley among the various parties hereunto subscribed during the period from April 1st to September 30th, in 1933, only, said distribution to be in accordance with the provisions hereinafter contained.

1. The waters of said Pit River shall be distributed to the various parties hereunto subscribed in accordance with the plan of distribution and various provisions contained in the above mentioned proposed agreement.

2. Said Division of Water Resources may appoint a water master to distribute the waters of said Pit River in Big Valley, as hereinbefore provided for, during the 1933 season and that said water master shall have power and authority to inspect and regulate the diversions of all the parties hereto in accordance with this agreement, and in the exercise of such authority may enter

upon the lands of said parties for the purpose of such inspection and regulation, and may establish and maintain such gaging stations and measuring devices and require such works in said river and diversions as may be necessary or convenient. The several water right owners shall furnish the necessary labor and material for the construction and installation of said structures for their respective diversions.

3. In order to meet the costs of such distribution by the water master during the 1933 season, the parties hereto agree to pay to the Division of Water Resources on or before April 1, 1933, the sum of four hundred and fifty dollars (\$450.00), said sum to be apportioned among the various parties hereto in accordance with their respective irrigated areas in the same manner as the apportionment was made for the 1932 season.

4. It is further agreed that the Board of Directors of the Big Valley Water Users Association heretofore elected on March 20, 1933, shall act as a water users committee to represent the parties hereto; said committee shall be charged with the duty of assisting said water supervisor in enforcing the provisions of this agreement; said committee shall keep said water supervisor informed of the desires of the parties hereto; said committee shall keep the parties hereto informed of the plans of said water supervisor; and said committee shall convene on the last Saturday of each month and at such other times as the Chairman of said committee may designate.

IN WITNESS WHEREOF the parties hereto have affixed their hands and seals this 31st day of March, 1933.

Ward Kramer

Bieber, California

Peter Gerig

Bieber, California

G. L. Kramer

Bieber, California

Arad Babcock

Bieber, California

Lester Babcock	Bieber, California
A. Babcock	
McElroy Brown	
W. H. Gerig	
J. W. Leventon	Lookout, California
S. J. Thompson	
E. C. Babcock	Bieber, California
James H. Holl	Bieber, California
Dan Fox	Bieber, California
R. McArthur	McArthur, California
Jas. A. Hollenbeak	Pittville, California
Kate Gerig	Bieber, California
Antone Avilla	Bieber, California
A. E. DeMange by Frank Iverson	Bieber, California