



State of Idaho

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MEMORANDUM

From: Liz Cresto, Technical Hydrologist

Date: February 4, 2015

Subject: Analysis of junior diversions during flood control years limited to those periods when the Boise Reservoirs were physically filling

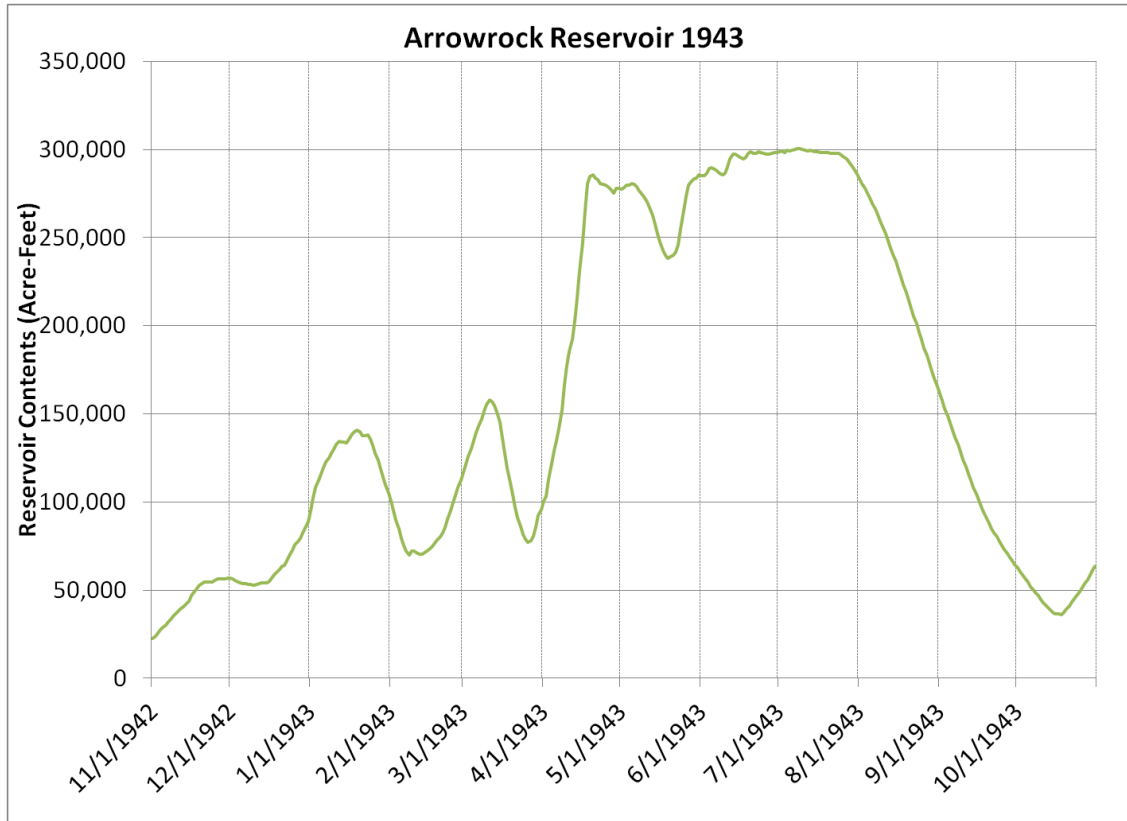
Purpose

This memorandum has been prepared in response to Interrogatories 4-6 from the “Pioneer Irrigation District’s First Set of Discovery Requests to the Idaho Department of Water Resource,” (Pioneer Discovery Request) dated November 26, 2014. This analysis identifies and quantifies water rights that diverted water during the “Refill Period” for the following priority dates: (1) junior to January 13, 1911 but senior to December 9, 1940, (2) junior to December 9, 1940 but senior to April 12, 1963, and (3) junior to April 12, 1963. As defined by the Pioneer Discovery Request, “The term ‘Refill Period’ shall mean the period of time in flood control release years during which the Boise River reservoir system (Arrowrock, Anderson Ranch, and Lucky Peak reservoirs) was ‘physically filling’ as that term is defined and used in the attached summary table provided by the Idaho Department of Water Resources.” The term “physically filling” is defined as the period of time when the sum of Arrowrock, Anderson Ranch, and Lucky Peak reservoir contents are increasing. While the Pioneer Discovery Request asked for 104 years of analysis, limitations on staff time required that staff analysis be restricted to a smaller subset of years. The Department staff analyzed three years: 1943, 1952, and 1956. The year 1943 was selected because only Arrowrock Reservoir was complete. The year 1952 was selected because Arrowrock and Anderson Ranch Reservoirs were complete. 1956 was selected because all three reservoirs, Arrowrock, Anderson Ranch, and Lucky Peak were complete. A significant lack of diversion data for junior water rights limited the analysis to only those diversions with data in the years of analysis. The three years provide a representative sample of relevant diversion data over the history of the Boise River reservoir system.

1943 Analysis

The year 1943 was chosen for analysis because data were available and it appeared that there were flood control releases from Arrowrock Reservoir although the 1943 annual watermaster report (1943 Black Book) did not specify if or when flood control releases from Arrowrock occurred. In 1943, the natural flow at Lucky Peak totaled 3,553,000 AF, which equates to approximately 180% of average for

the period of record (1906 to 2013). Arrowrock was the only reservoir in operation in 1943. Construction began on Anderson Ranch in 1941 but it was not completed until 1950. The determination of when the reservoirs were “physically filling” was therefore based solely on Arrowrock reservoir contents. Below is a hydrograph of the Arrowrock contents.



In 1943, the watermaster daily diversion records began in April. The determination of when Arrowrock was physically filling was limited to those periods beginning April 1, 1943 and ending on July 18, 1943 when according to the 1943 Black Book, flows were insufficient to meet irrigation demand and regulation began. The start of the regulation season corresponds with declining reservoir contents. Arrowrock was determined to be physically filling during the following time periods:

- April 1, 1943 to April 20, 1943,
- April 29, 1943
- May 2, 1943 to May 5, 1943,
- May 20, 1943 to May 31, 1943
- June 3, 1943 to June 5, 1943,
- June 10, 1943 to June 13, 1943,
- June 18, 1943 to June 20, 1943,
- June 23, 1943,
- June 28, 1943 to July 2, 1943,
- July 4, 1943,
- July 6, 1943 to July 8, 1943,

- July 13, 1943.

Table 1 lists water rights with priorities junior to January 13, 1911 and senior to 1943 that also had daily diversion records reported in 1943. Senior water rights were summed for each canal with junior water rights using Chart No. 25 in the 1943 Black Book. For the period of time in 1943 when it was determined that Arrowrock was physically filling, the daily diversions for junior water rights were determined. If Arrowrock was “physically filling” and the diversion rate was greater than the rate allowable under senior water rights, it was assumed that water was diverted to fill the junior water right. The last two columns in Table 1 identify the dates and associated quantities in which the junior rights were taking water.

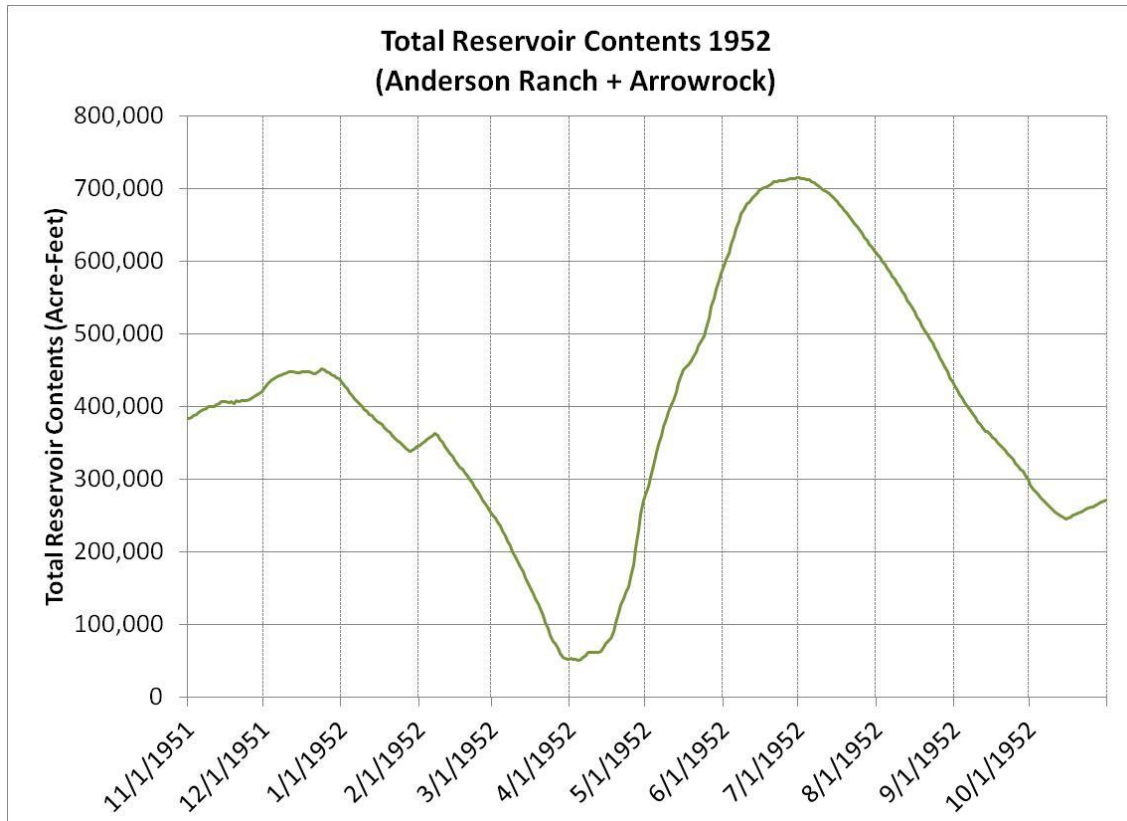
Table 1: Diversions that have at least one junior water right and a record of diverting water in 1943.

Diversion	Junior Water Right	Junior Priority Date	Junior Diversion Rate (cfs)	Total Senior Water Rights Diversion Rate Including Drainage Credits (cfs)	Period when Rights Junior to 1/13/1911 and senior to 1943 were Diverting while Arrowrock was Physically Filling	Total Junior Diversions when the Reservoirs were Physically Filling(AF)
Diversions between Lucky Peak Dam and the Middleton Gage						
Farmers Union including Boise Valley	63-2360 63-18700 63-21729	8/18/1924 2/17/1929 5/20/1926	1.2 0.91 1.8	278.712	None	0
New York	63-2388A	8/18/1924	299.83	2,596.83	April 29, May 2 -May 5, May 20 -May 31, June 3, June 28 - July 2, July 4	4,673
Settlers	63- 2388B	8/18/1924	0.99	175.49	May 2 - May 4, May 21 - 31, June 28 - July 2, July 4, and July 6 -July 8	47
Ridenbaugh	63-2388C	8/18/1924	0.18	539.6	May 23 - May 28, June 28 - July 2, July 4, and July 6 - July 8, July 13	6
Diversions between Middleton Gage and the Boise River confluence with the Snake River						
Pioneer Dixie	63-374	7/9/1914	20.9	40.3	May 20 - May 31, June 3 -June 5, June 10 - June 13, June 18 - June 20, June 28, and June 29	972
Riverside	63-300	4/1/1914	17.7	276.68	None	0

1952 Analysis

The year 1952 was chosen for analysis because it appeared that there were flood control releases and both Arrowrock Reservoir and Anderson Ranch reservoirs were in operation. The 1952 annual watermaster report (1952 Black Book) did not specify if or when flood control releases from Arrowrock

and Anderson had occurred. Construction on Lucky Peak began in 1949 but the reservoir was not in operation until 1955. In 1952, the natural flow at Lucky Peak totaled 2,823,000 AF, which equates to approximately 144% of average for the period of record. The determination of when the reservoirs were “physically filling” was based on when the sum of Arrowrock and Anderson Ranch reservoir contents were increasing. Below is a hydrograph of the summed contents of Arrowrock and Anderson Ranch reservoirs.



In 1952, the watermaster daily diversion records began in April. The determination of when the sum of Arrowrock and Anderson Ranch reservoirs were physically filling was limited to those periods beginning April 1, 1952 and ending on July 1, 1952 when according to the 1952 Black Book, flows were insufficient to meet irrigation demand and regulation began. The start of the regulation season corresponded with declining total reservoir contents. Arrowrock was determined to be physically filling during the following time periods:

- April 1, 1952
- April 5, 1952 to April 9, 1952,
- April 12, 1952 to June 27, 1952,
- June 30, 1952 to July 1, 1952

Table 2 lists water rights with priorities junior to January 13, 1911 and senior to 1952 for which daily diversion records were reported in 1952. Senior water rights were summed for each canal with junior water rights using Chart No. 25 in the 1952 Black Book. For the period of time in 1952 when it was

determined that the sum of Arrowrock and Anderson Ranch reservoirs were physically filling, the daily diversions for junior water rights were determined. If the reservoirs were “physically filling” and the diversion rate was greater than the rate allowable under senior water rights, it was assumed that water was diverted to fill the junior water right. The last two columns in Table 2 identify the dates and associated quantities in which the junior rights were taking water.

Table 2: Diversions that have at least one junior water right and a record of diverting water in 1952.

Diversion	Junior Water Rights	Junior Priority Dates	Junior Diversion Rates (cfs)	Total Senior Water Rights Diversion Rate Including Drainage Credits (cfs)	Period when Rights Junior to 1/13/1911 and Senior to 1952 were Diverting while Arrowrock and Anderson Ranch were Physically Filling	Total Junior Diversions when the Reservoirs were Physically Filling(AF)
Diversions between Lucky Peak Dam and the Middleton Gage						
Farmers Union and Boise Valley	63-2360 63-18700 63-21729	8/18/1924 2/17/1929 5/20/1926	1.2 0.91 1.8	278.712	None	0
New York	63-2388A	8/18/1924	299.83	2598.83	April 28 - May 10, May 12 to June 27, June 30 - July 1	23,789
Settlers	63- 2388B	8/18/1924	0.99	183.92	May 6 - May 7, May 19 - June 11, June 17 - June 26	71
Ridenbaugh	63-2388C	8/18/1924	0.18	539.77	May 23 - June 11, June 17 - June 27, June 30 - July 1	12
Diversions between Middleton Gage and the Boise River confluence with the Snake River						
Riverside	63-300	4/1/1914	17.8	272.57	None	0
Eureka #2	63-21363	5/11/1950	46	53.4	April 27 - June 14, June 20 - June 27, June 30	3,339
Pioneer Dixie	63-374	7/9/1914	20.9	39.1	April 26 - June 16, June 18 - June 27, June 30 - July 1	2,540

1956 Analysis

The year 1956 was chosen for analysis because it predates the Lucky Peak 4/12/1963 water right, the three reservoirs (Arrowrock, Anderson Ranch, and Lucky Peak) were complete, and it appeared to be a year with flood control releases. In 1956, the natural flow at Lucky Peak totaled 3,159,249 AF, which

equates to approximately 160% of average for the period of record. Anderson, Arrowrock, and Lucky Peak were summed to determine the total system contents. If the total system contents increased from the prior day, this was deemed “physically filling.” The determination of when the reservoirs were physically filling was limited to those periods beginning April 1, 1956 and ending on July 2, 1956 when according to the 1956 Black Book, flows were insufficient to meet irrigation demand and regulation began. The start of the regulation season corresponded with declining total reservoir contents. The reservoirs were “physically filling” between April 11, 1956 and July 1, 1956. Below is a hydrograph of the total system contents.

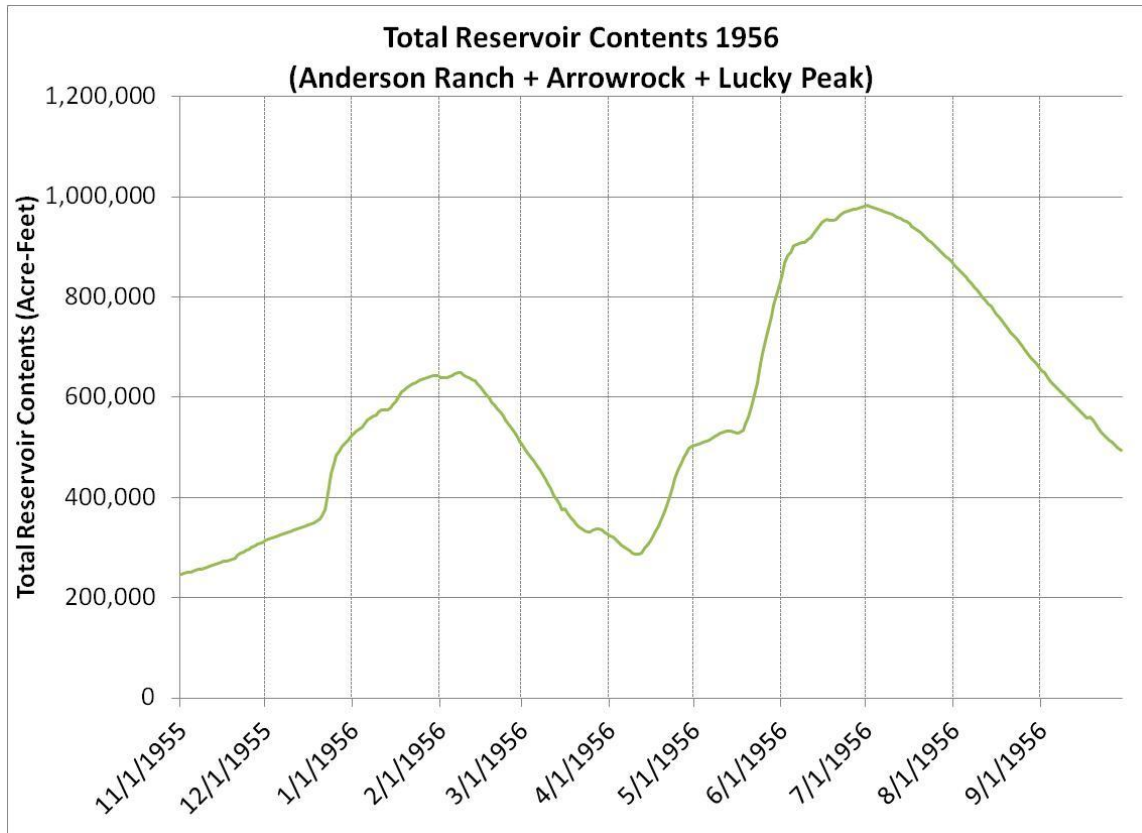


Table 3 lists water rights with priorities junior to January 13, 1911 and senior to 1956 that also had daily diversion records reported in 1956. Senior water rights were summed for each canal with junior water rights using Chart No. 25 in the 1956 Black Book. For the period of time in 1956 when it was determined that the sum of the total reservoir contents were physically filling, the daily diversions for junior water rights were determined. If the reservoirs were “physically filling” and the diversion rate was greater than the rate allowable under senior water rights, it was assumed that water was diverted to fill the junior water right. The last two columns in Table 3 identify the dates and associated quantities in which the junior rights were taking water.

Table 3: Diversions that have at least one junior water right and a record of diverting water in 1956.

Diversion	Junior Water Rights	Junior Priority Dates	Junior Diversion Rates (cfs)	Total Senior Water Rights Diversion Rate Including Drainage Credits (cfs)	Period when Rights Junior to 1/13/1911 and Senior to 1956 were Diverting while the Reservoirs were Physically Filling	Total Junior Diversions when the Reservoirs were Physically Filling(AF)
Diversions between Lucky Peak Dam and the Middleton Gage						
Farmers Union and Boise Valley	63-2360 63-18700 63-21729	8/18/1924 2/17/1929 5/20/1926	1.2 0.91 1.8	278.712	None	0
New York	63-2388A	8/18/1924	299.83	2604.83	April 14 – May 10, May 16 - July 1	24,877
Ridenbaugh	63-2388C	8/18/1924	0.18	539.77	April 23 – April 26, May 18 – May 26, June 7, June 27 – July 1	7
Settlers	63- 2388B	8/18/1924	0.99	185.108	April 22 – April 26, May 18 – May 27, June 3 – June 5, June 28 – July1	43
Diversions between Middleton Gage and the Boise River confluence with the Snake River						
Eureka #2	63-21363	5/11/1950	46	52.95	April 11 - June27, June 29 – July 1	4,855
Riverside	63-300	4/1/1914	17.7	290.374	June 20 – June 21	
Pioneer Dixie	63-374	7/9/1914	20.9	39.1	April 15 – June 19, June 22 - July 1	2,898
Upper Center Point Canal	63-32342	3/15/1954	10	12.82	April 17 – May 31, June 7 – June 16, June 22 – June 27, July 1.	583