

Figure 5. Water right irrigation POU's from both groundwater and surface water sources in WD37

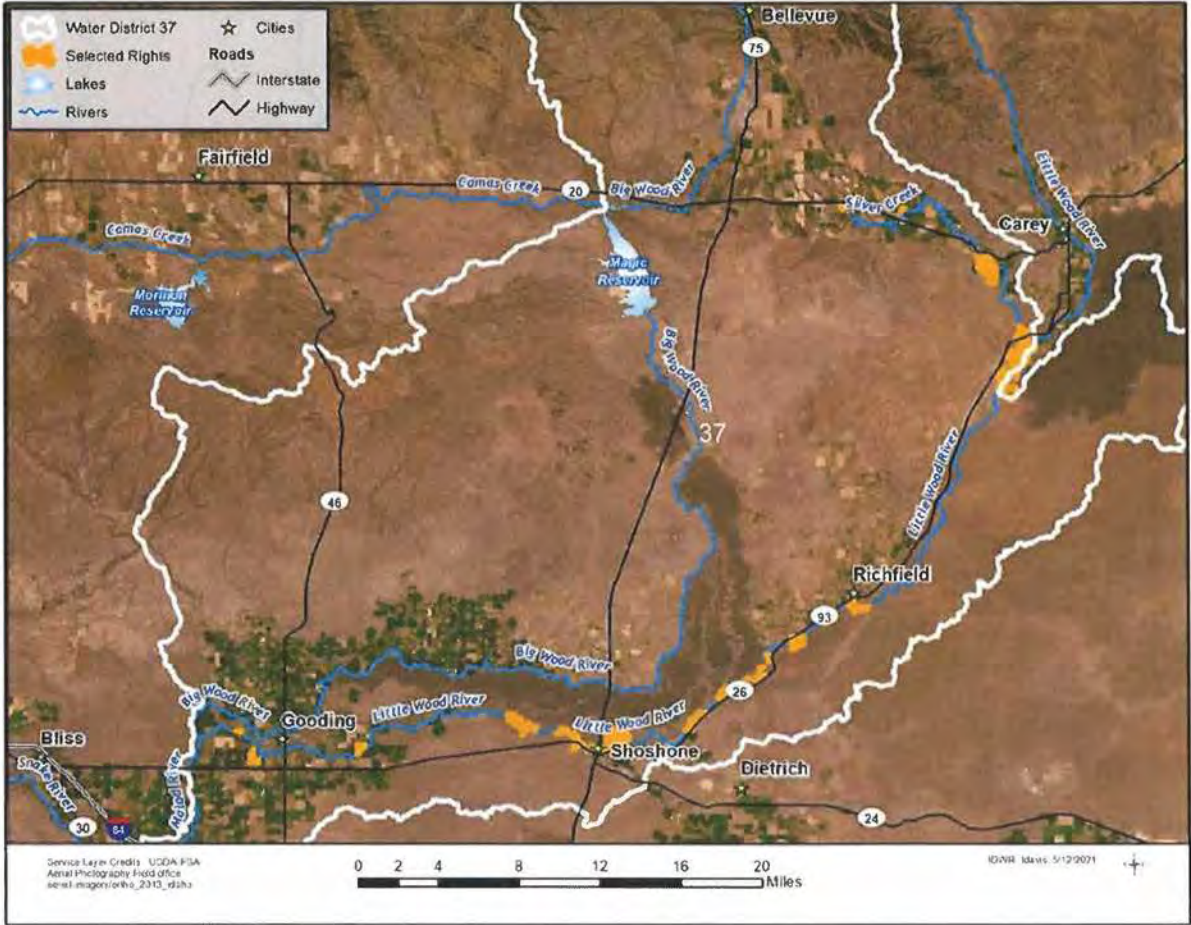


Figure 6. Selected Water Right POUs from Silver Creek, Silver Creek Tributaries, and the Little Wood River

10. Analysis of Possible Injury

The following analysis of possible injury is limited to water rights on the Little Wood River and Silver Creek.

A. Comparison of Little Wood River and Silver Creek Water Right Priorities: 2021 vs. Pre-Groundwater Development

Water right priority date deliveries on the Little Wood River and Silver Creek are published in annual water district reports. Reports are available for most years from 1919 through 2020.¹⁵ Annual reports are missing for some early years between 1919 and 1934. Some available reports from these early years do not include summaries of water right priority deliveries or cuts.

As discussed in the IDWR staff memorandum from Jennifer Sukow dated May 17, 2021 (“Sukow Memo”), groundwater development within the Wood River Valley “increased steadily between the late 1940s and 1991.” The pre-groundwater development period for which water right delivery records are available for the Little Wood River and Silver Creek is limited to 1919 through the mid-1940s.

As described in the IDWR staff memorandum from Sean Vincent dated May 17, 2021 (“Vincent Memo”), “the SWSI for the Big Wood River above Hailey is a better choice for predicting the available supply for surface water users in the Wood River Valley as well as downstream users that don’t have access to Magic Reservoir but instead divert from Silver Creek or the Little Wood River. The 2021 April SWSI [50% chance exceedance forecast] for the Big Wood River above Hailey was -2.7 with a predicted April through September runoff volume of 127 KAF.”

The 2021 predicted April SWSI value of -2.7 published by the NRCS is based on a SWSI analysis period from 1961 to present. Upon request by IDWR, the NRCS completed an expanded SWSI analysis at the Big Wood River above Hailey for the 104-year historical period of record, 1917 through 2020. The 2021 April SWSI 50% chance exceedance value for the historical period of record is -3.1 and among the lowest ranked SWSI values for the 104-year period. Other years with the same -3.1 April SWSI value include 1988 and 1961, ranked respectively at 91 and 92. The next two closest years are 1939 (-3.0 SWSI) and 1937 (-3.2 SWSI), ranked respectively at 90 and 93. Both 1939 and 1937 are in the pre-groundwater development period for which water right priority delivery records are available. The next two closest years from the pre-groundwater development period are 1929 and 1926 (-3.5 SWSI, and runoff of 116 KAF and 114 KAF respectively), but annual water district reports are not available for those years.

Table 6 shows the 2021 April SWSI 50% chance exceedance value compared to similar years from the pre-groundwater development period for the Big Wood River above Hailey.

¹⁵ The annual reports are titled “Water Distribution and Hydrometric Works.” Silver Creek and the Little Wood River below Silver Creek was originally designated as Water District 11-AB. In 1971, Water District 11-AB was renumbered as Water District 37-M. Effective 2014, Water District 37-M was combined with Water District 37, Big Wood River and tributaries excluding Camas Creek and tributaries.

Year	SWSI 1917-2020	Stream Flow Apr-Sep (KAF)	SWSI Rank	Most Sr. Water Rt. Priority Filled	Comment
1939	-3.0	131	90	7/8/1884	7/8/1884 priority filled all season
2021	-3.1	127			
1937	-3.2	123	93	4/1/1884	4/1/1884 priority filled all season
1929	-3.5	116	96	NA	Delivery records not available
1926	-3.5	114	97	NA	Delivery records not available

Table 6. 2021 Predicted SWSI and comparable years from pre-groundwater development period for Big Wood River above Hailey.

1939 Water Right Priority Deliveries

In 1939, all water rights bearing a priority date of 4/1/1884 and senior on the Little Wood River and Silver Creek system were filled throughout the irrigation season. The next junior priorities, 6/3/1884 through 7/17/1884, were cut for two days from May 10 to May 12. The next junior water right priority date on the system is 4/1/1885, which was cut or partially cut for a total of 26 days including 10 days during mid to late May, and 16 days from August 20 to September 5.

In 1939, Magic Reservoir filled to capacity on approximately April 9.¹⁶

1937 Water Right Priority Deliveries

In 1937, all water rights bearing a priority date of 5/5/1884 and senior on the Little Wood River and Silver Creek system were filled throughout the irrigation season. The next junior priority, 5/15/1884, was cut for six days from May 22 to May 28. The next junior priority, 6/3/1884, was cut for seven days from July 30 to August 6. The next junior priority, 7/8/1884, was cut for a total of 22 days, from May 28 to June 11 (14 days), and again from July 30 to August 6 (8 days).

Magic Reservoir did not fill to capacity in 1937; maximum reservoir fill reached about 172 KAF on about May 18, 1937. The 1937 fill included 92,000 acre-feet of carryover at the close of the 1936 irrigation season.¹⁷

The 1939 and 1937 water right priority cut tables are included in Table 11 of this memo.

Analysis of Watermaster Records for 2021 Analog Years

As noted in the Vincent Memo, the potential analog years for the Wood River Valley, based on review of SWSI data for the period 1991 to 2020, are 2004 (-2.6 SWSI) and 2020 (-2.8 SWSI). For the full period of record 1917 to 2020, the years with the most similar total supplies to the 50% exceedance forecast for 2021 are 1988 and 1961 (SWSI = -3.1). The years 2020 and 2004 are selected as the most analogous years to 2021 for predicting water right priority cuts on the Little Wood and Silver Creek system because they are more recent and should be more

¹⁶https://waterdata.usgs.gov/id/nwis/dv?cb_00054=on&format=html&site_no=13142000&referred_module=sw&period=&begin_date=1938-10-01&end_date=1939-10-01

¹⁷ WD 37 and 11, *1937 Water Distribution and Hydrometric Work, Big Rivers and Little Wood Rivers*.

representative of groundwater pumping in 2021. The 2020 and 2004 water right priority cut tables are included in Table 11 of this memo.

2020 Water Right Priority Deliveries

In 2020, all water rights bearing a priority date of 4/1/1883 and senior on the Little Wood River and Silver Creek system were filled throughout the irrigation season.¹⁸ The next junior priority dates, 4/6/1883 through 4/1/1884, were cut from early to mid-September to the end of the irrigation season. The 5/1/1884 priority rights were cut on July 22 through the end of the season.

2004 Water Right Priority Deliveries

In 2004, all water rights bearing a priority date of 9/1/1883 and senior on the Little Wood River and Silver Creek system were filled throughout the irrigation season. The next junior priority date, 4/1/1884, was cut from September 4 through the end of the season.

In 2004, Magic Reservoir filled to only 77 KAF on about May 1; the reservoir was shut off on approximately July 1.

Comparison of Water Right Priority Cuts: 1939 and 1937 vs. 2020 and 2004

Comparison of the 2020 and 2004 water right priority cuts with the 1939 and 1937 water right priority cuts generally indicates that the 1884 priority rights were cut more frequently and longer in 2020/2004 than 1939/1937.

Tables 7 through 10 compare the 2020 and 2004 water right priority cuts with the water right priority cuts in 1939 and 1937. Specifically, the tables compare the number of days the different priorities were cut between the more recent years and the older years. For example, in 2004, the 4/1/1885 priority right was cut, or off, a total of 69 days from July 22 through the end of the season. In comparison, the 4/1/1885 priority right was off a total of 25 days in 1939. The difference between the number of days off (44 days in this example), is multiplied by the 4/1/1885 priority water rights cumulative diversion rate to calculate a total net volume of water cut between the two years. Totals are given in cubic feet per second (“cfs”) and acre-feet (“AF”). The net volume represents the additional amount of water cut under the 4/1/1885 priority in 2004 versus 1939. This example is repeated for each priority cut in 2020 versus 1939 and 1937, and each priority cut in 2004 versus 1939 and 1937.

As shown in the tables, the total net curtailment volume in 2020 versus 1939 and 1937 is 5,312 AF and 4,225 AF respectively. The total net curtailment volume in 2004 versus 1939 and 1937 is 3,416 and 2,269 AF respectively. Note that the 1937 net curtailment volume is lower primarily because cuts to the 4/1/1885 priority in 1937 were greater than both 1939 and 2004 (the 4/1/1885 priority was cut a total of 86 days in 1937 compared to 69 days in 2004).

¹⁸ The 2020 WD37 annual report shows the 4/1/1883 priority was cut on 9/24/2020. Per communications with the WD37 watermaster and local water users, the typical irrigation shut off date in WD37 is about September 25. IDWR therefore removed the 4/1/1883 priority date curtailment on 9/24/2020, and assumed the priority was delivered through the year.

The analysis summarized in Tables 7 through 10 uses an irrigation season from May 1 through September 25. The September 25 end date is representative of the normal irrigation shut off date in WD37.

Priority Date Cut in 2020	Date First Cut in 2020	Priority Cut in 1939?	Number of Days Off in 1939	Number of Days Off in 2020	Difference in No. Days Off (2020 - 1939)	Priority Right Cummulative Diversion Rate (cfs)	Net Cut Total 24 hr-cfs	Net Cut Volume (Acre Ft.)
Cut 5/10-12, 5/17-								
4/1/1885	7/13/2020	24, 8/20-9/5	25	66	41	10.1	413.3	819.7
7/17/1884	7/22/2020	Cut 5/10 -5/12	2	66	64	1.4	89.6	177.7
7/8/1884	7/22/2020	Cut 5/10 -5/12	2	66	64	2.4	153.6	304.7
6/3/1884	7/22/2020	Cut 5/10 -5/12	2	66	64	4.0	256.0	507.8
5/15/1884	7/22/2020	No - on all season	0	66	66	6.5	429.0	850.9
5/5/1884	7/22/2020	No - on all season	0	66	66	6.2	409.2	811.6
5/1/1884	7/22/2020	No - on all season	0	66	66	1.9	125.4	248.7
4/30/1884	9/9/2020	No - on all season	0	16	16	5.0	80.0	158.7
4/15/1884	9/9/2020	No - on all season	0	16	16	1.8	28.8	57.1
4/1/1884	9/9/2020	No - on all season	0	16	16	14.6	233.6	463.3
9/1/1883	9/10/2020	No - on all season	0	15	15	20.0	300.0	595.1
6/14/1883	9/10/2020	No - on all season	0	15	15	6.6	99.0	196.4
4/6/1883	9/17/2020	No - on all season	0	8	8	7.6	60.4	119.8
							2,677.9	5,311.6

Table 7. Water Right Priority Cut Comparison: 2020 vs. 1939

Priority Date Cut in 2004	Date First Cut in 2004	Priority Cut in 1939?	Number of Days Off in 1939	Number of Days Off in 2004	Difference in No. Days Off (2004 - 1939)	Priority Right Cummulative Diversion Rate (cfs)	Net Cut Total 24 hr-cfs	Net Cut Volume (Acre Ft.)
Cut 5/10-12, 5/17-								
4/1/1885	7/19/2004	24, 8/20-9/5	25	69	44	10.1	443.5	879.7
7/17/1884	7/19/2004	Cut 5/10 -5/12	2	69	67	1.4	93.8	186.1
7/8/1884	7/19/2004	Cut 5/10 -5/12	2	69	67	2.4	160.8	318.9
6/3/1884	7/19/2004	Cut 5/10 -5/12	2	69	67	4.0	268.0	531.6
5/15/1884	9/4/2004	No - on all season	0	21	21	6.5	136.5	270.7
5/5/1884	9/4/2004	No - on all season	0	21	21	6.2	130.2	258.3
5/1/1884	9/4/2004	No - on all season	0	21	21	1.9	39.9	79.1
4/30/1884	9/4/2004	No - on all season	0	21	21	5.0	105.0	208.3
4/15/1884	9/4/2004	No - on all season	0	21	21	1.8	37.8	75.0
4/1/1884	9/4/2004	No - on all season	0	21	21	14.6	306.6	608.1
							1,722.1	3,415.8

Table 8. Water Right Priority Cut Comparison: 2004 vs. 1939

Priority Date Cut in 2020	Date First Cut in 2020	Priority Cut in 1937?	Number of Days Off in 1937	Number of Days Off in 2020	Difference in No. Days Off (2020 - 1937)	Priority Right Cummulative Diversion Rate (cfs)	Net Cut Total 24 hr-cfs	Net Cut Volume (Acre Ft.)
		Cut 5/22 - 28; 7/30						
7/17/1884	7/22/2020	- 8/6; 8/23 - 8/30	20	66	46	1.4	64.4	127.7
		Cut 5/22 - 5/28;						
7/8/1884	7/22/2020	7/30 - 8/6;	13	66	53	2.4	127.2	252.3
		Cut 5/22-5/28;						
6/3/1884	7/22/2020	7/30 - 8/6	13	66	53	4.0	212.0	420.5
5/15/1884	7/22/2020	Cut 5/22 - 5/28	6	66	60	6.5	390.0	773.6
5/5/1884	7/22/2020	No - on all season	0	66	66	6.2	409.2	811.6
5/1/1884	7/22/2020	No - on all season	0	66	66	1.9	125.4	248.7
4/30/1884	9/9/2020	No - on all season	0	16	16	5.0	80.0	158.7
4/15/1884	9/9/2020	No - on all season	0	16	16	1.8	28.8	57.1
4/1/1884	9/9/2020	No - on all season	0	16	16	14.6	233.6	463.3
9/1/1883	9/10/2020	No - on all season	0	15	15	20.0	300.0	595.1
6/14/1883	9/10/2020	No - on all season	0	15	15	6.6	99.0	196.4
4/6/1883	9/17/2020	No - on all season	0	8	8	7.6	60.4	119.8
							2,130.0	4,224.9

Table 9. Water Right Priority Cut Comparison: 2020 vs. 1937

Priority Date Cut in 2004	Date First Cut in 2004	Priority Cut in 1937?	Number of Days Off in 1937	Number of Days Off in 2004	Difference in No. Days Off (2004 - 1937)	Priority Right Cummulative Diversion Rate (cfs)	Net Cut Total 24 hr-cfs	Net Cut Volume (Acre Ft.)
		Cut 5/22 - 28; 7/30						
7/17/1884	7/19/2004	- 8/6; 8/23 - 8/30	20	69	49	1.4	68.6	136.1
		Cut 5/22 - 5/28;						
7/8/1884	7/19/2004	7/30 - 8/6;	13	69	56	2.4	134.4	266.6
		Cut 5/22-5/28;						
6/3/1884	7/19/2004	7/30 - 8/6	13	69	56	4.0	224.0	444.3
5/15/1884	9/4/2004	Cut 5/22 - 5/28	6	21	15	6.5	97.5	193.4
5/5/1884	9/4/2004	No - on all season	0	21	21	6.2	130.2	258.3
5/1/1884	9/4/2004	No - on all season	0	21	21	1.9	39.9	79.1
4/30/1884	9/4/2004	No - on all season	0	21	21	5.0	105.0	208.3
4/15/1884	9/4/2004	No - on all season	0	21	21	1.8	37.8	75.0
4/1/1884	9/4/2004	No - on all season	0	21	21	14.6	306.6	608.1
							1,144.0	2,269.1

Table 10. Water Right Priority Cut Comparison: 2004 vs. 1937

Table 11. WD 37 Water Right Priority Cut Tables for Little Wood River and Silver Creek, 2020, 2004, 1939 and 1937

Year: 2020

SILVER CREEK & LITTLE WOOD RIVER

Date Priority Cut Made	Date of Priority Cut to and including:	Remarks
April 26, 2020	May 27, 1899	Cottonwood Decree
May 13, 2020	May 27, 1899	Reinstate - Dam washed out
June 3, 2020	April 1, 1905	
June 11, 2020	All Decrees	All rights reinstated
June 16, 2020	May 27, 1899	Cottonwood Decree
June 22, 2020	June 1, 1887	
July 13, 2020	May 31, 1885	
July 22, 2020	May 1, 1884	
September 9, 2020	April 1, 1884	
September 10, 2020	June 14, 1883	
September 17, 2020	April 6, 1883	
September 24, 2020	April 1, 1883	
October 6, 2020	April 6, 1883	33% reinstate

Year: 2004

SILVER CREEK & LITTLE WOOD RIVER
 WATER DISTRICT 37M

Date of Priority	Date Priority Cut Made	Remarks
Cottonwood Rights	May 24, 2004	
October 25, 1892	June 18, 2004	
June 1, 1889	July 6, 2004	
April 1, 1886	July 12, 2004	
June 3, 1884	July 19, 2004	
April 1, 1884	September 4, 2004	

Year: 1939

Water District 11-AB			
Priority	When Expired	Again Supplied	Remarks
April	1, 1886	May 4th	
April	15, 1885	May 7th	
June	3, 1884	May 10th	
April	1, 1885	May 12th	50% Good
April	1, 1885	May 14th	100% Good
April	1, 1885	May 17th	
April	1, 1885	May 24th	
May	31, 1885	June 8th	
June	1, 1886	June 20th	
Nov.	1, 1889	July 10th	
April	1, 1888	July 12th	
June	1, 1887	July 14th	
June	1, 1886	July 16th	
Nov.	1, 1885	July 18th	
May	31, 1885	July 24th	
May	15, 1885	Aug. 5th	
Apr.	15, 1885	Aug. 7th	
April	1, 1885	Sept. 5th	

Year: 1937

Water District No. 11-AB			
Priority	When Expired	Again Supplied	Remarks
June 1, 1885	May 14th		
April 1, 1885	May 15th		
May 15, 1884	May 22nd	May 28th	
July 8, 1884		May 28th	
April 1, 1885		June 11th	
April 1, 1885	June 15th	June 19th	
April 15, 1885		June 19th	
April 1, 1885	June 25th		
April 1, 1885		June 29th	50% good
May 31, 1885		July 1st	
June 15th, 1885		July 9th	
April 1, 1885	July 20th		50% good
April 1, 1885	July 23rd		
June 3, 1884	July 30th		
July 17, 1884		August 5th	
July 17, 1884	August 23rd		
July 17, 1884		August 30th	
April 15, 1885		September 12th	
May 15, 1885		September 16th	
June 15, 1885		September 26th	