

## **Lemhi Big Springs Creek Seepage Studies: 2007 and 2008**

Two seepage studies were conducted the first August 21-22, 2007 and the second August 19, 2008 by IDWR staff. These studies consisted of measuring surface water flows (stream flows, diversion rates, and return flows) in Lemhi Big Springs Creek in order to quantify gaining and losing reaches.

All of the diversions were off during the 2007 seepage run. The subreach from the confluence of what we called the east and west forks to BS 5a/BS 4 had a cumulative reach gain of 28.6 cfs. The reach from BS5a/BS4 down to the mouth lost about -0.80 cfs.

During the 2008 study, 13 measurements or observations were taken, including measurements of diversions, stream flows, and return flows. The upper part of Big Springs Creek gains rapidly. This was observed adjacent to the highway gaining flows upstream of the upper most diversion, BS6. The flow measured above BS6 was 17.3 cfs; 5.3 cfs of this was diverted by BS6. Downstream of BS6 and upstream of BS5 a side channel tributary starts from a man made pond that collects spring water. This channel flows along the south side of the highway until it reaches two culverts, separated by ~150 yards, where the flow is split and flows under the highway into the main stem Big Springs. Big Springs Creek gains 9.3 cfs from the side tributary and also has an additional 13.5 cfs in reach gains from BS6 to BS5a. Big Springs 5 (BS5) diverts 3.4 cfs and BS5a diverts 1.2 cfs. Below BS5 two diversions, CH4 (0.1cfs) and CH3 (0.2cfs), were taking smaller volumes and this reach was losing 0.8 cfs due to seepage. BS2 was diverting the most the day of the study at 6.6 cfs and BS1 was only diverting 0.3 cfs; but downstream of BS3 to the mouth was also a gaining reach that accumulated an additional 4.1 cfs.

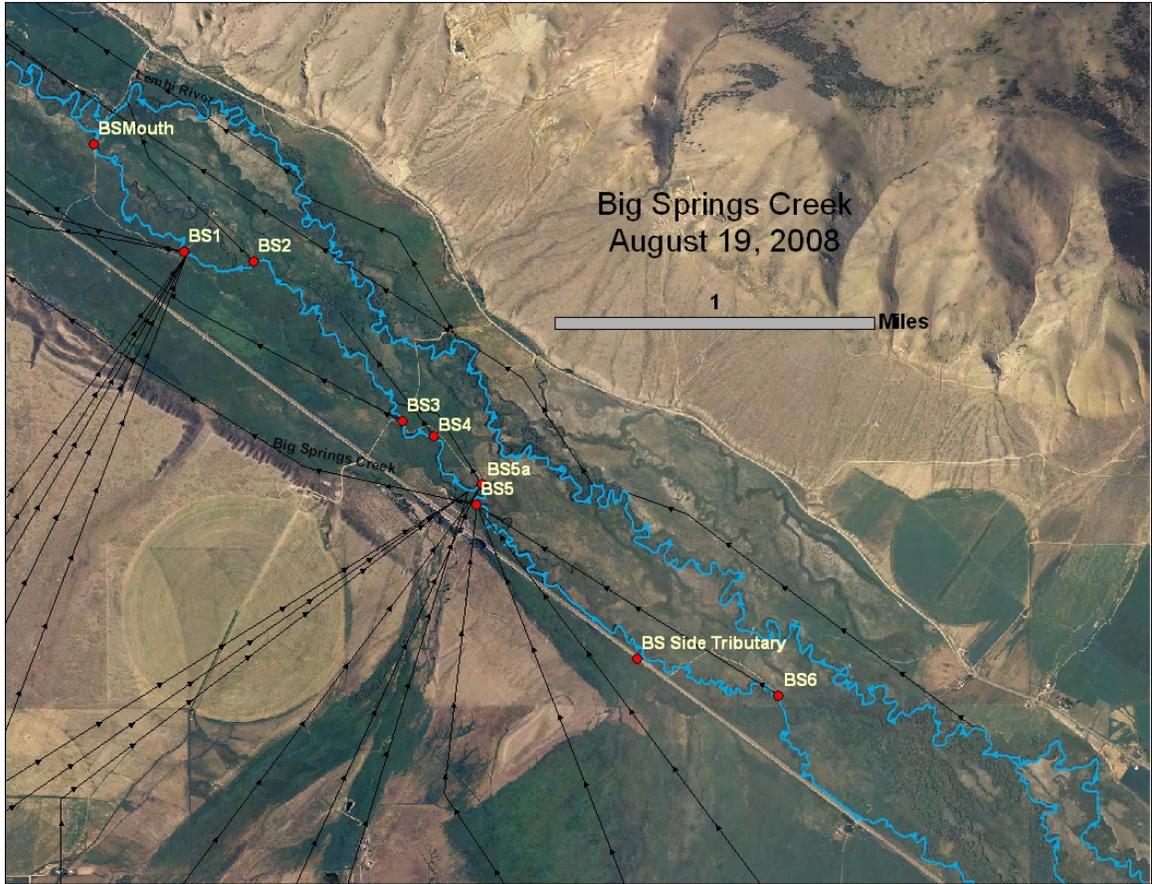


Figure 1. Map of Big Springs Creek with important surface water features labeled. The black lines with arrows represent the MIKE Basin Model diversion reaches.

Main Stream Location	Trib/Div Location	Discharge (cfs)	Q diverted out (cfs)	Trib/diversion Q in	Big Springs Creek Q (cfs)	Seepage (cfs)	Point_X	Point_Y	X-Section Substrate	Date and time
BS East Channel, Abv Diversions		6.93					2548537	1499835.741	Sandy and silt	8/21/2007 4:10-4:40
	BS West Channel Abv diversions	2.20		2.20			2548471	1499815.32	Fine Gravel	8/21/07 14:06
BS East and West Channel Confluence		<b>9.13</b>			9.13		2548491	1499854.883		
Between Confluence and BSC6										
Abv BS6		18.2			18.2		2548327	1500228.378	Coarse gravel	8/21/2007 5:30-6:20
	BS6	0.00	0.00							
Blw BS6		<b>18.2</b>			18.2					
BS6 to BS5-5A						9.07				
Abv BS5A and BS5		37.7					2546837	1501244.006	Fine Gravel and Coarse Cobbles	8/21/2007 7:00-7:30pm
	BS 5 and BS5A	0.00	0.00							
BS Blw 5 and 5A		<b>37.7</b>			37.7					
BS5-5A to BS4						19.5				
BS Abv BS4		<b>34.4</b>			34.4					
	BSC4	0.00	0.00							
Blw BS4 and Abv BS3		34.4			34.4		2546412	1501639.711	Gravel	8/21/2007 8:52-9:50
BS4 to BSC3						-3.25				
Big Springs Blw BSC4 and Abv BSC3		34.4			34.4		2546412	1501639.711	Gravel	8/21/2007 8:52-9:50
	BSC3	0.00	0.00							
Big Springs Blw BSC3		<b>34.4</b>			34.4					
BS3 to BS2						0.00				
Abv BS2		<b>40.5</b>			40.5					
	BSC2	0.00	0.00							
Blw BS2		40.5			40.5		2545661	1502471.016	Gravel	8/22/2007 10:45-11:20
BS2 to BS1						6.11				
Abv BS1		40.5			40.5					
	BS1	0.00	0.00				2545565	1502447.069		
Blw BS1		<b>40.5</b>			40.5					
BSC1 to the MOUTH						-3.67				
Big Springs <b>Mouth</b>		36.8			36.8		2544878	1503055.192	Gravel + some cobbles	8/22/2007 12:20-12:50

Table 1. Summary of the 2008 seepage study for Big Springs Creek, including reach gains and losses calculated from the measured flows. Location coordinates are in the IDTM projection.

<b>Big Springs Creek Summary</b>	
Initial flow/input	6.93
Diverted rate out	0.00
Tributary/injection Input	2.20
Cumulative reach losses	-6.92
Cumulative reach gains	34.6
Calculated output	36.8
Measured output	36.8

Table 2. Summary of the 2008 Big Springs Creek seepage study.

Main stream location	Trib/diversion location	Discharge	Q diverted out	Trib/diversion Q in	Big Springs Creek Q	Seepage	Point_X	Point_Y	Date and time	Notes
Above BS6		17.30			17.30		2548332	1500195	8/19/2008 11:26am	
	BS6	5.30	5.30				2548313	1500297		
Below BS6		<b>12.00</b>			12.00					
	Big Springs Side	9.28		9.28			2547600	1500482		
BS below side		<b>21.28</b>			21.28		2547600	1500482	8/19/2008 3:00pm	Measured upstream of two culverts that cross under the highway and feed the mainstem Big Springs
Above BS5 and Upper Gauge		34.74			34.74		2546815	1501269	8/19/2008 12:45pm	
	BS5	3.394	3.39				2546788	1501259.6	8/19/2008 3:43pm	Downstream of screen on ditch, screen staff plate read 1.22ft.
Below BS5		<b>31.35</b>			31.35					
Above BS5a		<b>31.35</b>								
	BS5a	1.24	1.24				2546811	15001411	8/19/08 0:00	Staff plate on screen read 1.77ft.
Below BS5a		<b>30.10</b>			30.10					
Above BS6 to BS5a						13.46				
Above BS4		<b>30.10</b>								
	BS4	0.10	0.10				2546445	1501760	8/19/2008 1:55pm	
Below BS4		<b>30.00</b>			30.00					
Above BS3										
	BS3	0.24	0.24				2546418.5	1501680.5		
Below BS3		28.95			28.95		2546288	1501776	8/19/2008 2:00pm	Light sprinkling during a thunderstorm.
BS5a to BS3						-0.82				
Above BS2		<b>28.95</b>								
	BS2	6.55	6.55				2545668	1502483.6		
Below BS2		23.43			23.43		2545647	1502452	8/19/2008 5:20pm	
BS3 to BS 2						1.03				
Above BS1		<b>23.43</b>								
	BS1	0.30	0.30				2545317.5	1502535.1	8/19/2008 5:30pm	Visual estimate, very small flow and no good measurement location.
Below BS1		<b>23.13</b>			23.13					
Mouth/gauge		26.20			26.20		2544861.4	1503074.4		Stage was 4.00ft at 5:50pm dls. Flow value is from IPCO rating.
BS2 to Mouth						3.08				

Table 3. Summary of the 2008 seepage study for Big Springs Creek, including reach gains and losses calculated from the measured flows. Location coordinates are in the IDTM projection.

<b>Big Springs Creek Summary</b>	<b>cfs</b>
Initial flow/input	<b>17.30</b>
Diverted rate out of Big Springs Creek	<b>17.12</b>
Tributary/injection Input	<b>9.28</b>
Cumulative reach losses	<b>-0.82</b>
Cumulative reach gains	<b>17.56</b>
Calculated output	<b>26.20</b>
Measured output	<b>26.20</b>

Table 4. Summary of the 2008 Big Springs Creek seepage study.