Upper Lemhi River Seepage Study
July 22-23, 2008

A seepage study was conducted the afternoon of July 23 and July 24, 2008 by IDWR staff on the Lemhi River from the town of Leadore just upstream of the L63 diversion to just below the confluence with Big Springs Creek. The study consisted of measuring surface water flows (stream flows, diversion rates, return flows and tributary inputs) in the Lemhi River in order to quantify gaining and losing reaches. During the two day study fifteen measurements or observations were taken, including measurements of diversions (L63, L62, L61, L60, L59) and tributaries (Canyon Creek, Big Timber Creek, Big Springs Creek)(Figure 1; Table 1). The following three Idaho Power Company maintained gages were referred to in this study: Lemhi River above L63; Lemhi River above Big Springs Creek; and Big Springs Creek above the Lemhi River. The Lemhi River above L63 station was used to compare flows between the two days to ensure that conditions had not changed; the stage was the same both days.

During the study, L63 diverted the entire flow, but the Lemhi River gained flows rapidly in this reach accumulating 14 cfs above the mouth of Canyon Creek. Below Canyon Creek to the mouth of Big Timber Creek the Lemhi River gained 16.17 cfs and almost 6 cfs was diverted. Below Big Timber Creek to L61 the Lemhi River lost less than 1.5 cfs, and from L61 to Big Springs Creek the Lemhi River gained an additional 26 cfs. With the inflow of Big Springs Creek the flow in the Lemhi River at the bottom of this study reach was almost 57 cfs with a total diversion rate of 30.5 cfs.

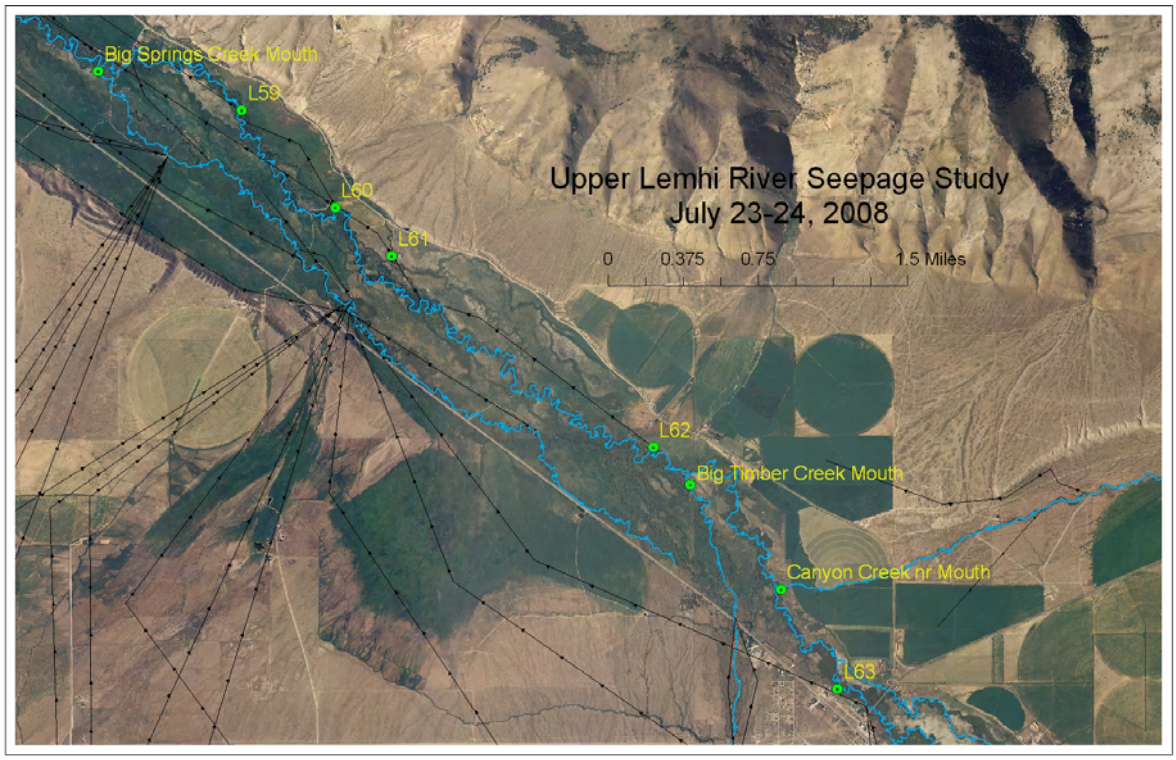

Figure 1. Map of Lemhi River with important surface water features labeled.

Main stream location	Trib/diversion location	Discharge	Q diverted out	Trib/diversion Q in	Lemhi R. Q	Seepage	Point_X	Point_Y	Date and time	Notes
		(cfs)	**(cfs)**	(cfs)	(cfs)	(cfs)				
Above L63		6.91			6.91				7/23/2008 3:20pm	The staff plate at the IPCo gauge read 0.99 and was the same the following morning when we continued this seepage run.
	L63	7.17	7.17				2550942	1498101	7/23/2008 3:48pm	Accessed from Leadore, through Doris' property.
Below L63		**0.00**			0.00					No flow past L63 but it was muddy and marshy, gaining flow.
Above L63 to Lemhi above Canyon Ck						0.26				
Above Canyon		14.19			14.19		2550215	1499012	7/23/2008 5:55pm	Near exclosure fence, 150ft upstream of Canyon Creek
Canyon Creek		3.66		3.66					7/23/2008 4:52pm	Measured at the Canyon Creek gauge which is ~225ft upstream of Lemhi River, but below Whitefish ditch.
Below Canyon		**17.85**			17.85					
Big Timber Creek		2.19		2.19	2.19		2549672	1499724	7/24/2008 11:23am	
Below BT Creek		**36.21**								
Canyon Creek to BT Mouth						30.36				
Above L62		36.21			36.21		2549374	1500009	7/24/2008 9:48am	Checked Lemhi Gauge above L63 before continuing seepage run on 7/24. Silt lenses on substrate.
	L62	5.36	5.36				2549087	1500251	7/24/2008 9:26am	Stage measurement on North side of screen, flow measurement below return flow and up from pump. Stage = 1.55
Below L62		**30.85**								
Above L61		19.20			19.20		2547233	1501632	7/24/2008 1:18pm	
	L61	10.22	10.22				2549097	1500261		Measured 10.007 in ditch below screen the flume value for H=0.99 is 10.22cfs. Due to poor location of measurement in ditch we used the flume value. Q=10.2*(H+0.011)^1.621
Below L61		**8.98**			8.98					
Big Timber to L61						-11.65				
Above L60		35.15			35.15		2546734	1502085	7/24/2008 3:30pm	
	L60	5.20	5.20				2546555	1502216	7/24/2008 2:47pm	Staff plate on screen is out of water on North side of screen.
Above L59 below L60		**29.95**			29.95					
	L59	2.59	*2.59*							
Below L59		37.16			37.16		2545783	1503108	7/24/2008 5:20pm	
L61 to L59						35.97				
Lemhi above Big Springs Creek		37.16								Measured at IPCo gauge, 15ft below bridge. The IPCo rating flow is calculated at 37.0 based on the 0.60ft stage measurement.
Big Springs Creek		**19.60**		19.60						Flow from stage measurement and IPCo rating curve.
Below BS Creek		**56.76**			56.76					

Table 1. Summary of seepage study for the upper Lemhi River (above L63 to below the Big Springs Creek confluence), including reach gains and losses calculated from the measured flows. Coordinates are in the IDTM 83 projection.

Lemhi River Summary	cfs
Initial flow/input	**6.912**
Diverted rate out of the Lemhi River	**30.542**
Tributary/injection Input	**25.445**
Cumulative reach losses	**-11.646**
Cumulative reach gains	**66.590**
Calculated output	**56.759**
Measured output	**56.759**

Table 2. Summary of the upper Lemhi River seepage study.