

# MEMORANDUM

July 23, 2004

To: Hal Anderson

From: Shane Bendixsen

Subject: Brian Higgs Comments Regarding the Big Lost Report by Johnson, Ralston, and Mink.

The following is brief hydrologic review of the above-mentioned comments. Response to the comments is in the same order as presented by Mr. Higgs.

**Page 1; 1<sup>st</sup> paragraph; 2<sup>nd</sup> sentence:**

This is a typo: not relevant.

**Page 1; 1<sup>st</sup> sentence; 2<sup>nd</sup> paragraph:**

The comment on page 31 is regarding the variation in flow, not assurance.

**Page 1; item #3, 1<sup>st</sup> sentence:**

Much of this is true, but I fail to see what difference it makes. Also the authors of this report may have assumed that the reader was familiar with Crosthwaite's (1970) report. This report is the most detailed study for the area and explains how surface and ground water are interrelated in the Big Lost Basin. In the lower portion of the valley the Big Lost River enters the Eastern Snake Plain and depths to ground water range from 600 to 1000 feet below land surface.

**Page 2; item #4, 2<sup>nd</sup> sentence:**

This is may be true, but I fail to see why it is mentioned.

**Page 3; 1<sup>st</sup> sentence and item #5**

The authors were not biased, but again assumed that the reader was familiar with Crosthwaite's (1970) work.

A report (Johnson and other's, 1991) was completed using statistical methods, with Crosthwaite's water budget, and some updated diversion data.

**Page 4; 1<sup>st</sup> paragraph:**

This is a statistical analysis. Similar statistical methods are used in surface and ground water studies and are considered standard.

**Page 6; last paragraph, 1<sup>st</sup> sentence:**

The author's are merely pointing out the weakness in some of the data and state that the method used should minimize the error.

**Page 7; 1<sup>st</sup> paragraph, "Monthly values..."**

The method used does not require ground water data Mr. Higgs refers to.

**Page 8; 2<sup>nd</sup> paragraph, 3<sup>rd</sup> sentence, Crosthwaite and others determined that 8,500 acres were irrigated by ground water.**

The 8,500 acres was a 1970 estimate. Since then, I am sure more land has come under irrigation with ground water. I am also sure that the author's estimate included supplemental wells that are used in dry years for the 47,000-acre feet average.

**Page 18; Paragraph 1.**

I know of no increased flows due to the Borah Peak Earthquake. As far as whether surface water demand went down or the watermaster records are in error is speculation for both parties.

**Page 23; 1<sup>st</sup> paragraph, 4<sup>th</sup> sentence:**

This again is whether the watermaster is keeping correct records. In my opinion, the authors are just stating all possibilities.

**Page 26, 1<sup>st</sup> paragraph, 3<sup>rd</sup> sentence.**

In 1991 ground water levels were falling in all of Southern Idaho. The authors probably were assuming who ever read the report were aware of this.

**Page 26:1<sup>st</sup> paragraph, 4<sup>th</sup> sentence.**

This involves saturated versus unsaturated flow. Unsaturated flow (divergence between surface and ground water) usually increases leakage.

**Page 27: 1st paragraph.**

14: Table 1 is on page 14.

**Page 27: 2<sup>nd</sup> paragraph, last sentence.**

I believe this is what the authors said.

**Page 31; last sentence, "It is acknowledged..."**

Two periods were chosen by the authors for the regressions: pre 1960 and post 1960. This was chosen to show pre ground water development versus post ground water development, which was the basis for this report. Using a different time period such as 1950 to 1970 would have had a mixing effect.

**Page 52; #6**

Again, Crosthwaite (1970) stated that surface and ground water were so interrelated in the Big Lost that one could not be affected without affecting the other.

**Page 52, #8**

To my knowledge, it is the only diversion depletion estimate. Again the method did not require the ground water data Mr. Higgs refers to.

**Page 53, #9**

There are no pumping data presented in Figure 6. In general though, during wet years there is less demand and therefore less ground water diverted.

While Johnson, Ralston, and Mink's 1991 report is vague, it is based on statistics that are widely used and considered standard. Mr. Higgs states that it is an inappropriate methodology, but does not explain why.

The report is factually correct, but presently the preferred method is a numeric model. Consideration should be given that a numeric model may or may not provide more accurate results. The USGS in the early 1990's did complete a numeric model for the Big Lost, but never published the report.

In Mr. Higgs conclusions he also states that he plotted ground water elevations along with the river elevations and determined that farther down the valley ground and surface water diverge. Therefore in times of drought ground water pumping does not affect surface water flow. What is not taken into account is that much of the river farther down the valley is dry.

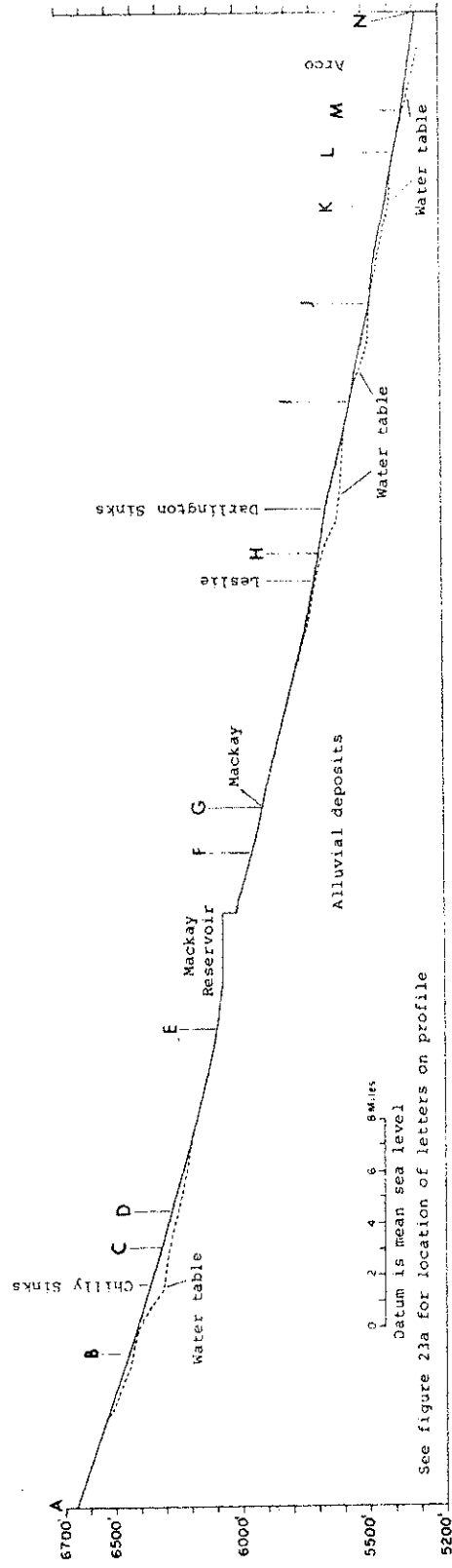
Again the only detailed published work in the Big Lost is Crosthwaite, et al, (1970). He described water in the basin as, "The ground and surface water of the Big Lost River basin are so closely interrelated that they should be considered as a single resource". The

attached figure presents a ground \ surface water profile for the basin made by Crosthwaite.

## **REFERENCES**

Crosthwaite, E.G., Thomas, C.A., and Dyer, K.L., 1970, Water Resources of the Big Lost River Basin, South Central, Idaho, USGS Water Resources Division. Prepared in Cooperation with the Idaho Department of Reclamation, Boise Idaho.

# BIG LOST BASIN SURFACE / GROUND WATER PROFILE



ADAPTED FROM CROSTHWAITE AND OTHERS, 1970