



HYDROSPHERE
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Department of Water Resources

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RE: Thoughts on ESHMC Meeting October 17-18

Dear Paul and Donna:

Herein are thoughts and comments regarding the information presented at the modeling committee meeting of last October. Please accept my apology for taking so long to get this feedback to you.

There were five topic areas in which I had some comments or questions.

Allan Wylie and Roger Warner presented analyses of the river-aquifer connections and spring discharges in the Shelley-Neeley reach. Allan's work seems to demonstrate that the river-aquifer connection is dynamic in some sections of this reach, the river alluvium being perched part of the year and connected to the ESPA part of the year. This confirms speculations made by Bob Sutter several years ago. As Allan noted, this situation has implications for the use of response functions in evaluating pumping effects in the reach, because those functions assume a continuous connection. I realize this is more of a "model use" than "model calibration" issue, but it is not too soon to be thinking and talking about how to handle it. Perhaps this section of the river could be parsed out as its own unique response zone, or treated with a sub-model.

Roger's presentation on spring flows was very interesting, but I'd like to be able to look some trends and differences that he didn't cover in his talk. Can I obtain a copy of his powerpoint presentation or, better yet, the worksheets with the data he used?

Allan also talked a little bit about the weighting scheme to be used in calibration. I didn't have a particular issue with his presentation, but I wanted to reiterate the importance of

accurately simulating reach gains and spring flows in the model. These are critical to development of both conjunctive management and recharge programs.

Bryce Contor's presentation on canal seepage brought a question to my mind regarding transient calibration. I got the impression from his talk that canal seepage was going to be assumed a constant (% of diversion) throughout the transient calibration period (albeit with different percentages for different canals). It seems to me that one of the main reasons for doing a transient calibration is to better capture the dynamics of aquifer response. If we have any reason to believe that an important parameter, like canal seepage, has changed over the 20-year calibration period, we should be trying to represent that change in our input assumptions used in that calibration. It seems to be generally held that irrigation practices have become more efficient. If we don't try to reflect these changes in the inputs to the transient calibration, PEST may generate inappropriate aquifer parameter values as it tries to minimize prediction error over the 20-year period.

There have been so many presentations about the various inputs that I have lost track of which ones are assumed constant, which ones vary annually, which ones vary with each stress period, etc. Perhaps it would be helpful to all of us to have some kind of a summary table showing how the various inputs to the recharge calculation (e.g., canal seepage, crop mix, etc.) will be assumed to vary over the transient calibration period.

Bryce and Rick Allen both talked about the ET adjustment factor. Bryce suggested the factor be greater than one in order to account for evaporation from soil and leaf surfaces wetted by sprinklers. Later, Rick made a point that SEBAL-based ET may overestimate pumping because it includes the consumption of soil moisture; this suggests that the adjustment factor should be less than one. I don't recall that there was a resolution to this apparent contradiction.

Finally, I have some continuing concerns about tributary underflow estimates. John Lindgren has apparently concluded that there is insufficient information on which to base any changes in the present underflow estimates or to define any annual variation in those estimates. However, as with canal seepage, this is a situation where, in the context of transient calibration, the assumption of constancy may be worse than an educated guess about variability.

I spent a little time looking at Steve Baker's open file report on tributary basins. I am not sure how the ground water outflows in his report relate to the tributary underflows used in the model, but assuming they are the same, I came away less than confident that we are using reasonable numbers. (This is not to reflect on Steve... his report just summarizes ground water outflow estimates drawn from other sources.) For example, the ground water contribution from the Oakley Fan/Goose Creek sub-basin to the ESPA is estimated to be a constant 215,000 af/yr, though water levels on the Fan have been dropping dramatically for years and appear now to be lower than those in adjacent areas of the ESPA. Similar situations appear to exist for the Raft River and a few other sub-basins.

In another case, the estimate of underflow from the Big Lost River ranges from 142,000 af/yr to 308,000 af/yr, a more than 100% difference, while precipitation in the sub-basin is estimated to vary only over a 25% range.

Tributary underflows are a significant component of the aquifer water budget, and declines in these inflows may have direct and indirect impacts on reach gains from the ESPA to the Snake River. If these effects are not reflected in the input data used in the transient calibration, I am concerned that the resulting model calibration parameters will later hamper our ability to discern impacts of ground water pumping from impacts of changes in tributary inflows. At the least, the potential effects on calibration of variation in these important aquifer inputs should be addressed with a sensitivity analysis.

Again, I apologize for taking so long to get these thoughts to you. I hope you find them useful nevertheless.

Sincerely,
Hydrosphere Resource Consultants, Inc.

by: 
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cc: Jeff Fereday
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