

**HYDROSPHERE**  
Resource Consultants

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Department of Water Resources

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RE: Comments on ESHMC Meeting March 21-22

Dear Paul and Donna:

Herewith are my current thoughts and comments on issues presented and discussed at the modeling committee meeting last month. Some of my comments suggest specific activities and some are just food for thought.

First, I thought it was a good meeting. A lot of progress is being made in many areas and I can start to see how the effort will come together. The downside of all this progress is that it was difficult to assimilate everything that was presented in the short time we spent together discussing things. This makes the documentation process quite important. I strongly support your plan to prepare "design documents" and post them on the IDWR web site. I think these documents should attempt to cover as many design decisions as possible, including decisions, both explicit and implicit, to *exclude* features or details (e.g., representation of the Twin Falls tract).

My comments on the technical issues presented and discussed are mainly related to aquifer boundary conditions and to the effects on the aquifer of changes in irrigation practices.

The proposed adjustments to model boundaries at tributaries seem reasonable. I would suggest that the relationship between the basalt aquifer and the Oakley Fan be examined in some greater detail before making any final decisions in that area. I say this because there is an acknowledged connection between the two systems and because the mass measurements seem to indicate more significant water level changes in that area than almost anywhere else in the ESPA. I think it will be important to be able to differentiate

the effects of ground water development on the Fan from effects of ground water development in the ESPA.

The proposed method of defining the aquifer bottom also seems reasonable. I would be interested in seeing a map of the resulting aquifer thickness (water level elevation minus bottom elevation), mainly to assess whether there are areas where the linearity assumption, which underlies the use of response functions, may be questionable.

I would like to see Allan Wylie's sensitivity studies include some investigation of boundary condition assumptions in the Shelley to Neeley reach. This is an area where the connection between the river and the aquifer (and the reservoir) may be dynamic; there may be connections at some times, or under some conditions, but not others. Since this is an area where river gain/loss prediction will be especially important, I think it deserves some attention in the sensitivity analysis.

My second general area of comment is with regard to changes in irrigation practices and effects on the aquifer. My main concern is that the model (and, more specifically, the recharge tool) allow us to distinguish, as accurately as possible, the changes in reach gains that are due to ground water development from those that are due to changes in surface water irrigation practices that affect return flows and aquifer recharge. This is a fundamental issue for conjunctive management.

Recharge from surface water irrigation is being deduced, as the residual, from water budget calculations. The water budget terms in this calculation that have the least uncertainty are river diversions, recent (SEBAL-based) evapotranspiration (ET) from crops and native vegetation, and gross monthly precipitation. The water budget calculation, however, implies that we know all the terms on the right-hand side of the equation exactly, and focuses all the error in those quantities into the estimate of recharge.

Although there is a solid effort underway to measure the surface return flow component of the water budget, no matter how good a job we do *now* with identifying and measuring surface return flows, we still have to estimate what they *were* over the 1980-2001 period. I suspect that the relationships among river diversions, surface return flows and deep percolation from fields have changed over the calibration period. They almost certainly vary with wet and dry cycles as irrigators make lesser or greater efforts to operate conservatively. Trends toward greater conservation, conversion to sprinkler application, crop mix decisions, and even conservation reserve programs could all be expected to have subtle or not-so-subtle effects on recharge from surface irrigation.


It is my understanding that canal seepage will be set up in the recharge tool in such a way as to permit investigation of different loss assumptions. I think it will also be desirable to be able to adjust recharge estimates to reflect assumptions about changes in surface return flow and deep percolation relationships related to changes in on-farm irrigation practices. This will facilitate the future construction of model scenarios that can better isolate the effects of changes in surface irrigation practices. Even if we don't understand these

relationships very well at the moment, it will be important to be able to investigate them, and their effects, in the future.

I also think it is not too soon to start thinking about a protocol for deciding which recharge parameters PEST should be allowed to touch, and in what order.

As always, I offer these comments in the spirit of constructive criticism, with the aim of developing a set of tools that can address the questions of conjunctive management as fully as possible.

Sincerely,  
Hydrosphere Resource Consultants, Inc.

by:   
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cc: Jeff Fereday  
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