

MEMORANDUM

To: Rick Raymondi
IDWR
Fr: Bryce Contor
IWRRI
Date: 6 February 2008
Re: Summary of ESHMC discussions

At the ESHMC meeting on 8 January 2008, IWRRI presented information on the following topics:

1. Considerations for modeling one-month stress periods.
2. Source of irrigation water on mixed-source lands.
3. Canal seepage.
4. Recharge on non-irrigated lands.

IWRRI has provided electronic copies of the accompanying slides to IDWR.

The second item was not on the agenda but arose out of discussion of one-month stress periods. A fifth item, discussion of irrigation return flows, was on the agenda but not discussed. Slides for this discussion have been provided but were not shown at the meeting.

The following items arose out of our discussions:

1. One month-stress periods: No obstacles were seen to gathering data (or interpolating data as needed) on a one-month temporal scale. IWRRI plans to continue gathering and processing data compatible with one-month stress periods.

During the discussion we touched briefly on changes in irrigated acreage over time and changes in return flows, but both these topics will need to be addressed again in more detail.

IWRRI agreed to set up a data repository where data can be made available as they are gathered, so that members of the ESHMC may begin to review and use the data.

2. Source of irrigation water on mixed-source lands: IWRRI agreed to explore the following:

- a) How does the fraction of mixed-source lands in each entity from the ESPAM1.1 data set (derived from analysis of surface-water diversion volume) compare to the fraction implied by the 400-meter radius search discussed at the meeting?
- b) What do the mixed-source maps look like if the radius search is modified so that only parcels nearest wells are deemed "Ground-water" and only parcels furthest from wells are deemed "Surface-water?"

IWRRI proposes to explore these two questions and circulate a written proposal for source of irrigation water for ESPAM 2.0, by the end of January 2008.

There was also discussion on the possible effect upon curtailment calculations if the mixed-source map is changed. No conclusions or action items were agreed to in this discussion. IWRRI proposes that the treatment of mixed-source lands for ESPAM 2.0 be based entirely upon technical considerations for best model calibration. There is no particular reason that curtailment calculations need to use the same procedures as calibration calculations.

3. Canal Seepage:

- a) It was generally agreed that we should represent the major canals explicitly as leaky, whether or not they are contiguous with irrigated lands. This should provide a more correct spatial distribution of recharge.
- b) We expect that in reality, seepage does vary month-to-month. We discussed but did not come to agreement on whether to represent this in the ESPAM2.0 recharge data. It was suggested that we could have the first month's seepage rate be higher. However, it was pointed out that in an early-spring recharge experiment at Aberdeen Springfield canal, the water did not percolate nearly as fast as expected, perhaps due to frozen soil underlying the canal. Also, we discussed the fact that we aren't particularly interested in *canal seepage* per se as in the aquifer recharge that occurs. If the early-season seepage primarily charges bank storage and creates a wetted bulb in the vadose zone under the canal, there may not be any more recharge (or perhaps even less) than in later months.
- c) Willem Schreuder agreed to provide canal-seepage data from the Republican River, which IWRRI will review along with data from Mexico that were used during ESPAM1.x data-gathering. We agreed that soil and geologic conditions of the Eastern Snake Plain are likely different than either of these systems, so we must be cautious in using these data.

IWRRI proposes to prepare a revised map of leaky canals, review the Republican River and Mexico data, and circulate a written proposal based on the data and the 8 January discussion. We expect to provide this in February 2008.

4. Recharge on Irrigated Lands. We had a divergence of opinions on this topic, with two options argued for:
 - a) Use the existing capability of the Recharge Tools to allow PEST to scale the existing exponential algorithm during optimization. This may include minor modification to increase the number of spatial regions that can be individually adjusted.
 - b) Modify the FORTRAN part of the Recharge Tools to internally perform the existing exponential algorithm or a similar one, allowing PEST to modify the parameters of the algorithm itself.

Figure 1 illustrates conceptually the difference between results that could be obtained by the two methods. The current mechanism allows the curve to be rotated about the origin, while allowing PEST to modify parameters would allow changing the actual shape of the curve. Note that generally the calculation will be applied to very small depths per month, representing the lower portions of the curves.

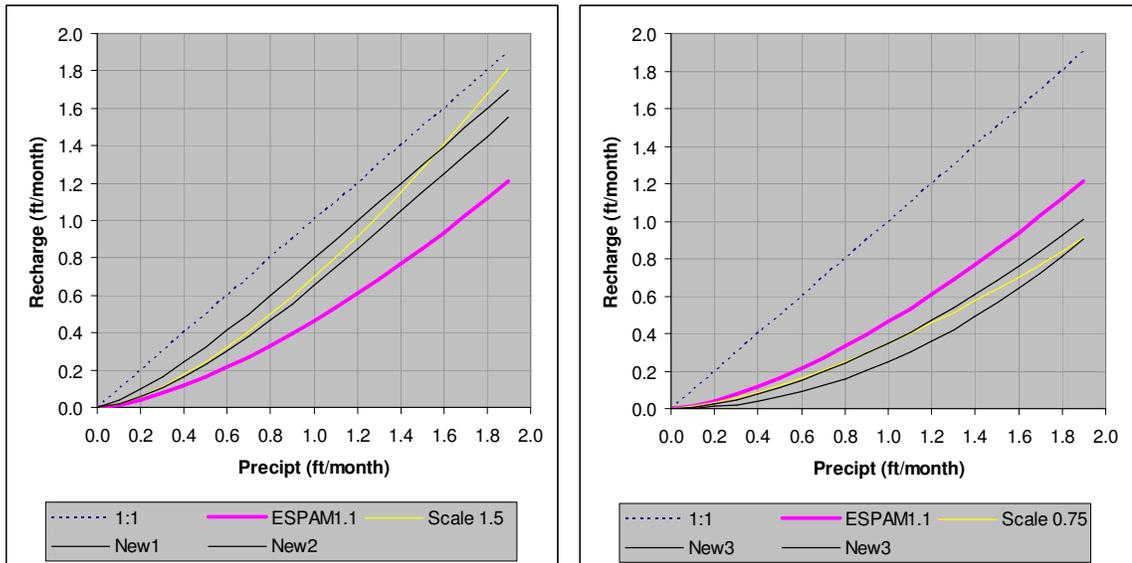


Figure 1: Scaling Non-irrigated recharge (yellow curves) vs. altering parameters. In both figures the heavy pink line labeled "ESPAM1.1" represents the parameters use for thin soil in the last calibration. The yellow lines labeled "Scale" represent the current methodology, while the black lines represent the alternate methodology in (b) above or (c) below.

Other options discussed but not strongly promoted include:

- c) Write a small PEST-touchable pre-processor that would allow the exponential algorithm parameters to be modified. This may be considered an interim step while other algorithms are explored. It provides identical capability to (b) but does not hard-wire a particular algorithm into the FORTRAN tool. It may increase run times.
- d) Consider a daily soil-moisture-balance algorithm such as the one successfully applied in the Spokane Valley Rathdrum Prairie Interagency Aquifer Model. This would need some modification to deal with concentration of percolation due to snowmelt and local topography.

IWRRRI agreed to tabulate the daily-soil-balance calculations that Rick Allen has performed for some of the stations with the existing Thick-soil calculations. IDWR agreed to experiment with re-running ESPAM1.1 PEST calibration runs, allowing PEST to adjust non-irrigated recharge for the "Lava Rock" and "Thin Soil" groups, using the existing provisions.