## Wylie, Allan

**From:** Wylie, Allan
**Sent:** Wednesday, July 07, 2010 9:55 AM
**To:** Bryan Kenworthy; Bryce Contor; Chuck Brendeke; Chuck Brockway; 'Dar Cammond'; David Blew; Gary Johnson; 'Greg Clark'; Greg Sullivan; 'Gregg S. Ten Eyck'; 'hyqual@cableone.net'; 'J D May'; James R Bartolino; 'Jeff Sondrup'; Jennifer Johnson; Jim Brannon; John Lindgren; Jon bowling; 'jon@ringertclark.com'; 'Ken Skinner'; Koreny, John S.; 'Linda Lemon'; McVay, Michael; Mike Beus; Raymondi, Rick; Rick Allen; Roger Warner; 'Sharon parkinson'; Stacey L Taylor; Swank, Lyle; Thomas R Wood; Vincent, Sean; Willem Schreuder (Willem.Schreuder@prinmath.com)
**Subject:** On-Farm Water Budget committee report.

The On-Farm Water Budget Committee met July 6, 2010 at 9:00 am. Attendees included Allan Wylie, Greg Sullivan, Jim Brannon, and Bryce Contor.

We initially discussed the parameters involved in the on-farm algorithm.

Eff – maximum achievable efficiency that a farmer could attain under water short conditions before further shortage in irrigation supply would cause him to begin reducing the number of acres irrigated.

DPin – fraction of the initial irrigation loss diversions x (1 - eff) that percolates below the root zone of the crop to the underlying aquifer under water short conditions.

DPex – fraction of excess applied water (farm delivery x eff minus ET) that percolates below the root zone. This is in addition to the deep percolation computed using the DPin parameter.

The committee concluded that Eff may be, in part, a function of the crop mix. For example, potatoes would always have adequate water because they are sensitive to moisture stress, and farmers would not stress them. The achievable efficiency for potatoes is probably in the range of the design efficiency for the particular irrigation application method that is used (typically sprinklers). On the other hand, alfalfa and pasture grass are not as sensitive to moisture stress, and under water short conditions, farmers will tend to short these crops by deficit irrigating them. This can result in irrigation efficiencies for these crops that are greater than the system design values. Grain crops fall in between potatoes and the hay crops, being able to tolerate some moisture stress. The committee will propose maximum efficiencies for each crop type and will compute an area weighted average efficiency for each ESPAM irrigation entity. Bryce indicated willingness to develop a skeleton spreadsheet for the next meeting. The committee will also consider the effect of the irrigation application method (e.g., % sprinklers) on the maximum efficiency selected for each entity.

The committee discussed the impact of deficit irrigation and the fact that soil moisture can provide an additional source of supply to the crops when the amount diverted is not sufficient to meet the immediate crop needs. The committee concluded that a soil moisture algorithm should be incorporated in the On-Farm Water Budget calculations; however, they wanted to check it before using it in a calibration run. Jim Brannon indicated that he would prepare a flow chart and test the algorithm using deficit, minimal, and excess water conditions.

In the interim Allan would conduct a model run using the updated water budget provided by Bryce with the maximum efficiency starting at 0.80 and adjustable between .75 and .90.

The committee also discussed the potential disconnect that may exist in ESPAM 2.0 between the return flows used in computing the Snake River reach gains used in calibration and the surface runoff computed in the on-farm water budget analyses.

In ESPAM 1.1, return flows were computed as a percentage of the Snake River diversions, with the return flow percentages derived from historical return flow measurements. These computed return flows were subtracted from the historical diversion to compute the net diversions available to recharge the aquifer. All net diversions in excess of the crop irrigation requirement were assumed lost to deep percolation. In ESPAM 1.1, there was inherent consistency between the return flows in the irrigation water budget and the return flows that went into the calculation of the reach gains used in calibration.

In ESPAM 2.0, diversions will not be reduced on the front end to account for return flows. Instead, the full diversions will be processed by the MKMOD On-Farm Water Budget pre-processor. Conveyance losses will be computed as a percentage of the diversions, and these losses will be assumed to recharge the aquifer. The net diversions after conveyance loss will be delivered to the farm where they will be processed by the On-Farm Water Budget algorithm. Of the on-farm losses, a portion will be designed as aquifer recharge (using the DPin and DPex factors) and the remainder of the losses will go to surface runoff (back to the Snake River). It is proposed that the Snake River reach gains used in calibration will be computed using the same procedure used in ESPAM 1.1, with return flows computed using the return flow percentages. The surface runoff losses computed in the On-Farm Water Budget algorithm will not affect the reach gain calculations. Depending on how the On-Farm Water Budgets are parameterized, there is potential for significant differences between the computed surface runoff figures and the return flows used in the reach gain calculations. It was agreed that these differences should be tabulated and considered further. Allan will prepare a comparison.

The next meeting is scheduled for July 12 and 3:30 pm Mountain time. The call in number is 215-446-0193 and the access code is 629741. Anyone interested is welcome to participate.

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