

## ESHMC Meeting Notes September 12th, 2012

**Item 1 -** Introductions were made, and an attendance list was circulated. The following were present at the meeting:

- Rick Raymondi
- Allan Wylie
- Jennifer Sukow
- David Hoekema
- Mike McVay
- Jon Bowling
- Sean Vincent
- Harvey Walker
- Bryce Contor

**Chuck Brockway, Chuck Brendecke, Greg Sullivan, Dave Colvin, Stacey Taylor, Gary Johnson, and Willem Schreuder joined the meeting via polycom.**

**Item 2 -** Stacey Taylor briefed the committee on the progress of developing the final report. She said that she was close to having a draft ready for the next review, and she showed who had provided comments. Stacey said that she needed to compile a list of recommendations for future work, and that IDWR needed to address a few more comments. She added that the figures are completed, and she was working on tables.

The status of the appendix containing documentation of the on-farm water budget was discussed. Allan Wylie said he would find the current version. Dave Colvin said that Jim Brannon was responsible for a write-up. Stacey asked if documentation was necessary for the recharge tools. Bryce Contor said that a write-up for the tools is parallel in importance to the on-farm water budget and the MKMOD discussion. Sean Vincent agreed. Stacey responded that she would put together what Zach Maillard had assembled.

Chuck Brockway indicated that he was not able to find certain files and asked if there is a plan for something to help non-developers find important files. He mentioned that some of the design documents do not say where the files are. Jennifer Sukow asked what Chuck was trying to find and that he should contact her for help. Chuck Brendecke said that there is a lot of information in the meeting folders that is hard to find. Jennifer Sukow said that important information in the meeting folders should be in the design documents. Chuck Brendecke asked if all the current tables and figures have been posted. Stacey said she was not sure but would look into it. Jennifer Sukow said the current version of tables and figures have not been posted. Stacey said she would send the current versions to IDWR for posting, and that by the end of September the next draft would be posted for review.

Jennifer Sukow accessed the ESHMC web page to show the committee where model files are organized and posted. Chuck Brendecke said that he wanted to emphasize how

important it is to find all the pieces of information that went into the final model version. Jennifer said that the Department is re-organizing the files, and she asked the committee to call if anyone is having problems. IDWR agreed to move the meeting agenda and minutes to an annual folder on the web page. David Hoekema said that he liked the organizational structure for ESPAM1.1, and asked if the Department could use that structure for version 2. Jennifer said that IDWR would work on the organizational structure.

- Item 3 -** Allan Wylie indicated that the ESPAM2 validation report had been finalized and was made available to the committee on September 4<sup>th</sup>. He noted that comments had been received from Bryce Contor, and he would like all comments to be submitted by October 8<sup>th</sup>.
- Item 4 -** Jennifer Sukow gave a brief overview of the design document that discusses irrigation return flows. She said the design document covers how return flows are measured, how the data are processed, how the data are used in model calibration, and how the reach gains are processed. Chuck Brockway suggested re-organizing the data, and Jennifer agreed.
- Item 5 -** Rick Raymondi presented an overview of a field survey undertaken jointly by the Shoshone-Bannock Tribes and IDWR to measure flows in the lower Portneuf River in the area that is inundated by American Falls Reservoir for most of the year. Rick said that the goal is to use the data to determine reach gains. Chuck Brockway mentioned that bank storage would impact the measurements after the reservoir stage is lowered, and he wondered how long the affects would persist. Rick said he was not sure, and he showed the hydrograph of American Falls reservoir stage for the current and previous water year along with the average stage. Willem Schreuder said that water levels in observation wells do not show much fluctuation when the reservoir is lowered and that he did not think there was a huge amount of bank storage.

Allan Wylie said he is interested in comparing reservoir stage with water levels measured in the Fort Hall Bottoms. He said that when the reservoir is lowered, water levels in the aquifer should respond. Bryce Contor said that most wells in the Fort Hall Bottoms are deep, and he indicated that shallow piezometers are needed for this analysis. Willem asked if the bank storage is a small or large volume. Allan said it seems likely that bank storage is a small amount.

Allan began to discuss the hydrogeology in the area of American Falls reservoir. He indicated the sediments that underlie the reservoir are missing in the area north and slightly east of the dam. Bryce mentioned that there are flowing wells in the Springfield area and on the south side of the reservoir at a convent. Chuck Brockway mentioned that there is a USGS report written by Spinazola that covers the area. Allan said that the report was not published. Bryce mentioned that in the report written by Ralston, a three-layer representation of the aquifer system was recommended. Willem asked if one of the 3 layers was a confining layer, and Allan said yes.

Chuck Brockway asked if further work to better define the American Falls area was a candidate for a future model version, and Allan said yes. Bryce said that investigating the deep layer and how it interacts with the shallow zone could be important. Willem agreed and added that if bank storage is important, it may be difficult to calibrate with the springs. Chuck Brockway said that many believe bank storage from American Falls is important to the administration of water rights and some adjustment to the flows in the calculation of reach gains is necessary. Chuck added that there are lots of unanswered questions regarding the interaction between the shallow system and the aquifer.

**Item 6 -** Allan presented the results from recent predictive uncertainty analyses. He began with a table of completed analyses. The table contained the calibrated impact, maximized impact, and the minimized impact of the stress applied at the centroid of a water district on a reach or spring. Allan also showed the model version used for the various analyses.

Allan indicated there was a more significant change or difference between the calibrated impact and maximized and minimized impact on the near Blackfoot to Minidoka reach from the stresses applied at WD 120. There was also a significant difference between the calibrated impact and the maximized impact on the near Blackfoot to Minidoka reach from the stress applied at WD 34. David Hoekema said that the difference between the impact and the calibrated gain is the most significant factor. Bryce said that an example of what David said is that for WD 34, the difference is +/- 54%. Willem agreed that the correct way to represent the data is to use absolute values. Allan said filtering the reach gain data may help to reduce the difference between the maximum or minimum and the calibrated impact.

Gary Johnson asked if the impacts are steady state values, and Allan said yes. Greg Sullivan said that the other reaches might not have a high level of uncertainty, and he concluded that the differences (in the near Blackfoot-Minidoka reach) are shed somewhere else in the model. Allan agreed. Willem said that the uncertainty may be different depending on what question is asked. Bryce and Allan agreed with Willem. Allan added that uncertainty has to do with both where the stress is applied and what you are asking the model.

Chuck Brendecke said that he felt the suggestion by Greg Sullivan had merit, when he suggested displaying where the impact of one district goes up or increases then another district must go down or decrease. Allan said the pie charts show what Greg had requested, and he would develop pie charts for all stresses applied in the Appendix to the Uncertainty Report. Chuck Brendecke then said a summary of the parameters that changed and how different the parameters are between the maximum and minimum stress applied would be helpful. Allan said the parameters change on the blue highlighted lines on the table (WD120 to nr Blackfoot-Minidoka; WD34 to nr Blackfoot-Minidoka; WD99 to nr Blackfoot-Minidoka).

Chuck Brockway said that the Director asked for a rigorous uncertainty analysis. He asked if the Committee gave him that, and answered his own question by saying “no”. Chuck said we gave him (Director) an analysis, but we can’t structure recommendations that are helpful. Willem said there is no single answer, and this analysis is a step toward answering his question. Allan said the analysis points out a weakness in the model which is a reason to perform it, and Allan believes there is a remedy to the weakness. Allan then said that all uncertainty from the analysis is related to the nr Blackfoot to Minidoka reach and that the model shifted gains to different reaches. Allan said that he believed that the level of uncertainty would be reduced by filtering the reach gain data, and he planned to make that recommendation to the committee.

Willem commented while reviewing the steady state values in the table that one could argue the data are filtered. He said that we are concentrating on the changes from the calibrated impact. Allan said that all reach gains data are transient and unfiltered in ESPAM2.1. Willem said that we are trying to evaluate to what extent the model can predict change. He added that the model can be off by 500% but still correctly predicting change. Allan commented that this could be tested in a simple way. Willem said that if PEST doesn’t do a good job, it has the ability to move between reaches. He said PEST is currently matching an absolute target poorly in the Nr Blackfoot to Minidoka reach for both the minimum and maximum applied stress. Then he said he is less optimistic that filtering will solve the problem, and maybe some more sophisticated comparison would be beneficial. Willem gave an example – something that detects when you are out of phase.

Bryce commented that you have to have faith in the data. Willem agreed that having good/reliable data is a problem, and he added that it is best to predict to something to which the model has been calibrated. Bryce agreed that trying to do some “smoothing” of the data would improve the confidence in the data. Allan said we could throw out the “noise”. Willem asked if we are confident in the reach gain targets. Bryce said the targets are the best that could reasonably be obtained. Allan said that we are using real values to process the reach gains. Willem said there is gage data, and he recommended taking a close look at the assumptions used in processing the data. Jennifer Sukow said that the data are pretty good, and then she explained the new return flow data and the differences the actual measurements made in processing the reach gains. Willem responded that it is important to use the best data available. David Hoekema asked if there is room for improvement in calculating the reach gains. Allan said that an investigation into how the reach gains are developed could be undertaken. Chuck Brockway asked when the Uncertainty Report would be completed, and Allan said soon.

**Item 7 -** Allan Wylie presented a list of candidate improvements for the development of ESPAM2.1 (*Note – this meeting occurred before the mistake in the Mud Lake water budget was discovered. After the corrections were made to the water budget, the model was re-calibrated to create ESPAM2.1. Therefore, the following discussion actually pertains to ESPAM2.2 or the next version of ESPAM.*). He mentioned that the data set

will be extended, through 2010 or possibly 2011 depending on when the next version is ready. The list also included incorporating the METRIC data and developing a procedure to represent intervening years, representing the Portneuf River, including the Menan gage to develop new reach targets, filtering the reach gain data, and adjusting the elevation of Briggs Spring.

For the Portneuf River, Allan showed model cells that could be used to represent the connected reach. Bryce cautioned that we don't know the effect of the reservoir on the river, but he added that the effect could be estimated. Allan said that we have gage measurements on the lower Portneuf for calibration. Willem said that increasing the reservoir stage could increase river discharge. Willem asked if the Portneuf would provide a different gain/loss target that would be subtracted from the Near Blackfoot to Neeley, and Allan said yes and that the Portneuf would be its own target. Allan added that we would have to be careful that the Portneuf gains are not double counted.

Allan said the Portneuf cells beneath the reservoir would have a different conductance than the rest of the reservoir bottom. Willem recommended against putting the 4 cells in the model unless there are data for calibration. Sean Vincent thought it would be difficult to explain the different conductance in those four cells.

Allan explained the new model reaches that would result from including the Menan gage. Bryce said that the Menan gage is a good gage. Allan agreed. David Hoekema asked what would be gained with the new gage. Allan said it will help with evaluating transfers. Bryce said the Snake River is connected above Menan but not connected below Roberts. Allan said most of the lower reach is perched. Bryce said that if the reaches behave differently, then it makes sense to use the gage. David Hoekema agreed.

Allan then discussed an experiment that he thought was worthy of performing using the current model (i.e., ESAPM2.0). He proposed running observed and modeled Snake River gains through the same filter and adjusting weights to provide a similar weight distribution. Then he suggested rerunning one or more of the runs with high predictive uncertainty. He concluded that if filtering lowered the predictive uncertainty, then the filtering process would be adopted for the next ESPAM version, but it won't instantly result in ESPAM2.1. Bryce said that it would be a test of concept. Willem asked why, if the experiment worked, the resulting model would not become ESPAM2.1, and Allan said that because of the contested case (Rangen, Inc.), the Department needs to stay with ESPAM2 for now.

Allan showed examples of what filtering could do to re-shape the measured gains on the Heise to Shelley, Shelley to Nr Blackfoot, and Nr Blackfoot to Neeley reaches. David Hoekema asked if there is something real in the spikes that should not be filtered. Allan commented that David asked a good question, and said that if we filter one reach we have to filter all the reaches even though some do not need filtering. Allan added that there is nothing in the model that would allow matches to the spikes.

Jennifer Sukow said that the phase shift between modeled vs. measured data in the Shelley to Nr Blackfoot reach would be worth investigating. Allan said he had looked into this issue but couldn't resolve the problem. Willem asked if it could be American Falls Reservoir and if the filling could affect the gains. David Hoekema said that he does not think the reservoir operations are reflected in the gains. Willem commented that PEST makes an effort to match the gains, while it could be working on something else. David said he does not like the phase shift, and unless we understand why the gains are out of phase, he questioned whether it could be real. Bryce said the modeled gains are not real, but he added that filling American Falls Reservoir could explain the spikes in the Nr Blackfoot to Neeley hydrograph. Chuck Brockway said he had a hard time believing the spikes, and Allan agreed. Willem suggested proceeding with the filtering and that Allan should start the Neeley to Minidoka time series with a value somewhere lower than 2000 cfs, because the Butterworth filter assumes the first value is representative of past conditions. Allan agreed with Willem's suggestions. Allan suggested adjusting the drain at Briggs Spring to a higher elevation to allow the model to replicate the observed seasonal variation in the measured data. Bryce Contor and Chuck Brockway agreed.

Allan asked the committee for other suggestions as candidates for improving and developing the next version of the model. Bryce suggested representing 1) the fault that runs through the Rexburg Bench; and 2) the Teton River where it interacts with the aquifer. Willem asked Bryce to inform the committee about the fault. Bryce said that there is little communication between the aquifer beneath the Rexburg Bench and the South Fork of the Snake River. Allan said that Roger Warner gave the committee a presentation on this subject a year ago. Sean Vincent said that there are a number of faults in that area. Willem asked if the river is mostly perched in that area. Bryce responded no, but indicated the Teton River is perched at Teton City.

Chuck Brendecke asked if this is the area where PEST bumped up the underflow. Allan said the underflow issue was north of the area where Bryce is concerned. Allan said that a low permeability feature could be inserted into the model to represent the fault. Chuck Brockway said that if the committee adopts one of the two features that Bryce is proposing, then second feature should also be adopted. Allan said that the committee doesn't need to decide today, this is just a wish list.

Willem recommended looking at the predicted gains and losses and cross plots of predictions vs. observations. He said that we should be looking at the slope of the cross plots, and that a match has a slope of 1. He added that matching the slope could be an additional target. Bryce agreed that Willem's suggestion should be added to the wish list.

David Hoekema suggested switching around the pilot points to see how it affects the model. Allan agreed and suggested adding more pilot points to the wish list. Bryce asked what the downside of adding more pilot points is, and Allan said that it does not increase the run time. Willem said that there is a danger of having too many pilot points. Allan said that the model has tens of thousands of observations, but we don't

want to have more pilot points than cells in the model. Chuck Brockway said that totally turning the calibration over to PEST is a philosophy that should be considered. Willem said that the committee needs to stay in charge of the model. Chuck Brockway said that whatever PEST says needs to be tempered with rational observation.

**Item 12** – The committee agreed that the next meeting should be November 9<sup>th</sup>, 2012.

**Item 13** - The ET Subcommittee began discussions, and the minutes are in the ET Subcommittee folder on the ESHMC web site.

### **DECISION POINT SUMMARY**

The following was agreed upon:

- 1) IDWR/IWRRI agreed to assemble available information for documentation of the recharge tools and include it in the final report.
- 2) IDWR/IWRRI agreed that the next version of the final report would be made available for committee review by the end of September.
- 3) IDWR agreed to move the meeting agenda and minutes to an annual folder on the web page.
- 4) The Committee agreed to have Allan proceed with filtering of the reach gains. No one on the committee disagreed with this experiment.
- 5) Allan, Chuck Brockway, and Bryce Contor agreed that the drain representing Briggs Spring should be adjusted to a higher elevation to allow replication of the observed seasonal variation in the measured data. No one on the committee disagreed with this proposed adjustment.
- 6) The committee agreed that the next meeting should be November 9<sup>th</sup>, 2012.