

MTAC Meeting Notes from February 6, 2014

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

Jim Bartolino (USGS)
Ernie Carlsen (Idaho Water Engineering)
Jason Fisher (USGS)
Sunny Healey (TNC Silver Creek)
Tom Hellen (Hailey)
Patti Lousen (self/Wood River Land Trust)
Wayne Martin (self)
Pat McMahon (SVWSD)
Mike McVay (IDWR)
Neeley Miller (IDWR)
Wendy Pabich (Water Futures)
Christian Petrich (SPF/Hailey)
Erick Powell (Brockway Engineering)
Larry Schoen (Blain County)
Jennifer Sukow (IDWR)
Ken Thornock (The Valley Club)
Dave Tuthill (Idaho Water Engineering)
Sean Vincent (IDWR)
Allan Wylie (IDWR)

Agenda Item 1 – Overview of Project Public Meeting (Sean Vincent/Jim Bartolino)

Sean Vincent and Jim Bartolino briefed the MTAC on the Wood River Valley Aquifer Model Project Update Public Meeting that was held on January 29th 2014 at the Wood River High School Distance Learning Lab.

Agenda item 2 – Municipal and Domestic Water Use (Jennifer Sukow)

The presentation discussed calculation of aquifer recharge in municipal service areas and subdivisions. Municipalities and subdivisions in the Wood River Valley are served by community water systems with centralized wastewater treatment, community water systems with septic systems, and domestic water systems with septic systems. The presentation showed how aquifer recharge will be calculated in areas served by each of these types of systems. Jennifer asked the MTAC to provide input on how stormwater runoff is handled in cities and subdivisions in the Wood River Valley. Pat McMahon and

Larry Schoen indicated that stormwater is managed using dry wells or other practices that result in infiltration of stormwater runoff. To the knowledge of the committee, stormwater runoff from cities or municipalities is not discharged directly to the river.

Larry Schoen pointed out that there are many small lined ponds that are used for fire suppression in the Valley and asked if we had plans to address them in our current work. Additionally, Wendy Pabich asked if Jennifer is capturing the return flows to the river associated with ponds. Jennifer mentioned that the evaporation from ponds will be included in the ET deducted during the calculation of aquifer recharge, and that we are including return flows from ponds to the river in our calculations based on records provided by the Watermaster.

Agenda Item 3 – Modeling Process Flow Diagrams/Model Calibration (Jason Fisher/Allan Wylie)

Jason Fisher presented a flow chart describing inputs and outputs from pre- and post-processing of the groundwater flow model. Processing components were identified as completed or in development and placed in the context of the wrv package vignette. Attention was given to describing the MODFLOW input and output files.

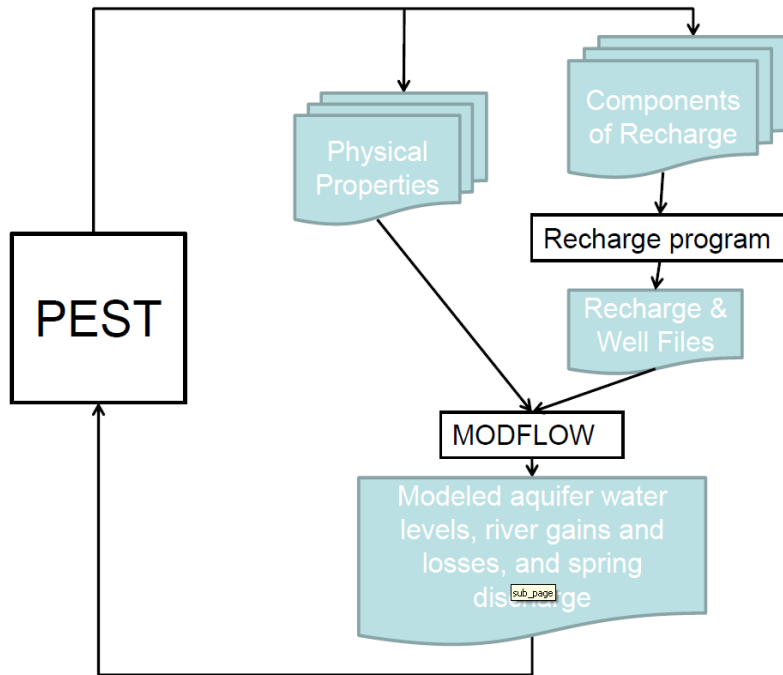
Allan Wylie discussed the plan for model calibration. He indicated that for this presentation he will specifically address adjustable parameters, what the “model” consists of, and end with a flow diagram.

Allan began by stating that he considers anything that we cannot measure directly to be an adjustable parameter. He added that the classic adjustable parameters are the physical properties such as hydraulic conductivity/transmissivity, specific yield and storage coefficient, and riverbed/drain conductance. Allan indicated that these will be included in the MODFLOW input files discussed previously by Jason Fisher.

Allan added that components of the water budget such as recharge on non-irrigated land, evapotranspiration, tributary underflow, and canal seepage are also adjustable parameters. These will be put into the recharge program which creates the recharge and well files. The recharge and well files will be included in the MODFLOW input files.

Allan moved on to discuss the calibration tool known as PEST (Parameter Estimation). Allan indicated this program compares model output with field observations for elements such as river aquifer interactions, spring discharge, and water levels in wells. The objective for PEST is to minimize the difference between modeled and observed values. PEST prepares input files for Recharge program and for MODFLOW. It will then run the Recharge program which prepares some of the input files for MODFLOW and then runs MODFLOW, it then compares the MODFLOW output with observed values, makes adjustments to the physical properties and components of recharge, and runs

the Recharge program and MODFLOW again. PEST runs through this routine many times until it has minimized the difference between model outputs and field observations.



Larry Schoen asked Allan about the basis for ET being considered adjustable parameter. Allan indicated that we use METRIC measure ET. It's adjustable because there are gaps in the METRIC data, so we must use NDVI to estimate ET in those years.

Wendy Pabich asked Allan how much confidence he has that PEST is adjusting the right parameters. Allan indicates that's a great question. He said that as modelers we have to very carefully set the proper constraints for each of the parameters, particularly for the components of recharge. Otherwise you will end up with output that does not make sense. Once we believe the model has been calibrated we will begin our uncertainty analysis.

Jason Fisher indicated that if we are making the wrong adjustments the model will not converge.

Sean Vincent added that the advertised purpose of PEST is not just for calibration, but it will also be used for uncertainty analysis.

Christian Petrich asked if PEST will be used during uncertainty analysis to evaluate the range in outcomes (for example, for the impacts of a single well on a reach of the river). Allan indicated that we will select scenarios to evaluate. Instead of looking at just one well, Allan indicated we will more likely look at groups of wells and the impacts a group of wells would have within a particular scenario.

Sean Vincent added that regarding the predictive uncertainty analysis done by PEST that it has an objective function to minimize the difference between modeled and observed values and there will be a calibration run that has the minimum objective function which may be the “best” calibration. When we do the predictive uncertainty analysis we have to put bands on what the model will consider to be calibrated. For example, we will take the minimum objective function and allow it to increase by a specific amount (for example 5%) and still be considered “calibrated.” If we chose a larger percentage deviation from the minimum objective function, say 10%, we could expect a wider range of predictions.

Agenda Item 4 – Lunch Break

Agenda Item 5 – River and Drain Locations (Jennifer Sukow)

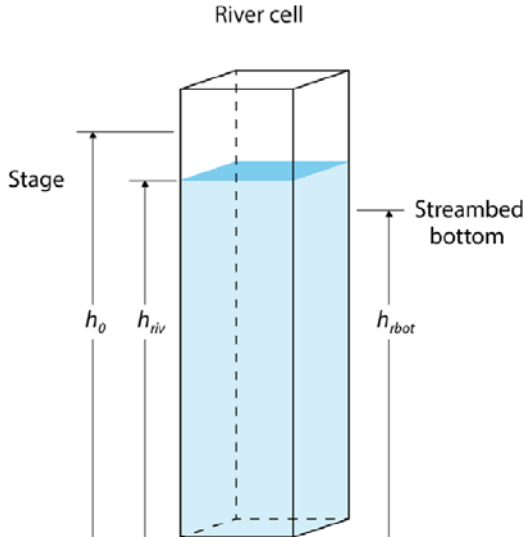
The presentation showed the locations of gaining and losing river reaches, discussed the proposed assignment of reaches to MODFLOW river and drain files, and presented preliminary calibration targets for reaches and subreaches. Four reaches will have transient calibration targets with monthly gain/loss values. These reaches include near Ketchum to Hailey, Hailey to Stanton Crossing, Willow Creek, and the spring creeks (Silver Creek and its tributaries) above Sportsman Access. The transient reach gain targets were discussed in a previous meeting and were shown again in this presentation. Because these four reaches are relatively long and may contain both gaining and losing reaches, there are also 10 subreaches of the Big Wood River and 10 subreaches of Silver Creek and its tributaries that will have an average gain/loss target for the model calibration period. The average gain/loss targets were calculated by comparing 2012-2013 USGS seepage survey measurements for the subreaches with 2012-2013 USGS seepage survey measurements for the four larger reaches and 1995-2010 average reach gains/losses for the four larger reaches. During model calibration, the average modeled gain/loss from 1995-2010 for each subreach can be compared with the average gain/loss target for the subreach. The average gain/loss targets will provide PEST with information about whether a subreach gains or loses on average, but will not provide PEST with transient information regarding seasonal changes in subreach gains or losses.

Several MTAC members asked questions about the calculations associated with transient and average reach gain targets. Jennifer indicated that a design document detailing the calculation of the transient and average reach gain targets will be prepared by IDWR. The design document will provide committee members the opportunity to review the reach gain calculations in detail.

Agenda Item 6 – Model Construction Update (Jason Fisher)

Jason discussed his work to construct the model to date, particularly his efforts on integrating the river component into the model. Jennifer has previously discussed how she created the input data. Jason discussed the 21 reaches of the Big Wood River and Silver Creek. He described the depth of the river and riverbed thickness for each reach. Jason described the process for calculating riverbed bottom elevation by reach as follows: Riverbed bottom elevation = Land Surface Elevation – Average River Depth – Riverbed Thickness. Jason indicated that we model Riverbed Bottom Elevation by using a head dependent flux boundary using both the River Package (RIV) and Drain Package (DRN).

Head Dependent Flux Boundary: River (RIV)



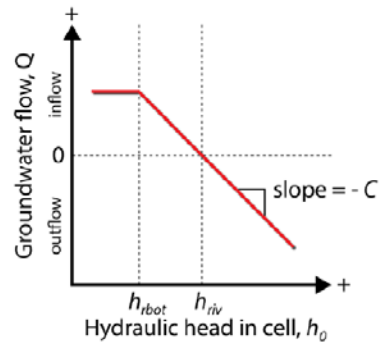
Darcy's Law:

$$Q = -KA [(h_{riv} - h_0) / L]$$

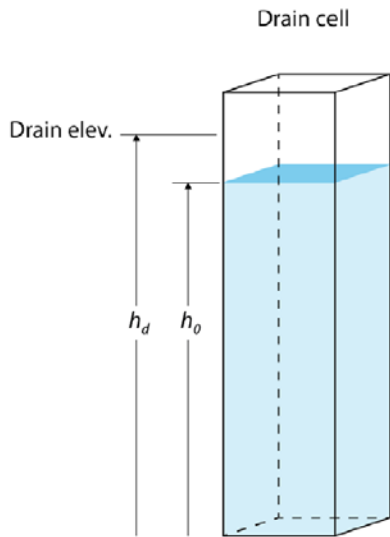
$$Q = -C (h_{riv} - h_0)$$

where riverbed conductance is

$$C = KA / L$$



Head Dependent Flux Boundary: Drain (DRN)



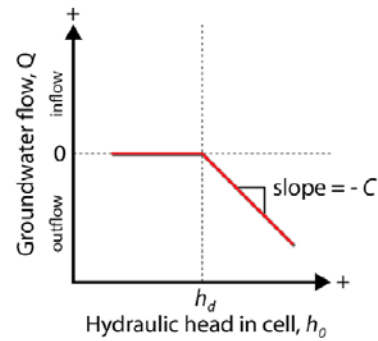
Darcy's Law:

$$Q = -KA [(h_d - h_o) / L]$$

$$Q = -C (h_d - h_o)$$

where drain conductance is

$$C = KA / L$$



Jason indicated that work-in-progress consist of calculating recharge on irrigated lands and municipal/subdivisions. Additionally, Jason is taking the ESRI ArcGIS processing instructions developed by Jennifer and converting them into R code.

Dave Tuthill asked at what point response functions would be developed for the model?

Sean Vincent said we are not scheduled to have the initial calibration completed until April 2015 and the model is not scheduled to be completed until the end of 2015. He indicated that he doesn't think we'll begin working on response functions until late 2015.

Agenda Item 7 – Announcements, Action Items, Next Meeting (Jim Bartolino)

The committee agreed the next meeting should be held at the Community Campus in Hailey, Idaho on Thursday April 3rd 2014 from 10am until 3pm.