

ESHMC Meeting Notes April 3rd, 2013

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
- Sean Vincent
- Dave Colvin
- Harvey Walker
- Jon Bowling
- Bryce Contor
- Chuck Brendecke*
- Chuck Brockway Jr.*

* present but did not sign the attendance sheet

Greg Sullivan, Willem Schreuder, Rick Allen, Roger Warner, and Stan Clark joined the meeting via polycom.

Item 2 - Sean Vincent began the committee business portion of meeting by introducing David Hoekema, who was recently hired by the Department, to the committee. Sean then gave the committee an overview of the ESPA synoptic measurement that was about to begin later in April. He indicated that approximately 1,420 measurements would be taken. Bryce asked if the synoptic would be repeated in the fall, and Sean said that due to budget constraints, a fall synoptic is not planned. Willem Schreuder asked if there are any new wells in the center of the plain that would be measured. Sean said that IDWR and the USGS looked for wells in that area. Willem said that is a hopeful sign. Sean added that some of the wells are in tributary basins. Willem asked if there are any new wells first measured in 2012 that could be part of the synoptic, and Allan Wylie said yes. At the end of the discussion, Sean said that the total number of measurements includes 108 wells that are continuously measured.

Rick Raymondi briefed the committee on the status of Stacey Taylor (IWRR) who was on maternity leave. He also showed the committee new return flow monitoring sites on the New Sweden Irrigation District and the Idaho Irrigation District lands.

Finally, Rick Raymondi posed the question to the committee as to whether there was interest in requesting a presentation from Rob VanKirk who had recently completed hydrologic studies of the Henry's Fork basin, which is a tributary basin of the ESPA. The committee was in agreement that Rob should be invited to present on issues related to the water budget of the basin.

Item 3 - David Hoekema began a discussion of the aquifer implications from the fall 2012 storage release from Magic Reservoir. He said that the release occurred in order to repair a leaky hydraulic oil line related to the Simplot hydropower turbines on the Magic Dam hydroelectric plant. The EPA threatened to fine Simplot if the leak was not repaired. David said that a judge (District Court Judge Robert Elgee) ordered the Big Wood Canal Company to begin a drawdown of the reservoir, and he said that there were two releases between October 29 and December 2, 2012. He also showed the impact of the release on the irrigation water supply forecast and the probability of filling the reservoir. He noted that the peak runoff from Camas Creek usually occurs in April, and the peak runoff from the Big Wood River usually occurs in June.

David said that he performed an analysis to quantify the volume of recharge that entered the aquifer through the perched reach of the Big Wood River by analyzing the difference in flow between the gage below Magic Reservoir and the flow at the gage on the Malad River at Gooding, just below the junction of the Big and Little Wood rivers. He provided his assumptions and background information for the study area. He showed hydrographs of the flows below Magic and at Gooding between October and the end of December (2012), and he said that there was flow at Gooding before the release from Magic due to an excess flow from an entering the Big Wood River from the North Side Canal Company's X-drop. He referred to this flow as the X drop return flow, and it was subtracted to isolate the water released from Magic Reservoir that past the Gooding gage.

By subtracting the flows at the two gages, David quantified the recharge that entered the aquifer from the release at Magic at approximately 32,200 acre-feet. Then he showed the results of model runs where he predicted the impacts to aquifer heads (day 40; January 1, February 1, March 1, April 1, July 1, and November 1, 2013; November 1, 2014; November 1, 2015; November 1, 2016; November 1, 2018; and November 1, 2022). Then he showed the flow increase over the next ten years at a list of Group A and Group B target springs and the percentage of the total portion that would accrue to the springs for each of the Group A and B targets. He also showed the quantity that would remain in aquifer storage, the portion that would accrue to river reaches, and the portion that would result in underflow and discharge to minor springs.

Sean Vincent said that the predicted impact on river reaches and springs is superimposed on what would have occurred in the upcoming irrigation season. Greg Sullivan asked if David had looked at water levels, and David said not yet. He added that he suspects the water levels in a well north of Shoshone would increase by 3 to 6 feet, and he may have to sort out pumping effects at the City of Shoshone. Rick Allen said that the model has some flow paths.

Item 4 - Mike McVay presented the managed recharge site evaluation strategy that he has been developing at the request of the Idaho Water Resource Board. He began by showing the distributions of specific yield and transmissivity in ESPAM version 2.1 and indicated the locations of the Great Rift and Mud Lake barrier. Bryce Contor said the Great Rift actually trends more to the east towards American Falls. Then Mike

summarized the recharge evaluation previously performed by Gary Johnson and said that the exaggerated rate used in his analysis allowed an illustration of the aquifer behavior. Next Mike showed animations based on the Johnson report of the aquifer head change in response to recharge at the Shoshone site, Mile Post 31, Northside canal, the Milner-Gooding Canal, Southwest Irrigation District wells, Minidoka, Aberdeen-Springfield Canal, New Sweden Canal, Idaho Irrigation District Canal, Great Feeder Canal, Freemont Madison east, and the Egin Lakes sites.

Mike then said the results of the Johnson report may be misleading as to the ability of a site to divert and accept recharge. Willem said that just because there is a small change in head does not mean there is a small reach gain. Mike agreed. He then said that shallow groundwater in some areas within the aquifer boundary may make managed recharge less effective than model predictions. He showed an area in the northeast portion of the Great Feeder service area as an example of shallow groundwater and discussed the caution that should be used when employing a regional model for a localized analysis. He compared the results of using the regional model to evaluate recharge at Egin, the Great Feeder, and the Minidoka site and discussed the influence of the local hydrogeology at each location.

Mike then discussed recharge capacity issues including site diversion capacity, site infiltration capacity, and local groundwater capacity. David Hoekema asked what was meant by diversion capacity, and Mike said it is an average of what was diverted for recharge over the past 10 years. He then indicated that in determining if there is “enough room” for recharge he chose a 15 foot buffer between land surface and the fall season water table. He altered the model to use drains in shallow groundwater (<20 ft) as an indication when to stop recharge (when 5% of the recharge volume entered the drains).

Mike showed two tables, one for fall and one for spring which showed recharge limits at recharge sites due to groundwater conditions. Later, he showed a table with an assessment of site diversion capacity, and most were based on historic recharge diversions, but some were based on estimates or site design criteria. Next, he showed a table with a summary of site infiltration capacities based on ESPAM2.1 calibrated seepage rates, published data from recharge reports, and discussions with canal company managers.

The presentation was concluded with tables (spring and fall) indicating where there are physical limitations to recharge (diversion capacity, infiltration capacity, and groundwater capacity) for the sites, a graph with the retention during 10 years of recharge water within the aquifer for the various sites and a ranking summary, and finally, paired tables showing a ranking of aquifer storage efficiency, and efficiency and recharge limitations for spring and fall.

Bryce asked how efficiency and recharge were ranked, and Mike said by volume and percentage. Greg Sullivan asked how much he looked at reach gains and spring discharge, and Mike said his analysis was aquifer centric and storage retention was

prioritized. Greg responded that timing is important to users, and Mike said that the main point when designing a recharge program is deciding first what it is that you want to accomplish. Greg said that he should consider another metric which is the timing of when the water discharges. Allan said that in this case, the client was the Idaho Water Resource Board, and it was requested that Mike evaluate how much water would remain in storage. Greg commented that Mike's presentation was very well put together. Greg asked what kind of drafting software was used to create cross-sections, and Mike said he uses Rockware and Excel. Bryce said that Mike's analysis was labor intensive.

Item 5 - Chuck Brockway Jr. presented an overview of the Blue Lakes Spring discharge measurements. He began by describing the site layout and indicated that the work was done for the City of Twin Falls. He said that Twin Falls diverts between 25 to 30 cfs from the spring.

Chuck indicated that the stage – discharge relationship using data from previous measurements at the old gage site demonstrated a rather poor fit to the rating curve, and the data scatter became worse as discharge decreased. He said that it was recommended to the City that flow measurements could be improved by a new weir. Bryce Contor said that the old place of measurement was not a good location, and Chuck said that it was either a bad place to measure or vegetative growth affected the measurements, or it was a combination of both problems.

Chuck showed a hydrograph of the Blue Lakes Spring discharge for the period from 1950 – 2012, and he indicated that the 2010 – 2012 flows were the lowest on record. He said that the annual low flow occurs when Twin Falls needs the water. He then showed a photo of the newly installed weir and stilling well and said that the foot bridge was removed, a water by-pass was constructed, and then a trapezoidal ramped broad-crested weir was installed. Chuck commented that the weir functions well, but because the country club wanted to maintain the streamflow characteristics, the weir is broader than ideal.

Chuck indicated that there will be concurrent measurements to develop a relationship between flows at the weir with the stage measured at the old gage station. He said that he wanted to go back and reconstruct more accurate flows for previous stage measurements. He said he also wanted to use the observation well above the rim to collect concurrent data and correlate spring discharge with groundwater levels.

Jennifer Sukow asked how long has the datalogger been installed in the stilling well, and Chuck said since spring 2011. Allan Wylie commented that he had tried to correlate the sum of diversions with water levels in wells above the rim, and he pointed out that the sum of diversions, including those by the City of Twin Falls, is used as a calibration target in the model. Chuck said that he also plans to attempt to correlate water levels with the sum of diversions. He added that the City wants to get a full supply without harming senior water rights.

Allan said that he does not get a good correlation with the total Blue Lakes Spring diversions and water levels in the aquifer, and that the correlation with the USGS stage is better. Chuck agreed and asked what well Allan was using. Allan responded any well that he had tried. He added that it would be nice to establish a relationship between a well with the old USGS gage at the upper pool to correct historical data. Chuck said that there are other wells, but they are not instrumented. Allan said the Department has been installing instrumentation in the next closest well above the rim for many of the springs. Chuck said there is a swamp below the rim, and no wells are in that area.

Jennifer Sukow asked what the source of Alpheus Creek is, and Chuck said it is seepage from the lower lake and discharge from the aquifer that bypasses the spring. Chuck added that from a 2011 study, it was concluded that all water from the spring, except Twin Falls the diversion, and all bypass flow emerge in Alpheus Creek. He also said that no flow discharges to the river. Jennifer asked if the Blue Lakes weir that measures flow to Blue Lakes Trout was still necessary, and Chuck said yes.

Allan said that it would be a benefit to correlate the Blue Lakes gage with total system flow, and Chuck agreed. Allan said he would like to go back to 1980 with the correlation, and Chuck agreed again. Bryce said that pumping wells change the gradient above the rim, and spring discharge has been affected. Chuck responded that the maximum total drawdown from pumping that he has observed above the rim is about 1 foot, so he doesn't think the wells are changing the gradient a great amount. Chuck added that previously, approximately 200 cfs flowed out of the lakes into dry channels to Alpheus Creek, but now there is no surface flow from the lakes to Alpheus Creek.

The discussion turned to collection of data in the early days of the historical period. Chuck said that his Father did his first investigations in 1974, and a dye tracer experiment was performed in 1974. Jennifer said Stannard measured flows before the springs were developed, but there is not good data as to where or how the discharge was measured. Chuck said the measurement had to be done either between the lakes or down on Alpheus Creek. Allan said that Stearns had measured the Blue Lakes Spring discharge. The committee then thanked Chuck for his presentation.

Item 6 - Allan Wylie began a discussion of candidate improvements to ESPAM2.1. He said the list is not prioritized yet, and he intended to accomplish that before the next meeting. He indicated that he would like to give irrigation entities names instead of numbers and improve the understanding of complicate entities. Bryce said the old model version used entity numbers. Jennifer Sukow said the IAR tool may still need numbers. Greg Sullivan said it was a good idea to use names for the entities, and it would improve understanding for the model user.

Allan mentioned a list of other candidate improvements including varying transmissivity with time; incorporating more METRIC data and developing a procedure to interpolate in between years that have been processed; extending the calibration

period; refine the calculation of recharge in non-irrigated areas; add more pilot points; include water quality, apparent groundwater age data, and temperature observations; refine the model grid; improve the understanding of the source of water on mixed source lands; convert the Snake River from the RIV package to the STR package; incorporate the vadose zone; convert the Magic Valley springs to the STR package and use drains to represent base flow; link the groundwater model with a surface water model; include two drains for every spring possibly letting the upper drain go dry; review reach gain targets; include the Menan gage; the new spring targets in the Fort Hall Bottoms, the Teton River, Rexburg bench faults, and the Portneuf River; include filtered and unfiltered Snake River reach gains; consider multiple layers in selected areas; include slope and R^2 for scatter plot in calibration targets; and adjust the seepage from the Northside system to account for canal improvements.

Allan showed the committee the prioritized list of improvements from 2007. Bryce said we ended up doing most items on the list. Dave Colvin asked if we were going to perform annual improvements, and Allan said IDWR intended to update the model often. Bryce asked if the list would be circulated, and Allan said yes. Greg Sullivan suggested getting detailed comments from committee members and developing some level of prioritization. Bryce suggested using survey monkey. Dave Colvin suggested separating the simple vs. complex candidates. Bryce suggested a matrix of desirability vs. ability to accomplish. Allan said he would circulate the candidates for votes to determine priority and then look at time and reasonableness. Dave Colvin said other candidates might come up that would be important.

Greg Sullivan said he would like to see a task list of what is necessary to accomplish. Bryce said that could be a second step after Allan circulates the list for comments. Greg responded that the committee wants agreement on what is necessary and steps that are needed to accomplish the improvements. Willem said the cross plot calibration is a great idea but will be difficult, and we won't know which ones will improve calibration. Allan said some candidates will be easy, but developing the filtered and unfiltered reach gains and including them in the calibration will be not difficult.

Willem said what improves the cross plots may be on the list, but we don't know that now. He said Allan may have to try different candidates, and it may take a lot of time. Willem said he was pleading for flexibility. Dave Colvin said the candidates should be grouped into easy, medium, and hard. Bryce said that the candidates should be ranked by priority within the easy, medium, and hard categories.

Willem asked what Allan should be working on first, and Bryce said Allan should do what is necessary for allowing the springs to go dry. Jennifer said that that is the advantage of allowing PEST to set the elevations. Bryce said that if the reason to set the elevations is to represent some real hydraulic characteristic, then let's figure out how to do that. Allan said the problem with letting PEST adjust elevations was determining how much adjustment to allow. He added that with 2 drains, it is a lot easier to let PEST adjust elevations. Willem said that to the extent we are trying to pay more attention to seasonality, PEST will adjust elevations so we get a better signal.

Allan said he would go through the reach gain data to try and figure out what is causing the noise. Allan recalled reviewing the Malad River at Gooding gage data with Idaho Power, and when flows dropped below or rose above a certain value, the data were left out. This removed spikes and allowed for a better calibration. Allan then restated that it might be worth going through the Snake River gains for the same purpose.

Item 7 - Sean Vincent briefed the committee on the progress of the Wood River valley groundwater model development. He said that the process would begin with design objectives, and he showed the committee the program web page. Sean said that at present, we don't have a model. Chuck Brendecke mentioned that Chuck Brockway has a model, and Sean clarified that the Department does not have a model. Bryce said that the Brockway model is in the public domain, and there is also one done by Carter Boardman for the Nature Conservancy.

Item 8 - Bryce lead a discussion regarding what to do about features that we know are there, but there are no data to support them. He said that in ESPAM1.1 and in 2.1 and in ESPA predecessors, the features were left out, and that in these cases, the modelers were more comfortable representing what was known and supported by data. He added that for the Spokane – Rathdrum model, the modelers included features for which there were no data but qualified the inclusions. Bryce then discussed the faults on the Rexburg Bench that isolate the aquifer and prevent connection with the South Fork of the Snake River. He said that up to this point, not including the faults is thought by the committee to be a lesser wrong than including the faults.

Bryce gave the following reasons to include features that we know are there, but there are no data to support them:

- 1) The features are important to predictions.
- 2) Once the data are obtained, it is easier to incorporate the data into the model if the features are already represented.
- 3) Including the features enables a sensitivity analysis.
- 4) If the features are not in the model, you can't see what the features do to the uncertainty of the prediction.

The following reasons were given to exclude features that we know are there, but there are no data to support them:

- 1) The modelers might be fooled.
- 2) The features are not important to our desired predictions.
- 3) The features would open the modelers up to criticism.
- 4) The features decrease calibration quality.
- 5) Even if the model calibrates with the feature, it may not be evidence that the feature is present.

Item 9 - The committee agreed that the next meeting should be June 26th, 2013.

DECISION POINT SUMMARY

The following was agreed upon:

- 1) The committee agreed that Rob Van Kirk should be invited to present on the findings of recent hydrologic investigations in the Egin Bench area.
- 2) The committee agreed that the candidates for improvement of ESPAM2.1 should be grouped circulated for voting to determine priority ranking.
- 3) IDWR agreed to go through the reach gain data to try and figure out what is causing the noise.
- 4) The committee agreed that the next meeting should be June 26th, 2013.