June 23, 2010

Ron,

It appears to me that GMA-9 has lost focus on the real task at hand.

The combination of pumping/drawdown/spring flow is an inseparable triad. Pumping is the only one of the three that GMA-9 can do something about, i.e. the only one of the three that is actionable by GMA-9. Drawdown and spring flow will be the consequences of action taken by GMA-9 and its component GCDs to manage pumping.

Thus GMA-9 should focus on the question of what is the management target for total groundwater pumping in GMA-9 in 2060, river basin by river basin and aquifer by aquifer and GCD by GCD? Because a reduction in total groundwater pumping is not, it appears, on GMA-9's table this question reduces to what is the management target **increase in** groundwater pumping in GMA-9 between now and 2060, river basin by river basin and aquifer by aquifer and GCD by GCD?

The discussion of estimated current and future exempt pumping is a distraction. That discussion goes to the issue of who will do the pumping, something that matters not a wit to the aquifers and springs.

The discussion of the impact of our variable rainfall is secondary to the main question that GMA-9 should answer. GMA-9 can take no action that will influence rainfall. Droughts will happen and must be dealt with as they occur. This is a matter for drought management to address.

Regards,
Lee

June 24, 2010

Ron,

Here is the written version of my oral comments last night in Boerne.

These are my personal remarks and not the official position of BCRAGD.

The elephant in the room is when are we going to run out of water and what will we do when it does?

GMA-9 has put three "scenarios" out for public comments. All three are for increases in pumping.

Nobody's well nowhere in GMA-9 will see a rise in level because of increased pumping.

How much your well level goes down due to increased pumping varies considerably depending on where you live. Thus it is very misleading to talk about "average" aquifer drawdown. The "average" comes from summing up areas which will see little drawdown with areas that will see drawdown several times the "average." Count on this. Everybody's well level will go down, at least some, with increased pumping. It's only a question of how much. If you had well problems during last year's drought, then your problems will only be worse when the next drought comes around.

The most recent GAM runs do not include drawdown maps that illustrate the variation of drawdown from the average overall drawdown. But previous GAM runs did. Such maps are very useful for visualization of drawdown variation over the expanse of GMA-9 and illustrate my point in the previous paragraph.

In certain areas an "average" drawdown over all of GMA-9 of, for example, 40 feet will result in widespread drastic drops in well levels. Depending on the thickness of the aquifer this may occur to the point where the aquifer will become completely dry in certain places. The areas most impacted are those with a high concentration of pumping.

Nobody's spring nowhere in GMA-9 will see an increase in flow because of increased pumping.

The story on springs is similar to the story for wells. Whether your spring will see reduced flow or even dry up due to increased pumping depends very much on where you live. Count on this. The spring that ran when you were a child and has now dried up is not coming back.

Droughts will occur and must be dealt with as they happen. With increased pumping the impacts of drought will be increasingly more frequent and more severe.

The explanation of Bill Hutchinson's technique behind the most recent GAM runs was woefully inadequate and confusing. Bill employed what is generically labeled "Monte Carlo" analysis. "Monte Carlo" is a technique that employs probability to model systems where one of the model imputs varies in a probabilistic manner, in this case the variable input of rainfall. A large number of model runs are made, each with a different rainfall input, and with the particular rainfall amount being determined at random but following a probability distribution. Thus most runs will have input rainfall close to the annual average while other, and fewer, runs will have input rainfall closer to observed extremes. When you plot the frequency of occurrence of particular model output results, the results will show a probability distribution that mimics the probability distribution of the variable input. There will be a clustering of results around an average, with fewer occurrences at the extremes. You can characterize the probability distribution of the results in different ways. There is always an average that corresponds to average rainfall. There will be a 5% exceedance number which represents a model result, for example drawdown, which in the large number or model runs was exceeded one out of twenty times. Likewise a 95% exceedance represents a model result which was <u>not</u>

exceeded nineteen out of twenty times. But it is very misleading to only look at the overall characteristics of the probability distribution of the model results. The best understanding, certainly for the layman, comes by looking at the complete frequency plot of the model results. Bill did not include such plots with the latest GAM runs, not did he include an explanation of the "Monte Carlo" technique that he used. This has led to extreme confusion among the public. I suggest that GMA-9 have Bill provide, by way of a presentation, those two missing bits to allay at least some of the confusion and misunderstanding.

And there is another aspect to the elephant in the room, one that was alluded to last night. It is quite possible, even likely, that once a total pumping number for 2060 is established and then the projected 2060 exempt pumping is subtracted that the result, the "regulatory MAG," will be less than current permitted pumping. This would say that there will be less room for permitted pumping in 2060 than today because of growth in exempt pumping and because, on the bottom line, we don't have much water.

Because of all these consequences of increased pumping GMA-9 need be very conservative in setting the management targets for total pumping. This would be conservative in the sense of conserving our aquifers and springs. Further it is much easier to increase management targets than to reduce them, especially as the targets get fossilized in permitted pumping amounts. Less increase is of course more conservative than more pumping. In my mind the pumping levels of Scenarios 6 and 7 are not just less conservative but are downright reckless. I suggest that GMA-9 adopt a management target pumping of no more than the pumping of Scenario 5. I am very concerned that the 33% increase of Scenario 5 may not be near conservative enough, but I believe that political considerations will preclude adoption of a lesser increase.

Finally I strongly suggest that the Edwards Group aquifer not be deemed non relevant. The practical effect of a non relevant Edwards Group would be to take the Edwards Group outside the joint planning process of GMA-9. Bandera and Kendall Counties are strongly dependent on Edwards Group springs as the headwaters for major streams in the two counties. Bandera and Kendall Counties and all the other GMA-9 players very much need to keep their seats at the GMA-9 table for the setting of Edwards Group DFCs.

Regards,
Lee

June 25, 2010

Ron,

I was really disappointed on Wednesday evening in Boerne in the discussions about monitoring wells.

The Hill Country GAM was most definitely calibrated against actual monitor well data. The calibration was done by seeing how well the model predicted history. To do that calibration the model started at a set of initial conditions, derived from monitor well data, and then progressed in time with actual historical pumping, as best TWDB could figure, and actual historical rainfall to produce predictions, after the fact predictions as it were. The predictions were checked against the actual monitor well data. The predictions agreed well with actuals. That the model predicted history is the indicator that it can predict the future.

The major complexity in looking at monitor well levels is that at any snapshot in time, no well is in equilibrium. The wells are constantly reacting to history, i.e. the near and long term time history of rainfall and pumping and the spatial distribution of same. And in a very complex way. So a snapshot at any particular time doesn't tell you much. The aquifers are not like lakes which are always pretty close to equilibrium over the entire area of the lake. (Except for aquifers like the EA.)

You have to look at trends in monitor levels, the longer term the better. Which when it comes to managing to a DFC fifty year hence is quite doable. We already have a fair number of wells, although we need more and they need to be strategically placed, that have already been monitoring some 10 or 20 years or even longer. Along the way of continued monitoring comes the ability to better calibrate the Hill Country GAM and other models.

Using monitor well levels in drought management is much more problematic that using monitor wells to manage to a DFC. But drought management is another subject of its own.

Regards,
Lee