

Meeting Summary - Status of the IRWP WMP

Arkansas Farm Bureau Center, Dining Room B, 4th Floor
1:00 PM, Thursday, October 8, 2009

Participants/Attendees:

Delia Haak – IRWP
Brian Haggard – UofA AWRC
Sheri Herron – IRWP
Karen McSpadden – IRWP
Tony Ramick – ANRC
Dharmendra Saraswat – UofA CES

Milo Shult – UofA DofAg
Earl Smith – ANRC
Tom Riley – UofA PPC
Evan Teague – IRWP
Kent Thornton – FTN

Purpose: The purpose of this meeting is to update the IRWP Executive Committee on the WMP status and discuss how to move forward with its completion. The following is a list of topics discussed: 1) Refinements to Dr. Saraswat's model; 2) Load reduction calculations; 3) Meeting EPA nine element requirements; and 4) Time estimates and potential completion date.

Evan welcomed everyone and called the meeting to order. He acknowledged Karen and Sheri participating via conference call.

Model Refinements

Dr. Saraswat provided a summary of the Wednesday, October 7, meeting between Dr. Haggard, Mr. Riley, Mr. Ramick, and himself.

Saraswat – Have been recently collaborating with Dr. Haggard on refining the Soil and Water Assessment Tool (SWAT) model for the Illinois River Drainage Area in Arkansas. The model performed well when estimating flow, sediment, and nutrients; however, there were some inconsistencies. After discussions with Dr. Haggard at ANRC's Arkansas NPS Stakeholders group meetings and further discussions during the UofA Division of Agriculture's Environmental Task Force, some differences were evident in 3-4 mostly forested subwatersheds. These differences were probably related to the groundwater/surface water interaction within the model. Though no investigation were carried out to determine the specific cause, it appears that assumption of 2.5 mg/L for nitrate loading in groundwater was not going down well with forested regions. According to 2007 studies performed by Dr. Haggard, different land uses contribute different nutrient loadings. These results are going to be used in the refined model to verify the correlation of model outputs with HUC-12 monitoring data.

The original SWAT model was calibrated for flow at three locations and at one location for sediment and nutrients, the Illinois River at Hwy 59 Bridge. The model validation was carried out only at the outlet of the watershed i.e. the Illinois River at Hwy 59 Bridge. This approach was adopted as the flow, sediment, and nutrient data for the entire study period (1996-2007) was available only at the watershed outlet. The refined model will include flow, sediment, and nutrient calibration/validation at multiple sites using different time periods of available monitoring data. The new approach is justified as per peer reviewed scientific literature. A map of all the locations to be used for calibration/validation was showed by Mr. Ramick (attached).

Common practice in watershed modeling is to calibrate on independent gauges and validate only on nested gauges. Nested gauges are those located on the same stream in series. Calibration is not performed on nested gauges because once calibrated for one gauge, the parameters are optimized for other gauges as well.

Overall, these refinements are expected to result in a better representation of the spatial heterogeneity by the model and are also expected to be a better representation for ANRC prioritization as well as IRWP. With the refinements made to Dr. Saraswat's model all parties were comfortable using it for prioritization in the WMP.

Ramick & Smith – The original study was restricted from 1996 to 2007. Indicated that new data through 2008 was available and asked if it could be used in modeling.

Saraswat – Indicated that it could and said that modeling over a longer time period ensures that the model is trained on wet/dry years for accurate simulation of watershed hydrology.

Haggard – Noted that extending the data set to include 2008 would also allow the effects of Fayetteville's new WWTP to be evaluated.

Saraswat – There is a new version of SWAT2009 (not publically released yet but made available to us by the SWAT model developers at USDA-ARS, Temple, TX) that enables the incorporation of land use changes over the entire study period. Since some of the subwatersheds in Northwest Arkansas have undergone rapid urbanization during the revised study period (1996 to 2008), the use of the latest model with the new feature is expected to be a better predictor of land use changes on flow, sediment, and nutrients loading.

McSpadden – The HUC-12 monitoring data could be used in the next model update.

Teague – The monitoring data could be used as a secondary method of prioritization for comparison against Dr. Saraswat's model results.

Q: Herron – Was the monitoring data used (could it be) for calibration and validation?

A: Saraswat – The monitoring data was not used as model input because it lacks the resolution required for modeling purposes (daily flow, sediment, and nutrients data is input in the model). It may be used as a secondary comparison but with caution since the location and time of in-frequent sampling adds uncertainty to monitored data.

Q: McSpadden – What happens if the monitoring data yields different priorities than the model?

A: Haggard – We go back to first step. We go to the site. Try to evaluate why the differences exist. But, the refinements to Dr. Saraswat's model should resolve most of these issues. Both approaches are targeting high ends of the data.

A: Smith – There are always things that cannot be accounted for but must be considered. Have there been any changes in the adjacent local areas such land use changes or are there larger forces at work such as climate change?

A: Saraswat – Some variation is always expected, but we need to try to explain it. For example, we received two "100-year storm events" within a few weeks of each other in 2008. Models cannot necessarily predict these types of events, thus, they may result in some discrepancies.

Q: Teague – We (IRWP) used the sampling program results for prioritization in the first draft of the WMP. Now we are proposing to use Dr. Saraswat's model as our primary prioritization tool. Will the sampling program data still be used?

A: Haggard – have to wait & see when data is monitored. .if represent in basin. . The UofA Division of Agriculture Environmental Task Force has taken the position that when real data exists, it outweighs

model output. Model output is just an estimate. Data represents what is actually occurring in the environment.

Ramick – update to model process – We must be consistent in our approach for priority watersheds. 2008 data available. .integrate it. . ANRC will use model output for prioritization for State NPS Plan. We submit this to EPA. It can cause problems if prioritization schedules are different.

Q: McSpadden – Why would there be differences? Two different prioritizations?

A: Ramick – look at model results & integration. .when monitoring . . difference in prioritization in Illinois. He can't use different information for various watersheds. .must be consistent across the state (funding).

Arkansas has eight priority watersheds as determined by the Arkansas NPS Stakeholders group. We (ANRC) must be consistent in our approach in all priority watersheds throughout the State or must be able justify to EPA Region 6 why we did not. If different information (data) is used for prioritization in the Illinois River Watershed for which there is no comparison in the other seven priority watersheds and this results in a different prioritization than the State's then we must be able to explain or justify these differences.

Thornton – Regarding the differences we have been discussing, it is worth noting that 23-24 out of 27 HUCs were closely correlated, only 3-4 different. This should be reduced to only 1-2 with the refinements to Dr. Saraswat's model we've discussed. This level of variability is acceptable. Conditions in the watershed are continually changing. The model increases your confidence level and where the priority is the same using two different approaches that's where you focus your efforts.

Ramick – Must remember that the model is just one tool. It is not the end all.

Load Reduction Estimates

Teague – How would they be determined and who would do this? Can they be performed using Dr. Saraswat's model?

Thornton – The process may or may not be done using Dr. Saraswat's model. There is more than one method available. It may put us in the position of selecting one method over another.

Ramick – Is the SWAT model capable of predicting load reductions? Possibly. But, it depends on the direction we want to go and the UofA. Not sure it is or who would do it.

Teague – How are they calculated?

Haggard – The scenario determines how it is used. (Dr. Riley agreed.) Will defer to Kent on how this will be done since this will be FTN's role over next month.

Thornton – You must answer several questions first. What's the target? What are you trying to achieve? What process do you use to establish targets for load reduction? Proposed using multiple ways – differing approaches. There is the weight of evidence approach and there is convergence. How to reduce load to achieve target?

Smith – EPA Region 6 in Dallas has commissioned another Illinois River basin study more specific to loading. It will be similar to a TMDL. This will be another study using possibly different methods to calculate load reductions.

Riley – Expressed reservation about using a load allocation approach where the WMP allocates responsibility/load. Recommended avoiding this approach particularly at the smaller HUC sizes. The 8-digit and 12-digit HUC levels are okay, but this becomes a problem when the 14-digit HUC level is used because individual landowners can be identified.

Haak – Are there any other targets that we can tie into to achieve goals?

Smith – You would essentially be generating a TMDL to establish these targets.

Thornton – A TMDL may not be realistic. For example, court ordered settlements have forced TMDL generation in many Delta states associated with Gulf of Mexico Hypoxia issue. In Mississippi, the state agency set targets to reduce nitrogen and phosphorus by 80% and 96%, respectively. They are now realizing that these targets cannot be achieved. They are going back and reevaluating these and trying to determine what is realistically achievable. Setting targets for nutrients is more difficult because there are no numeric criteria from which to work. They are not toxic. You are trying to determine at what level they illicit a response. Try to establish realistic endpoints and back into nutrients assuming the endpoints are attainable. If they are, then go back further.

Haak – What about the 303d listed streams? ADEQ's and EPA's goal is to delist streams.

Ramick – Load reduction is just one element of a management plan. An approach of expected load reductions based on realistic BMP adoption with incremental milestones that provide for flexibility should be used. The watershed is dynamic and things not in your control such as land use changes and weather will affect any goal or target you set. You should not select an unrealistic goal such that something as simple as an unusually wet year (incremental flows) can cause you to miss goals. You are backing yourself into a corner if you do this. Is this the preferred approach of EPA? Probably not, but it is an achievable one.

Haggard – Water quality changes with land use. The number one priority is to move closer to norm of basin. 2008 was a wet year. This was beneficial because it flushed the upper reaches of the watershed restoring conditions to 10-years ago. Increasing forest riparian zone will also return conditions closer to the norm.

Ramick – One objective should be to address low hanging fruit first. The WMP structure and how to do it.

Haak – Helping to implement the CREP program could be one of those.

Riley – Have established a dialogue with USDA-FSA discussing target strategies with an emphasis on potential value. FSA has indicated they are willing to focus CREP signup efforts in priority areas.

Haak – We can help educate landowners about the CREP program, possibly gain greater acceptance, and target our efforts.

Saraswat – I am developing a computer tool with some support from the ANRC that can be used to identify areas along streams where riparian buffers are needed. This would be very beneficial in identifying areas for BMP implementation. I spoke to Tony Franco (FSA) and will have further discussions with him to evaluate the possibility of it being used for CREP purposes.

Going back to uncertainties within modeling. During another project, a review of the most recent land use/land cover maps was performed to compare the maps to actual conditions. This review showed that there was 13% inaccuracies in land use/land cover alone. Therefore, there can be substantial inaccuracies inherent in the available data sets before model output is ever generated. It is unrealistic to try to set exact or precise load reduction targets or goals.

Thornton – Management options within HUC-12 can be provided. Identify what the board wants to focus depending on CREP and other program funding.

Haggard – Should target areas with the lowest percent riparian zone. The WMP identifies percent forest by HUC-12. Dr. Saraswat's model is important tool.

Riley – You could identify forest buffer with highest value using Dr. Saraswat's model.

Haak – Determining where we start is most important.

Haggard – Once you have the priorities, you can do a stream survey by walking the banks. You can also use digital aerial photography.

Teague – You could look at the high-resolution photography first and identify areas for further investigation before going into the field. You could estimate load reductions from BMP implementation in those areas.

Ramick – Use Dr. Saraswat's model to determine the priority areas. Evaluate what the priority constituent is, i.e. sediment, nutrient, etc. Determine the appropriate BMPs. Estimate what the percent implementation by landowners might be. Once you know this, you can calculate a potential load reduction of X.

Thornton – You can use Dr. Saraswat's tool to determine the most convenient location to begin, before going into the field. There are a couple of approaches. Identify the low hanging fruit which might be areas with the most degraded water quality or a logical approach might be to start in the upper reaches of the watershed and work your way towards the outlet at the Highway 59 Bridge. Any improvements made in the headwaters will also be realized downstream.

Ramick – You must also take into consideration that conditions in the watershed are not static. They are always changing. The IRWP doesn't know where the next Walmart Supercenter will be built; therefore, can't predict what impact that activity will have in that area.

Smith – You must determine what is achievable and what can be implemented. You then compare to your goals and modify your estimates if necessary. It is an iterative approach. You must reevaluate every five or ten years to see what impact things like development are having.

Haggard – Your priorities may change. You may need to adjust your criteria. The monitoring component can be used to identify strides taken. You reevaluate not every year, but maybe every 3 to 5 years.

Saraswat – In the state of Texas, the SWAT model was used to determine location for monitoring stations based on relative ranking of watersheds for sediment and nutrient loadings to streams/rivers/tributaries.

Haggard – Evaluations should be performed using flow-weighted concentrations instead of loads. Flow-weighted concentrations remove the variability associated with precipitation. The most important thing is trend analysis that shows continued improvements.

McSpadden – It doesn't seem right not to set hard targets and shoot for them. Is this acceptable to EPA?

Ramick – Yes. Other groups (Chesapeake Bay) have painted themselves into a corner by setting unrealistic targets or goals. The EPA understands that watersheds are dynamic and that the IRWP has no control over certain activities. If EPA knew what to do, they would have already done it. They can't know because they don't know what an individual landowner will commit to do or not do. No one can dictate that.

Thornton – We have to remember the concept of “adapt management”. We shouldn't be so rigid that we can't adapt to meet changing conditions.

Haggard – The worst goal we could set would be a kg/yr target. One wet year ruins it.

McSpadden – We should create document to be proactive rather than reactive. We can't control development in the watershed, but the WMP could be used to encourage, not dictate, different actions. We should try to head bad stuff off at the pass using good science and voluntarily implementation.

Teague – In summary, we will estimate load reductions based on realistic BMP adoption and implementation rather than establishing unrealistic load reduction targets.

Meeting 9-Element Requirements

Haggard – The WMP in its current form did not turn out as planned. It ended up being more of a guide to watershed management planning rather than a WMP for the Illinois River.

Thornton – But, it contains a lot of valuable information. It just needs reorganizing into a more user-friendly document.

Haggard & Thornton – Will coordinate on load reduction estimates and addressing ANRC's comments regarding Nine Element requirements. Break WMP into more concise document with supplemental handbooks (modules). Develop cost estimates for BMP implementation. Will work together after Dr. Saraswat's modeling is complete.

Ramick – A matrix of Dr. Saraswat's model, the 303d List, and Dr. Haggard's monitoring will be used to set priorities.

Thornton – Will review the document providing “keep” or “move” recommendations. Additional items that must be included: schedule/ milestones, load reduction estimates, cost estimates, etc. This editing should be complete by the end of October 2009.

Haggard – Will use Kent's recommendations to divide the document into multiple products, i.e. the management plan that meets the nine element requirements and several handbooks (modules). Will develop handbooks (modules) addressing target specific areas such as agriculture, urban, forest, low impact development, etc. as supplements to the WMP. Will start at end of October 2009 and should be finished with revisions by late January or early February 2010. Should give ANRC a month or more for review.

Saraswat - Should complete additional modeling by end of November 2009.

Haak – This is within our deadline. We must have the final report to Region 6 by April 2010.

Ramick – Will we get chapters as they are completed?

Haggard – That is up to the Board.

McSpadden – We will schedule a special board meeting to provide an update of today's meeting and to discuss other topics.

Teague – Everyone is comfortable with using Dr. Saraswat's model for prioritization?

The group indicated that they were.

Teague – Before we were using the sampling data to develop our priority watersheds. What happens to this information? Do we still use it? If so, how will it be presented?

Haggard – There is still one remaining question for the board to consider concerning the HUC-12 prioritization. Dr. Saraswat's model bases its priorities on N, P, and sediment. The sample data does too, but it also addressed bacteria. This could be listed as separate data with separate priority not covered by the model. How to address the bacteria data with the WMP? Include it or separate it?

McSpadden – The WAG has already voted to include this in the WMP. Why different priorities based on N, P, and sediment?

Haggard – Dr. Saraswat used all three to come up with one set of assumptions. High priorities are based on all three. There will be 2-3 HUC-12 identified by bacteria as priorities that don't match with the combined N, P, and sediment results from Dr. Saraswat's model.

McSpadden – How were these combined to determine priorities?

Saraswat – Used three different approaches to provide a relative ranking of subwatersheds based on sediment Nitrate-nitrogen and phosphorus loading. Have yet to decide which one to use.

McSpadden – Is it possible to add bacteria to matrix?

Saraswat & Haggard – Yes.

Ramick – But . . . Bacteria was not used for prioritization of the State's other priority watersheds. ANRC must use a consistent approach for the entire state. This would be unique additional data.

Haggard – It could be considered separately in the WMP.

Haak – Could this data be combined with ADEQ data used to generate the 303d List? Could be used to show trends.

Haggard – It could be used for that, but I don't have access to it. It would be helpful.

Ramick – ADEQ bacteria data is point source related, not NPS. ANRC doesn't use it.

Smith – USGS collects some bacteria data but only for special projects. It would be sporadic at best.

Haggard – The data shows that as pasture/urban land use exceeds 50% bacteria levels increase. It is HUC specific and can be used for additional prioritization.

Saraswat – Why not wait until several years of bacteria data are available? All the other data used in the WMP represents multiple years. Don't we risk hurting the landowners due to lack of several years of data?

Haggard – This data is the best most up to date data set available.

Haak – Could the data be used to delist streams?

Ramick – Delisting is a much more difficult and longer process than listing.

McSpadden – They have used less to list.

Thornton – A white paper could be developed explaining the data and how it should be used, e.g. to support prioritization, for further study, etc. Could be circulated to the board for use in determining how or if the data should be used in the WMP.

Haak – Support the drafting of a white paper.

Smith – A management plan acceptable to EPA should allow flexibility and meet 319 funding requirements. The bacteria questions need to be investigated; however, there is much more data on other constituents (N, P, Sed.) than the bacteria. Performing prioritization using a limited amount of data may hurt acceptance by EPA.

McSpadden – The decision was made by board to include all data, not to pick constituents. The goal of the partnership is to identify water quality problems in the watershed and work to fix them. We must revisit this. Adaptive management applies.

Haak – AWRC is not certified for bacteria.

Haggard – AWRC is not certified for bacteria. There have been very few requests for it, and maintaining the certification was cost prohibitive. We follow EPA standard methods. ADEQ & EPA have never had a problem accepting our data. Use of data is not valid for regulatory purposes.

Ramick & Smith – Non-certified data is not eligible for delisting of streams. It can't be used for regulatory issues.

McSpadden – We are a citizen group developing a WMP for voluntary BMP implementation. Not regulatory.

The meeting was adjourned at 3:00 PM.