

Draft
Minutes of Meeting
North Bosque River TMDL Refinement Project Advisory Group
October 4, 2007
10:00 am -2:30 pm
J. J. Pickle Research Campus
Center for Research in Water Resources
Building 119

Stakeholders Present: Ricky Garrett (City of Waco); Richard Eyster (Texas Department of Agriculture).

Stakeholders Absent: Norman Bade (Natural Resources Conservation Service); Jay Bragg (Brazos River Authority, replacing John Ellis); Shawneille Cambell (U.S. Environmental Protection Agency); John Cowan (Texas Association of Dairymen and Dairy Farmers of America); John Foster (Texas State Soil & Water Conservation Board); Jerry Golden (City of Clifton); Norman Johns (National Wildlife Federation); Allan Jones (Texas A&M University System); Mark Kaiser (City of Stephenville); Ned Meister (Texas Farm Bureau); Anjna O'Connor (U.S. Army Corp of Engineers); Tony Provin (Texas Cooperative Extension); Pat Radloff (Texas Parks and Wildlife Department); Justin Taylor (Sierra Club); Joseph White (Baylor University).

Support Team Present: Larry Hauck (TIAER); James Houser (TIAER); George Ward (UT-CRWR)

Others Present: Clyde Bohmfalk (TCEQ); Faith Hambleth (TCEQ); Larry Koenig (TCEQ); Tom Weber (TCEQ); Bruce Wiland (Wiland Consulting); Penny Wimberly (City of Waco).

Materials Distributed:

The following was provided at the meeting: April meeting minutes, meeting agenda, calibration parameters handout and presentation handout.

Welcome & Introduction

The eighth meeting of the North Bosque River TMDL Model Refinement Project Advisory Group was held on Thursday, October 4, 2007 from 10:00 AM until 2:30 PM at the Center for Research in Water Resources, J.J. Pickle Research Center, The University of Texas at Austin. A lunch break occurred from approximately 11:45 AM to 12:30 PM. Larry Hauck (TIAER) introduced the meeting and self-introductions were made.

Old Business

The group approved the minutes from the April meeting.

Meeting Overview

Larry Hauck introduced the presentation and outlined what it would cover.

The meeting covered three topics: discussion on and definition of TMDL allocation scenarios; presentation of SWAT-TCEQ calibration and verification; and presentation of preliminary SWAT-TCEQ sensitivity analysis.

Discussion on and definition of TMDL allocation scenarios:

Larry Koenig reminded attendees that the target of the TMDL is in-stream concentrations of phosphate phosphorus ($\text{PO}_4\text{-P}$), to be obtained by percent reductions of historical $\text{PO}_4\text{-P}$ loads and concentrations.

Dr. Hauck then showed a slide that identified the five TMDL index stations along the North Bosque River (NBR) where changes in $\text{PO}_4\text{-P}$ are being documented and will be evaluated within the present project. In addition, model output data would be available at all delineated subbasin outlets.

A discussion on what should be the baseline conditions followed. It was pointed out that the baseline would be for 1998 conditions in the NBR watershed, or before best management practices (BMPs) began. It was suggested that a baseline of current (2007) conditions might also be established.

The first scenario for the TMDL was discussed. It was suggested that this scenario should replicate to the greatest degree possible the conditions and phosphorus control practices simulated in the previous TMDL. Then it was suggested that a second scenario should simulate current practices being implemented in the NBR watershed, because Natural Resources Conservation Service guidance and other factors have changed since the original TMDL allocation was performed. Bruce Wiland pointed out that the issue of third party fields for dairy manure application was not previously addressed. A discussion ensued about how third party fields might best be simulated. In addition, it was discussed how initial soil test P (STP) in waste application fields (WAFs) and third party fields would be determined and implemented in the TMDL scenario applications.

Finally, other possible BMPs for alternative TMDL allocation scenarios were discussed. There was some interest in increasing the number of reservoirs that are the size of present Public Law (PL)-566 reservoirs. Larry Koenig pointed out that any new PL-566 reservoirs built would have to be carefully planned to prevent them being considered as having high aquatic life use. It was added that the Army Corps of Engineers had expressed possible interests in building new reservoirs similar to PL-566 reservoirs and that funds for such a project might be available. In any case, there was a good deal of interest in simulating the effects of new reservoirs, but also limiting the number of such reservoirs to not more than six.

It was also mentioned that many freestall dairies are going to manure vacuum systems, which led to a discussion of the potential impact on P loading that might result from such a technology and how it would be simulated in the model. Commercial fertilization substitution with manure was also mentioned, and it was pointed out that this is essentially captured by the simulation of third party fields. A biogas plant has recently begun operating in the area. It was discussed that the facility would dispose of liquid wastes on new waste application fields. Discussions also occurred on how to best represent this facility in the model.

The discussion of allocation scenarios concluded with comments about the level of percent reduction that would be needed to reach the target concentration. It was pointed out that the new simulations may result in different percent reduction requirements than did the previous TMDL assessment in order to reach the target in-stream PO₄-P concentration at the index station in the Meridian area.

Presentation of SWAT-TCEQ calibration and verification:

Jim Houser (TIAER) then reviewed and discussed the model validation process. First, the purpose of model calibration and verification (the two processes involved in model validation) was reviewed. Then Dr. Houser reviewed the long-term hydrologic calibration. Dr. Houser presented the hydrologic calibration summary statistics for all the streamflow monitoring stations in the watershed. A map of the precipitation stations in the NBR watershed was also shown to illustrate one possible reason why the model predictions are better in the upper North Bosque than in the south. The northern region of the watershed had good coverage with precipitation stations, while south of Hico there were relatively fewer precipitation stations.

Dr. Houser then moved to a discussion of the short-term nutrient and sediment calibration and verification. Dr. Houser pointed out that data indicate large amounts of manure taken to compost facilities in the years 2000 and 2001. Based on the unknowns imposed as a result of the manure haul-off, the decision was reached to exclude the year 2000 from the verification period. Therefore, only the years 1998 and 1999 were used for the verification period.

Dr. Houser also explained how accuracy of model prediction becomes less reliable as the size of the simulated subbasin decreases, due to the fact that management and precipitation data becomes more uncertain and divergences from the “average” management used in the simulations has a greater impact on model output compared to measured output. Water quality loadings from larger watersheds are more likely than loadings from smaller watersheds to respond to the “average” management used in the calibration simulations, simply because of the larger number of agricultural operations in the larger watersheds and the spatial integration provided by the larger size.

Dr. Houser also showed how fluctuation of cow numbers in the subbasins made some water quality monitoring stations more reliable calibration points than others. The less the variability of cow numbers during the calibration and verification periods, the more likely

the “average” cow number used in the simulation would match the actual cow number in the subbasin throughout the simulation period. The cow number dictates the amount of manure applied in the subbasin.

Dr Houser next presented some information from a recent journal article on measures of model performance for nutrient load predictions by the SWAT model. Due to the compounding of errors associated with nutrient predictions, the measures of model performance for nutrients are not as stringent as those for hydrologic calibration.

Results for the sediment and nutrient calibration were shown by Dr. Houser for all water quality monitoring sites within the NBR watershed. It was demonstrated that the model was meeting measures of model performance at all index stations along the main branch of the NBR. Predictions of average daily loads and average daily concentrations were also shown. Dr. Houser said that improvements in the average daily concentration predictions were still being pursued, but since average daily concentration results are dominated by low flow periods associated with small loads, adjustments would be unlikely to affect the present satisfactory load calibration.

Dr. Houser next presented the verification data. The accuracy of prediction during the verification period was not as good as during the calibration period. Dr. Houser pointed out this was largely due to the shorter time period of the verification, which exacerbates any differences from the measured data and that the verification period was an extremely dry period with only a few instances of significant streamflow. Most of the prediction error was due to an over-prediction of flow after a prolonged period of dry conditions. Larry Koenig added that prediction and measurement of low concentrations is especially problematic, and that the lower the values being simulated the greater the impact on percent error created by over-prediction.

Presentation of preliminary SWAT-TCEQ sensitivity analysis:

The last part of Dr. Houser’s presentation focused on a preliminary sensitivity analysis. Dr. Houser looked at the effects of different nutrient removal efficiencies in the PL-566 reservoirs, as well as the effect of PL-566 reservoir removal. Dr. Houser also showed the difference created in P loadings when P settled in dairy lagoons was not land applied. Lastly, Dr. Houser demonstrated some of the impacts of water quality in-stream kinetics on model output.

Meeting closing:

Because of the absence of a dairy industry representative, there was discussion of the need for another meeting, perhaps involving only the City of Waco and the dairy industry representatives, to determine more of the specifics of the TMDL allocation BMPs and scenarios. TIAER would provide follow up this discussion.

The meeting adjourned at 2:30 PM.