

FINAL
Minutes of Meeting
North Bosque River TMDL Refinement Project Advisory Group
August 23, 2005
10:00 am -3:30 pm
J. J. Pickle Research Campus
MCC Building

Stakeholders Present: John Ellis (Brazos River Authority; replacing Kyle Headley); Jerry Golden (City of Clifton); John Cowan (Texas Association of Dairymen and Dairy Farmers of America); Allan Jones (Texas A&M University System); Tony Provin (Texas Cooperative Extension); Richard Eyster (Texas Department of Agriculture); Ned Meister (Texas Farm Bureau); Pat Radloff (Texas Parks and Wildlife Department); John Foster (Texas State Soil & Water Conservation Board); Anjna O'Connor (U.S. Army Corp of Engineers); Shawneille Cambell (U.S. Environmental Protection Agency); Richard Kiesling (U.S. Geological Survey); Ricky Garrett (City of Waco)

Stakeholders Absent: Joseph White (Baylor University); Norman Johns (National Wildlife Federation); Justin Taylor (Sierra Club); Mark Kaiser (City of Stephenville); Norman Bade (Natural Resources Conservation Service)

Support Team Present: Larry Hauck (TIAER), Ali Saleh (TIAER), Anne McFarland (TIAER), James Houser (TIAER), George Ward (UT-CRWR)

Others Present: Bill Carter (TCEQ); Faith Hambleton (TCEQ); T.J. Helton (TSSWCB); Paul Jensen (PBS&J); Larry Koenig (TCEQ); Chris Linendoll (TCEQ); Golam Mustafa (USEPA); Tom Weber (TCEQ); Bruce Wiland (Wiland Consulting)

Materials Distributed:

The following was provided at the meeting: Draft minutes from the last meeting; handouts on the three presentations; 1) Data Acquisition, 2) Model Enhancements, and 3) Data Assumptions for Model Validation.

Welcome & Introduction

The fourth meeting of the North Bosque River TMDL Model Refinement Project Advisory Group was held on Tuesday, August 23, 2005 from 10:00 AM until 3:30 PM in Room Room 3.1004 (Hill Country Room) of the MCC Building, J.J. Pickle Research Center, the University of Texas at Austin. Larry Hauck (TIAER) introduced the meeting and self-introductions were made.

Old Business

The group approved the minutes from the last meeting

Meeting Overview

Larry Hauck presented the project schedule showing the progress to date and the tasks that will occur over the remainder of the project. He stated that the presentations would address progress in data acquisition activities, status of the model enhancements, and necessary assumptions to validate the refined model for the period of 1993–2000. The assumptions to be discussed at this meeting were qualified as those dealing with the validation of the model and not with future application of the model to evaluate different load allocation scenarios.

Data Acquisition Activities

Anne McFarland gave an update on acquired and direct data acquisition activities for the following areas:

- The new land use/land cover layer from the TAES Spatial Science Laboratory was discussed. Delays in this deliverable have occurred due to problems in land classification between range and improved pasture.
- An explanation of updates to the dairy waste application field (WAF) information was provided.
- Activity on the PL-566 reservoir characterization was presented.
- An update was given on data collected from the improved pasture plots receiving commercial fertilizer. Prompted by inquiries, Dr. McFarland clarified that dissolved organic carbon and bacteria were not constituents that were being assessed in field plot runoff.
- Self-reported wastewater treatment plant (WWTP) data were presented. Jerry Golden pointed out that phosphorus (P) removal at Clifton's WWTP became effective last November-December, and that by February they had reached compliance with a running average discharge limit of 7 lb P/day.
- Data on dairy lagoon systems and number of discharges were presented. Tony Provin asked about the discharge volume for lagoon spills and cautioned about assuming that all discharges are making it to receiving streams.
- Self-reporting P soil data for dairies were presented. It was pointed out that interpretation of the soil data was complicated by the use of multiple techniques and labs, and that the data are sparse for the period 1993-2000. Soil test P (STP) sampling required by TCEQ is being standardized to only the Mehlich III extraction method using ICP, but consistent data under this protocol are just now becoming available. Dr. Provin indicated that there was no way to really "translate" the results from one STP method to another, particularly for measurements for WAFs. Dr. Provin asked if we had information on what fields get manure applied and how much. Dr. Hauck responded that we do not have specific field-level data. John Cowan asked if another watershed without the known complexities was going to be simulated for comparison with the North Bosque River watershed. Dr. Hauck answered that such an effort was not within the scope of the current project, but that instead individual subbasins within the

North Bosque River watershed and field plots would be validated with the refined model so that all the major representative land uses would be examined.

- A summary of the self-reporting lagoon and manure nutrient data were presented. Dr. Provin was concerned that the lagoon liquid concentrations seemed low and suggested comparing the results with data collected by Dr. Saqib Mukhtar. Dr. McFarland pointed out that the self-reporting data most likely represent surface samples rather than samples from throughout the entire lagoon profile. As lagoon surface samples, these data may be similar to what would be anticipated with a lagoon discharge, although very little, if any, direct discharge concentration data are available for comparison. The self-reporting data represent the yearly sampling of the lagoons by the producer to determine nutrient levels for land application and not the concentration of lagoon discharges.
- Data collection activities for defining typical waste management activities were reviewed along with type of crop management information being collected. Dr. Provin alerted the group to the website for his lab where fertility recommendations could be found. (<http://soiltesting.tamu.edu>)
- Dr. McFarland indicated that the next several tasks dealt with direct data collection activities to be used in validation of the instream transport component of the model. Time of travel studies were discussed for use in calibrating model hydrology at low to moderate flows, and an example of the results was shown.
- Data collection efforts to evaluate seasonal biomass of periphytic algae and macrophytes were presented, as well as preliminary results for algal nutrient dose response bioassay experiments. Ricky Garrett asked if there were any historical algal biomass data for comparison. Dr. McFarland replied that there were none that she was aware of, but if anyone was aware of any studies TIAER would like to know about them.
- Sediment phosphorus sorption studies in the headwaters and along the main-stem of the North Bosque River were discussed and preliminary results for equilibrium P concentration (EPCo) of sediments were presented. EPCo determines whether the sediments in streams act as a sink or a source of P based on concentration of soluble P in the ambient water. Dr. Provin expressed concerns about the sediment sampling and analysis methods used. Dr. McFarland explained that USGS guidance for sample collection was followed and that both anaerobic and aerobic methods were used in the lab to evaluate P isotherms for these sediments. Allen Jones asked about the intent of the algae and sediment studies. What would they tell us about the P impact on Lake Waco? Dr. Hauck answered that these studies would not provide information of the effect on Lake Waco but that they would supply information important to the modeling of the North Bosque River between storm events when instream assimilation is most likely to occur. Both impacted and least-impacted microwatersheds were evaluated, so it should be possible to determine some “baseline” level if impacts were not occurring. Mr. Golden pointed out that due to the location of the sampling points the effect on EPCo by Stephenville and Clifton looked much worse than other towns with WWTP effluents due to the fact that the sampling points were located directly below the outfall of Stephenville and Clifton but not for the other towns. Distances of impact from WWTP discharges should be considered in evaluating the data.

Model Enhancements

Ali Saleh, Jim Houser, Larry Hauck, and Anne McFarland all discussed different aspects of the model refinement.

- Dr. Saleh presented advantages of and reasons for updating the model from SWAT 2000 to SWAT 2003.
- New precipitation sites to improve the weather resolution in the modeling were presented.
- Dr. Saleh explained the improvements to the SWAT P algorithm that base coefficients on soil chemical and physical properties. Dr. Provin asked if the model took in to consideration the changing clay mineralogy as one crosses the watershed. Dr. Saleh said it does not, but that on the scale we are working there is a limit to what can be done. However, it was our responsibility as modelers to hear these concerns so that adjustments might be made in the future.
- Dr. Saleh introduced efforts to date on the inclusion of PL566 reservoirs in the modeling effort.
- Dr. Houser presented the dynamic manure application modifications for SWAT. He presented some sample output from a preliminary test simulation that demonstrated how the model changed manure application rates and added WAF areas based on user-defined soil test P thresholds. Dr. Provin expressed concern that example soil test P model output did not respond as he thought it should at low soil test P concentrations. It was explained that this is how the current SWAT soil soluble P algorithm responds, and that this algorithm is based on the current state of the science.
- Dr. Hauck presented a model enhancement to allow simulation of unauthorized discharges from municipal sewer collection systems. A question arose as to how big some of the spills were since only median values were presented, which could not be addressed because the actual data were not available. Dr. Hauck also responded that in TIAER's analysis some unreasonably large discharges were reduced to the daily capacity of the WWTP. Some expressed the belief that the potential contributions were such a "drop in the ocean" that it might not even be worth simulating. Nevertheless, unauthorized discharges from municipalities had been mentioned as a concern previously and including unauthorized discharges will demonstrate that we have met that concern. Whether it has a significant effect or not can be determined by sensitivity analysis within the modeling effort. It was also pointed out that unauthorized discharges change the water quantity but not appreciably the total P loading, since WWTP processes, unless they include P removal, do not substantively reduce the total P loading between their influent and effluent. A concern was expressed about the best values to assume for nutrient concentrations in these discharges. It was suggested that a medium concentration for untreated municipal wastewater be used based on the Metcalf & Eddy (1991) numbers. Some expressed that perhaps the weak concentration should be used for larger spills. One person questioned whether the Metcalf & Eddy (1991) numbers reflected recent reductions in P concentration of untreated municipal wastewater due to P restrictions in detergent. An effort will be made to

find more recent values for untreated municipal wastewater, particularly with regard to phosphorus concentrations.

At this point an hour and 15 minute break was taken for lunch.

The afternoon session was attended by fewer stakeholders than the morning session as some individuals had other commitments.

To begin the afternoon session Dr. McFarland presented the current status of the lagoon discharge model and operating assumptions used by the model.

- The lagoon discharge model's daily water balance is based on inflows of precipitation, runoff, and daily waste volume and outflows for evaporation and dewatering. The daily waste volume is based on the number of inspected rather than permitted cows. She explained that land area was not taken into consideration in dewatering, because it was assumed that there was enough land. Dr. Provin pointed out that many operators may try to hold as much water as possible in the lagoons until summer for crop irrigation during dry periods. Dr. McFarland explained that the model currently restricts dewatering in the winter if a winter crop is not indicated in the permit. Several people responded that winter dewatering probably did occur during the calibration timeframe whether a winter crop was grown or not. The model can be run with and without winter dewatering restriction. It was concluded that the restriction of winter dewatering during the 1993-2000 period of model validation would be revisited. The other major concern was that the discharge volume of 100,000 ft³ as a limit for discharges might be too high. The model was based on a 25-yr, 24-hr stormwater storage volume. The new regulations are different, and Dr. McFarland explained that the model could be adjusted to the new rules. Some of the audience felt that the number of below average operators of lagoons was probably low now, but that during the calibration period it was probably greater than the 20% assumed in the example presented. Nutrient concentrations are based on self-reporting data on lagoon concentrations. Very limited concentration data on discharges are available. Dr. McFarland said she had done a preliminary loads evaluation. This load evaluation will be revisited in light of discussions on winter dewatering and presented to the stakeholders.

Data assumptions for model validation

Dr. Hauck presented various assumptions being used during the validation period.

- Land-use management. A question arose concerning historical turkey WAFs. The response was that historically turkey litter was disposed on-site, but no on-site disposal is specified in any of the present water quality management plans based on information provided to TIAER by the TSSWCB. It will be difficult to determine where the turkey waste was going. Since the mid to late 90s, it appears that most turkey operations have their litter collected, taken to a nearby compost facility, and any direct turkey litter land application does not occur on-site, but to third-party sites.

- It was presented that initial STP numbers would be determined by initiating the simulation at a time when milk production began to increase sharply in Erath county (e.g., 1988) and allowing the model to simulate the build-up of soil nutrients before the validation period. A lengthy discussion then ensued concerning the validity of this approach versus the use of measured STP values in the watershed. Dr. Provin offered that he might have some data to help validate STP values. Bruce Wiland asked what would be the soil values to initialize simulation conditions prior to any build-up. Low single digit values were proposed. It was suggested that a statistical distribution for STP could be determined for comparison with simulated SWAT soil test P.
- It was proposed that lactating and dry cows would be used for the cow numbers that determine manure amounts. It was suggested that heifers be included if they are present. We agreed to attempt to determine heifer numbers.
- The fact that some P is trapped in lagoons was addressed, and it was not clear how often lagoons are cleaned out. Some pointed out that some producers are agitating lagoons which decreases the solids accumulation in the lagoons. It was proposed that P from the lagoons would be applied yearly in order to account for its eventual application.
- It was proposed that the newly released ASAE numbers for manure characteristics would be used to determine the nutrient content of dairy manure. The new ASAE standards contain algorithms that allow manure characteristics to be based on animal performance levels and diets. The group encouraged us to use actual measured values for manure characteristics whenever possible. The quantity and quality of such data during the validation period is questionable. Such data, to the degree it is available, will most likely be used to confirm calculations based on the new ASAE algorithms. It was agreed that we would consult with Tamilee Nennich, the new Texas Cooperative Extension dairy specialist located in Erath County. Dr. Nennich was very involved in writing the new ASAE dairy standards for manure and may have some local data to help with characterization.

Some limited discussions ensued prior to the adjournment of the meeting concerning the best way to get the desired feedback for the advisory group concerning assumptions that need to be made to operate the refined model for the validation period. No definitive conclusions were reached regarding the best way to accomplish this feedback.

The meeting adjourned at 3:30 PM.