

## **Watershed Assistance to Improve Water Quality in North Central Texas**

Texas Water Resources Institute  
FY 03 Federal Appropriated Funds  
Project # 03-60768

Quarter no. 18 From 1/08/07 Through 4/08/08

### **Progress in Meeting Project Milestones and Output Commitments**

#### Task, Deliverables and Schedules

The Texas Water Resources Institute (TWRI) along with the Texas A&M University Spatial Sciences Laboratory (SSL), Texas AgriLife Research and Extension Center at Temple and Texas AgriLife Extension have been diligently working to complete project deliverables. Project efforts during the eighteenth quarter focused on modeling activities and education. The SSL and BAREC have completed efforts to calibrate and validate and ran management/BMP scenarios through the SWAT model for Cedar Creek Reservoir looking to reduce nutrient and sediment loadings.

TWRI continues to update its Web site containing water quality information, specifically related to project efforts, for scientists and the general public and to provide project oversight and financial management for the project.

In looking forward to the next quarter, work associated with Eagle Mountain Reservoir and Richland Chambers Reservoir Watersheds modeling activities will continue.

The economics team has developed an economic model that will quantify the cost effectiveness of different BMP scenarios. Extension specialists have been conducting stakeholders and work group meetings in an effort to finalize the WPP by August 2008.

The status of tasks, milestones and deliverables will be defined using the following terms:

Pending	Work has not started on the deliverable
Initiated	Work has started
Completed	The objectives were achieved and deliverables are finished
Deferred	Work has started, but further action is delayed pending other information, the completion of another objective, staff restraints, etc.
Ongoing	Work will continue throughout the term of the contract

Task 1 SWAT Modeling

Date	Status	Deliverables
1/1/04	Completed	1. Complete model calibration and validation for Cedar Creek Reservoir Watershed
1/1/05	Initiated	2. Model calibration and validation for Eagle Mountain Reservoir Watershed
9/1/06	Initiated	3. Model calibration and validation for Richland Chambers Reservoir Watershed

Comments:

- The Spatial Sciences Lab (SSL), in cooperation with the Texas AgriLife Research and Extension Center at Temple, has completed the validation and calibration of the SWAT model for Cedar Creek Watershed. This deliverable is 100 percent complete.
- The research team has identified BMPs which will be beneficial in reducing loadings in stream segments and Cedar Creek Reservoir. SWAT runs have been made to obtain estimates as to the type of reservoir loadings (point or non point sources) and sources of contamination (stream segments, tributary flow or resuspension of reservoir sediments). These model runs have helped focus BMP selection.
- The research team has finalized BMP scenarios runs through the SWAT/QUAL2E/WASP model to look at plausible BMPs to implement and at which locations, as well as the overall reduction these BMPs will have on nutrient and sediment loading into Cedar Creek Reservoir. This deliverable is 100 percent complete.
- SSL has collected water quality data and weather station data for Eagle Mountain Reservoir. Basins and sub-basins have been delineated for the SWAT model and the process is under way to calibrate and validate the model. The SWAT model has been calibrated and validated for hydrologic processes. Furthermore SWAT has been calibrated and preliminarily validated for water quality parameters. This deliverable is 75 percent complete.
- SSL and Texas AgriLife Research and Extension Center at Temple have begun to collect water quality and flow data for the Richland Chambers Watershed.
- Baylor University conducted a sediment survey of Eagle Mountain Reservoir in order to verify storage capacity, flows and sediment size for the model. A survey of Richland Chambers Reservoir is scheduled to begin in August. The survey had been postponed to recent rainfall.
- Using stakeholder input, SSL updated the landuse information to include more pasture land and associated fertilizer application.
- In a modeling exercise to determine the direct effect of landuses directly adjacent to Cedar Creek Reservoir, the SSL modeled a buffer strip of 2,000 ft around the reservoir with regards to fertilizer application of yards and runoff rates in the reservoir. No significant impacts were noted.

- Developed a modeling tool to capture averaged NEXRAD weather data for the subwatershed scale on a daily basis. This tool averages rainfall over the subwatershed and spatially divides the data within the watershed. This deliverable is 100 percent complete
- Modeling activities continue for Eagle Mountain Reservoir Watershed. The SWAT model has been calibrated for flow and sediment. The research team is working on calibrating the model for water quality parameters (nutrients) as well as for low flow conditions. This activity should be complete this quarter. This deliverable is 85% complete.
- Modeling activities continue for Richland Chambers Reservoir Watershed. Data has been gathered and analyzed and the model has been set-up. The model has been calibrated for flow and the research team is working to finalize model calibration for nutrients. This deliverable is 45% complete.

## Task 2 Economic Analysis

Date	Status	Deliverables
9/1/04	Completed	1. Begin developing input data for economic analysis of alternative BMPs for Cedar Creek Reservoir and Watershed
4/1/05	Completed	2. Conduct economic analyses of alternative BMPs for Cedar Creek Reservoir Watershed
10/1/05	Initiated	3. Begin developing input data for economic analyses of Eagle Mountain Watershed
4/1/06	Pending	4. Conduct economic analyses of alternative BMPs for Eagle Mountain Reservoir Watershed
4/1/06	Pending	5. Begin developing input data for economic analyses of Richland Chambers Reservoir Watershed
11/1/07	Pending	6. Conduct economic analyses of alternative BMPs for Richland Chambers Reservoir Watershed

### Comments:

- Input data has been gathered for the economic model used to quantify the cost and benefits of identified BMPs input into the SWAT model to look at reducing nutrient and sediment loadings in Cedar Creek Watershed. Background data on cost and effectiveness of suggested BMPs has been gathered. The model is 100 percent complete. The model is being developed so that additional BMPs can be added in the future.
- BMPs being evaluated include: terraces, contour farming, crop residue management, conversion of cropland to grass or urban, grazing management – rotational grazing, fencing of water supply, fertilizer/nutrient management, pasture planting/range seeding, streambank stabilization, sediment retention structures and improving pasture conditions from fair to good.

- The economics team, having received the final BMP scenario runs from SWAT have of finalized the economic model for the Cedar Creek Reservoir Watershed. This deliverable is 100 percent complete.
- On November 6 and 20, 2007 TWRI coordinated meetings with stakeholders to gather economics data on BMPs for the Cedar Creek Reservoir Watershed.
- On March 11, 2007 a meeting was held with the economics team to further refine input numbers for BMP cost and efficiency.

**Task 3 Extension Education**

Date	Status	Deliverables
4/1/04	Completed	1. Develop generalized watershed management program bulletin
7/1/04	Completed	2. Conduct two-day watershed management training program for County Extension Agents and other selected resource personnel
10/1/05	Completed	3. Recruit Cedar Creek stakeholder committee
1/1/05	Completed	4. Develop Cedar Creek Watershed characteristics fact sheet
1/1/05	Completed	5. Construct demonstration trailer
4/1/05	Completed	6. Hold Cedar Creek public meeting on watershed characteristics and pollution problems
4/1/05	Completed	7. Recruit Eagle Mountain stakeholder committee
4/1/05	Completed	8. Conduct two-day training program on stream erosion for County Extension Agents and other resource personnel
4/1/05	Completed	9. Hold two Cedar Creek stakeholder committee meetings
7/1/05	Deferred	10. Develop Eagle Mountain Watershed characteristics fact sheet
7/1/05	Completed	11. Conduct two Cedar Creek Extension education meetings on urban storm water quality, agricultural nonpoint source pollution prevention and wastewater
7/1/05	Initiated Completed Completed	12. Develop general fact sheets on: 1) Wastewater management options around lakes, 2) Urban storm water management, and 3) Lawn management
10/1/05	Initiated	13. Hold Eagle Mountain stakeholder committee meetings
10/1/05	Initiated	14. Hold Eagle Mountain public meeting on watershed characteristics and pollution problems
7/1/08	Pending	15. Develop Richland Chambers Watershed characteristics fact sheet
7/1/08	Pending	16. Conduct educational meetings in the Richland Chambers Watershed
10/1/08	Pending	17. Hold Richland Chambers stakeholder committee meetings

10/1/08      Pending      18. Hold Richland Chambers public meeting on watershed characteristics and pollution problems

Comments:

- Extension developed a generalized watershed management bulletin entitled “The Watershed Management Approach.” This deliverable is 100 percent complete.
- Extension personnel held a two-day watershed management training on September 16-17, 2004, in Fort Worth. Participants included County Extension Agents and other Extension personnel, TRWD staff, NRCS and SWCD personnel from counties within Cedar Creek and Eagle Mountain Watersheds.
- Cedar Creek Watershed fact sheet development is in the intermediate stage. This deliverable will be completed once BMP runs have been made through the SWAT model and recommendations have been made on how to reduce loadings into the reservoir. This deliverable is 85 percent complete.
- Extension developed a generalized bulletin on stormwater management. This deliverable is 100 percent complete.
- Educational materials for the trailer are under development. The demonstration trailer has been used at more than 75 events with over 6,000 participants.
- Extension personnel developed a generalized, interactive presentation on the North Central Texas Water Quality Project highlighting project goals and objectives. This informative presentation is auto-narrated and can be used by Extension Agents in presentations to individual county groups. This presentation is available through the North Central Texas Water Quality project Web site.
- Extension worked with County Extension Agents in Kaufman, Henderson, Van Zandt and Rockwall counties to gather soil samples as part of a soil sampling campaign aimed to collect data to verify findings of the SWAT model. Over 100 samples were collected.
- Conducted four water quality programs in the Cedar Creek Watershed geared toward agricultural stakeholders on the issues of non-point source pollution.
- Presented the project poster at the United States Water Quality Conference in San Diego, Texas A&M University’s Water Week, the Southern Region Water Quality Conference in Lexington, KY, the National Water Quality Conference in San Antonio, TX, and the Texas River and Reservoir Managers Meeting, Austin, TX.
- Stream Trailer curriculum project (additional deliverable) is under development and 90 percent complete.
- Extension worked with TRWD to collect stream bank soil samples used to verify loadings being predicted in the SWAT model.
- Extension personnel held a two-day watershed management training on November 17-18, 2005 in Fort Worth. Participants included County Extension Agents and other Extension personnel, TRWD staff, NRCS and SWCD personnel from counties within Cedar Creek and Eagle Mountain Watersheds, EPA, city personnel and engineering consulting firms.
- Extension personnel held a stream restoration training in cooperation on September 12-13, 2006, in Dallas, TX. The event was attended by 42 participants

and was very well received. The event included a day and a half of lecture and a half day of in the field data collection and discussions on stream morphology. The field portion of the training was conducted at the Arbor Hills Nature Preserve in Plano, TX. Training material can be accessed online at:

<http://www.bae.ncsu.edu/people/faculty/jennings/Texas%20Workshop%20Sep%2006.html>

- Extension developed a training program focused on Master Gardener's and Master Naturalist on rainwater harvesting. This educational program covers topics such as stormwater management, non-point source pollution prevention, nutrient management, erosion, etc.
- Extension conducted an agent training on December 8, 2006, for County Extension Agents in the North Central Texas Water Quality Project area. The training focused on water quality issues facing urban and rural stakeholders.
- Extension staff have conducted twelve trainings for the Master Gardener program dealing with rainwater harvesting. To date they have trained over 145 individuals to be certified trainers. These individuals have reached more than 2,600 individuals.
- Worked with local county Extension agents to install three rainwater harvesting demonstrations in the project study area
- Extension coordinated 2 work group meetings (July 24 & 25) in the Cedar Creek to gather information for the WPP. The groups focused on the Ag NPS and urban WWTP/Stormwater management.
- Extension conducted a stakeholder meeting of the Cedar Creek watershed partners on August 28, 2007.
- Texas AgriLife Extension Service and the Texas AgriLife Research and Extension Urban Solutions Center conducted a stakeholder meeting in the Cedar Creek watershed on October 23, 2007. Topics of discussion included the evaluation and ranking of BMPs, modeling data review, educational programs and the nine elements of watershed planning.
- On December 21, 2007 Texas AgriLife Extension conducted a Multi-county training on water quality and BMPs that can be implemented to reduce erosion and the transport of nutrients from landowners property.
- The Texas AgriLife Research and Extension Urban Solutions Center with the assistance of local county Extension agents have developed a stakeholder list for the Eagle Mountain Reservoir watershed. The first meeting of the group to discuss water quality of the watershed and provide information on the research project as well as their role in watershed planning is being set for May 2008.
- Texas AgriLife Extension Service and the Texas AgriLife Research and Extension Urban Solutions Center conducted a stakeholder meeting in the Cedar Creek watershed on January 24, 2008. Topics of discussion included educational outreach, setting water quality goals and discussions on BMP effectiveness. The next meeting is scheduled for April 30, 2008.
- Texas AgriLife Extension is working on the following publications 1) stream processes, 2) Where does the rainfall go, 3) Utilizing rain gardens for stormwater abatement, 4) Vegetative filter strips, and 5) grassed waterways.

**Task 4 Administration**

Date	Status	Deliverables
1/7/04	Completed	1. Quarterly Progress Report
4/7/04	Completed	
7/7/04	Completed	
10/7/04	Completed	
1/7/05	Completed	
4/7/05	Completed	
7/7/05	Completed	
10/7/05	Completed	
1/7/06	Completed	
4/4/06	Completed	
7/7/06	Completed	
10/7/06	Completed	
1/7/07	Completed	
4/7/07	Completed	
7/7/07	Completed	
10/7/07	Completed	
1/7/08	Completed	
4/7/08	Completed	
7/7/08		
10/7/08		2. Final Report

Comments:

- TWRI continually updates the Web site created specifically for the North Central Texas Water Quality Project. The Web site can be accessed at the following address: <http://nctx-water.tamu.edu>
- On May 4, 2007, TWRI coordinated a meeting with the Texas Commission on Environmental Quality and the Texas State Soil and Water Conservation Board to discuss modeling activities, educational programs, stakeholder participation, economic analysis and project deliverables of the North Central Texas Water Quality project and activities in the Cedar creek and Eagle Mountain Reservoir Watersheds.
- TWRI has identified stakeholder groups within the Cedar Creek watershed and will begin Stakeholder and workgroup meetings in July.
- Conducted three meeting with the Kaufman-Van Zandt SWCD to develop an implementation proposal to be submitted to TSSWCB for BMP implementation ion the Cedar creek Watershed.
- Organized stakeholder and work group meetings for the Cedar Creek WPP.
- On September 14, 2007, TWRI coordinated a project meeting of the North Central Texas Water Quality Project team to discuss modeling activities, educational programs, stakeholder participation, economic analysis and project deliverables.
- On November 6 and 20, 2007 TWRI coordinated meetings with stakeholders to gather economics data on BMPs for the Cedar Creek Reservoir Watershed.

- TWRI worked with NRCS to develop a plan of work and project budgets for continual funding received from NRCS through federal appropriations for the continuation of this project.
- On April 9, 2008, TWRI coordinated a project meeting of the North Central Texas Water Quality Project team to discuss modeling activities, educational programs, stakeholder participation, economic analysis and project deliverables.

#### Problems or Obstacles Encountered and Remedial Actions Taken

The Spatial Sciences Laboratory and Texas AgriLife Research and Extension Center at Temple have been working closely with Texas Water Resources Institute (TWRI) towards successful completion of project deliverables.

#### Work Planned for Next Reporting Period

##### Task 1: SWAT Modeling

Run the SWAT model for Eagle Mountain Reservoir and begin identifying BMPs for the watershed to meet water quality standards. Continue data collection and model development on Richland Chambers Reservoir.

##### Task 2: Economics

Finalize running different scenarios with SWAT/QUAL2E/WASP output looking at the combination that provides the least cost while still achieving the necessary load reductions.

##### Task 3: Education

Conduct stakeholder and educational meetings in the Cedar Creek and Eagle Mountain Watersheds. Continue conducting BMP meetings to educate local landowners of practices they can implement on private property that can lessen soil erosion and water quality impairments as well as identify funding opportunities for these practices such as EQIP and others. Continue rainwater harvesting training.

##### Task 4: Administration

TWRI will continue working with TRWD, SSL, Texas AgriLife Research and Extension Center at Temple and Texas AgriLife Extension Service in moving forward with project deliverables and reporting progress on a quarterly basis. Efforts will be made to publicize the project and raise awareness of water quality issues within the study area.