

**SWAT Model Simulation of the Arroyo Colorado Watershed
CWA 319(h)
TSSWCB Agreement No. 02-021-07-09**

Quarter no. 1 From 7/26/07 Through 9/30/07

I. Abstract

The QAPP was submitted to TSSWCB and is currently at EPA awaiting approval. Data has been assembled for the SWAT model simulation. The project is currently waiting on QAPP approval to move forward.

II. Overall Progress and Results by Task

TASK 1: Coordinate and Administer Project

Subtask 1.1: TWRI will coordinate project efforts with all project partners, as well as ongoing projects in the watershed. These projects include the Arroyo Colorado Ag NPS Assessment, Education of BMPs in the Arroyo Colorado Watershed, and the WQMP Implementation Assistance in the Arroyo Colorado Watershed. TWRI will participate in Arroyo Colorado Watershed Partnership meetings (steering committee and work groups) to report progress and coordinate efforts. TTVN meetings or teleconferences will be held, as appropriate, with project partners to discuss project activities, project schedule, lines of responsibility, communication needs, and other requirements.

The following actions have been completed during this reporting period:

- a. TWRI participated in the Arroyo Colorado Watershed Partnership Ag Issues Workgroup meeting as well as the Arroyo Colorado Watershed Partnership Steering Committee meeting on July 24, 2007. A background on the SWAT modeling project and its status was presented at both meetings.

17% Complete

Subtask 1.2: TWRI will prepare electronic quarterly reports for submission to the TSSWCB. Progress reports shall document all activities performed within a quarter and shall be submitted by the 15th of January, April, July, and October. All progress reports will be provided to all project partners.

The following actions have been completed during this reporting period:

- a. Submitted Year 1, Quarter 1 Report on October 15, 2007.

17% Complete

Subtask 1.3: TWRI, with support from SSL and TAES, will develop a QAPP for activities in Task 2 consistent with EPA Requirements for Quality Assurance Project Plans (QA/R-5) and the TSSWCB Quality Management Plan.

The following actions have been completed during this reporting period:

- a. TWRI submitted a QAPP to TSSWCB on June 18, 2007. TWRI is awaiting comment/approval from TSSWCB and EPA on the QAPP so work can begin.

50% Complete

Subtask 1.4: TWRI will implement the approved QAPP and provide revisions and necessary amendments to the QAPP.

The following actions have been completed during this reporting period:

- a. Nothing to report at this time.

0% Complete

Subtask 1.5: TWRI will attend meetings with the TSSWCB project manager and other meetings, as needed, to review project status, deliverables, and other project matters.

The following actions have been completed during this reporting period:

- a. Nothing to report at this time.

0% Complete

Subtask 1.6: TWRI will perform accounting functions for project funds and will submit appropriate Reimbursement Forms to TSSWCB at least quarterly.

The following actions have been completed during this reporting period:

- a. Nothing to report at this time.

0% Complete

Subtask 1.7: TWRI will develop, host and maintain an internet website for the dissemination of information.

The following actions have been completed during this reporting period:

- a. TWRI obtained all of the files from Texas Sea Grant for the existing Arroyo Colorado Web site. Also, TWRI submitted a request to transfer the domain name to the TWRI server. The site, <http://www.arroyocolorado.org> is currently operating on the TWRI server. Information on the SWAT modeling project as well as all other ongoing Arroyo Colorado projects will be posted to the site during the next quarter.

15% Complete

Subtask 1.8: TWRI, with assistance from SSL and TAES, will develop the final report and technical documentation of the project for submission to TSSWCB, EPA, and project partners.

0% Complete

Task 2: Watershed data compilation, analysis, and simulation using SWAT

Subtask 2.1: Various data such as land use (current and historical), soil, BMP implementation locations, topography, sub-watershed delineation (matching earlier HSPF sub-watersheds), long-term weather data, crop management practices, stream flow and water quality data (current and historical) on sediment, BOD, and nutrients, for the Arroyo Colorado Watershed will be compiled for the period of 1999-2006 from sources such as USGS, TCEQ, TWDB, TPWD, IBWC, Nueces River Authority (NRA), TAES, TCE, and NRCS.

The following actions have been completed during this reporting period:

- a. Scientists visited the watershed in early September to begin assembling data and determining data sources. As a result of the trip, a major portion of data assembly is complete including:
 - I. **GIS data**
 - A. DEM
 1. 30 m USGS DEM, and 10 m resampled DEM (elevation values are available at 10 m intervals for only a portion of the watershed; for remaining area, elevation values are resampled at 10 m intervals) obtained from NRCS-Fort Worth, TX.
 - B. Soil map
 1. STATSGO (from the previous HSPF modeling effort-TCEQ) and SSURGO soil maps are available. SSURGO soil map is obtained from NRCS web site.
 - C. Land use map
 1. Landuse map from the previous HSPF modeling study (1995 land use conditions)
 2. Landuse map prepared by Spatial Sciences Lab, Texas A&M University, College Station incorporating the present land use conditions (2006-2007). Crop rotation, irrigation and other management operations are also available on a farm/field basis.
 - D. Irrigation Districts
 1. A map showing irrigation districts in the watershed was obtained from Irrigation Technology Center, Texas A&M University, College Station.
 - E. Other GIS input obtained from previous HSPF modeling study are
 1. Watershed boundary (of previous modeling work)
 2. Map showing sub-watersheds (of previous modeling work)
 3. Stream traces
 4. TCEQ water quality stations
 5. The TMDL monitoring stations
 6. Location of Outfalls
 7. Long-term water quality monitoring stations
 - II. **Weather data**
 - A. Daily Weather data collected for the period 1988-2006 for stations in Brownsville, McAllen, Mercedes and Harlingen from the source, State Climatologist Office, College Station.
 - B. Parameters include:

1. Precipitation
 2. Maximum and minimum temperature
 3. Wind speed
 4. Relative humidity
- C. Quality of Weather data:
1. Precipitation data contained gaps (of one/two days to two continuous months). Gaps of 5 or more continuous days were filled using NEXRAD rainfall data available for the same station. For other small gaps, a flag is included in the data for SWAT model to generate the missing precipitation records.
 2. Gaps similar to precipitation data also exist in temperature data. Efforts will be made as far as possible to fill them.
- III. Other Data
- A. Daily flow data for the period 1988-2006 for two stations 1. south of Mercedes and 2. South of Harlingen are obtained from International Boundary and Water Commission.
 - B. Tile drains: Depth, spacing and tentative location of tile drains were obtained from various sources such as Texas State Soil and Water Conservation Board, USDA-NRCS offices located in the watershed
 - C. Point Source data: Some information on existence of wastewater treatment facilities, small domestic wastewater systems, onsite treatment systems and colonias and their permitted discharge limits were obtained from a TCEQ report entitled "Pollutant Reduction Plan for the Arroyo Colorado" dated March 2006.
 - D. Request was sent to TECQ for getting the time series of monitored water quality data for the period 1988-2006.
- IV. Management Data
- A. The dominant land cover in the watershed is cropland. Information on cultivation practices such as tillage, planting, irrigation, fertilization, chemical application and harvest were obtained from various sources during the field visit. Agencies such as TSSWCB, NRCS and USDA were consulted to obtain typical cultivation practices followed for different crops such as sorghum, cotton and sugar cane. This information will be used for modeling the crops cultivated in the watershed.

33% Complete

Subtask 2.2: The SWAT model will be set up and calibrated to measured flow and in-stream measurements of sediment, BOD, and nutrient concentrations for the period of 1999-2003 (with 1999 as warm-up period) using monitoring data available from USGS and IBWC stream gages, as well as data from the TWDB, TCEQ, and NRA. Model parameters related to (sub) watershed/landscape processes will be adjusted to match the measured and simulated flow, sediment, BOD and nutrient loading at key locations in each subwatershed.

The following actions have been completed during this reporting period:

- a. Awaiting QAPP Approval.

0% Complete

Subtask 2.3: Subsequent to calibration, the model will be validated using measured flow and in-stream measurements of sediment, BOD, and nutrient concentrations for the period of 2004-2006.

The following actions have been completed during this reporting period:

- a. Awaiting QAPP Approval.

0% Complete

Subtask 2.4: Simulate load reduction scenarios for a suite of management measures specified by the TSSWCB.

The following actions have been completed during this reporting period:

- a. Awaiting QAPP Approval.

0% Complete

Subtask 2.5: Provide TSSWCB the flow and watershed loadings to the Arroyo Colorado, as determined by SWAT, for input by TCEQ into the EFDC model. SWAT output will include time series of average daily flow (in CMS) and sediment, BOD, NH₃-N, NO₂+NO₃, TN, OP and TP loadings (in metric units of mass) at the Port of Harlingen and for each sub-basin (10-14) downstream of the Port of Harlingen (flow to be reported as flow volume for the sub-basins).

The following actions have been completed during this reporting period:

- a. Awaiting QAPP Approval.

0% Complete

III. Related Issues/Current Problems and Favorable of Unusual Developments

- None to report at this time

IV. Projected Work for Next Quarter

Task 1

- Revise QAPP per EPA comments and resubmit if necessary.
- Submit year 2, quarter 1 report

Task 2

- Pending QAPP Approval, the data assembled will be use to calibrate and validate the model per task 2.