

Texas Water Resources Institute

**Arroyo Colorado Agricultural Nonpoint Source Assessment
FY 06 CWA 319(h)
TSSWCB Agreement No. 06-10-07-05**

Quarter no. 17 From 1/1/11 Through 3/31/11

I. Abstract

Work during this quarter consisted primarily of AgriLife Research drafting a final report. Also, the SWAT QAPP is currently at TSSWCB for comments. TWRI and TSSWCB have been working together on planning the next Ag Issues Workgroup meeting that will be held on April 21, 2011.

II. Overall Progress and Results by Task

TASK 1: Project Coordination and Administration

Subtask 1.1: TWRI will organize an Ag Monitoring Oversight Committee to coordinate project efforts with all project participants. This Committee will be composed of Research, TAMUK, Extension, TCEQ, TDA, Texas Sea Grant, TSSWCB, Nueces River Authority, producer groups, irrigation districts, and drainage districts. This Committee will meet at least semi-annually to discuss project status, provide input on monitoring design, coordinate project activities, and coordinate monitoring efforts with educational activities.

The following actions have been completed during this reporting period:

- a. The next Ag Issues Workgroup will be meeting on April 21, 2011.

95% Complete

Subtask 1.2: TWRI will prepare electronic quarterly reports for submission to the TSSWCB. All progress reports will be provided to the Ag Monitoring Oversight Committee [Final report provided under Task 8].

The following actions have been completed during this reporting period:

- a. Submitted Year 5, Quarter 3 Report on January 17, 2010.

95% Complete

Subtask 1.3: Monitoring results will be transferred to Extension and Research for development of educational materials and presentation to stakeholders. Based on the results of the monitoring, Extension will hold workshops demonstrating the impacts of implementing BMPs in the watershed and coordinate periodic meetings of ag producers to bring awareness concerning the impact of the drainage ditches on the mitigation of pollutants from the fields (the educational activities are funded under a FY05 project).

The following actions have been completed during this reporting period:

- a. Nothing to report at this time.

0% Complete

Subtask 1.4: TWRI will attend meetings with the TSSWCB project manager and other meetings, as needed, to review project status, deliverables, etc. During quarters when no Ag Monitoring Oversight Committee are scheduled, TTVN meetings will be conducted with project participants to discuss project activities, project schedule, lines of responsibility, communication needs, and other requirements

The following actions have been completed during this reporting period:

TWRI and TSSWCB continued to communicate this quarter as TWRI, TSSWCB, and TCEQ changes are currently being made to the SWAT Model scenarios.

95% Complete

Subtask 1.5: TWRI will participate in Arroyo Colorado Partnership and Arroyo Colorado Agricultural Issues Work Group Meetings.

The following actions have been completed during this reporting period:

- a. An Agricultural Issues Workgroup meeting will be held on April 21, 2011. It is anticipated that a future monitoring project will be derived and an Agricultural Success story will come out of this meeting.

95% Complete

Subtask 1.6: TWRI will submit appropriate Reimbursement Forms.

The following actions have been completed during this reporting period:

- a. As of February 28, 2011, \$341,077 or 68% of project funds have been expended

74% Complete

Subtask 1.7: TWRI will develop (Months 1-3), host and maintain an internet website for the dissemination of information on educational, monitoring and demonstration activities taking place across the Arroyo Colorado watershed. Website delivery of information will be the most time and cost effective way to disseminate information to interested people or groups.

The following actions have been completed during this reporting period:

- a. The website continues to be updated with presentations pertaining to the project.

92% Complete

TASK 2: Compilation and Evaluation of Prior Studies and Data

Subtask 2.1: TWRI, with assistance from members of the Ag Monitoring Oversight Committee, will compile historical water quality data and information from previous studies and conduct a detailed analysis of the most significant water quality parameters to investigate the trends and

the different biological and physical process taking place in the watershed that contribute to changes in water quality in the Arroyo

The following actions have been completed during this reporting period:

- a. TWRI requested written comments from TSSWCB regarding the compilation summary of historical data collected related to agricultural issues, which was submitted as a draft report on June 30, 2008.

30% Complete

Subtask 2.2: TWRI, with assistance from members of the Ag Monitoring Oversight Committee, will organize the results from the earlier non-point source pollution projects conducted in the Arroyo Colorado watershed and summarize the results and conclusions of these studies.

The following actions have been completed during this reporting period:

- a. Draft report of summarized data was submitted to TSSWCB on June 30, 2008.

50% Complete

Subtask 2.3: TWRI, with assistance from members of the Ag Monitoring Oversight Committee, will identify critical data gaps that should be filled.

The following actions have been completed during this reporting period:

- a. Draft report of identified data gaps was submitted to TSSWCB on June 30, 2008.

50% Complete

Subtask 2.4: TWRI will transfer results to Extension to be used to develop educational material through the FY05 Arroyo Education Project.

The following actions have been completed during this reporting period:

- a. Nothing to report at this time.

0% Complete

TASK 3: Inventory Conservation Practice Implementation

Subtask 3.1: Research-Temple, with assistance from Extension, USDA-NRCS, USDA-FSA, the TSSWCB Harlingen Regional Office, and the SWCDs, will identify all producers in the watershed.

The following actions have been completed during this reporting period:

- a. This task is complete

100% Complete

Subtask 3.2: Research-Temple, with assistance from Extension, USDA-NRCS, USDA-FSA, the TSSWCB Harlingen Regional Office, and the SWCDs, will compile information on the location and types of Conservation Practices implemented in the Arroyo Colorado Watershed since 1995. This will include, but not be limited to, practices implemented through the Environmental

Quality Incentives Program (EQIP) and the Water Quality Management Plan (WQMP) Program.

The following actions have been completed during this reporting period:

- a. This task is complete

100% Complete

Subtask 3.3: Research-Temple will assemble a geo-referenced database and develop a map (hard copy and electronic) displaying conservation practice implementation information collected in Subtask 3.2.

The following actions have been completed during this reporting period:

- a. Maps are completed and files were submitted to TSSWCB on September 4, 2009 via email. Narayanan Kannan provided the GIS shape files and the maps simply as jpgs for review.

100% Complete

Subtask 3.4: Research-Temple will transfer the information from Subtask 3.1 and Subtask 3.3 to Extension for use in targeting educational activities.

The following actions have been completed during this reporting period:

- a. Nothing to report

0% Complete

Subtask 3.5: Research-Temple will identify areas needing priority implementation work through correlation with Task 4 and the results from Tasks 6-9.

The following actions have been completed during this reporting period:

- a. Nothing to Report

0% Complete

TASK 4: Update Land Use/Land Cover Data

Subtask 4.1: The Spatial Sciences Lab (SSL) will obtain 1998 LULC for the Arroyo Colorado Watershed from TCEQ and all data used to produce it. Coordinate with TPWD and the Habitat Work Group to obtain relevant recent LULC data. Identify the major changes from 1998 to 2005.

The following actions have been completed during this reporting period:

- a. SSL is awaiting approval from TSSWCB to finalize the LU/LC map
- b. No other activity to report.

90% Complete

Subtask 4.2: SSL will obtain 2003 LANDSAT ETM+ Data, Path 26/ Row 42 and Path 27/ Row 42. Proceed to image classification at a level equivalent to the MRLC classification to level 2.

The following actions have been completed during this reporting period:

- a. SSL is awaiting approval from TSSWCB to finalize the LU/LC map.
- b. No other activity to report.

90% Complete

Subtask 4.3: If available, SSL will obtain applicable digital data on cropland from USDA – FSA and add up to level 2 classification.

The following actions have been completed during this reporting period:

- a. SSL is awaiting approval from TSSWCB to finalize the LU/LC map.
- b. No other activity to report.

90% Complete

Subtask 4.4: If available, SSL will obtain digital location data on citrus production from USDA-APHIS and add up to level 2 classification.

The following actions have been completed during this reporting period:

- c. SSL is awaiting approval from TSSWCB to finalize the LU/LC map.
- d. No other activity to report.

90% Complete

Subtask 4.5: If available, SSL will obtain digital data on locations of sugarcane fields from sugar mill and add up to level 2 classification.

The following actions have been completed during this reporting period:

- a. SSL is awaiting approval from TSSWCB to finalize the LU/LC map.
- b. No other activity to report.

90% Complete

Subtask 4.6: SSL will obtain 2004 1m DOQ for Cameron, Hidalgo and Willacy counties. Improve the level 2 classification to a level 4 classification by manual digitalization.

The following actions have been completed during this reporting period:

- a. SSL is awaiting approval from TSSWCB to finalize the LU/LC map.
- b. No other activity to report.

90% Complete

Subtask 4.7: SSL will obtain most recent digital data from irrigation districts and add up to level 4 classification.

The following actions have been completed during this reporting period:

- a. SSL is awaiting approval from TSSWCB to finalize the LU/LC map.
- b. No other activity to report.

90% Complete

Subtask 4.8: SSL will obtain 1998 tile drainage data and if available, obtain updated data from TSSWCB and Extension.

The following actions have been completed during this reporting period:

- a. This task is complete.

100% Complete

Subtask 4.9: SSL will obtain 1998 data on colonia and if available, obtain updated data from TWDB. Superpose colonia data to level 4 classification.

The following actions have been completed during this reporting period:

- a. SSL is awaiting approval from TSSWCB to finalize the LU/LC map.
- b. No other activity to report.

90% Complete

Subtask 4.10: SSL will obtain 1998 data on non-colonia septic systems and if available, obtain updated data from Lower Rio Grande Valley Development Council (LRGVDC). Superpose non-colonia septic systems data to level 4 classification.

The following actions have been completed during this reporting period:

- a. This task is complete.

100% Complete

Subtask 4.11: SSL will obtain 1998 data on land Application and if available, obtain updated data from NPDES Permits. Superpose land application data to level 4 classification.

The following actions have been completed during this reporting period:

- a. SSL is awaiting approval from TSSWCB to finalize the LU/LC map.
- b. No other activity to report.

90% Complete

TASK 5: Develop Quality Assurance Project Plan

Subtask 5.1: TWRI will develop a Quality Assurance Project Plan (QAPP) that will detail project goals and objectives relating to water quality monitoring activities; identify the data needed to fulfill those objectives; list field and laboratory methods; describe procedures and schedules to be followed; and specify a data management structure and the quality assurance protocols.

The following actions have been completed during this reporting period:

- a. This task is complete

100% Complete

Subtask 5.2: TWRI will provide annual revisions and necessary amendments to the QAPP to the TSSWCB and EPA.

The following actions have been completed during this reporting period:

- a. No activity to report.

65% Complete

**TASK 6: Perform Sub-Watershed Monitoring and Measure
Pollutant Attenuation in Drainage Ditches**

Subtask 6.1.1: TAMUK will perform routine monthly grab sampling at four drainage ditch sites.

The following actions have been completed during this reporting period:

- a. No activity to report.

95% Complete

Subtask 6.1.2: TAMUK will periodically operate automated samplers and water-level recorders at all four drainage ditch sites to characterize the effects of run-off generated by high storm flow pulses.

The following actions have been completed during this reporting period:

- a. No activity to report.

50% Complete

Subtask 6.1.3: Stage-discharge relationships will be developed, maintained and updated, as necessary, for all drainage ditch sites.

The following actions have been completed during this reporting period:

- a. No activity to report.

95% Complete

Subtask 6.1.4: TAMUK will conduct routine general maintenance of all automated sampling and water level equipment to help ensure that these instruments will operate properly during storm flow conditions.

The following actions have been completed during this reporting period and will continue in subsequent project periods:

- a. No activity to report.

95% Complete

Subtask 6.1.5: TAMUK will develop a report summarizing the monitoring data.

The following actions have been completed during this reporting period:

- a. No activity to report.

75% Complete

Subtask 6.2.1: In coordination with the sub-watershed monitoring sites discussed in Task 6.1, TAMUK, with assistance from Research, will assess nitrogen and phosphorous mitigation processes in drainage ditches.

The following actions have been completed during this reporting period:.

- a. No activity to report.

75% Complete

Subtask 6.2.2: TAMUK, with assistance from Research, will develop a suite of suitable BMPs that incorporates the information obtained from the investigation of agricultural drainage ditches described in Subtask 6.2.1 above.

The following actions have been completed during this reporting period:

- a. No activity to report.

60% Complete

TASK 7: Evaluate BMPs to Reduce NPS Pollution at the Farm Level

Subtask 7.1: Selection of sites. AgriLife Extension (Extension), AgriLife Research -Weslaco (Research-Weslaco), and Texas A&M University-Kingsville (TAMUK) will select suitable demonstration sites to assess loadings from agricultural runoff and leachate produced by different BMPs and compare traditional practices with innovative BMP for the three (3) most representative crops of the watershed. Six (6) representative sites will be characterized and physical characteristics of such as topography, soil texture, salinity and fertility levels, water quality and crops will be obtained and evaluated

The following actions have been completed during this reporting period:

- b. This task is complete

100% Complete

Subtask 7.2: Installation of sensors. Flow meters, rain gauges, piezometers, soil water sensors will be installed by Research-Weslaco in the demonstration sites

The following actions have been completed during this reporting period:

- b. This task is complete

100% Complete

Subtask 7.3: Collection and analysis of Data. Runoff and leachate samples will be collected by Research-Weslaco for the different practices and laboratory analyses will be performed to

determine agricultural loadings such as nutrients and solutes. BMPs and traditional practices will be compared economically and their relationship with nutrient loadings will be established

The following actions have been completed during this reporting period:

- a. This task is complete.

100% Complete

Subtask 7.4: Field Days and Result Demonstrations. Extension will conduct one field day and one result demonstration per year to demonstrate and transfer the result to farmers and interested persons. Newspaper and communications media will be used to divulge the results

The following actions have been completed during this reporting period:

- a. No activity to report.

85% Complete

TASK 8: SWAT Model Simulation of the Arroyo Colorado watershed

Subtask 8.1: AgriLife Research – Temple will simulate load reduction scenarios for a suite of management measures based on the Arroyo Colorado WPP for period after the calibration and validation periods. Selected scenarios will be specified in the QAPP. Scenarios to be modeled will be determined by TSSWCB in consultation with TWRI, AgriLife Research – Temple, TCEQ, and other stakeholders, as appropriate, from the Arroyo Colorado Steering Committee and various work groups.

The following action have been completed during this reporting period:

- a. The SWAT QAPP has been revised and is currently with TSSWCB for comments.

50% Complete

Subtask 8.2: AgriLife Research – Temple will 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).

Through TSSWCB project 02-21, the SWAT model was to be 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). Subsequent to calibration, the model was to be validated using measured flow and in-stream measurements of sediment, BOD, and nutrient concentrations for the period of 2004-2006.

The following action have been completed during this reporting period:

- a. No activity to report.

0% Complete

TASK 9: Develop Final Report

Subtask 9.1: TWRI, with assistance from Research and TAMUK, will prepare final report for submittal to the TSSWCB.

- a. AgriLife Research has begun drafting a final report.

10% Complete

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

- No issues to report at this time