

**Texas Water Resources Institute**

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

Quarter no. 10 From 4/01/09 Through 6/30/09

**I. Abstract**

Sampling efforts in drainage ditches and edge-of-field continues this quarter. The edge-of-field monitoring is complete in all but one site for 2009. TWRI requested a scope of work amendment to add deliverables from the SWAT Model Simulation Project (02-21) and TWRI requested a one-year no cost extension for this project. The maps displaying conservation practice implementation information are also near completion and will be presented during the next quarter.

**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 TAES, TAMUK, TCE, 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 Arroyo Colorado Watershed Partnership Ag Issues Workgroup (Ag Monitoring Oversight Committee) will meet on July 27, 2009 where an update for this project will be provided to the group.

**65% 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 3, Quarter 3 Report on July 15, 2009.

**65% Complete**

*Subtask 1.3: Monitoring results will be transferred to TCE and TAES for development of educational materials and presentation to stakeholders. Based on the results of the monitoring, TCE 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:

- b. Multiple discussions between TWRI and TSSWCB occurred during this past quarter as TWRI worked to amend the workplan to include tasks from the Arroyo Colorado SWAT Model simulation project (02-21) and to extend the project deadline for one year thru August 31, 2010.
- c. An official amendment to the scope of work and no-cost extension request was submitted through C&G during June and should be processed the next quarter.
- d. TWRI worked with business coordinator to ensure that TAMUK had access to funds to purchase lab supplies and expendables in return for their analysis of AgriLife Research edge-of-field samples.

**65% 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 update of project activities was presented at the Arroyo Colorado Steering Committee Meeting in Weslaco on April 27, 2009 and an additional update will be given at the steering committee meeting on July 27, 2009.

**65% Complete**

*Subtask 1.6: TWRI will submit appropriate Reimbursement Forms.*

The following actions have been completed during this reporting period:

- a. AgriLife submitted an invoice in the amount of \$28,526.23 covering all expenses from March 1, 2009 through May 31, 2009. Total funds expended on the project thus far are \$185,356.94.

**44% Complete**

*Subtask 1.7: TWRI will develop (Months 1-3), host and maintain (Months 3-36) 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.

**50% 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:

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

**50% Complete**

*Subtask 2.4: TWRI will transfer results to TCE 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: TAES-Temple, with assistance from TCE, USDA-NRCS, USDA-FSA, the TSSWCB Harlingen Regional Office, and the SWCDs, will identify all producers in the watershed.*

**100% Complete**

*Subtask 3.2: TAES-Temple, with assistance from TCE, 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.*

**100% Complete**

*Subtask 3.3: TAES-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 near completion and will be presented at the next ag issues workgroup meeting on July 27, 2009.

**85% Complete**

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

The following actions have been completed during this reporting period:

- a. Nothing to report at this time.

**0% Complete**

*Subtask 3.5: TAES-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 at this time.

**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.

**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.

**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.

**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:

- b. SSL is awaiting approval from TSSWCB to finalize the LU/LC map.

**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.

**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..

**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.

**90% Complete**

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

The following actions have been completed during this reporting period:

- a. Tile drainage data was unavailable.

**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.

**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. Non-colonia septic systems data unavailable from the LRGVDC.

**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.

**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.*

**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. TWRI submitted an amended and clean copy of the QAPP as an annual update in December and received approval on the amended updated QAPP on February 23, 2009.

**50% 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. Three sampling events (one in each month) were carried out to collect samples at the drainage ditches
- b. Sampling resumed at the ABD road site, as the construction of the Bridge was completed.
- c. Sample analysis is currently being carried out for the June sampling event following the QAPP holding time and analysis protocol guidelines.
- d. A Sampling Campaign has been scheduled for July 17<sup>th</sup> 2009.

**50% 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. Automated samplers were tested in the laboratory.
- b. Deployment could not be carried out during this time period due to the lack of significant runoff producing rains.

**25% 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. Three Additional Data points for establishing the stage-discharge relationship have been obtained at all four sampling sites. These measurements were carried out using the Marsh-McBirney flowmate. The depth area velocity method is being applied to obtain the required stage discharge relationships.
- b. The flowrates in the some of the ditches have been close to zero due to lack of sufficient rainfall.

### **50% 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. A routine maintenance of all field equipment were carried out and calibrated prior to each sampling event.
- b. The procured field equipment was calibrated per manufacturer's specifications to ensure proper operations.

### **50% 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. A project update summarizing the data collected will be presented on July 27 at the Arroyo Colorado Agriculture Issues Workgroup Meeting in Weslaco.
- b. Interpretation of edge-of-field sampling is also being prepared for presentation at the same meeting.

### **35% Complete**

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

The following actions have been completed during this reporting period:

- a. Preliminary conceptual models on nitrogen transformation in the watershed are being developed based on the data.
- b. Preliminary conceptual models for Phosphorus transformation in the watershed are being developed as TP and ORP were detected in the winter samples, but were not detected in the summer samples.

### **45% Complete**

*Subtask 6.2.2: TAMUK, with assistance from TAES, 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. The effects of using Baffles for DO enhancement is being evaluated using Harding Ranch Road Site as a test case
- b. The effects of vegetation (wetlands) on nutrient dynamics is being evaluated at the other sites.

**10% Complete**

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

*Subtask 7.1: Selection of sites. Texas Cooperative Extension (TCE), Texas Agricultural Experiment Station-Weslaco (TAES-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*

**100% Complete**

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

The following actions have been completed during this reporting period:

- a. All sensors, meters, etc. are installed. 2 new sites have been selected and approved in order to overcome the drain tile access issues that we had previously; they are still called FD and FF but are different fields on different farms (FD for Krenmueller farms in South Pharr, and FF for Russell plantation in San Benito). Both of the drain outlets are easy to access and sample.
- b. AgriLife Research installed signs at all of the participating producer sites (in English and Spanish) to notify the producers to contact AgriLife Research before irrigating.
- c. AgriLife Research is more than halfway through their sampling schedule for 2009 (began early January) throughout the sites FA, FB, FC, FE and FF. However, site FD will not be planted until fall 2009. Per previous discussions with project personnel, AgriLife Research notified TAMUK regarding their intent to send TAMUK samples.

**100% Complete**

*Subtask 7.3: Collection and analysis of Data. Runoff and leachate samples will be collected by TAES-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. Sampling for sites FA, FB, FC, FE, and FF is complete for 2009 (2 samplings each). Sampling for site FD won't start until fall 2009 (0 sampling) as nothing has been planted this spring.

**42% Complete**

*Subtask 7.4: Field Days and Result Demonstrations. TCE 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. Nothing to report at this time.

**0% Complete**

### **TASK 8: Develop Final Report**

*Subtask 8.1: TWRI, with assistance from TAES and TAMUK, will prepare final report for submittal to the TSSWCB.*

**0% Complete**

### **III. Related Issues/Current Problems and Favorable or Unusual Developments**

- No issues to report at this time

### **IV. Projected Work for Next Quarter**

#### **Task 1**

- Year 3, Quarter 4 Report will be submitted.
- Participate in an Arroyo Colorado Ag Issues Workgroup Meeting and the Arroyo Colorado Steering Committee Meeting (both on July 27, 2009) and provide a project update to the workgroup and Steering Committee.

#### **Task 2**

- Address written comments from TSSWCB.

#### **Task 3**

- Complete maps displaying conservation practice implementation information and present the maps at the next ag issues workgroup meeting to discuss our next step to target education and outreach efforts.

#### **Task 4**

- Address written comments from TSSWCB to finalize and post LULC map.

#### **Task 5**

- Provide any updates to TSSWCB.

#### **Task 6**

- Sub-watershed monitoring will continue.

#### **Task 7**

- Wait to sample site FD until fall when planting will first occur.
- Wait on lab results from TAMUK to begin analysis of data.