

Texas Water Resources Institute

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

Quarter no. 9 From 1/01/09 Through 3/31/09

I. Abstract

Sampling efforts in drainage ditches continues and we finally have success in sampling edge-of-field sites this quarter. In fact 2 of the 6 sites are already complete and 3 of the 6 are halfway finished. Only one site was not sampled this spring as nothing was planted. Sampling at this site (FD) will commence this fall. Also, we were able, with the assistance of the local TSSWCB office to identify 2 new sites that allowed AgriLife Research to sample tile drains. This change was included in the QAPP update, which was also approved this 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) met on January 26, 2009 where an update for this project was provided to the group.
- b. A site tour of some of the research sites was provided by AgriLife Research following the meeting.

63% 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 2 Report on April 16, 2009.

63% 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:

- c. No meeting was held this quarter.

49% 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 January 26, 2009 and an additional update will be given at the steering committee meeting on April 27, 2009.
- b. TWRI participated in the Arroyo Colorado Watershed Partnership Ag Issues Workgroup (Ag Monitoring Oversight Committee) meeting on January 26, 2009.

63% 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 \$22,080.99 covering all expenses from November 1, 2008 through February 28, 2009. Total funds expended on the project thus far are \$156,830.71.

37% 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. Nothing to report at this time.

65% 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. The ABD road site had accessibility issues during the month of March due to road construction and extremely low flows
- c. Sample analysis is currently being carried out for the March sampling event following the QAPP holding time and analysis protocol guidelines.

45% 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. Three new battery operated automated samplers have been acquired for the project through matching funds and calibrated for deployment
- 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 three 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. Collection of additional points was not possible at the ABD road site in this quarter due to accessibility and low flow conditions.
- c. The flowrates in the some of the ditches have been close to zero due to lack of sufficient rainfall.

45% 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
- b. Two additional field probes (YSI) for measuring DO, pH, Salinity, Conductivity and Temperature have been acquired with TAMUK funds for backup monitoring.
- c. The procured field equipment was calibrated per manufacturer's specifications to ensure proper operations.

35% 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 was presented at the January 26 Arroyo Colorado Agriculture Issues Workgroup Meeting in Weslaco.
- b. Another report related to analysis of Edge-of-Field Monitoring is under preparation.
- c. The results of this sampling from this quarter will be presented in the July Meeting of the Arroyo Colorado Agriculture Issues Workgroup Meeting in Weslaco.

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.

35% 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. Nothing to report at this time.

0% 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 FC 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. Sites FA, FB, and FE are 50% complete for the 2009 season (1 sampling each).
- b. We noticed tremendous differences regarding the water management throughout the various sites as runoff was limited (5% of water applied) or excessive (60% of water applied). Measurements at the field showed limited EC regarding runoff water (less than 900 ppm) compared to ground water (1,200-1,800ppm) and drain tiled water (5,500-9,900 ppm). Could runoff water be re-used on salt tolerant crops during drought years? No results from chemical parameters were received from TAMUK at this time.

29% 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

- Efforts to improve communication between AgriLife Research and TAMUK and between the growers and AgriLife Research were very successful. Due to meetings held, signs developed and installed and regular emails/phone calls, AgriLife Research received fair notification on the majority of fields (one field was in exception and the irrigation event was missed because the irrigator/farmer did not notify AgriLife Research) regarding irrigation and sampling events. Because of this change, AgriLife Research was able to provide ample notice to TAMUK for sample analysis needs. Only one incident occurred this spring where TAMUK was forced to rearrange their schedule to accommodate short notice samples. Because of the efforts of AgriLife Research and TAMUK, as well as their flexibility, edge-of-field monitoring has been successful this year. This is a big accomplishment in itself as it can be difficult sampling real-world situations while working around producers and their ever-changing schedules.

IV. Projected Work for Next Quarter

Task 1

- Year 3, Quarter 3 Report will be submitted.
- Participate in an AC Steering Committee Meeting (April 27, 2009) and provide a project update to the Steering Committee.

Task 2

- Address written comments from TSSWCB.

Task 3

- Continue development of BMP maps for use in educational activities.

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

- Continue sampling on sites FA, FB, and FE.
- Wait to sample site FD until fall when planting will first occur.
- Wait on lab results from TAMUK to begin analysis of data.