



**Texas State Soil and Water Conservation Board
Section 319(h) Nonpoint Source Program
FY 2006 Project 06-10 Grant Application**



NONPOINT SOURCE SUMMARY PAGE for the CWA, Section 319(h) Agricultural/Silvicultural Nonpoint Source Program					
Title of Project:	Arroyo Colorado Agricultural Nonpoint Source Assessment				
Project Goals/Objectives:	(1) Perform a complete historical data review and analysis related to water quality and agricultural best management practices implemented in the watershed; (2) Investigate site-specific differences and temporal variation of water quality in drainage from agricultural production areas; and (3) Collect data for future recalibration of SWAT model to better estimate the total nonpoint source loading into the river.				
Project Tasks:	(1) Coordinate and Administer Project, (2) Compile and Evaluate Prior Studies and Data, (3) Inventory Conservation Practice Implementation, (4) Update Land Use / Land Cover Data, (5) Develop Quality Assurance Project Plan, (6) Perform Sub-Watershed Monitoring and Measure Pollutant Attenuation in Drainage Ditches, (7) Evaluate BMPs to Reduce NPS Pollution at the Farm Level, and (8) Develop Final Report.				
Measures of Success:	(1) Evaluation of historical water quality and previous studies; (2) Assessment of BMP implementation in the watershed; (3) Evaluation of landuse in Arroyo Colorado watershed; (4) Characterize ag runoff at the subwatershed level; (5) Evaluation of mitigation effects of drainage ditches; (6) Demonstration of irrigation BMPs effectiveness in reducing NPS				
Project Type:	Statewide (); Watershed Implementation/Education (X); Watershed Planning/Assessment (X); Watershed Protection ()				
Status of Water Body: 2002 Water Quality Inventory and 303(d) List	Segment ID: Arroyo Colorado (Tidal) 2201 Arroyo Colorado (Above Tidal) 2202	Parameters: Depressed dissolved oxygen Bacteria	Category: 5c 5c		
Project Location:	Segments 2201 (Tidal) and 2202 (Above Tidal) of the Arroyo Colorado Watershed				
Key Project Activities:	Hire Staff (X); Monitoring (X); Regulatory Assistance (); Technical Assistance (); Education (X); Implementation (); Demonstration (X); Other ()				
NPS Management Program Elements:	<p>This project assists the State in achieving <u>Short-Term Goal One - Data Collection and Assessment, Short-Term Goal Two - Implementation, and Short-Term Three - Education.</u></p> <p>This project assists the State in achieving the <u>Data Collection and Assessment Objective</u> of Conducting monitoring to determine effectiveness of Watershed Protection Plans and BMP implementation. The project assists the State in achieving the <u>Implementation Objective</u> of developing BMPs to address constituents of concern, as well as implementing recommendations of the pending Arroyo Colorado Watershed Protection Plan. This project also assists the State in achieving the <u>Education Objective</u> of expediting development of technology transfer activities to be conducted upon completion of BMP implementation.</p> <p>Finally, the project assists the State in meeting the following three <u>Milestones</u>:</p> <ul style="list-style-type: none"> • Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality. • Complete water quality monitoring, analyze data, assess loadings, and determine the origin and distribution of pollutants. • Implement voluntary actions in the watershed and adjust the BMP implementation based on follow-up verification monitoring of effectiveness. 				
Project Costs:	Federal:	\$430,650	Non-Federal Match:	\$287,502	Total: \$718,152
Project Management:	Texas Water Resources Institute				
Project Period:	September 1, 2006 – August 31, 2009				

Part I – Applicant Information

Applicant							
Project Lead		C. Allan Jones					
Title		Director					
Organization		Texas Water Resources Institute					
E-mail Address		CAJONES@ag.tamu.edu					
Street Address		1500 Research Parkway, Suite 240A 2118 TAMU					
City	College Station	County	Brazos	State	TX	Zip Code	77843-2118
Telephone Number	(979) 845-1851			Fax Number	(979) 845-8554		

Project Partners	
Names	Roles & Responsibilities
Texas State Soil and Water Conservation Board	TSSWCB NPS Team and Harlingen Regional Office staff will be responsible for overall management of the project. Both the NPS Team and Regional Office will be included as members of the Oversight Committee. The TSSWCB project manager will also be involved in the development and approval of all press releases and workshop information (as they relate to TSSWCB programs) prior to dissemination.
Texas Agricultural Experiment Station-Weslaco (Dr. Juan Enciso)	Evaluate BMPs to Reduce NPS Pollution at the Farm Level (Task 7) and serve as member of the Oversight Committee
Texas A&M Spatial Sciences Lab (Dr. Srinivasan)	Update Land Use / Land Cover Data (Task 4)
Texas Agricultural Experiment Station-Temple (Dr. Wes Rosenthal)	Inventory Conservation Practice Implementation (Task 3) and serve as member of the Oversight Committee
Texas A&M-Kingsville (Dr. Venki Uddameri)	Perform Sub-Watershed Monitoring and Measure Pollutant Attenuation in Drainage Ditches (Task 6) and serve as member of the Oversight Committee
Texas Water Resources Institute	Project coordination, quality assurance, and reporting (Tasks 1, 2, 5, and 8). Coordinate Oversight Committee.
Texas Cooperative Extension	The Weslaco District Office, Hidalgo County Office, and Cameron County Office will be responsible for the educational component, crop production meetings, safety training, soil testing campaign, and serve as members of the Oversight Committee.
Texas Sea Grant	Member of Oversight Committee. Coordination with Watershed Protection Plan activities.
Texas Department of Agriculture	Member of Oversight Committee.
Texas Commission on Environmental Quality	Member of Oversight Committee.

Part II – Project Information

Project Type

Surface Water	<input checked="" type="checkbox"/>	Groundwater	<input type="checkbox"/>				
Does the project implement recommendations made in a completed Watershed Protection Plan or approved TMDL Report or Implementation Plan?				Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
If yes, identify the document.							
If yes, identify the agency/group that developed and/or approved the document.					Year Developed		

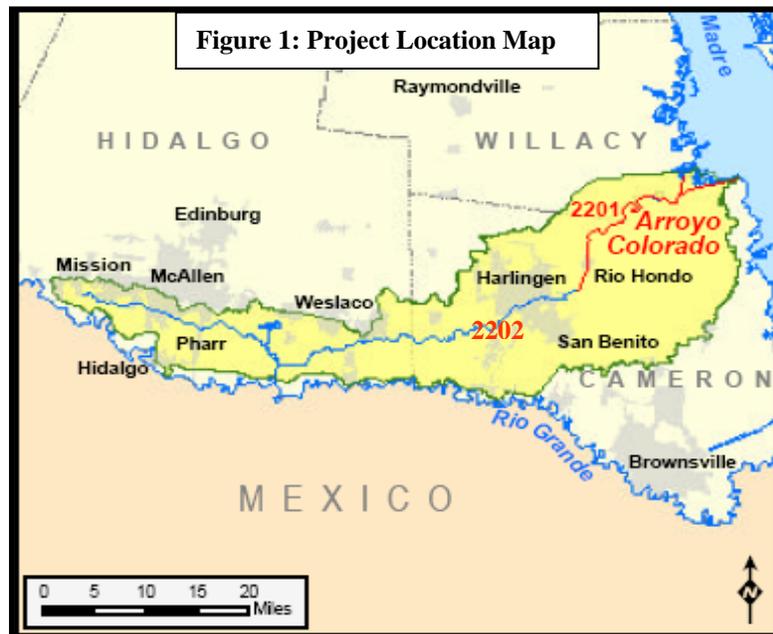
Watershed Information

Watershed Name(s)	Hydrologic Unit Code (8 Digit)	Segment ID	305 (b) Category	Size (Acres)
Arroyo Colorado Watershed	12110208	2201/2202	5(c)	432,000

Project Narrative

Problem/Need Statement

The Arroyo Colorado flows through Hidalgo, Cameron and Willacy Counties in the Lower Rio Grande Valley of Texas into the Laguna Madre (Figure 1). Flow in the Arroyo Colorado is sustained by wastewater discharges, agricultural irrigation return flows, urban runoff, and base flows from shallow groundwater. The Arroyo is the major source of fresh water to the lower Laguna Madre, an economically and ecologically important resource to the region. The Laguna Atascosa National Wildlife Refuge and several county and city parks are located within the Arroyo watershed. The mild climate, semi-tropical plants and animals, and many recreational opportunities draw large numbers of people to the Arroyo Colorado watershed. One third of the stream is also used for shipping from the Gulf Intracoastal Waterway to the Port of Harlingen.



As a result of low dissolved oxygen levels, the tidal segment of the Arroyo Colorado (2201), does not currently meet the aquatic life use designated by the State of Texas and described in the Water Quality Standards. This has been the case for every 303(d) list prepared by the state since 1986. There have also been concerns for high nutrient levels in this river as documented on every 305(b) assessment prepared by the state since 1988. In order to meet the dissolved oxygen criteria (24-hour average of 4.0 mg/L and minimum of 3.0 mg/L) at least 90% of the time between the critical period of March through October, TCEQ (2003) estimates a 90% reduction in nitrogen, phosphorous, oxygen demanding substances and sediment will be necessary.

Watershed Protection Plan Development

In response to this impairment, a local effort has been initiated to develop a watershed protection plan (WPP) to improve conditions in the Arroyo Colorado. Working with the TCEQ, the TSSWCB, and other agencies, a local steering committee will devise and implement strategies to increase dissolved oxygen in the Arroyo and improve its environmental condition.

The Arroyo Colorado Watershed Steering Committee has established several work groups to address the six major components of the watershed plan: wastewater infrastructure; agricultural issues; habitat restoration; refinement of the TMDL analysis; land use; and public education. The project has significant financial support from federal nonpoint source grants under CWA Section 319(h). Already, the stakeholders have made great progress. The Education and Outreach Work Group has developed an outstanding multimedia presentation about pollution problems in the Arroyo and how to get involved in addressing them. In May 2004, the TCEQ and the Habitat Restoration Work Group established contracts with Texas A&M's Sea Grant program and the Texas Parks and Wildlife Department to provide an independent watershed coordinator and a habitat restoration specialist to assist in the development of the WPP. TPWD has contracted with Alan Plummer Associates, Inc. to develop a habitat restoration feasibility study. Funding for this study was obtained from NOAA through GLO. A Draft Wastewater Infrastructure plan has been developed. In September 2005, the TSSWCB and the Agricultural Issues Work Group established contracts with (1) Hidalgo and Southmost SWCDs to provide technical and financial assistance to landowners to aid in the development and implementation of WQMPs and (2) the Texas Water Resources Institute and Texas Cooperative Extension to provide education on best management practices. The Draft WPP is expected to be completed February 2006.

Project Narrative

General Project Description

The primary focus of this 319(h) project is to better characterize agricultural runoff in the Arroyo Colorado, assess and demonstrate the effects of BMP implementation at the field and sub-watershed level, and measure progress towards meeting WPP goals. A secondary focus is to evaluate the natural phosphorus reduction capabilities of drainage ditches on runoff from irrigated cropland in the Arroyo Colorado watershed.

This project will provide storm and routine monitoring of drainage ditches that contribute nonpoint source loadings to the Arroyo Colorado in order to better assess agricultural NPS loadings and reductions resulting from BMP implementation. Monitoring will primarily be directed at evaluating areas with significant irrigated cropland acreage to evaluate nonpoint source pollution (NPS) contributions and determine NPS reductions resulting from BMPs.

A final report will be developed assessing the effects of the conservation practices. Soil sampling and water quality monitoring will be utilized to gauge the impacts on water quality.

This project will be consistent with the Watershed Protection Plan and highly coordinated with the Arroyo Partnership and Arroyo Ag Steering Committee as well as the educational and implementation projects already underway in the watershed. These groups and projects will provide for a great deal of public participation and many opportunities for public input.

In this project, TAMUK and TAES will provide assessment activities at 4 sub-watershed sites within the Arroyo Colorado:

- Mile 4 North FM 491 in Hidalgo County (Lat. 26 06 47.8758, Long -97 53 27.8602)
- ± 3 miles north of the intersection of US Military Highway 281 and 493 in Hidalgo County (Lat. 26 06 44.6665, Long -98 02 14.987)
- Harding Ranch Road approximately 3 miles north of 508 and 1420 in Cameron County (Lat.26 16 47, Long 97 43 27)
- ABD Road and FM 1479 about 4 miles south of Highway 83 in Cameron County (Lat. 26 08 06 Long 97 43 27)

The monitoring effort will make use of numerous automated sampling systems in TAMUK's possession that will be made available to this project. Historical or nondirect data obtained from other projects with QAPPs approved by EPA or the State of Texas will also be used to supplement this project. The data collected for this project will be used to determine the reduction of NPS pollution associated with implementation efforts and provide data to inform TSSWCB of areas where focused reduction efforts are most needed. This project will also support the educational efforts in the watershed.

The four sub-watersheds chosen for this study represent predominately irrigated cropland within the Arroyo watershed with two sites being located in Cameron County and two sites in Hidalgo County. The two stream sites in Cameron County were monitored from 2000 to 2002. The historical water quality data available at these sites will be made available as non-direct data to this project for use in the assessment of water quality.

The sub-watershed monitoring activities of this project will consist of automated stormwater sampling, monthly ambient grab sampling, and instantaneous streamflow measurements. Field measurements of dissolved oxygen, water temperature, specific conductance, and pH will occur with all grab sampling. Stormwater samples will be retrieved on a daily basis during storm events and flow composited into a single sample. All water samples will be analyzed for various nutrient forms (i.e., total phosphorus, dissolved orthophosphate phosphorus [frequently referred to as soluble reactive phosphorus], total Kjeldahl nitrogen, dissolved ammonia, dissolved nitrite plus nitrate), and total suspended sediments (TSS). In addition, monthly grab samples will be analyzed for BOD5. The nitrogen forms are included in the laboratory analyses to provide a more complete indication of macronutrient conditions in the watershed, to evaluate whether agricultural BMPs are reducing both nutrients (nitrogen and phosphorus), and to ensure that efforts to reduce one nutrient is not inadvertently increasing another.

This project will provide result demonstrations to landowners in the Arroyo Colorado watershed. This edge of field monitoring will represent both tiled and non-tiled irrigated cropland fields that drain to both drainage ditches and directly into the Arroyo. Surface runoff, along with outflow from the tile drainage system, will be monitored. Surface runoff and tile drain samples will be retrieved on an event basis and flow composited into a single sample. All water samples will be analyzed for various nutrient forms (i.e., total phosphorus, dissolved orthophosphate phosphorus [frequently referred to as soluble reactive phosphorus], total Kjeldahl nitrogen, dissolved ammonia, dissolved nitrite plus nitrate), and total suspended sediments (TSS). In addition, monthly grab samples will be analyzed for BOD5.

Project staff will also maintain equipment to record instantaneous water level information and gather the required physical measurements and flow data needed to develop, maintain and update, as needed, the stage-discharge relationships (rating curves) at all stations.

This project is dependent upon and is an important component of the larger project effort in the Arroyo Colorado described above. It is closely linked to the CWA §319 funded FY05 Arroyo BMP Education Project being conducted by TWRI and TCE, the FY05 Arroyo WQMP Implementation Project being conducted by the TSSWCB and Hidalgo and Southmost SWCDs, and the Arroyo Watershed Coordination Project being conducted by TCEQ and Texas Sea Grant.

The results of this study will be used to support ongoing educational and implementation efforts and future modeling efforts planned for the watershed.

Water Quality Impairment

Describe all known causes (pollutants of concern) of water quality impairments from any of the following sources: 2002 Water Quality Inventory and 303(d) List, 2002 Summary of Waterbodies with Water Quality Concerns (Secondary Concerns List) or Other Documented Sources (ex. Clean Rivers Program Basin Summary or Basin Highlights Reports).

<u>Waterbody (Segment)</u>	<u>Standards not met in 2002 (parameter)</u>	<u>2002 Concerns</u>
Arroyo Tidal (2201)	Aquatic Life Use Not Supporting (D.O. and ambient toxicity in sediment)	Nutrient Enrichment (ammonia, nitrate+nitrite) Historic Fish Kills (low D.O.)
Arroyo Abv Tidal (2202)	Contact Recreation Not Supporting (bacteria) Fish Consumption Partially Supporting (DDE, and other organic compounds in fish tissue)	Nutrient Enrichment (ammonia, nitrate+nitrite, ortho-phosphorous, total phosphorus) Algal Growth (excessive) Aquatic Life Use (D.O.) Historic Fish Kills
<u>Waterbody (Segment)</u>	<u>Standards not met in 2004 (parameter)</u>	<u>2004 Concerns</u>
Arroyo Tidal (2201)	Aquatic Life Use Not Supporting (D.O.)	Nutrient Enrichment (ammonia, nitrate+nitrite) Historic Fish Kills
Arroyo Abv Tidal (2202)	Contact Recreation Not Supporting (bacteria) Fish Consumption Not Supporting (DDD, DDE, DDT, chlordane, dieldrin, endrin, heptachlor epoxide, heptachlor, lindane, hexachlorobenzene, toxaphene)	Nutrient Enrichment (ammonia, nitrate+nitrite, ortho-phosphorous, total phosphorus) Algal Growth (excessive) Historic Fish Kills

Project Goals

The primary goals of the project are to better characterize agricultural runoff in the Arroyo watershed, demonstrate and evaluate BMP effectiveness, and measure progress in achieving water quality goals in the watershed.

In order to achieve these goals, the following objectives will be completed:

1. Perform a complete historical data review and analysis related to water quality and agricultural best management practices implemented in the watershed.
2. Investigate site-specific differences and temporal variation of water quality in drainage from agricultural production areas.
3. Collect data for future recalibration of SWAT model to better estimate nonpoint source loading into the river.

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 1:	Coordinate and Administer Project					
Costs:	Federal:	\$27,401	State:	\$45,525	Total:	\$72,926
Objective:	To effectively coordinate and monitor all work performed under this project including technical and financial supervision, preparation of status reports, and maintenance of project files and data. An Oversight Committee for Ag Monitoring will be organized as a subgroup of the Arroyo Ag Issues Work Group to coordinate project efforts with all project participants. TWRI will perform accounting functions for project funds and be responsible for developing timely and accurate reports. Progress reports shall document all activities performed within a quarter and shall be submitted not later than thirty (30) days after the close of the quarter. An interactive internet website will also be created and maintained to provide the most current progress.					
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.					
	Start Date:	Month 1	Completion Date:	Month 36		
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].					
	Start Date:	Month 1	Completion Date:	Month 36		
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).					
	Start Date:	Month 1	Completion Date:	Month 36		
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.					
	Start Date:	Month 1	Completion Date:	Month 36		
Subtask 1.5:	TWRI will participate in Arroyo Colorado Partnership and Arroyo Colorado Agricultural Issues Work Group Meetings.					
	Start Date:	Month 1	Completion Date:	Month 36		
Subtask 1.6	TWRI will submit appropriate Reimbursement Forms.					
	Start Date:	Month 1	Completion Date:	Month 36		

Subtask 1.7	<p>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.</p> <p>Information presented through the website will include:</p> <ul style="list-style-type: none"> • PDF version of all reports, journal articles, faculty papers and presentations generated from this project. • Links to all cooperating and/or participating agencies. • Links to all project primary investigators. • Links to university academic departments that are involved in the project. • Links to other related websites <ul style="list-style-type: none"> ○ Texas State Soil and Water Conservation Board ○ Texas Water Resource Institute. ○ Environmental Protection Agency-Office of Water, CWA Section 319 ○ Soil and Water Conservation Districts • Schedule of upcoming meetings/programs dealing with this project. 			
	Start Date:	Month 1	Completion Date:	Month 36
Deliverables	<ul style="list-style-type: none"> • Quarterly Reports • Meeting notices, agendas, minutes, meeting materials, and lists of attendees of Committee Meetings • Reimbursement Forms • Web site to publish results, bulletins, and reports 			

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 2:	Compile and Evaluate Prior Studies and Data					
Costs:	Federal:	\$14,054	State:	\$3,727	Total:	\$17,782
Objective:	<p>Compile historical water quality data and previous studies from the Arroyo Colorado Watershed, summarize the results and conclusions, identify data gaps, and organize the information for transfer to TCE for the development of fact sheets, presentations, and other educational materials through the ongoing Arroyo BMP Education Project. This will help promote the implementation of cost effective conservation practices that reduce nutrient runoff by informing and educating producers about appropriate practices and the water quality problems in the watershed.</p>					
Subtask 2.1:	<p>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.</p>					
	Start Date:	Month 1		Completion Date:	Month 6	
Subtask 2.2:	<p>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</p>					
	Start Date:	Month 1		Completion Date:	Month 6	
Subtask 2.3:	<p>TWRI, with assistance from members of the Ag Monitoring Oversight Committee, will identify critical data gaps that should be filled</p>					
	Start Date:	Month 1		Completion Date:	Month 6	

Subtask 2.4:	TWRI will transfer results to TCE to be used to develop educational material through the FY05 Arroyo Education Project					
	Start Date:	Month 1	Completion Date:	Month 6		
Deliverables	<ul style="list-style-type: none"> Report summarizing historical water quality data, results of prior studies, and data gaps. 					

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 3:	Inventory Conservation Practice Implementation					
Costs:	Federal:	\$15,317	State:	\$12,208	Total:	\$27,525
Objective:	To compile information on the location and types of Conservation Practices implemented in the Arroyo Colorado Watershed.					
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.					
	Start Date:	Month 1	Completion Date:	Month 6		
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.					
	Start Date:	Month 1	Completion Date:	Month 12		
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.					
	Start Date:	Month 12	Completion Date:	Month 18		
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.					
	Start Date:	Month 12	Completion Date:	Month 18		
Subtask 3.5:	TAES-Temple will identify areas needing priority implementation work through correlation with Task 4 and the results from Tasks 6-9.					
	Start Date:	Month 12	Completion Date:	Month 18		
Deliverables	<ul style="list-style-type: none"> A database and map (hard copy and electronic) showing the location and types of conservation practices implemented since 1995. 					

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 4:	Update Land Use / Land Cover Data					
Costs:	Federal:	\$34,590	State:	\$22,455	Total:	\$57,045
Objective:	To update and revise all land use / land cover (LULC) categories for the Arroyo Colorado watershed at a level equivalent to the MRLC classification to level 4. This data will be used to update and revise the TMDL model and target implementation efforts. This will include, but not be limited to, collection of LULC data from USDA-FSA, Texas Natural Resource Information System (TNRIS), USDA-APHIS, irrigation districts, USGS, and others.					
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.					
	Start Date:	Month 6		Completion Date:	Month 18	
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.					
	Start Date:	Month 6		Completion Date:	Month 18	
Subtask 4.3:	If available, SSL will obtain applicable digital data on cropland from USDA – FSA and add up to level 2 classification.					
	Start Date:	Month 6		Completion Date:	Month 18	
Subtask 4.4:	If available, SSL will obtain digital location data on citrus production from USDA-APHIS and add up to level 2 classification.					
	Start Date:	Month 6		Completion Date:	Month 18	
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.					
	Start Date:	Month 6		Completion Date:	Month 18	
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.					
	Start Date:	Month 6		Completion Date:	Month 18	
Subtask 4.7:	SSL will obtain most recent digital data from irrigation districts and add up to level 4 classification.					
	Start Date:	Month 6		Completion Date:	Month 18	
Subtask 4.8:	SSL will obtain 1998 tile drainage data and if available, obtain updated data from TSSWCB and TCE.					
	Start Date:	Month 6		Completion Date:	Month 18	
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.					
	Start Date:	Month 6		Completion Date:	Month 18	
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.					
	Start Date:	Month 6		Completion Date:	Month 18	

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.			
	Start Date:	Month 6	Completion Date:	Month 18
Deliverables	<ul style="list-style-type: none"> The SSL will provide the TSSWCB with LULC grid for the Arroyo Colorado Watershed composed of the most recent data available. 			

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 5:	Develop Quality Assurance Project Plan					
Costs:	Federal:	\$7,027	State:	\$1,864	Total:	\$8,891
Objective:	To develop Data Quality Objectives (DQO), a Quality Assurance Project Plan (QAPP) and provide amendments and annual revisions to the QAPP, as needed. The Quality Assurance Project Plan (QAPP) will be developed using guidelines in EPA QA/G-5, "Guidance for 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.					
	Start Date:	Month 1	Completion Date:	Month 6		
Subtask 5.2:	TWRI will provide annual revisions and necessary amendments to the QAPP to the TSSWCB and EPA.					
	Start Date:	Month 6	Completion Date:	Month 36		
Deliverables	<ul style="list-style-type: none"> Approved QAPP Approved annual revisions and amendments to QAPP 					

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 6:	Perform Sub-Watershed Monitoring and Measure Pollutant Attenuation in Drainage Ditches					
Costs:	Federal:	\$230,000	State:	\$134,846	Total:	\$364,846
Objective:	To (1) perform routine grab and storm event water quality assessment activities at four sampling sites in Cameron and Hidalgo Counties in order to assess agricultural NPS loadings, (2) determine the degree to which pollutant assimilation is occurring in drainage ditches, and (3) investigate site-specific differences and temporal variation in water quality in drainage ditches representative of agricultural production areas.					
Subtask 6.1:	<p>TAMUK will perform routine grab and storm event water quality assessment activities, including collection of flow and associated measurements for developing and maintaining stage-discharge relationships in irrigation drainage ditches draining agricultural sub-watersheds at four sampling sites in Cameron and Hidalgo Counties.</p> <p>Subtask 6.1.1 TAMUK will perform routine monthly grab sampling at four drainage ditch sites. Water quality samples will be collected only if water is flowing. If water is not flowing when monthly sampling is scheduled, a water quality sample will not be collected, but it will be documented that the stream was pooled or dry. Routine grab samples will be analyzed for nutrients, TSS, and BOD. In addition, field constituents of dissolved oxygen, pH, conductivity, and water temperature will be recorded at the time grab samples are collected.</p> <p>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. TAMUK will utilize existing raingage and remotely-sensed NEXRAD data to identify optimal periods for carrying out such sampling. Given the variable nature of the rainfall process, it is difficult to estimate the exact number of samples that will be obtained. However, attempts will be made to carryout at least one sampling campaign quarterly during the sampling period. At each drainage ditch site, individual runoff samples will be collected daily during storm events and flow composited into one sample that will be analyzed for nutrients, BOD, and TSS. Care will be taken to ensure that the data loggers are programmed to capture the effects of rainfall pulses and not respond to minor water level fluctuations caused due to irrigation flooding. The monthly water level data collected as part this task and unit hydrograph techniques will be used to identify the optimal response frequency to capture high-intensity rainfall pulses.</p> <p>Subtask 6.1.3 Stage-discharge relationships will be developed, maintained and updated, as necessary, for all drainage ditch sites. This will include taking flow measurements and re-surveying stream cross-sections, if apparent changes have occurred.</p> <p>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.</p> <p>Subtask 6.1.5 TAMUK will develop a report summarizing the monitoring data.</p>					
	Start Date:	Month 6		Completion Date:	Month 30	

Subtask 6.2:	TAMUK will determine the degree to which pollutant assimilation is occurring in drainage ditches, site-specific differences and temporal variation in water quality in drainage ditches representative of agricultural production areas will be investigated. Assess the characteristics and the benefits of the drainage ditches in controlling agricultural pollution in order to suggest suitable best management practices in the watershed that include effective use of the drainage ditches.					
	<p>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.</p> <p>Subtask 6.2.1 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.</p>					
	Start Date:	Month 6	Completion Date:	Month 30		
Deliverables	<ul style="list-style-type: none"> • Electronic copy of data collected • Report summarizing data • Description of mitigation effects of drainage ditches • Description of suitable BMPs that incorporate the information obtained from the study of agricultural drainage ditches 					

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 7:	Evaluate BMPs to Reduce NPS Pollution at the Farm Level					
Costs:	Federal:	\$94,835	State:	\$64,907	Total:	\$159,743
Objective:	To evaluate and demonstrate the effectiveness of irrigation best management practices on reducing agricultural NPS loadings.					
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					
	Start Date:	Month 1	Completion Date:	Month 4		
Subtask 7.2:	Installation of sensors. Flow meters, rain gauges, piezometers, soil water sensors will be installed by TAES-Weslaco in the demonstration sites					
	Start Date:	Month 1	Completion Date:	Month 6		
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					
	Start Date:	Month 4	Completion Date:	Month 30		
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					
	Start Date:	Month 12	Completion Date:	Month 30		

Deliverables	<ul style="list-style-type: none"> • Result Demonstration Report: “Evaluation and Demonstration of Irrigation Best Management Practices on Reducing Agricultural Loadings in the Arroyo Colorado” • Fact sheet: “Best Management Practices for Reducing Nonpoint Source Pollution”
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Tasks, Objectives and Schedules (Replicate or modify table as needed)						
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Task 8:	Develop Final Report					
Costs:	Federal:	\$7,425	State:	\$1,969	Total:	\$9,394
Objective:	To develop a final report summarizing the results and activities of the project. Development of this report will be guided and directed by the Oversight Committee.					
Subtask 8.1:	TWRI, with assistance from TAES and TAMUK, will prepare final report for submittal to the TSSWCB.					
	Start Date:	Month 30	Completion Date:	Month 36		
Deliverables	<ul style="list-style-type: none"> • Draft final report submitted three months before end of project • Final report at culmination of project in electronic format 					

Measures of Success

<ul style="list-style-type: none"> • Evaluation of historical water quality and previous studies • Assessment of BMP implementation in the watershed • Evaluation of landuse in Arroyo Colorado watershed • Characterize ag runoff at the subwatershed level • Evaluation of mitigation effects of drainage ditches • Demonstration of irrigation BMPs effectiveness in reducing NPS
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2005 Texas Nonpoint Source Management Program Document Reference

Goals &/or Milestone(s)
Short-Term Goal One – Data Collection and Assessment
Short-Term Goal Two – Implementation
Short-Term Three – Education
Milestone B. Data Review – Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point / nonpoint sources, land use data, and all known stressors influencing water quality.
Milestone C. Targeted Assessment – Complete water quality monitoring, analyze data, assess loadings, and determine the origin and distribution of pollutants.
Milestone F. Implementation – Implement voluntary actions in the watershed and adjust the BMP implementation based on <u>follow-up verification monitoring of effectiveness.</u>

Part III – Financial Information

Budget Summary			
Federal 319(h)	\$430,650	% of total project	60%
Non-Federal Match	\$287,502	% of total project (at least 40%)	40%
Total \$ Cost	\$718,152	Total project %	100%
Category	Federal	Non-Federal Match	Total
Personnel	\$95,057	\$56,096	\$151,153
Fringe Benefits	\$24,841	\$12,249	\$37,090
Subtotal Personnel & Fringe	\$119,898	\$68,345	\$188,243
Travel	\$12,480		\$12,480
Equipment	\$0		\$0
Supplies	\$23,300		\$23,300
Contractual	\$200,000	\$134,846	\$334,846
Construction			
Other	\$18,800		\$18,800
Subtotal	\$254,580	\$134,846	\$389,426
Total Direct Costs	\$374,478	\$203,191	\$577,669
Indirect Costs (15%)	\$56,172	\$31,095	\$87,267
Unrecovered IDC		\$53,216	\$53,216
Total Project Costs	\$430,650	\$287,502	\$718,152

Budget Justification		
Category	Total Amount	Justification
Personnel & Fringe Benefits	\$185,391	<u>Federal:</u> <ul style="list-style-type: none"> • TWRI Project Manager @ 30% in yr 1, 5% in yr 2, and 13.3% in yr 3 • TWRI IT Associate @ 4.167% each year • TAES-Temple Asst Prof (2 mos) • SSL Research Assoc (12 mos @ 25%) in years 1 & 2 • SSL Student Techs (2 @ 9 mos @ 100%) in years 1 & 2 • SSL Project Manager @ 1.7% in years 1 & 2 • TAES-Weslaco Research Tech II @ 33% each year <u>Non-Federal Match:</u> <ul style="list-style-type: none"> • TWRI Director @ 4.5% each year • TAES-Temple Asst Prof (1 mo.) • SSL Systems Analyst @ 8.3% in years 1 & 2 • TAES-Weslaco Asst Prof & Ext Ag Eng Spec @ 10% each year
Travel	\$12,480	<u>Federal:</u> <ul style="list-style-type: none"> • TWRI – \$2,120 annually (\$6,360) for Quarterly Meetings in Weslaco • TAES – Temple – \$2,120 for 4 data collection trips to watershed • SSL – College Station – \$500 per year in years 1 & 2 (\$1,000) • TAES – Weslaco – \$1,000 annually (\$3,000) for sampling & meetings
Equipment	\$6,000	<u>Federal:</u> <ul style="list-style-type: none"> • TAES – Weslaco – Mule (utility work vehicle)
Supplies	\$24,300	<u>Federal:</u> <ul style="list-style-type: none"> • SSL – College Station – \$1,000 for computer • TAES – Weslaco – \$23,300 for field demo
Contractual	\$334,846	<u>Federal:</u> <ul style="list-style-type: none"> • \$200,000 contracted to TAMUK for Task 6 (see attached budget) <u>Non-Federal Match:</u> <ul style="list-style-type: none"> • \$133,333 contracted to TAMUK for Task 6 (see attached budget)
Construction	\$0	
Other	\$11,800	<u>Federal:</u> <ul style="list-style-type: none"> • TAES – Weslaco – \$1,800 for soil and water analysis & \$10,000 for publications
Indirect	\$85,970	<u>Federal:</u> <ul style="list-style-type: none"> • 15% of Total Direct Federal (excluding \$175,000 contractual) <u>Non-Federal Match:</u> <ul style="list-style-type: none"> • 45.5% of Total Direct Non-Federal Match (excluding \$175,000 contractual)
Unrecovered IDC	\$53,216	<u>Non-Federal Match:</u> <ul style="list-style-type: none"> • 30.5% of Total Direct Federal (excluding contractual)

