



**Texas State Soil and Water Conservation Board
 State Nonpoint Source Grant Program
 Project 15-53**

| PROJECT SUMMARY PAGE | | | |
|---|---|---|---|
| Title of Project | Delivering Education Programs Focused on Stakeholder Needs to Address Agricultural NPS in the Arroyo Colorado Watershed | | |
| Project Goals/Objectives | <ul style="list-style-type: none"> • Distribute and develop materials needed to educate agricultural producers focused on technical information of BMPs • Educate agricultural producers on various financial and technical assistance programs available to help implement and pay for BMPs • Host field tours with producers currently using BMPs to highlight their effectiveness • Host demonstrations for agricultural producers to observe the effects of BMPs • Increase the number of producers that participate in incentive programs and install BMPs • Host a soil testing campaign to encourage the reduction of fertilizer application | | |
| Project Tasks | (1) Project Administration; (2) Conduct Education and Outreach to Increase Landowner Participation in Incentive Programs | | |
| Measures of Success | <ul style="list-style-type: none"> • Number of agricultural producers being educated • Increased participation in incentive programs or increased adoption of BMPs | | |
| Project Type | Implementation (); Education (X); Planning (); Assessment (); Groundwater () | | |
| Status of Waterbody on 2012 Texas Water Quality Inventory and 303(d) List | <u>Segment ID</u> 2201 (Arroyo Colorado Tidal) | <u>Parameter</u> Bacteria DDE in edible tissue Depressed dissolved oxygen Mercury in edible tissue PCBs in edible tissue | <u>Category</u> 5c 5c 5c 5c 5a |
| | 2201B (Unnamed drainage tributary) | Bacteria | 5b |
| | 2202 (Arroyo Colorado Above Tidal) | Bacteria Mercury in edible tissue PCBs in edible tissue | 5b 5c 5a |
| Project Location (Statewide or Watershed and County) | Arroyo Colorado Watershed in Hidalgo, Cameron and Willacy Counties | | |
| Key Project Activities | Hire Staff (); Surface Water Quality Monitoring (); Technical Assistance (); Education (X); Implementation (); BMP Effectiveness Monitoring (); RUAA (); Demonstration (); Planning (); Modeling (); Bacterial Source Tracking (); Other () | | |
| Texas NPS Management Program Elements | <ul style="list-style-type: none"> • E1, LTGs 1, 2, 3, 6, 8 • E1, STG 2D, STG 3A, 3B, 3C, 3D, 3F • E2, E3 | | |
| Project Costs | \$ 83,027 | | |
| Project Management | <ul style="list-style-type: none"> • Texas Water Resources Institute • Texas A&M AgriLife Extension Service | | |
| Project Period | October 1, 2014 – March 31, 2016 | | |

Part I – Applicant Information

| Applicant | | | | | | | |
|------------------|---|--------|--------|------------|--------------|----------|-------|
| Project Lead | Kevin Wagner | | | | | | |
| Title | Associate Director | | | | | | |
| Organization | Texas A&M AgriLife Extension Service, Texas Water Resources Institute | | | | | | |
| E-mail Address | klwagner@ag.tamu.edu | | | | | | |
| Street Address | 1500 Research Parkway Ste 110 | | | | | | |
| City | College Station | County | Brazos | State | TX | Zip Code | 77843 |
| Telephone Number | 979-845-2649 | | | Fax Number | 979-845-8554 | | |

| Project Partners | |
|---|---|
| Names | Roles & Responsibilities |
| Texas State Soil and Water Conservation Board (TSSWCB) | Provide state oversight and management of all project activities and ensure coordination of activities with related projects and the Texas Commission on Environmental Quality (TCEQ). |
| Texas Water Resources Institute (TWRI), Texas A&M AgriLife Extension Service & Texas A&M AgriLife Research | Provide overall project coordination and administration, reporting, project education and outreach and coordination of education and outreach, promote the participation in incentive programs. |
| Texas A&M University, Department of Biological and Agricultural Engineering (BAEN) | Work with TWRI in updating educational materials to make region specific. |
| Texas A&M AgriLife Research and Extension Center, District 12 | Work with TWRI in updating educational materials to make region specific and present during educational events, as appropriate. |
| Texas State Soil and Water Conservation Board, Harlingen Regional Office (HRO) | Work with and assist SWCDs in the development, implementation, and maintenance of WQMPs. Responsible for technical review and certification of WQMPs. Provide information to AgriLife Extension to coordinate related education programs and assist with demonstration field tours. |
| Southmost Soil and Water Conservation District #319, Hidalgo Soil and Water Conservation District #350 and Willacy Soil and Water Conservation District #349 (SWCD) | Collaborates with HRO to develop, implement and maintain WQMPs. Provide information to AgriLife Extension to coordinate related education programs and assist with demonstration field tours. |

Part II – Project Information

| Watershed Information | | | | |
|------------------------------|--|-------------------|----------------------------|---------------------|
| Watershed Name | Hydrologic Unit Code (12 Digit) | Segment ID | 305(b) Category | Size (Acres) |
| Lower Arroyo Colorado | 121102080700 | 2201 | 5c 5c 5c 5c 5a | 83,558 acres |
| Middle Arroyo Colorado | 121102080600 | 2202 | 5b 5c 5a | 105,412 acres |
| Upper Arroyo Colorado | 121102080100 | 2202 | 5b 5c 5a | 109,630 acres |

Water Quality Impairment

Describe all known causes of water quality impairments from any of the following sources: 2012 Texas Water Quality Inventory and 303(d) List, Clean Rivers Program Basin Summary/Highlights Reports, or other documented sources.

Impairments

SegID 2201: Arroyo Colorado Tidal: From the confluence with Laguna Madre in Cameron/Willacy County to a point 100 meters (110 yards) downstream of Cemetery Road south of Port Harlingen in Cameron County

| <u>Parameter</u> | <u>Category</u> | <u>Year</u> |
|------------------|-----------------|-------------|
| Bacteria | 5c | 2006 |

2201_03: From the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31 to the confluence with Harding Ranch Ditch tributary

2201_04: From the confluence with Harding Ranch Ditch tributary to just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186

2201_05: From just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186 to the upstream end of the segment

| <u>Parameter</u> | <u>Category</u> | <u>Year</u> |
|----------------------|-----------------|-------------|
| DDE in edible tissue | 5c | 2010 |

2201_05: From just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186 to the upstream end of the segment

| <u>Parameter</u> | <u>Category</u> | <u>Year</u> |
|----------------------------|-----------------|-------------|
| Depressed dissolved oxygen | 5c | 1996 |

2201_04: From the confluence with Harding Ranch Ditch tributary to just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186

2201_05: From just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186 to the upstream end of the segment

| <u>Parameter</u> | <u>Category</u> | <u>Year</u> |
|--------------------------|-----------------|-------------|
| Mercury in edible tissue | 5c | 2008 |

2201_05: From just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186 to the upstream end of the segment

| <u>Parameter</u> | <u>Category</u> | <u>Year</u> |
|-----------------------|-----------------|-------------|
| PCBs in edible tissue | 5a | 2008 |

2201_05: From just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186 to the upstream end of the segment

Water Quality Impairment

SegID 2201B: Unnamed Drainage Ditch Tributary (B) in Cameron County Drainage District #3 (unclassified water body) From the confluence with the Arroyo Colorado in Cameron County in the Rio Hondo turning basin at -97.6, 26.196 decimal degrees to a point 17.6 km upstream at the FM 510 crossing.

| Parameter | Category | Year |
|-----------|----------|------|
| Bacteria | 5b | 2010 |

2201B_01: Entire Water Body

SegID 2202: Arroyo Colorado Above Tidal: From a point 100 meters (110 yards) downstream of Cemetery Road south of Port Harlingen in Cameron County to FM 2062 in Hidalgo County

| Parameter | Category | Year |
|-----------|----------|------|
| Bacteria | 5b | 1996 |

2202_01: From the downstream end of segment to the confluence with Little Creek just upstream of State Loop 499.

2202_02: From the confluence with Little Creek to the confluence with La Feria Main Canal just upstream of Dukes Highway.

2202_03: From the confluence with La Feria Main Canal just upstream of Dukes Highway to the confluence with La Cruz Resaca just downstream of FM 907

2202_04: From the confluence with La Cruz Resaca to the upper end of segment at FM 2062

| Parameter | Category | Year |
|--------------------------|----------|------|
| Mercury in edible tissue | 5c | 2008 |

2202_01: From the downstream end of segment to the confluence with Little Creek just upstream of State Loop 499.

2202_02: From the confluence with Little Creek to the confluence with La Feria Main Canal just upstream of Dukes Highway.

2202_03: From the confluence with La Feria Main Canal just upstream of Dukes Highway to the confluence with La Cruz Resaca just downstream of FM 907

2202_04: From the confluence with La Cruz Resaca to the upper end of segment at FM 2062

| Parameter | Category | Year |
|-----------------------|----------|------|
| PCBs in edible tissue | 5a | 2008 |

2202_01: From the downstream end of segment to the confluence with Little Creek just upstream of State Loop 499.

2202_02: From the confluence with Little Creek to the confluence with La Feria Main Canal just upstream of Dukes Highway.

2202_03: From the confluence with La Feria Main Canal just upstream of Dukes Highway to the confluence with La Cruz Resaca just downstream of FM 907

2202_04: From the confluence with La Cruz Resaca to the upper end of segment at FM 2062

Water Quality Concerns

Seg ID 2201: Arroyo Colorado Tidal: From confluence with Laguna Madre in Cameron/Willacy County to a point 100 meters (110 yards) downstream of Cemetery Road south of Port Harlingen in Cameron County

| <u>Parameter</u> | <u>Level of Concern</u> |
|------------------|-------------------------|
| bacteria | CN |

2201_01: From the downstream end of the segment to the confluence with San Vicente Drainage Ditch

2201_02: From the confluence with San Vicente Drainage Ditch to the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31

| <u>Parameter</u> | <u>Level of Concern</u> |
|------------------|-------------------------|
| Chlorophyll-a | CS |

2201_01: From the downstream end of the segment to the confluence with San Vicente Drainage Ditch

2201_02: From the confluence with San Vicente Drainage Ditch to the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31

2201_03: From the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31 to the confluence with Harding Ranch Ditch tributary

2201_04: From the confluence with Harding Ranch Ditch tributary to just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186

2201_05: From just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186 to the upstream end of the segment

| <u>Parameter</u> | <u>Level of Concern</u> |
|----------------------------|-------------------------|
| Depressed dissolved oxygen | CN |

2201_05: From just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186 to the upstream end of the segment

| <u>Parameter</u> | <u>Level of Concern</u> |
|------------------|-------------------------|
| nitrate | CS |

2201_01: From the downstream end of the segment to the confluence with San Vicente Drainage Ditch

2201_02: From the confluence with San Vicente Drainage Ditch to the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31

2201_03: From the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W

Water Quality Concerns

26.31 to the confluence with Harding Ranch Ditch tributary

2201_04: From the confluence with Harding Ranch Ditch tributary to just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186

2201_05: From just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186 to the upstream end of the segment

| <u>Parameter</u> | <u>Level of Concern</u> |
|------------------|-------------------------|
| orthophosphorus | CS |

2201_03: From the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31 to the confluence with Harding Ranch Ditch tributary

2201_04: From the confluence with Harding Ranch Ditch tributary to just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186

2201_05: From just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186 to the upstream end of the segment

SegID 2201A: Harding Ranch Drainage Ditch Tributary (A) to the Arroyo Colorado Tidal (unclassified water body)

| <u>Parameter</u> | <u>Level of Concern</u> |
|------------------|-------------------------|
| ammonia | CS |

2201A_01: Entire water body

SegID 2201B: Unnamed Drainage Ditch Tributary (B) in Cameron County Drainage District #3 (unclassified water body)

| <u>Parameter</u> | <u>Level of Concern</u> |
|------------------|-------------------------|
| Chlorophyll-a | CS |

2201B_01: Entire Water Body

| <u>Parameter</u> | <u>Level of Concern</u> |
|------------------|-------------------------|
| nitrate | CS |

2201B_01: Entire Water Body

SegID 2202: Arroyo Colorado Above Tidal: From a point 100 meters (110 yards) downstream of Cemetery Road south of Port Harlingen in Cameron County to FM 2062 in Hidalgo County

| <u>Parameter</u> | <u>Level of Concern</u> |
|------------------|-------------------------|
| Chlorophyll-a | CS |

Water Quality Concerns

2201_01: From the downstream end of the segment to the confluence with San Vicente Drainage Ditch

2201_02: From the confluence with San Vicente Drainage Ditch to the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31

2201_03: From the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31 to the confluence with Harding Ranch Ditch tributary

2201_04: From the confluence with Harding Ranch Ditch tributary to just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186

| <u>Parameter</u> | <u>Level of Concern</u> |
|------------------|-------------------------|
|------------------|-------------------------|

| | |
|---------|----|
| nitrate | CS |
|---------|----|

2201_01: From the downstream end of the segment to the confluence with San Vicente Drainage Ditch

2201_02: From the confluence with San Vicente Drainage Ditch to the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31

2201_03: From the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31 to the confluence with Harding Ranch Ditch tributary

2201_04: From the confluence with Harding Ranch Ditch tributary to just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186

| <u>Parameter</u> | <u>Level of Concern</u> |
|------------------|-------------------------|
|------------------|-------------------------|

| | |
|-----------------|----|
| orthophosphorus | CS |
|-----------------|----|

2201_01: From the downstream end of the segment to the confluence with San Vicente Drainage Ditch

2201_02: From the confluence with San Vicente Drainage Ditch to the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31

2201_03: From the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31 to the confluence with Harding Ranch Ditch tributary

2201_04: From the confluence with Harding Ranch Ditch tributary to just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186

| <u>Parameter</u> | <u>Level of Concern</u> |
|------------------|-------------------------|
|------------------|-------------------------|

| | |
|------------------|----|
| Total phosphorus | CS |
|------------------|----|

2201_01: From the downstream end of the segment to the confluence with San Vicente Drainage Ditch

2201_02: From the confluence with San Vicente Drainage Ditch to the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31

2201_03: From the confluence with an unnamed drainage ditch with NHD RC 12110108005353 at point N-97.53, W 26.31 to the confluence with Harding Ranch Ditch tributary

2201_04: From the confluence with Harding Ranch Ditch tributary to just upstream of the City of Hondo Wastewater Discharge at point N-97.58359, W26.247186

Project Narrative

Problem/Need Statement

The Arroyo Colorado is located in Cameron, Hidalgo, and Willacy counties in the Lower Rio Grande Valley of South Texas and is an ancient channel of the Rio Grande River. It extends eastward for about 90 miles beginning near the City of Mission through southern Hidalgo County to the City of Harlingen in Cameron County, eventually discharging into the Lower Laguna Madre near the Cameron-Willacy county line. The land that drains into the Arroyo Colorado is known as the Arroyo Colorado watershed and is approximately 706 square miles that generally consists of coastal plain that slopes gently eastward toward the Gulf of Mexico. Land uses have been classified by the Spatial Sciences Lab of Texas A&M University at College Station and primarily include agriculture (54%), range (18.5%), urban (12%), water bodies (6%) and sugarcane (4%) (Kannan, 2012); however, vegetable and fruit crops are grown in portions of the watershed and some industry exists. One third of the stream is also used for shipping from the Gulf Intracoastal Waterway to the Port of Harlingen. The Arroyo Colorado not only serves as a natural habitat, fishery and recreational waterway, but with its multiple land uses it also serves a very important purpose of draining runoff and return flows from both urban wastewater discharges and agricultural irrigation as well as stormwater runoff and base flows from groundwater.

Agriculture and municipalities are the two primary water users in the watershed and flow in the Arroyo Colorado is primarily sustained by agricultural irrigation return flows and wastewater discharges; thus, the Arroyo Colorado serves as a conveyer of this water as it leaves the system. Approximately two dozen cities in the area use the Arroyo Colorado as a primary drainage-way and it serves as a major source of freshwater 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 Colorado watershed, making it an area for bird-watchers, nature-lovers and outdoors enthusiasts. When wastewater discharges and agricultural return flows enter the Arroyo Colorado, they carry nutrients, sediment and bacteria into the waterbody.

The tidal segment of the Arroyo Colorado was first listed as having low levels of dissolved oxygen in 1996 and elevated levels of bacteria in 2006 (Texas Commission on Environmental Quality, 2013), while the above tidal segment was listed in 1996 for having elevated levels of bacteria. To address the Arroyo Colorado's bacteria and dissolved oxygen impairment as well as nutrient concerns, the Arroyo Colorado Watershed Partnership developed *A Watershed Protection Plan for the Arroyo Colorado – Phase I*. The WPP, which was released in 2007, included recommendations from five major workgroups: wastewater infrastructure; agricultural issues; habitat restoration; water quality monitoring; and education and outreach. The Arroyo Colorado Agricultural Issues Workgroup, made up of local, state, and federal stakeholders, recommended that education and outreach be one of the priorities for implementation.

Since then, several projects have occurred such as an integrated farm management program, pesticide education program and a cost-share education program. Although the programs have been effective in raising awareness about water quality, the Arroyo Colorado Watershed Partnership has still not met its goal of acreage under a conservation plan. To address this, an education program is still needed to 1) continue raising awareness, and 2) provide technical education so that people understand which practices they need to adopt and why they need to do so. Results from a recent survey support that outreach and education for agricultural producers is a critical component to achieving voluntary implementation of BMPs.

Results of a recent evaluation assessing educational needs of agricultural producers in the Lower Rio Grande Valley of Texas showed that water quantity was the primary educational need. Agricultural producers indicated that their main concern is the amount of irrigation water available for the upcoming year and specific conservation practices that reduce the amount of irrigation water used. Reducing the quantity of irrigation water applied is of particular importance in improving water quality as Enciso (2012) found that excessive tailwater during irrigation events can contain high amounts of nutrients. Curbing tailwater flows into the Arroyo Colorado is just as important as nutrient management in reducing the nutrient loads applied to the land's surface that can contribute to local impairments. Second to water quantity, agricultural producers were generally interested in water quality, per the evaluation results. They are mostly interested in knowing what current water quality levels are and how they may impact their operations. In discussions with producers, they have expressed a desire to reuse irrigation water runoff, but are concerned about the

water quality, especially related to salinity. Financial incentives were the third highest area that producers were interested in according to the results. Sources of available financial incentives and how to apply for them to help implement conservation practices ranked among the highest in the construct. Finally, in response to conservation practice educational needs producers want more information on conservation practice effectiveness and how those practices can improve their operations. Addressing these educational needs is crucial to gaining widespread adoption of agricultural management practices.

In addition to determining educational needs, the evaluation also assessed barriers to adopting best management practices by agricultural producers in the Lower Rio Grande Valley. Economic barriers ranked highest among the reasons for non-adoption, specifically the initial cost of installation and low incentive levels. These barriers are clearly evident here in the Lower Rio Grande Valley as water is very inexpensive and the antiquated water delivery system is not conducive to some of the more efficient methods of irrigation. For example, drip irrigation is known to be more efficient but because the water delivery system is designed to deliver large quantities at one time, in order to utilize drip irrigation one must have a reservoir on farm in order to deliver small quantities of water frequently. The high initial cost of installing drip irrigation combined with inexpensive water costs provide no incentive to switch to more efficient methods of irrigation. Another barrier noted by producers is the lack of opportunity to see demonstrations of conservation practices and their effectiveness. Many producers do not believe that conservation practices such as reduced till or cover crops will work in the area. Following closely behind economic barriers is the lack of information on incentive programs. The survey results indicate that there is a need for educational programs and demonstrations that will address the primary barriers to adopting practices.

Supporting these barriers in the literature, Nowak (1992) described two reasons for non-adoption; 1) being unable to adopt and 2) being unwilling to adopt. In the first reason, he describes that information is lacking or scarce and the availability and accessibility of supporting resources is limited, which are directly tied to education. In his second reason, he says that limitation is related to conflicting information and poor applicability and relevance of information, which are also related to education. Rogers (2003) also supports this by providing the needed components of innovations, which are: relative advantage, compatibility, complexity, observability, and trialability. Educators are not able to meet the component of trialability; however, the other four can be provided. Recent education programs have been unable to provide the first three components to producers and as a result, the amount of interest in adopting management practices has not met the goals of the Arroyo Colorado Watershed Partnership. It is the goal of this project to deliver the most relevant information to agricultural producers and equip them with the technical information needed to adopt best management practices, especially through incentive programs.

References:

- Kannan, N. Texas Water Resources Institute, (2012). *Swat modeling of the Arroyo Colorado watershed* (Technical Report 426). Retrieved from website: <http://twri.tamu.edu/reports/2012/tr426.pdf>
- Nowak, P. (1992). Why farmers adopt production technology Overcoming impediments to adoption of crop residue management techniques will be crucial to implementation of conservation compliance plans. *Journal of Soil and Water Conservation*, 47(1), 14-16.
- Rogers, E. M. (2003). *Diffusion of Innovations*. New York, NY: Free Press.
- Texas Commission on Environmental Quality. (2013, February 13). *Draft 2012 Texas integrated report - Texas 303(d) list (category 5)*. Retrieved from http://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/12twqi/2012_303d.pdf

Project Narrative

General Project Description (Include Project Location Map)

This project will primarily continue efforts from TSSWCB 10-11, but the educational program will focus on two topics; first to provide the most up-to-date information on technical and financial assistance from federal, state and local agencies and second to highlight local success stories of producers currently implementing conservation practices. As indicated from a recent evaluation of agricultural producers a lack of awareness about technical and financial assistance programs, as well as lack of opportunity to see conservation practices' effectiveness are two of the main barriers to adoption. By focusing educational efforts on these two topics those barriers will be addressed first-hand. Focusing on success stories of local producers will not only provide an opportunity for others to learn about the various conservation practices that can help improve soil health and water quality, but they will also see first-hand that these practices are effective here in the Lower Rio Grande Valley.

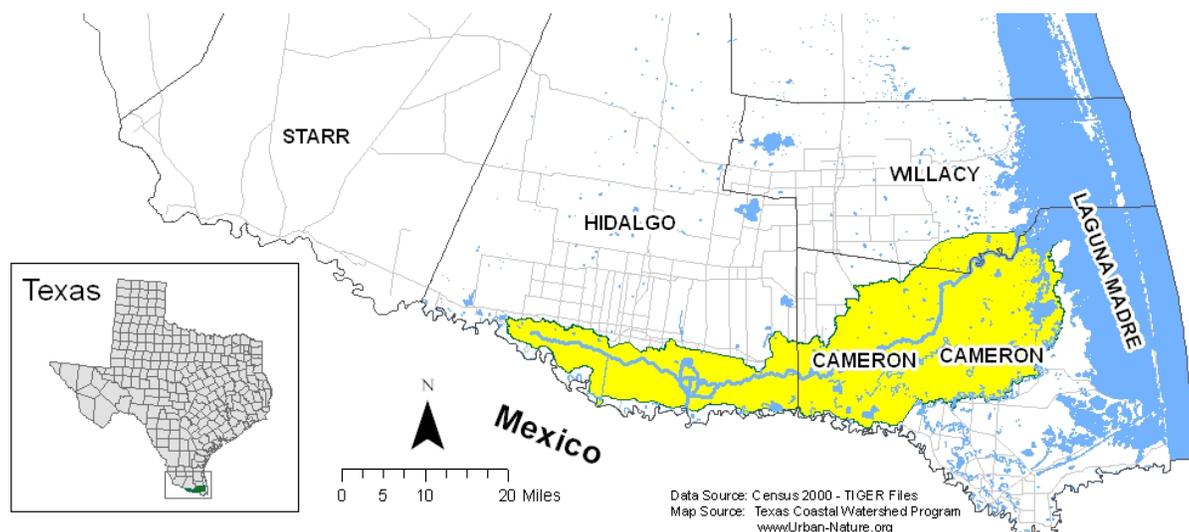


Figure 1. Highlighted in yellow is the Arroyo Colorado watershed.

Improving and maintaining soil health plays a key role in reducing pollutant loads in the Arroyo Colorado. To draw attention to the topic of soil health, a soil testing campaign will be held in the Fall/Winter of 2014/2015, allowing producers within Hidalgo, Cameron and Willacy counties to receive soil analysis free of charge. The soil testing campaign will be promoted via press release in local newspapers, online news sources, radio, direct mailings, social media, as well as flyers posted at local farm and ranch stores. The Extension Assistant will be available to assist with interpreting soil testing results if requested.

As this is a continuation of an existing project, a producer mailing list already exists, but the Extension Assistant will continue to develop that list as new contacts are made as well as utilize contacts within other agencies to distribute information to their own existing mailing lists. These mailing lists will be used to inform producers about the availability of technical and financial assistance, upcoming educational programs, field demonstration and trials. The Extension Assistant will work closely with NRCS, FSA, TSSWCB, SWCD, Irrigation Districts and Drainage Districts to help promote their activities and educational programs as well as be available to give presentations and help host/organize programs as requested.

The Extension Assistance will update existing BMP materials and develop new materials if needed that focus on priority BMPs and promote the adoption of those practices. A review of all existing BMP material will be done to ensure that all materials have the most current and up-to-date information to reflect new practices and any changes in technical and financial assistance programs due to the passing of the most recent farm bill. An existing manual, Irrigation Training Program: South Texas Edition will be revised to suit the needs of the Rio Grande Valley. Although entitled South Texas Edition, the manual was not written for deep south Texas. This manual will be a guide for producers on all relevant methods of irrigation, their installation costs, water use efficiency and economic analysis.

Again, water quantity and practices to reduce water use ranked high in an evaluation of agricultural producers' educational needs. Updating this manual to include current information tailored to the Lower Rio Grande Valley would cover both of these educational needs that producers have voiced as highly important to them. In addition, revising the manual would allow for the possibility of offering an irrigation training workshop in the future, where we could use the manual as curriculum and bring in experts to present on the various topics.

The essential objective of this project is to educate agricultural producers in the Arroyo Colorado Watershed about the impairments facing the Arroyo Colorado and what they can do to help improve not only the quality of water, but soil health and their overall operations. To do so, the Extension Assistant will be readily accessible for meetings, and deliver education programs and workshops about the Arroyo Colorado Watershed and the impairments it faces. Education materials will be distributed at these meetings and education programs as well as by direct mailings and through social media. In addition to hosting education programs and field demonstrations, the Extension Assistant will be available to help other partners like NRCS, FSA, etc. plan, organize and promote their own programs. Communication on a regular basis will ensure efforts are not duplicated and the most up-to-date information is reaching agricultural producers in the area. The Extension Assistant will work closely with NRCS to publicize their renewed emphasis on soil health particularly by identifying producers already working with NRCS and enlisting them for programs and field tours to showcase the conservation practices they are using, highlighting their success.

| Tasks, Objectives and Schedules | | | |
|--|---|---------|-----------------|
| Task 1 | Project Administration | | |
| Costs | \$12,903 | | |
| Objective | To effectively administer, coordinate and monitor all work performed under this project including technical and financial supervision and preparation of status reports. | | |
| Subtask 1.1 | TWRI will prepare electronic quarterly progress reports (QPRs) for submission to the TSSWCB. QPRs shall document all activities performed within a quarter and shall be submitted by the 15 th of March, June, September and December. QPRs shall be distributed to all project partners. | | |
| | Start Date | Month 1 | Completion Date |
| | | | Month 18 |
| Subtask 1.2 | TWRI will perform accounting functions for project funds and will submit appropriate Reimbursement Forms to TSSWCB at least quarterly. | | |
| | Start Date | Month 1 | Completion Date |
| | | | Month 18 |
| Subtask 1.3 | TWRI will host coordination meetings or conference calls with TSSWCB at least quarterly to discuss project activities, project schedule, communication needs, deliverables, and other requirements. TWRI will develop lists of action items needed following each project coordination meeting and distribute to project personnel. | | |
| | Start Date | Month 1 | Completion Date |
| | | | Month 18 |
| Deliverables | <ul style="list-style-type: none"> • Quarterly progress reports in electronic format • Reimbursement Forms and necessary documentation in hard copy format • List of action items needed from project coordination meetings | | |

| Tasks, Objectives and Schedules | | | |
|--|---|---------|-----------------|
| Task 2 | Developing and Updating Educational Materials | | |
| Costs | \$34,364 | | |
| Objective | To ensure that only the most relevant information is being delivered to agricultural producers and that the messages is consistent across collaborating agencies. | | |
| Subtask 2.1 | The Extension Assistant will use an inventory of existing educational materials related to priority BMPs and conduct a literature review of their effectiveness. | | |
| | Start Date | Month 1 | Completion Date |
| Subtask 2.2 | The Extension Assistant will use information in the USDA-NRCS Field Office Technical Guide to develop educational materials that highlight specifications, beyond descriptions, about various BMPs that are of interest to producers. The Extension Assistant will consult with SWCD, NRCS, FSA and HRO to make sure that all information being provided in educational materials is current and correct. Materials will be distributed at the various educational events mentioned in Task 3. | | |
| | Start Date | Month 1 | Completion Date |
| Subtask 2.3 | The Extension Assistant will coordinate an update of the Irrigation Training Program manual so that the information is current and tailored to the Lower Rio Grande Valley. This manual will consist of the following topics, but not limited to: <ul style="list-style-type: none"> • Economics • Irrigation scheduling • Irrigation technologies and BMPs • Water quality issues • Crop-specific guidelines The manual will be printed and provided to participants at relevant educational events as listed in Task 3 or upon request. The update of this manual will allow for future opportunities to develop an irrigation training workshop using this manual as the curriculum if funding becomes available. | | |
| | Start Date | Month 1 | Completion Date |
| Subtask 2.4 | Materials that educate producers on technical and financial assistance programs will be updated to reflect any changes to those programs as outlined by the most recent Farm Bill and delivered at educational events listed in Task 3 to further encourage the adoption of BMPs through assistance programs. | | |
| | Start Date | Month 1 | Completion Date |
| Deliverables | <ul style="list-style-type: none"> • Inventory and literature review of priority BMPs • Revised and updated Irrigation Training Program manual • Educational materials on BMP specifications • Additional educational materials (developed as appropriate) | | |

| Tasks, Objectives and Schedules | | | | |
|--|--|---------|-----------------|----------|
| Task 3 | Conduct Education and Outreach to Increase Landowner Participation in Technical and Financial Assistance Programs | | | |
| Costs | \$10,390 | | | |
| Objective | To host educational events and field days as well as evaluate educational program effectiveness. Distribute educational materials that encourage the use of best management practices and promote the technical and financial assistance programs that support them. Further, objectives are to contact landowners through direct mailings, direct contact and support and participate in entity meetings and other demonstrations. | | | |
| Subtask 3.1 | The Extension Assistant will continue to expand upon the mailing list of producers in the Arroyo Colorado watershed. | | | |
| | Start Date | Month 1 | Completion Date | Month 18 |
| Subtask 3.2 | The Extension Assistant will use the mailing list identified in Subtask 3.1 to distribute educational materials such as fact sheets, notify producers of federal, state and local technical and financial assistance program updates, invite producers to programs/workshops and field demonstrations/tours and to maintain a general line of communication. Direct mailings, news releases, social media, and other communication channels will be used to promote the aforementioned activities. | | | |
| | Start Date | Month 1 | Completion Date | Month 18 |
| Subtask 3.3 | The Extension Assistant will coordinate with SWCDs, NRCS, FSA, HRO, and cooperating producers to host one educational program annually, specifically dedicated to promoting technical and financial assistance programs. The Extension Assistant will utilize previously developed materials as well as develop technical materials that highlight the specifications of BMPs in the NRCS FOTG (subtask 2.2). | | | |
| | Start Date | Month 1 | Completion Date | Month 18 |
| Subtask 3.4 | Texas A&M AgriLife Extension will coordinate with SWCDs, NRCS, FSA, HRO, and cooperating producers to host field tours that demonstrate benefits of BMPs and WQMPs. At least 1 field tours will be held annually. These events will consist of either a tour of a farm that is currently implementing BMPs, such as cover crops or a demonstration of equipment like laser land leveling to illustrate the efficacy of BMPs. The Extension Assistant will also support, promote, and participate in, as appropriate, any field days, demonstrations, site tours, or education events sponsored by NRCS, FSA, HRO, and/or SWCDs for the Arroyo Colorado watershed | | | |
| | Start Date | Month 1 | Completion Date | Month 18 |
| Subtask 3.5 | Educational program (Subtasks 3.3, 3.4) effectiveness will be assessed using a post-evaluation at events. Evaluations will contain before and after scales (to measure knowledge before and after the program) for producers to rate their knowledge gained as well as their opinion about the program. Results will be used to assess their gain in knowledge and willingness to adopt. | | | |
| | Start Date | Month 1 | Completion Date | Month 18 |
| Subtask 3.6 | The Extension Assistant will continue providing irrigation districts, drainage districts, and commodity organizations with educational materials to encourage water quality discussions among entities. Further, the Extension Assistant will attempt to participate in the entities meetings annually to discuss the project and maintain an open line of communication to provide presentations, information and help organize and promote events if requested. | | | |
| | Start Date | Month 1 | Completion Date | Month 18 |
| Deliverables | <ul style="list-style-type: none"> • Direct mailing list • News releases • Annual financial and technical assistance program agenda • Annual demonstration field tour agenda • Number of meeting attendees • Post-evaluation results from educational events • Entity meeting agendas participated in • List of field days, demonstrations and other events participated in | | | |

| Tasks, Objectives and Schedules | | | | |
|--|---|---------|-----------------|----------|
| Task 4 | Organize and Promote Participation in Soil Testing Campaign | | | |
| Costs | \$14,540 | | | |
| Objective | To host and advertise the soil testing campaign that will help producers meet requirements of various management practices and incentive programs, as well as to promote interest in soil health and management. | | | |
| Subtask 4.1 | To encourage the use of soil testing in support of nutrient management and soil health, Texas A&M AgriLife Extension will host a soil testing campaign for agricultural producers in Hidalgo, Cameron and Willacy counties. The soil testing campaign will be offered in the fall of 2014 through winter of 2015. Producers will be encouraged to soil test to determine nutrient application needs and AgriLife Extension will provide follow-up educational assistance to interpret soil test results. | | | |
| | This project will pay up to \$10 per soil test sample taken and will pay for all soil tests necessary to comply with soil testing frequencies consistent with the NRCS practice standard for Nutrient Management (590). Soil tests and shipping paid for with project funding must be completed by a public soil testing laboratory, such as the AgriLife Extension Soil, Water and Forage Testing Laboratory. | | | |
| | Start Date | Month 1 | Completion Date | Month 18 |
| Subtask 4.2 | The Extension Assistant will coordinate with County Extension Agents in Hidalgo, Cameron and Willacy counties to make sure they are aware of the soil testing campaign and are promoting it to their county producers as well as providing soil sample bags, submittal forms and guidelines. The Extension Assistant will be available to give presentations about the soil testing campaign and proper soil sampling techniques upon request. | | | |
| | Start Date | Month 1 | Completion Date | Month 18 |
| Subtask 4.3 | Advertisement for the soil testing campaign will be conducted through direct mailings to producers identified in Subtask 3.1. Flyers advertising the campaign will be posted at local farm and ranch stores, cotton gin co-ops, county extension offices, and other appropriate locations. At the beginning of the campaign a press release will be written for local papers and radio and social media will be utilized to promote the campaign. Contacts with NRCS, FSA, SWCD, HRO, Irrigation districts and drainage districts will be asked to promote the campaign through their newsletters, direct contact and by posting the poster in their offices. The Extension Assistant will give a presentation at the annual Cotton and Grain Pre-plant meeting held every year in January. | | | |
| | Start Date | Month 1 | Completion Date | Month 18 |
| Deliverables | <ul style="list-style-type: none"> • Number of soil testing participants • Results of soil testing campaign • Flyers for Soil Testing Campaign and list of where it was posted • Press release for the campaign | | | |

Project Goals (Expand from Summary Page)

- Update existing educational materials and develop new materials that focus on specifications of BMPs to reduce the complexity of BMPs and demonstrate compatibility with current operations
- Updated and revised for the Lower Rio Grande Valley Irrigation Training Program manual
- Educate agricultural producers on various aspects of irrigation to demonstrate the feasibility of adopting BMPs
- Support and promote the adoption of BMPs through incentive programs by hosting annual cost-share update meetings and field tours to demonstrate the effectiveness of BMPs
- Increase the number of BMPs that have been adopted through providing materials and other educational efforts

Measures of Success (Expand from Summary Page)

- Update and/or development of educational materials specifically addressing BMPs and incentive programs.
- Number of producers reached through education programs.
- Increase in the number of BMPs installed as a result of increased outreach and education through this project.
- Evaluation of educational programs and producers likeliness to adopt practices

2012 Texas NPS Management Program Reference (Expand from Summary Page)

Components, Goals, and Objectives

Element 1: Explicit short- and long-term goals, objectives ... that protect surface and groundwater.

- LTG 1: Focus NPS abatement efforts, implementation strategies, and available resources in watersheds identified as impacted by nonpoint source pollution
- LTG 2: Support the implementation of state, regional and local programs to prevent NPS pollution through assessment, implementation and education.
- LTG 3: Support the implementation of state, regional and local programs to reduce NPS pollution, such as implementation of strategies defined in... Watershed Protection Plans
- LTG 6: Increase overall public awareness of NPS issues and prevention activities
- STG 2: Implementation: Coordinate and administer the implementation of Watershed Protection Plans and other state, regional, and local plans/programs to reduce NPS pollution.
 - Objective D: Implement... Watershed Protection Plans developed to restore and maintain water quality in water bodies identified as impacted by nonpoint source pollution.
- STG 3: Education: Conduct education and technology transfer activities to help increase awareness of NPS pollution and prevent activities contributing to the degradation of water bodies, including aquifers, by NPS pollution
 - Objective A: Enhance existing outreach programs at the state, regional and local levels to maximize the effectiveness of NPS education
 - Objective B: Administer programs to educate citizens about water quality and their potential role in causing NPS pollution
 - Objective C: Where applicable, expedite development of technology transfer activities to be conducted upon completion of BMP implementation.
 - Objective D: Conduct outreach through the ...Texas Cooperative Extension, Soil and Water Conservation Districts, and others to facilitate broader participation and partnerships. Enable stakeholders and the public to participate in decision-making and provide a more complete understanding of water quality issues and how they relate to each citizen.
 - Objective F: Implement public outreach and education to maintain and restore water quality in water bodies impacted by NPS pollution.

Element 2: Working partnerships and linkages to appropriate state, ..., regional and local entities, private sector groups and Federal agencies.

Element 3: Balanced approach that emphasizes both state-wide nonpoint source programs and on-the-ground management of individual watersheds.

Part III – Financial Information

| Budget Summary | |
|------------------------------|------------------|
| Category | Costs |
| Personnel | \$ 52,855 |
| Fringe Benefits | \$ 12,897 |
| Travel | \$ 1,839 |
| Equipment | \$ 0 |
| Supplies | \$ 264 |
| Contractual | \$ 0 |
| Construction | \$ 0 |
| Other | \$ 4,342 |
| Total Direct Costs | \$ 72,197 |
| Indirect Costs (≤15%) | \$ 10,830 |
| Total Project Costs | \$ 83,027 |

| Budget Justification | | |
|-----------------------------|--------------|--|
| Category | Costs | Justification |
| Personnel | \$ 52,855 | <ul style="list-style-type: none"> • Extension Assistant @ .75 FTE for 1.5 years: \$29,940 • BAEN Associate Professor & Extension Specialist @ .06 FTE for 1 year: \$5,650 • BAEN Associate Professor @ .02 for 1 year: \$2,426 • AgEcon Post Doc @ .16 FTE for 1 year: \$12,306 • TWRI Program Manager @ .02 for 1.5 years: \$1,626 • TWRI Project Specialist @ .02 for 1 year: \$907 |
| Fringe Benefits | \$ 12,897 | <ul style="list-style-type: none"> • Extension Assistant @ .75 FTE for 1.5 years: \$9,172 • BAEN Associate Professor & Extension Specialist @ .06 FTE for 1.5 years: \$1,203 • BAEN Associate Professor @ .02 for 1 year: \$671 • AgEcon Post Doc @ .16 FTE for 1 year: \$1,050 • TWRI Program Manager @ .02 for 1.5 years: \$498 • TWRI Project Specialist @ .02 for 1 year: \$303 |
| Travel | \$ 1,839 | <ul style="list-style-type: none"> • Extension vehicle usage, 165 miles/month @ \$0.40/mi = \$1,188 • Lodging, per diem and rental vehicle, as needed, for overnight trips at the state rates for the locations = \$651 |
| Equipment | \$ 0 | N/A |
| Supplies | \$ 264 | <ul style="list-style-type: none"> • Supplies needed to print materials, reports and carry out project details as well as fuel if/when a rental vehicle is needed |
| Contractual | \$ 0 | N/A |
| Construction | \$ 0 | N/A |
| Other | \$ 4,342 | <ul style="list-style-type: none"> • Soil testing, 310 samples @ \$10: \$3,100 • Soil sample shipping: \$1,194 • TWRI Printing: \$48 |
| Indirect | \$ 10,830 | Calculated at 15% of Modified Total Direct Cost |