



**Texas State Soil and Water Conservation Board
 State General Revenue Nonpoint Source Grant Program
 FY 2011 Project 11-50**

PROJECT SUMMARY PAGE											
Title of Project	Assessment of Water Quality and Watershed Planning for the Leona River										
Project Goals/Objectives	To provide stakeholders and agencies with sufficient information to address bacteria impairments on the Leona River through verification of use attainment, revision of water quality standards, or development of a WPP or TMDL by 1) collecting water quality data for evaluation of bacteria and nitrate concentrations and assessment of source identification, 2) conducting BST to aid in the identification of bacteria sources, 3) developing a comprehensive GIS inventory and an updated land use classification and conducting a source survey, 4) collecting information on factors affecting recreational use, 5) using modeling tools to provide an evaluation of loadings and sources throughout the watershed, and 6) facilitating public involvement so that stakeholders can make informed decisions about the future of the watershed.										
Project Tasks	1) Project Administration; 2) Quality Assurance; 3) Bacterial Source Tracking; 4) Survey and Inventory of Possible Bacteria Sources; 5) Surface Water Quality Monitoring; 6) Assess Attainability of Recreational Use; 7) Data Analysis and Watershed Modeling; 8) Public Participation and Stakeholder Facilitation										
Measures of Success	1) Decision-making for watershed planning activities is founded on local stakeholder input. 2) Collecting water quality monitoring data of known and acceptable quality that are representative of conditions. 3) BST is conducted to allow an evaluation of sources contributing to impairment and identification of critical loading areas. 4) Generating an updated land use/land cover classification. 5) Factors affecting attainment of recreation use are assessed. 6) Spatially explicit modeling and LDCs allow a defensible assessment of sources, loadings, and critical areas. 7) Successfully facilitating public participation as measured by meeting attendance as well as feedback from stakeholders.										
Project Type	Implementation (); Education (X); Planning (X); Assessment (X)										
Status of Waterbody on 2010 Texas Integrated Report	<table border="1"> <thead> <tr> <th><u>Segment ID</u></th> <th><u>Parameter</u></th> <th><u>Category</u></th> </tr> </thead> <tbody> <tr> <td>2109 Leona River</td> <td>Bacteria</td> <td>5c</td> </tr> <tr> <td></td> <td>Nitrate</td> <td>CS</td> </tr> </tbody> </table>	<u>Segment ID</u>	<u>Parameter</u>	<u>Category</u>	2109 Leona River	Bacteria	5c		Nitrate	CS	
<u>Segment ID</u>	<u>Parameter</u>	<u>Category</u>									
2109 Leona River	Bacteria	5c									
	Nitrate	CS									
Project Location (Statewide or Watershed and County)	Leona River Watershed in Frio, Uvalde, and Zavala Counties										
Key Project Activities	Hire Staff (X); Surface Water Quality Monitoring (X); Technical Assistance (); Education (X); Implementation (); BMP Effectiveness Monitoring (); Demonstration (); Planning (X); Modeling (X); Bacterial Source Tracking (X); Other ()										
Texas NPS Management Program Elements	<ul style="list-style-type: none"> • Element One (STGs 1A, 1B, 1C, 3B, 3D) • Element Two • Element Five 										
Project Costs	\$861,714										
Project Management	<ul style="list-style-type: none"> • Texas Institute for Applied Environmental Research at Tarleton State University 										
Project Period	January 1, 2011 – June 30, 2013										

Part I – Applicant Information

Applicant							
Project Lead	Dan Hunter						
Title	Executive Director						
Organization	Texas Institute for Applied Environmental Research at Tarleton State University						
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Telephone Number	254-968-9566			Fax Number	254-968-9336		

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.
Texas Institute for Applied Environmental Research at Tarleton State University (TIAER)	Coordinate and manage all work described in Tasks. Develop GIS inventory and perform LDC analysis and spatially explicit modeling. Conduct water quality monitoring and analyses. Collaborate with Nueces River Authority to facilitate stakeholder process.
Nueces River Authority (NRA)	Collaborate as critical local stakeholder, provide guidance and support gathering historical information, assist in portions of sampling tasks and play a lead role in communicating with other local stakeholders.
Texas AgriLife Research – Department of Soil and Crop Sciences (SCSC)	Conduct Bacterial Source Tracking (Task 3)
Texas A&M University – Spatial Sciences Laboratory (SSL)	Classify land use (subtask 4.2)
Nueces-Frio-Sabinal Soil and Water Conservation District, Winter Garden Soil and Water Conservation District, and Frio Soil and Water Conservation District (SWCDs 221, 326, and 325)	Collaborate as critical local stakeholders and play a lead role in communicating with other local stakeholders.
Texas AgriLife Extension Service – Department of Soil and Crop Sciences (AgriLife Extension)	Deliver Texas Watershed Steward Program workshop in the Leona River watershed (subtask 8.4) through TSSWCB project 07-09.

Part II – Project Information

Watershed Information

Watershed Name	Hydrologic Unit Code (8 Digit)	Segment ID	305(b) Category	Size (Acres)
Leona River	12110106	2109	5c	429,244

Water Quality Impairment

Describe all known causes of water quality impairments from any of the following sources: 2010 Texas Integrated Report, Clean Rivers Program Basin Summary/Highlights Reports, or other documented sources.

Bacteria is listed on the draft *2010 Texas 303(d) List* as an impairment for assessment units 2109_01 (from the downstream end of segment to the confluence of Yoledigo Creek), 2109_02 (from the confluence of Yoledigo Creek to the confluence of Camp Lake Slough), and 2109_03 (from the confluence of Camp Lake Slough to the upper end of segment) of the Leona River. All three assessment units were first listed for bacteria in 2006 and are classified as category 5c, indicating that additional data and information need to be collected before a TMDL is scheduled. The sources of these bacteria impairments are listed as nonpoint source and unknown.

Along the Leona River, all three assessment units are also indicated within the draft *2010 Texas Integrated Report* to have concerns for nitrate based on screening levels. The sources for this concern for nitrates are indicated to come from municipal point source discharges, nonpoint sources and unknown sources.

Within the NRA Clean Rivers Program 2008 Basin Summary Report and 2010 Basin Highlights Report, the impairments for bacteria and concerns for nitrates are noted as the only water quality problems along the Leona River. A couple of exceedences below the lower pH criterion of 6.5 were indicated for AU 2109_01, and one low dissolved oxygen measurement was noted for AU 2109_02 and four low DO measurements for AU 2109_03. Neither pH nor DO were indicated as impairments or concerns, although within the 2008 Basin Summary Report, it was noted that all four low DO measurements occurred at Station 18415; this particular station may have an emerging problem to watch for in future assessments.

Project Narrative

Problem/Need Statement

The Leona River (Segment 2109) is a tributary of the Frio River within the Nueces River Basin. The river flows 85 miles from US 83 in Uvalde County, through Zavala County, then to its confluence with the Frio River in Frio County. The watershed is approximately 429,244 acres. Cities within the watershed include Uvalde in Uvalde County and Batesville in Zavala County, both of which have wastewater discharge permits to the river.

The Leona River watershed is rural and land use is predominantly agriculture, including cropland and pastureland. According to the USDA NASS 2007 Census of Agriculture, approximately 2.4 million acres of land in Frio, Uvalde, and Zavala counties are farmland. Leading animal operations that exist in all three counties are beef cattle and sheep. Winter wheat production, oats, sorghum and cotton are among the leading crops harvested in all three counties. Large amounts of land are also used to grow forages such as hay, grass silage and greenchop in Uvalde and Frio counties, and Frio county had more than 58,000 acres in peanut production in 2007.

While mainly rural, the cities of Uvalde and Batesville are located within the watershed. Uvalde has an estimated population of 16,000, while about 1,300 people reside in Batesville. Both cities have wastewater treatment facilities (WWTFs) with discharges into the Leona River; Uvalde actually has 2 outfalls. Other permitted dischargers include Agrilink Foods, which discharges processing waste via irrigation and the U.S. Fish and Wildlife Service National Fish Hatchery in Uvalde, which discharges flush water intermittently into the Leona.

The Leona River was first listed as having a bacteria impairment for contact recreation in the *2006 Texas Water Quality Inventory and 303(d) List*. It was listed as having a concern for bacteria in prior reports. It has also been listed as having a concern for nitrates beginning with the *2002 Texas Water Quality Inventory and 303(d) List*. The draft *2010 Texas Integrated Report* includes a bacteria impairment for all three AUs within the Leona River. The draft *2010 Texas Integrated Report* continues to note nitrates as a concern within all three assessment units.

Historically, the Leona River was a popular place for swimming, canoeing, and fishing. Based on an editorial to the Uvalde Leader News on July 13, 2003, degradation began in the late 1960s. Increase runoff from agricultural fields, WWTF discharges, clearing of the riparian areas, and introduction of invasive plant species have all contributed to this degradation.

In 2004, NRA received a Clean Water Act §319(h) Nonpoint Source Grant through the TSSWCB and the U.S. Environmental Protection Agency, to design and implement an education program targeted at the headwater stream segments of the Nueces River Basin, including the Leona River. The Headwaters Stewardship program paved the way for an expanded sustained education effort by providing the education tools, enlightened audiences, and a cooperative capacity among local conservation organizations. This project will build on the success of the Headwaters Stewardship program.

The TCEQ and the TSSWCB established a joint, technical Task Force on Bacteria TMDLs in September 2006 charged with making recommendations on cost-effective and time-efficient bacteria TMDL development methodologies. The Task Force recommended the use of a three-tier approach that is designed to be scientifically credible and accountable to watershed stakeholders. The tiers move through increasingly aggressive levels of data collection and analysis in order to achieve stakeholder consensus on needed load reductions and strategies to achieve those reductions. In June 2007, the TCEQ and the TSSWCB adopted the principles and general process recommended by the Task Force and directed agency staff to incorporate the principles of the recommendations into projects that address bacteria impairments.

Major revisions to the Texas Surface Water Quality Standards have been adopted by TCEQ, including modifications to contact recreation use and bacteria criteria. As part of this process, TCEQ has developed procedures for conducting recreational Use Attainability Analyses (UAAs). In order for a new category of recreational use or a different bacteria criterion to be applied to a waterbody, a recreational UAA will need to be conducted. TCEQ and TSSWCB have collaborated on developing a list of priority waterbodies for collecting information needed for recreational UAAs. The segment in this project's study area is on that list.

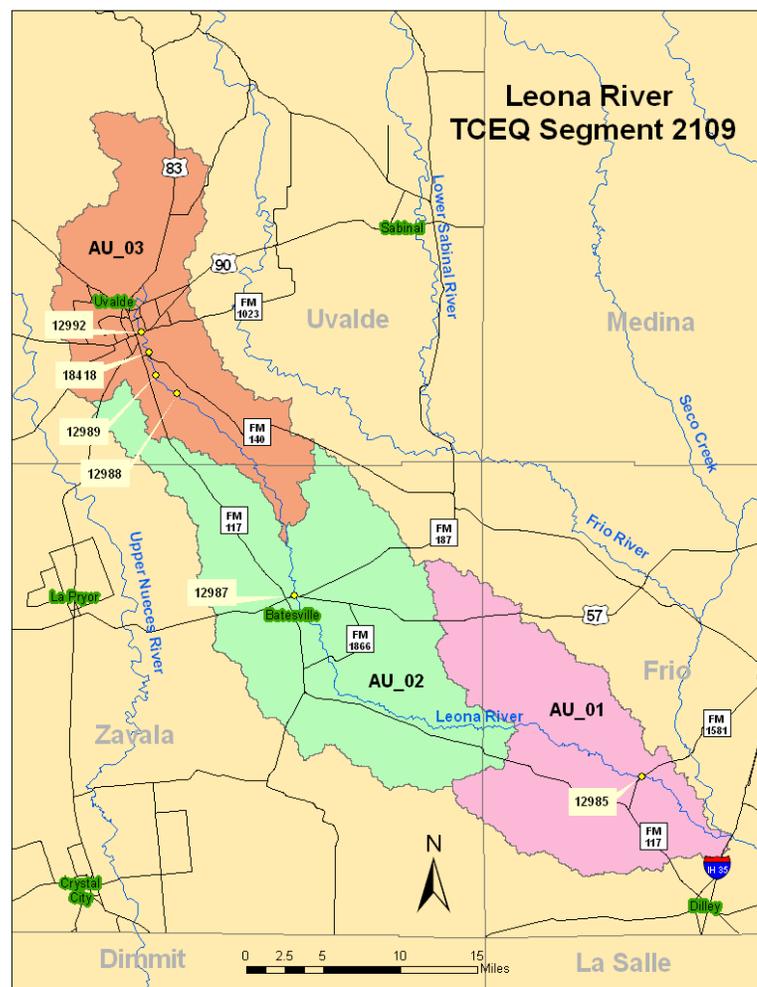
In accordance with the *Memorandum of Agreement Between the TCEQ and the TSSWCB Regarding TMDLs, Implementation Plans, and Watershed Protection Plans*, the TSSWCB has agreed to take the lead role in addressing the bacteria impairments in this project's study area. Through this project, the TSSWCB and collaborating entities will work with local stakeholders to progress through the data collection and analysis components of the first two tiers of the Task Force recommended three-tier approach. The goal is to remove the waterbodies in the study area from the 303(d) List; however, the mechanism is not predetermined. At the end of this two-year assessment project, possible outcomes include: 1) waterbodies are achieving current water quality standards, 2) adequate data exists to support a UAA to change water quality standards, 3) adequate data exists to develop a Watershed Protection Plan, or 4) adequate data exists to develop a TMDL and I-Plan for TCEQ adoption.

Project Narrative

General Project Description (Include Project Location Map)

TIAER and NRA, and other Project Partners, will work closely with stakeholders to communicate project goals, activities and findings', ensuring that decision-making regarding the waterbody is stakeholder-driven.

In order to communicate project goals, activities, results and accomplishments to affected parties, NRA and TIAER will facilitate public stakeholder meetings. At a minimum, public stakeholder meetings shall consist of an initial public meeting, a source survey design meeting, a meeting presenting results from initial LDCs and the GIS inventory, a Texas Watershed Steward Program workshop, several project update meetings, a meeting presenting data analysis results, and a meeting presenting final Technical Reports. Meeting frequency may need to be adjusted to accomplish project goals.



Educational efforts will also occur with affected city councils, county commissioners' courts, groundwater conservation districts and SWCDs. TIAER and NRA will coordinate with AgriLife Extension to host a Texas Watershed Steward Program workshop focused on the study area. Additionally, NRA will coordinate 3 riparian workshops in the watershed. NRA will develop and disseminate educational materials to watershed stakeholders, including, but not limited to, flyers, brochures, letters, and news releases. NRA will include information about the project in the Clean Rivers Program Basin Summary Report and the Basin Highlight Report. NRA will host an Internet site for the dissemination of project information.

TIAER will develop a comprehensive GIS inventory for the study area. TIAER will design and conduct a watershed source survey to better characterize possible sources of bacteria loadings in the study area. Results from the source survey will be used by SCSC to make appropriate adjustments to the BST sampling design and assess the adequacy of the Texas Known Source Library.

To provide sufficient water quality data to characterize bacteria loadings in the study area, TIAER will conduct routine ambient monitoring (at mainstem, tributary and spring sites) and effluent monitoring. To determine bacteria load reductions

needed to achieve water quality standards, TIAER will conduct a load duration curve (LDC) analysis of all historic and existing water quality monitoring data from the study area. LDCs will be developed for at least one critical index site per assessment unit. LDCs shall be consistent with 1) EPA's *An Approach for Using Load Duration Curves in the Development of TMDLs*, 2) EPA's *Options for Expressing Daily Loads in TMDLs*, and 3) EPA's *Development of Duration-Curve Based Methods for Quantifying Variability and Change in Watershed Hydrology and Water Quality*. Then, using water quality monitoring data collected through this project, TIAER will refine the developed LDCs.

SSL will classify current land use within the Leona River watershed using LULC classes comparable to NLCD. SSL will perform a combination of satellite based image classification schemes and where needed supplement with information from NAIP aerial photos. SSL, with groundtruthing by TIAER, will verify LULC classification through field sampling.

To estimate loadings from various sources and to identify critical loading areas within the watershed, TIAER will conduct watershed modeling for the study area. Utilizing information from the GIS inventory and watershed source survey, TIAER will develop a spatially explicit or mass balance model, such as SELECT, for the study area.

To assess and identify different sources contributing to bacteria loadings, SCSC will conduct Bacterial Source Tracking (BST) in the study area. The BST analysis will include library-independent BST utilizing the *Bacteroidales* PCR genetic test for human, ruminant, horse, and swine markers. Additionally, limited library-dependent BST will be conducted utilizing the ERIC-PCR and RP combination method for *E. coli* isolates. This will serve to confirm that the sources of *E. coli* and *Bacteroidales* are comparable and assess the spatial and temporal adequacy of the Texas Known Source Library. The Texas Known Source Library will need to be supplemented with known fecal samples from the study area.

TIAER will collect information to evaluate factors affecting attainment of recreational use in the Leona River. TIAER will conduct a thorough historical review of the recreational uses of the waterbody back to November 28, 1975. TIAER will conduct 2 field surveys at each selected site during the period people would most likely be using the waterbody for contact recreation to ascertain the suitability of the streams for contact recreation use. Digital photographic records of selected sites will provide evidence of observed uses or indication of human use. In order to obtain information on existing and historical uses and stream characteristics, TIAER shall conduct interviews of 1) users present during the field surveys, 2) streamside landowners along the field survey transects, 3) local residents, and 4) commercial providers of outdoor recreation goods and services.

Project Goals (Expand from Summary Page)

To provide stakeholders and agencies with sufficient information to address bacteria impairments on the Leona River through verification of use attainment, revision of water quality standards, or development of a WPP or TMDL. This goal directly supports the TSSWCB Statewide Bacterial Water Quality Impairment Reduction Initiative by focusing on sources of bacterial impairments within the Leona River. A further goal of this project is to assess nitrate concentrations and more clearly identify sources to provide stakeholders with more detailed information regarding nitrates along the Leona River. Specific objectives to meet these goals include:

- Collecting water quality data to allow continuing evaluation of bacteria and nitrate concentrations within the watershed and aid in the assessment of source identification.
- Conducting BST to aid in the identification of bacteria sources.
- Developing a comprehensive GIS inventory and an updated land use classification and conducting a source survey to aid in identifying bacteria and nitrate sources.
- Collecting information on factors affecting recreational use along the river and public perceptions of use.
- Merging water quality monitoring, BST, source survey and land use information with modeling tools to provide an evaluation of loadings and sources throughout the watershed.
- Facilitating public education and outreach through meeting with stakeholders to provide the information and knowledge to make informed decisions about the future of the watershed.

Measures of Success (Expand from Summary Page)

The ultimate success for this project will be determined by stakeholder feedback as to whether or not adequate information has been provided to allow stakeholders to move forward with watershed planning. Specific measures of success regarding the information collected within this project include:

- Decision-making for watershed planning activities in this project is founded on local stakeholder input.
- Collecting water quality monitoring data of known and acceptable quality that are representative of water quality conditions within the watershed for bacteria and nitrates.
- BST is conducted to allow an evaluation of sources of bacteria contributing to impairment and to identify critical loading areas across the watershed.
- Generating an updated land use/land cover classification of specific quality that characterizes current land use patterns across the watershed.
- Factors affecting attainment of recreation use are assessed consistent with TCEQ guidance.
- Spatially explicit modeling and LDCs allow a defensible assessment of sources, loadings, and critical areas of bacteria and nitrates for the watershed.
- Successfully facilitating public participation as measured by meeting attendance as well as feedback from watershed stakeholders and agency groups with vested interests within the watershed.

2005 Texas Nonpoint Source Management Program Reference (Expand from Summary Page)

- Element 1 – Explicit short-term goals, objectives and strategies that protect surface water.
 - Short-Term Goal One – Data Collection and Assessment – Objective A – Identify surface waterbodies from the Texas Water Quality Inventory and 303(d) List that need additional information to characterize non-attainment of designated uses and [water] quality standards [for use] during special project planning to focus on high priority waters.
 - Short-Term Goal One – Data Collection and Assessment – Objective B – Ensure that monitoring procedures meet quality assurance requirements and are in compliance with [the] EPA-approved TSSWCB Quality Management Plan.
 - Short-Term Goal One – Data Collection and Assessment – Objective C – Conduct special studies to determine sources of NPS pollution and gain information to target BMP implementation.
 - Short-Term Goal Three – Education – Objective B – Administer programs to educate citizens about water quality and their potential role in causing NPS pollution.
 - Short Term Goal Three – Education – Objective D – Conduct outreach to facilitate broader participation and partnerships [to] enable stakeholders to participate in decision-making and provide a more complete understanding of water quality issues and how they relate to each citizen.
- Element 2 – Working partnerships [with] appropriate state, regional, and local entities, private sector groups, and federal agencies.
- Element 5 – The State identifies waters impaired by NPS pollution and establishes a process to progressively address these waters by conducting more detailed watershed assessments...

Tasks, Objectives and Schedules			
Task 1	Project Administration		
Costs	\$60,402		
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	TIAER will prepare electronic quarterly progress reports (QPRs) for submission to TSSWCB. QPRs shall document all activities performed within a quarter and shall be submitted by the 15 th of December, March, June and September. QPRs shall be posted on the project website and provided to all Project Partners.		
	Start Date	Month 1	Completion Date Month 30
Subtask 1.2	TIAER 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 30
Subtask 1.3	TIAER will host coordination meetings or conference calls with TSSWCB, NRA, and SCSC, and include as appropriate other Project Partners, at least quarterly to discuss project activities, project schedule, communication needs, deliverables, and other requirements. TIAER will develop lists of action items needed following each project coordination meeting and distribute to project personnel.		
	Start Date	Month 1	Completion Date Month 30
Subtask 1.4	TIAER will execute subcontracts with NRA, SSL, and SCSC to perform work in subtasks.		
	Start Date	Month 1	Completion Date Month 30
Deliverables	<ul style="list-style-type: none"> • Quarterly Progress Reports in electronic format • Reimbursement Forms, and necessary supporting documentation, in either electronic or hard copy format • List of action items needed from project coordination meetings 		

Tasks, Objectives and Schedules			
Task 2	Quality Assurance		
Costs	\$16,488		
Objective	To develop and implement data quality objectives (DQOs) and quality assurance/control (QA/QC) activities to ensure data of known and acceptable quality are generated through this project.		
Subtask 2.1	TIAER will develop a QAPP for water quality monitoring activities in Tasks 3, 5 and 6 and a QAPP for watershed modeling activities in Tasks 4 and 7 consistent with the most recent versions of <i>EPA Requirements for Quality Assurance project Plans (QA/R-5)</i> and the <i>TSSWCB Environmental Data Quality Management Plan</i> .		
	Consistency with Title 30, Chapter 25 of the Texas Administrative Code, <i>Environmental Testing Laboratory Accreditation and Certification</i> , which describes Texas' approach to implementing the National Environmental Laboratory Accreditation Conference standards, shall be required.		
	All monitoring procedures and methods prescribed in the QAPP shall be consistent with the guidelines detailed in the <i>TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue (RG-415)</i> and <i>Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data (RG-416)</i> .		
	All procedures and methods for Task 6 prescribed in the QAPP shall be consistent with the guidelines detailed in the latest version of the <i>TCEQ Procedures for a Comprehensive RUAA and a Basic RUAA Survey</i> .		
	Start Date	Month 1	Completion Date
Subtask 2.2	TIAER will implement the approved QAPPs. TIAER will submit revisions and necessary amendments to the QAPPs as needed.		
	Start Date	Month 7	Completion Date
Deliverables	<ul style="list-style-type: none"> • QAPP for Tasks 3, 5 and 6 approved by TSSWCB in both electronic and hard copy formats • QAPP for Tasks 4 and 7 approved by TSSWCB in both electronic and hard copy formats • Approved revisions and amendments to these QAPPs, as needed • Data of known and acceptable quality as reported through Tasks 3, 4, 5, 6 and 7 		

Tasks, Objectives and Schedules			
Task 3	Bacterial Source Tracking		
Costs	\$61,016		
Objective	To conduct Bacterial Source Tracking to assess and identify different sources contributing to bacteria loadings.		
Subtask 3.1	SCSC will conduct library-independent BST on 225 water samples utilizing the <i>Bacteroidales</i> PCR genetic test for human, ruminant, horse, and swine markers. The number of samples may be adjusted depending on the complexity of sources as identified in the source survey (Task 4). Specific genetic markers for various animal sources are continually being developed by the scientific community and as new markers are identified, they should be included in this analysis, as the budget allows. Water samples for this subtask shall be a subset of those collected by TIAER through subtasks 5.1-5.2.		
	Start Date	Month 3	Completion Date
Subtask 3.2	SCSC will conduct limited library-dependent BST and analyze <i>E. coli</i> isolates from 75 water samples (1 isolate per water sample) from across the study area utilizing the ERIC-PCR and RiboPrinting combination method (total of 75 <i>E. coli</i> isolates). Likely human and animal sources of the <i>E. coli</i> will be identified using the Texas Known Source Library. This will serve to 1) confirm that the sources of <i>E. coli</i> and <i>Bacteroidales</i> are comparable and 2) assess the spatial and temporal adequacy of the Texas Known Source Library. Water samples for this subtask shall be a subset of those collected by TIAER through subtasks 5.1-5.2.		
	Start Date	Month 3	Completion Date
Subtask 3.3	TIAER will conduct watershed modeling for the study area (Task 7). SCSC will work with TIAER to 1) integrate BST results into the model, to the extent possible, and 2) address and reconcile discrepancies between BST and modeling results.		
	Start Date	Month 1	Completion Date
Subtask 3.4	The Texas Known Source Library needs to be supplemented with known fecal samples from the study area. SCSC will add up to 200 known source fecal samples (1-2 isolates per fecal sample) to the Texas Known Source Library. Fecal samples will be added to the BST library utilizing the ERIC-PCR and RiboPrinting combination method; isolates will be screened using ERIC-PCR and the non-clonal isolates (estimated at 20%) will be further analyzed using RiboPrinting. Samples for this subtask shall be collected by TIAER through subtask 5.9.		
	Start Date	Month 3	Completion Date
Subtask 3.5	SCSC will assist TIAER in designing a watershed source survey (also known as a sanitary survey), to be conducted through subtasks 4.3-4.4 that better characterizes possible sources of bacteria loadings in the study area. Results from the source survey will be used by SCSC to make appropriate adjustments to the BST sampling design, as related to samples collected by TIAER under subtask 5.1-5.2, and assess the adequacy of the Texas Known Source Library.		
	Start Date	Month 1	Completion Date
Deliverables	<ul style="list-style-type: none"> Technical Report detailing the results of Bacterial Source Tracking 		

Tasks, Objectives and Schedules			
Task 4	Survey and Inventory Possible Bacteria Sources		
Costs	\$ 96,496		
Objective	To develop a comprehensive GIS inventory for the study area and to assess the possible sources of bacteria loadings by conducting a watershed source survey. To classify current land use for the watershed through a combination of satellite based image classification schemes and where needed “heads-up digitizing” of NAIP aerial photos of the area.		
Subtask 4.1	TIAER will develop a comprehensive GIS inventory for the study area. Data should include the most recent information available on land use, elevation, soils, stream networks, reservoirs, roads, public parklands, municipalities and satellite imagery or aerial photography. Locations of SWQM stations, USGS gages, public access points to the waterbodies, floodwater-retarding structure, wetlands, TPDES permittees (including WWTFs, CAFOs and MS4s), and subdivisions should also be included. Sites permitted for land application of sewage sludge and septage should be included. Locations of possible bacteria sources, identified in subtask 4.4, should be incorporated. The cumulative impact of TSSWCB-certified WQMPs on the management of agricultural and silvicultural lands should be documented.		
	Start Date	Month 1	Completion Date
Subtask 4.2	SSL will perform a combination of satellite based image (2006-2009) classification schemes and where needed “heads-up digitizing” of the 2006-2009 NAIP aerial photos of the watershed using ESRI’s ArcGIS 9.x software.		
	SSL will identify individual LULC classes and delineate them in shapefile or ArcGIS grid format with a minimum mapping unit of 2 ac on screen. LULC classes will be comparable to NLCD.		
	SSL will verify LULC classification through field sampling and groundtruthing information, provided by TIAER, to an accuracy of 80% or greater. Ground control points used in the field sampling will be collected for at least ten locations per land use type using GPS units with an accuracy of 1-10 m.		
Start Date	Month 3	Completion Date	Month 23
Subtask 4.3	TIAER will collaborate with NRA to facilitate a meeting of local stakeholders and technical experts to design a source survey (also known as a sanitary survey) that better characterizes the possible sources of bacteria loadings. The source survey should be developed so that it represents warm and cool seasons and low and high flow conditions. The source survey should evaluate sources like WWTFs, central sewage collection systems, OSSFs, and MS4s. TPDES compliance issues should be examined. Wildlife, livestock and non-domestic animal populations should be examined.		
	Technical experts should include at least one representative, as appropriate to their jurisdiction and interest, from Texas Parks and Wildlife Department, Texas Department of Agriculture, Texas Commission on Environmental Quality, Texas AgriLife Extension Service, Texas Forest Service, Edwards Aquifer Authority, USDA APHIS Texas Wildlife Services, U.S. Geological Survey, U.S. Fish and Wildlife Service, USDA Natural Resources Conservation Service, USDA Agricultural Research Service, U.S. Army Corps of Engineers, and affected municipalities, counties, GCDs and SWCDs. As described in subtask 3.5, SCSC will assist TIAER in designing the source-survey.		
Start Date	Month 3	Completion Date	Month 20
Subtask 4.4	TIAER will conduct the source survey as designed in subtask 4.3.		
	Start Date	Month 5	Completion Date
Deliverables	<ul style="list-style-type: none"> • Technical Report describing results from the source survey • LULC for the watershed in shapefile or ArcGIS grid format 		

Tasks, Objectives and Schedules			
Task 5	Surface Water Quality Monitoring		
Costs	\$294,368		
Objective	To provide sufficient water quality data to characterize bacteria loadings across the various flow regimes at a number of locations throughout the study area.		
Subtask 5.1	<p>TIAER will conduct routine ambient monitoring at 9 mainstem sites once every two weeks, collecting field, conventional, flow, and bacteria parameter groups. The QAPP, as detailed in Task 2, will precisely identify sites. The sampling period extends over 24 months. The number of potential samples for collection through this subtask is 440, but due to drought conditions during the first year of sampling, planned samples have been reduced to 48% of potential or 212 samples. Currently, routine ambient monitoring is conducted quarterly at 3 stations by TCEQ (12985, 12987, 12989) and at 1 station by NRA (18418); TIAER will work with TCEQ and NRA to avoid duplicative routine ambient monitoring at these stations. Appropriate field splits at about 10% will be included for QA/QC for nitrogen analyses.</p> <p>Field parameters are pH, temperature, conductivity, and dissolved oxygen. Conventional parameters are total nitrite-nitrate nitrogen. Flow parameters are flow collected by gage, electric, mechanical or Doppler, including severity. Bacteria parameters are <i>E. coli</i> enumerated using USEPA Method 1603.</p>		
	Start Date	Month 7	Completion Date Month 30
Subtask 5.2	<p>TIAER will conduct targeted watershed monitoring at up to 7 tributary sites once every month, collecting field, conventional, flow, and bacteria parameter groups; specific parameters are defined in subtask 5.1. The QAPP, as detailed in Task 2, will precisely identify sites. The sampling period extends over 24 months. The number of potential samples for collection through this subtask is 168, but due to drought conditions during the first year of sampling, planned samples have been reduced to 50% of potential or 84 samples. Appropriate field splits at about 10% will be included for QA/QC for nitrogen analyses</p>		
	Start Date	Month 7	Completion Date Month 30
Subtask 5.3	<p>TIAER will conduct routine effluent monitoring at 3 WWTF outfalls and 1 other permitted intermittent discharger once every month, collecting field, conventional, flow and bacteria parameter groups; specific parameters are defined in subtask 5.1. The QAPP, as detailed in Task 2, will precisely identify sites. The sampling period extends over 24 months. The number of potential samples for collection through this subtask is 96. The modified budget reflects a decrease in discharge samples associated with the Batesville WWTF and the Fish Hatchery since discharges at these facilities are only periodic rather than constant to 70 samples or 73% of potential if discharge occurred continuously at all discharge sites. Appropriate field splits at about 10% will be included for QA/QC for nitrogen analyses.</p> <p>Coordination between TPDES permittees and the TCEQ Regional Office will be required. Neither TIAER nor NRA nor TSSWCB shall submit WWTF data to TCEQ for use in permit compliance and enforcement; rather, WWTF data will only be used to estimate bacteria loadings from wastewater discharges and to assist TPDES permittees in improving management and operations.</p>		
	Start Date	Month 7	Completion Date Month 30
Subtask 5.4	<p>TIAER will conduct springflow monitoring at up to 5 springs or wells once per season collecting field, conventional, flow and bacteria parameter groups; specific parameters are defined in subtask 5.1. The QAPP, as detailed in Task 2, will precisely identify sites. The sampling period extends over 9 seasons. The number of samples planned for collection through this subtask is 50, but due to drought conditions during the first year of sampling, planned samples have been reduced to 30% of planned or 15 samples. Appropriate field splits at about 10% will be included for QA/QC for nitrogen analyses</p>		
	Start Date	Month 7	Completion Date Month 30
Subtask 5.5	<p>TIAER will establish, and maintain, continuous flow monitoring gages at 3 mainstem sites. These sites shall be located near the outlets of each of the 3 assessment units as is practically possible. Continuous sampling extends over 24 months. These three gaging stations will complement gages maintained by the USGS. The USGS maintains gages in conjunction with the Edwards Aquifer Authority at stations 08203450 gage height and 08204005 for gage height and discharge.</p>		

	Start Date	Month 7	Completion Date	Month 30
Subtask 5.6	<p>TIAER will transfer monitoring data from activities in Subtask 5.1-5.2 to TSSWCB for inclusion in the TCEQ SWQMIS at least quarterly. Data will be transferred in the correct format using the TCEQ file structure, along with a completed Data Summary, as described in the most recent version of <i>TCEQ Surface Water Quality Monitoring Data Management Reference Guide</i>.</p> <p>TIAER will submit Station Location Requests to TCEQ, as needed, to obtain TCEQ station numbers for new monitoring sites.</p> <p>TIAER will input monitoring regime, as detailed in the QAPP, into the TCEQ CMS.</p> <p>Data Correction Request Forms will be submitted to TSSWCB whenever errors are discovered in data already reported.</p> <p>All monitoring data files, Data Summary, and Data Correction Request Forms will also be provided to NRA.</p> <p>TIAER will also transfer the data from activities in subtasks 5.3-5.5 and Task 6 to TSSWCB in the appropriate format for those monitoring activities.</p> <p>NRA will post monitoring data from activities in Task 5 to the project website in a timely manner.</p>			
	Start Date	Month 7	Completion Date	Month 30
Subtask 5.7	<p>TIAER will conduct a historical data review for the waterbody in order to assess and characterize trends and variability in water quality, specifically bacteria and nitrite-nitrate nitrogen. Historical data collection activities should concentrate on 1) ambient water quality data (including groundwater); 2) streamflow and water level data; 3) precipitation records; and 4) permitted facilities, discharges, and effluent quality. At a minimum, U.S. Geological Survey, National Weather Service, Texas Parks and Wildlife Department, Texas Water Development Board, the 3 GCDs, Edwards Aquifer Authority, NRA, TCEQ, and the U.S. Environmental Protection Agency should be queried for data related to the study area.</p>			
	Start Date	Month 1	Completion Date	Month 20
Subtask 5.8	<p>TIAER will store Method 1603 modified mTEC plates, from subtasks 5.1-5.4, at 4°C for shipment to SCSC. TIAER will coordinate the shipment of these samples with SCSC such that they are received in College Station within 3 days following enumeration.</p>			
	Start Date	Month 7	Completion Date	Month 26
Subtask 5.9	<p>TIAER will collect approximately 200 known source fecal samples from the study area. Fecal samples will be stored at 4°C and shipped to SCSC for <i>E. coli</i> isolation and analysis. TIAER will coordinate the shipment of these samples with SCSC such that they are received in College Station within 3 days of collection. Sources of fecal samples will be selected in coordination with SCSC.</p>			
	Start Date	Month 7	Completion Date	Month 26
Deliverables	<ul style="list-style-type: none"> • Station Location Request Forms (as needed) in electronic format • Monitoring data files and Data Summary in electronic format • Data Correction Request Forms (as needed) in electronic format • Monitoring data updates posted to the project website • Technical Report characterizing trends and variability in historical water quality monitoring data • Technical Report characterizing trends and variability in collected water quality monitoring data 			

Tasks, Objectives and Schedules			
Task 6	Assess Attainability of Recreational Use		
Costs	\$81,426		
Objective	To collect information that can be used to evaluate factors affecting attainment of recreational use in the Leona River.		
Subtask 6.1	TIAER will conduct at least one reconnaissance trip to assess potential survey sites. The goal will be to have approximately 3 sites per 5 miles of river (approximately 50 sites).		
	Start Date	Month 1	Completion Date
Subtask 6.2	Utilizing information from Task 4 (comprehensive GIS inventory and land use classification), subtask 6.1 (reconnaissance trip), Task 8 (public input), and other relevant information, TIAER will identify sites for RUAA data collection. Proposed sites should be located in areas where the waterbody is accessible to the public and has the highest potential for recreational use (primary contact). The sites should be well-spaced and, in general, distributed such that there are 3 sites for every 5 miles of stream. Sites shall be identified only for the mainstem of Leona River. Proposed sites shall at least include those from Subtask 5.1. The QAPP, as detailed in Task 2, will precisely identify selected sites.		
	Start Date	Month 3	Completion Date
Subtask 6.3	TIAER shall conduct a thorough historical information review of the recreational uses of the waterbody back to November 28, 1975. Historical resources that should be examined include, but are not limited to, photographic evidence, local newspapers, museum collections, published reports, historical society records, and long-term landowners/residents. The NRA, Texas Parks and Wildlife Department and commercial providers of outdoor recreation goods and services should be consulted for historical information.		
	Start Date	Month 3	Completion Date
Subtask 6.4	TIAER will conduct 2 field surveys at each selected site (Subtask 6.2). Surveys shall be conducted during a normal warm season (air temperature $\geq 70^{\circ}\text{F}$) during baseflow conditions. Baseflow conditions are sustained or typical dry, warm-weather flows between rainfall events, excluding unusual antecedent conditions of drought or wet weather. The surveys should be performed during the period people would most likely be using the waterbody for contact recreation, typically March to October (e.g., spring break, summer, holidays, and weekends).		
	To ascertain the suitability of the streams for contact recreation use, field surveys shall document hydrological characteristics of the stream, such as width and depth of channel and substantial pools, flow/discharge, air/stream temperature, bank access, and stream substrate. Information to be collected shall at least satisfy those questions found on the Field Data Sheet from the latest version of the <i>TCEQ Procedures for a Comprehensive RUAA and a Basic RUAA Survey</i> .		
	TIAER shall document and describe antecedent (prior to fieldwork) rainfall conditions (approximately 30 days) at each selected site.		
	Start Date	Month 18	Completion Date
Subtask 6.5	TIAER shall collect a digital photographic record of each selected site during the field surveys. Photographs shall include upstream, left and right bank, and downstream views. Any evidence of observed uses or indications of human use shall be photographed. Photographs should clearly depict the entire channel and each transect measured.		
	Start Date	Month 18	Completion Date
Subtask 6.6	In order to obtain information on existing and historical uses and stream characteristics, TIAER shall conduct interviews of 1) users present during the field surveys, 2) streamside landowners along the field survey transects, 3) local residents, and 4) commercial providers of outdoor recreation goods and services. Surveys shall include at least those questions found on the Interview Form from the latest version of the <i>TCEQ Procedures for a Comprehensive RUAA and a Basic RUAA Survey</i> .		
	Start Date	Month 18	Completion Date

Subtask 6.7	TIAER will combine findings from historical information review, field surveys, and user interviews into a Technical Report that shall at least include those contents described for a Comprehensive RUAA in the latest version of the <i>TCEQ Procedures for a Comprehensive RUAA and a Basic RUAA Survey</i> .			
	Start Date	Month 18	Completion Date	Month 26
Deliverables	<ul style="list-style-type: none"> • Contact Information Form from the latest version of the <i>TCEQ Procedures for a Comprehensive RUAA and a Basic RUAA Survey</i> • Field Data Sheets and Data Summary in electronic format • Digital photographic record, cataloged in an appropriate manner • Interview Forms and Data Summary in electronic format • Technical Report summarizing historical information review, field surveys, and user interviews 			

Tasks, Objectives and Schedules			
Task 7	Data Analysis and Watershed Modeling		
Costs	\$90,788		
Objective	To analyze and interpret data using load duration curves and spatially explicit modeling to determine bacteria load reductions needed to achieve water quality standards and estimate loadings from various sources.		
Subtask 7.1	TIAER will conduct a LDC analysis of all historic and existing water quality monitoring data from the study area. LDCs will be developed for at least one critical index site per each assessment unit for segment 2109. LDCs shall be consistent with 1) EPA's <i>An Approach for Using Load Duration Curves in the Development of TMDLs</i> , 2) EPA's <i>Options for Expressing Daily Loads in TMDLs</i> , and 3) EPA's <i>Development of Duration-Curve Based Methods for Quantifying Variability and Change in Watershed Hydrology and Water Quality</i> . Initial LDC development will be completed using available USGS gage flow data and the drainage area ratio approach. As gaging information becomes available from subtask 5.5, the approach for estimating historical flow data may be revised.		
	Start Date	Month 18	Completion Date Month 24
Subtask 7.2	Using water quality monitoring data collected by TIAER through Task 5 and assimilated data collected by TCEQ and NRA during the same time period, TIAER will refine LDCs developed in subtask 7.1. LDCs will be used to determine bacteria load reductions needed to achieve water quality standards. LDCs shall also be developed for nitrogen parameters.		
	Start Date	Month 23	Completion Date Month 30
Subtask 7.3	TIAER will conduct watershed modeling for the study area. Utilizing information from the GIS inventory (subtask 4.1) and the source survey (subtasks 4.3 and 4.4), TIAER will develop a spatially explicit or mass balance model, such as SELECT, for the study area. Modeling will be conducted on the Leona River watershed to estimate loadings from various sources and to identify critical loading areas within the watershed. TIAER will work with SCSC to 1) integrate BST results (Task 3) into the model, to the extent possible, and 2) address and reconcile discrepancies between BST and modeling results.		
	Start Date	Month 18	Completion Date Month 30
Deliverables	<ul style="list-style-type: none"> • Draft Technical Report detailing preliminary LDC analysis • Technical Report detailing final LDC analysis • Technical Report describing watershed modeling results 		

Tasks, Objectives and Schedules			
Task 8	Public Participation and Stakeholder Facilitation		
Costs	\$160,730		
Objective	To facilitate public participation and coordinate stakeholder involvement to ensure that decision-making is founded on local input and that watershed action is successful.		
Subtask 8.1	NRA will facilitate public participation activities and coordinate stakeholder involvement in the project; NRA and TIAER shall participate in Texas Watershed Coordinator Roundtables. NRA will develop (Months 1-2) and maintain (Months 3-30) a database of stakeholders likely to be affected by this project.		
	Start Date	Month 1	Completion Date
Subtask 8.2	NRA will provide logistical support for public meetings, including, but not limited to, securing meeting facilities, preparing/disseminating meeting notices and agendas, and preparing meeting summaries. At a minimum, public stakeholder meetings shall consist of an initial public meeting (Month 3), a source survey design meeting (subtask 4.3) (by Month 5), a meeting presenting results from initial LDCs and the GIS inventory (Month 6), Texas Watershed Steward Program workshop (subtask 8.4) (by Month 12), up to 4 project update meetings (Months 9, 12, 15 and 18), a meeting presenting data analysis results (Month 26), and a meeting presenting final Technical Reports (Month 30).		
	Meeting frequency may be adjusted throughout the course of the project to accomplish project goals. TSSWCB will review and approve all meeting notices, agendas, materials, and summaries prior to public dissemination.		
	TIAER will participate in all public stakeholder meetings.		
	Start Date	Month 1	Completion Date
Subtask 8.3	NRA, and TIAER as appropriate, will attend and participate in other public meetings as appropriate in order to communicate project goals, activities and accomplishments to affected parties. Such meetings include, but are not limited to, city councils, county commissioners' courts, local SWCDs, local GCDs, EAA, NRA Clean Rivers Program Basin Steering Committee and Coordinated Monitoring, and other appropriate meetings of critical watershed stakeholder groups.		
	Start Date	Month 1	Completion Date
Subtask 8.4	NRA will coordinate with AgriLife Extension to host a Texas Watershed Steward Program workshop focused on the Leona River through TSSWCB project 07-09, <i>Statewide Implementation of the Texas Watershed Steward Program</i> .		
	Start Date	Month 1	Completion Date
Subtask 8.5	NRA will facilitate communication with stakeholders in order to engage the public and affected entities in the watershed planning process. NRA will utilize all appropriate communication mechanisms including direct mail, e-mail, the project website, and mass media (print, radio, television).		
	NRA will develop and disseminate educational/informational materials to watershed stakeholders, including, but not limited to, flyers, brochures, letters, news releases, and other appropriate promotional publications. NRA will include information about the project in NRA newsletters and Clean Rivers Program publications. TIAER and SCSC shall contribute content matter for educational materials as appropriate. TSSWCB must approve all project-related content in any materials and publications prior to distribution.		
	Start Date	Month 1	Completion Date
Subtask 8.6	NRA will develop (Months 1-3), host and maintain (Months 4-30) a full website with a link on NRA website. (ie: http://www.leonariver.org) to serve as a public clearinghouse for all project- and watershed-related information. All meeting presentations, informational/educational publications, and monitoring and modeling documents and results will be posted to this website. The website will serve as a means to disseminate information to stakeholders and the general public. TIAER and SCSC shall contribute content matter for the website as appropriate.		
	Start Date	Month 1	Completion Date
	Start Date	Month 1	Completion Date

Subtask 8.7	NRA will coordinate three Riparian Workshops throughout the watershed.			
	Start Date	Month 18	Completion Date	Month 30
Deliverables	<ul style="list-style-type: none"> • Stakeholder contact list, updated as appropriate • Public meeting/workshop notices, agendas, materials, summaries and lists of attendees • Educational materials, as developed and disseminated • List of other meetings attended and dates with brief summary of topics discussed and action needed included in QPRs • Information developed for inclusion in Clean Rivers Program materials • Project website 			

Part III – Financial Information

Budget Summary	
Category	Costs
Personnel	\$ 360,549
Fringe Benefits	\$ 81,394
Travel	\$ 69,342
Equipment	\$ 18,000
Supplies	\$ 36,111
Contractual	\$ 176,907
Construction	\$ 0
Other	\$ 32,952
Total Direct Costs	\$ 775,255
Indirect Costs (≤15%)	\$ 86,459
Total Project Costs	\$ 861,714

Budget Justification		
Category	Costs	Justification
Personnel	\$ 360,549	See TIAER Personnel Budget Justification Table Below
Fringe Benefits	\$ 81,394	Based on approved fringe rates for TIAER employees which averages 28% overall
Travel	\$ 69,342	<ul style="list-style-type: none"> Travel includes at least 46 trips by field staff and laboratory personnel for monitoring, travel for the RUAA and field sampling for the GIS work, as well as attendance at at least 30 public meetings within the watershed. Almost all of these trips require an overnight stay by staff due to the travel distance. At least one trip to TCEQ in Austin is also included for TPDES information review as well as at least one trip per year to Temple to meet with the TSSWCB to debrief and coordinate on project efforts. Three trips are also included for travel of TIAER staff to College Station for training and coordination on efforts dealing with Tasks 3, 4 and 7.
Equipment	\$ 18,000	<ul style="list-style-type: none"> Plotter for educational displays and GIS maps (Tasks 4 & 8) FlowTracker for flow monitoring (Task 5)
Supplies	\$ 36,111	Necessary supplies associated with field monitoring, analysis, maintenance, repairs, meeting presentation materials, and project administration.
Contractual	\$ 176,907	<ul style="list-style-type: none"> \$37,536 – SCSC, Task 3 BST Analysis \$34,500 – SSL, Task 4.2 Land Use classification \$104,871 – NRA, Task 8 Public Participation and Stakeholder Facilitation
Construction	\$ 0	N/A
Other	\$ 32,952	<ul style="list-style-type: none"> Lab analysis costs (\$21,955) based on analysis of NO₂-N+NO₃-N and <i>E. coli</i> for 162 samples and lab expenses related to BST sample preparation. Shipping to and from SCSC, vehicle maintenance, postage and some field materials (\$10,997).

Indirect	\$ 86,459	Calculated as 15% of total direct less contractual and TIAER laboratory analysis.
SOURCE	TSSWCB will provide \$861,714 in non-federal funds sourced from state appropriations (FY2011 General Revenue) through the Nonpoint Source Grant Program to the Texas Institute for Applied Environmental Research at Tarleton State University.	

TIAER Personnel Budget Justification		
Name	Title	Estimated % Time
Field Operations		
Tim Jones	Sr. Research Associate	25%
Jeff Stroebel	Research Associate	30%
Abel Martinez	Research Associate	15%
David Pendergrass	Sr. Research Associate	5%
David Blankenship	Research Assistant	5%
Student Worker	Student Worker	29%
Analytical Laboratory		
Mark Murphy	Lab Manager	9%
James Hunter	Research Associate	9%
Dovie Reynolds	Sr. Research Assistant	<1%
Data Management, Assessment & Reporting **		
Larry Hauck	Lead Scientist	5%
Anne McFarland	Research Scientist	26%
Jim Rogers	Sr. Program Analyst	7%
Jimmy Millican	Sr. Research Associate	20%
Todd Adams	Research Associate	30%
TJ Kim	Sr. Research Associate	17%
Nancy Easterling	Research Associate	6%
Student Worker	Student Worker	23%
Project Administration, Public Outreach Coordination		
Jason Westbrook	Project Manager	6%
Nikki Jackson	Project Manager	40%

Contractual Budget Summary – NRA	
Category	Costs
Personnel	\$ 57,954
Fringe Benefits	\$ 13,875
Travel	\$ 7,448
Equipment	\$ 0
Supplies	\$ 3,160
Contractual	\$ 1,600
Construction	\$ 0
Other	\$ 7,155
Total Direct Costs	\$ 91,192
Indirect Costs (≤15%)	\$ 13,679
Total Project Costs	\$ 104,871

Contractual Budget Justification – NRA		
Category	Costs	Justification
Personnel	\$ 57,954	<ul style="list-style-type: none"> • Director of Resource Protection and Education – 1,100 hrs. to manage, document and report project outreach and stakeholder involvement activities. • Director of Finance – 100 hrs. to prepare financial reports and contract reimbursement documents • Information Systems – 200 hrs. to create and maintain project website • Part-time Associate – 650 hrs. to identify and locate landowners and other stakeholders affected by project. • Staff time to organize, teach and promote Riparian Workshops
Fringe Benefits	\$ 13,875	Cost of fringe benefits for project personnel at about 22% of salary
Travel	\$ 7,448	Travel to meetings and in conjunction with facilitating stakeholder involvement estimated based on 120 day trips @ average of \$32 each within project area and 6 over-night trips @ average of \$300 each outside of project area. Additional travel for Riparian Workshops and 6-month extension of project.
Equipment	\$ 0	N/A
Supplies	\$ 3,160	<ul style="list-style-type: none"> • Paper and envelopes for stakeholder mail-outs • Software/hardware/camera equipment • Communication, books/manuals for distribution to stakeholders
Contractual	\$ 1,600	Trainers to conduct three Riparian Workshops
Construction	\$ 0	N/A
Other	\$ 7,155	<ul style="list-style-type: none"> • \$3,640 – Direct communication costs associated with project; including but not limited to postage for mailing, direct telephone, website domain registry and hosting costs. • \$2,000 – Printing and advertising associated with project to facilitate stakeholder and public understanding. • \$1,515 – Postage and miscellaneous items for Riparian Workshops • Cost of facility rentals
Indirect	\$ 13,679	15% of total direct costs

Contractual Budget Summary – SCSC	
Category	Costs
Personnel	\$ 13,476
Fringe Benefits	\$ 4,264
Travel	\$ 1,200
Equipment	\$ 0
Supplies	\$ 13,500
Contractual	\$ 0
Construction	\$ 0
Other	\$ 200
Total Direct Costs	\$ 32,640
Indirect Costs (≤15%)	\$ 4,896
Total Project Costs	\$ 37,536

Contractual Budget Justification – SCSC		
Category	Costs	Justification
Personnel	\$ 13,476	\$10,976 M.S.-level Laboratory Technician or Postdoctoral Associate to process samples, analyze data, and assist in preparing reports (\$32,283/yr x 0.34 FTE for one year). Additional salary is supported through TSSWCB project 10-50 <i>Support Analytical Infrastructure and Further Development of a Statewide Bacterial Source Tracking Library</i> \$2,500 student worker to run project BST analyses
Fringe Benefits	\$ 4,264	\$4,024 Laboratory tech = salary * .171 + 526/mo for insurance. \$240 Student worker estimated as about 9.6% of personnel.
Travel	\$ 1,200	Travel to and from Leona watershed for stakeholder meetings, includes lodging and per diem
Equipment	\$ 0	N/A
Supplies	\$ 13,500	\$3,600 Costs of media, reagents, and other consumables for ERIC-RP combination fingerprinting are estimated at \$48 per sample for 75 isolates \$2,400 Costs of media, reagents, and other consumables for known source isolate samples estimated at \$48 per sample for 50 samples; Analysis of additional 150 samples is supported through TSSWCB project 10-50 <i>Support Analytical Infrastructure and Further Development of a Statewide Bacterial Source Tracking Library</i> \$7,500 Costs of media, reagents, and other consumables for Bacteroidales PCR are estimated at \$100/sample for 75 samples. Bacteroidales PCR analysis supplies for the remaining 150 samples will be funded through TSSWCB project 10-50 <i>Support Analytical Infrastructure and Further Development of a Statewide Bacterial Source Tracking Library.</i>
Contractual	\$ 0	N/A
Construction	\$ 0	N/A
Other	\$ 200	Shipping
Indirect	\$ 4,896	15% of total direct costs

Contractual Budget Summary – SSL	
Category	Costs
Personnel	\$ 0
Fringe Benefits	\$ 0
Travel	\$ 0
Equipment	\$ 0
Supplies	\$ 0
Contractual	\$ 30,000
Construction	\$ 0
Other	\$ 0
Total Direct Costs	\$ 0
Indirect Costs (≤15%)	\$ 4,500
Total Project Costs	\$ 34,500

Contractual Budget Justification – SSL		
Category	Costs	Justification
Personnel	\$ 0	N/A
Fringe Benefits	\$ 0	N/A
Travel	\$ 0	N/A
Equipment	\$ 0	N/A
Supplies	\$ 0	N/A
Contractual	\$ 30,000	Development of verified LULC classification
Construction	\$ 0	N/A
Other	\$ 0	N/A
Indirect	\$ 4,500	15% of total direct costs