



**Texas State Soil and Water Conservation Board  
 State General Revenue Nonpoint Source Grant Program  
 FY 2010 Workplan 10-51**

**SUMMARY PAGE**

Title of Project	Bacterial Source Tracking to Support the Development and Implementation of Watershed Protection Plans for the Lampasas and Leon Rivers [Short Title: Leon/Lampasas BST]		
Project Goals/Objectives	<ul style="list-style-type: none"> <li>To collect water samples and stream flow data in the Lampasas and Leon Rivers watersheds for BST</li> <li>Collect known source fecal samples from watersheds for inclusion in the Texas <i>E. coli</i> BST Library</li> <li>Conduct BST on water samples collected to assess and identify different sources contributing to the bacterial loading of each waterbody</li> <li>Deliver BST results to stakeholders through on-going WPP processes in each watersheds</li> </ul>		
Project Tasks	(1) Project Coordination & Administration; (2) Quality Assurance; (3) Water and Fecal Sample Collection; (4) Bacterial Source Tracking		
Measures of Success	<ul style="list-style-type: none"> <li>Data of known and acceptable quality are generated for surface water quality monitoring in the two watersheds of the study area</li> <li>Bacterial Source Tracking is conducted in the study area consistent with state approved methodologies</li> <li>Additional <i>E. coli</i> isolates from known fecal sources are added to the Texas <i>E. coli</i> BST Library</li> <li>BST results are provided to existing Leon and Lampasas River stakeholder groups</li> </ul>		
Project Type	Implementation ( ); Education ( ); Planning ( ); Assessment (X)		
Status of Waterbody on 2008 Texas Water Quality Inventory and 303(d) List	<u>Segment ID</u> 1221 – Leon River below Proctor Lake 1221A – Resley Creek 1221B – South Leon River 1221C – Pecan Creek 1221D – Indian Creek 1221F – Walnut Creek 1217 – Lampasas River above Stillhouse Hollow Lake	<u>Parameter</u> Bacteria Bacteria Bacteria Bacteria Bacteria Bacteria Bacteria	<u>Category</u> 5a 5c 5c 5c 5c 5c 5c
Project Location (Statewide or Watershed and County)	<ul style="list-style-type: none"> <li>Lampasas River Watershed in Bell, Burnet, Coryell, Hamilton, Lampasas, Mills, and Williamson Counties</li> <li>Leon River Watershed below Proctor Lake and above Belton Lake in Comanche, Hamilton, Erath, Coryell, Mills, and Bell Counties</li> </ul>		
Key Project Activities	Hire Staff (X); Surface Water Quality Monitoring (X); Technical Assistance ( ); Education ( ); Implementation ( ); BMP Effectiveness Monitoring ( ); Demonstration ( ); Planning ( ); Modeling ( ); Bacterial Source Tracking (X); Other ( )		
Texas NPS Management Program Elements	<ul style="list-style-type: none"> <li>Element One (LTG Objectives A &amp; B; STGs 1B, 1C, 1D)</li> <li>Elements Two, Five</li> </ul>		
Project Costs	\$432,905		
Project Management	<ul style="list-style-type: none"> <li>Texas Water Resources Institute</li> <li>Texas AgriLife Research Center at El Paso</li> <li>Texas AgriLife Research, Blackland Research and Extension Center at Temple</li> </ul>		
Project Period	August 1, 2010 – July 31, 2012		

## Part I – Applicant Information

Applicant							
Project Lead		B.L. Harris					
Title		Acting Director					
Organization		Texas Water Resources Institute					
E-mail Address		<a href="mailto:bl-harris@tamu.edu">bl-harris@tamu.edu</a>					
Street Address		1500 Research Pkwy, Ste A240 2118 TAMU					
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Telephone Number				979-845-1851		Fax Number 979-845-8554	

Co-Applicant							
Project Co-Lead		George Di Giovanni, Ph.D.					
Title		Professor and Faculty Fellow					
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E-mail Address		<a href="mailto:GDIGiovanni@ag.tamu.edu">GDIGiovanni@ag.tamu.edu</a>					
Street Address		1380 A&M Cir					
City	El Paso	County	El Paso	State	TX	Zip Code	79927-5020
Telephone Number				915-859-9111		Fax Number 915-859-1078	

Co-Applicant							
Project Co-Lead		June Wolfe, Ph.D.					
Title		Assistant Research Scientist					
Organization		Texas AgriLife Research, Blackland Research and Extension Center at Temple					
E-mail Address		<a href="mailto:jwolfe@brc.tamus.edu">jwolfe@brc.tamus.edu</a>					
Street Address		720 E Blackland Rd					
City	Temple	County	Bell	State	TX	Zip Code	76502
Telephone Number				254-774-6016		Fax Number 254-774-6001	

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 Water Resources Institute (TWRI)	Project coordination and administration, QAPP development, project reporting, assist with stakeholder interaction, support the development of technical reports.
Texas AgriLife Research, Blackland Research and Extension Center at Temple (AgriLife-TP)	Water sample collection and preparation, streamflow monitoring, known source fecal sample collection. Lampasas River Watershed Coordinator through TSSWCB project 07-11.
Texas AgriLife Research Center at El Paso (AgriLife-EP)	Conduct BST and incorporate known source fecal <i>E. coli</i> isolates into the Texas <i>E. coli</i> BST Library, compile BST results into technical reports delineated by watershed.
Brazos River Authority	Texas Clean Rivers Program entity for both watersheds. Leon River Watershed Coordinator through TSSWCB project 06-12.

## Part II – Project Information

### Watershed Information

Watershed Name(s)	Hydrologic Unit Code (8 Digit)	Segment ID	305 (b) Category	Size (Acres)
Leon River below Proctor Lake and above Belton Lake	12070201	1221	5a	871,488
Lampasas River above Stillhouse Hollow Lake	12070203	1217	5c	839,800

### Water Quality Impairment

Describe all known causes of water quality impairments from any of the following sources: 2008 Texas Water Quality Inventory and 303(d) List, Clean Rivers Program Basin Summary/Highlights Reports or other documented sources.

#### **IMPAIRMENTS (2008 Texas Water Quality Inventory and 303(d) List)**

(as this is a BST project only, description of impairments is limited to bacteria only)

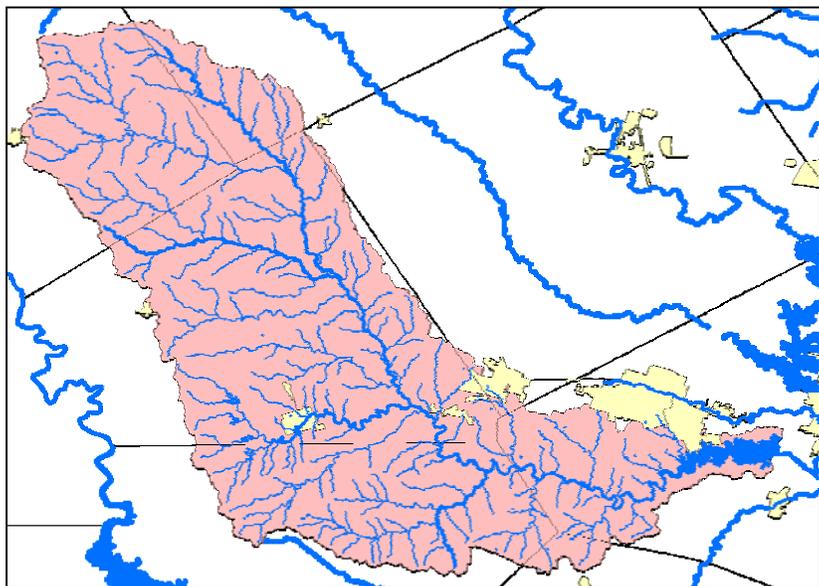
		<u>Impairment</u>	<u>Category</u>	<u>Year Listed</u>
<b>Segment 1221: Leon River:</b>				
1221_01	Directly upstream of Lake Belton	bacteria	5a	1996
1221_04	From the confluence w/ Plum Creek, to confluence w/ Peach Creek	bacteria	5a	1996
1221_05	From confluence with Pecan Creek, upstream to confluence w/ South Leon Creek	bacteria	5a	1996
1221_06	From confluence with South Leon Creek upstream to confluence w/ Walnut Creek	bacteria	5a	1996
1221_07	From the confluence with Walnut Creek upstream to Lake Proctor	bacteria	5a	1996
<b>Segment 1221A: Resley Creek:</b>				
1221A_01	From confluence of Leon River upstream to unnamed tributary approx. 1 mi. N of Comanche Co. Line	bacteria	5c	2004
1221A_02	From confluence of unnamed tributary upstream to upper end of waterbody; approx. 1.0 miles NW of Dublin	bacteria	5c	2004
<b>Segment 1221B: South Leon River:</b>				
1221B_01	Entire water body	bacteria	5c	2006
<b>Segment 1221C: Pecan Creek:</b>				
1221C_01	Entire water body	bacteria	5c	2006
<b>Segment 1221D: Indian Creek:</b>				
1221D_01	From confluence with Leon River upstream to Armstrong Creek	bacteria	5c	2006
1221D_02	From confluence with Armstrong Creek upstream to headwaters of water body	bacteria	5c	2006
<b>Segment 1221F: Walnut Creek:</b>				
1221F_01	Entire water body	bacteria	5c	2006
<b>Segment 1217: Lampasas River Above Stillhouse Hollow Lake:</b>				
1217_04	From FM 1690 crossing to the CR 117 crossing	bacteria	5c	2002
1217_05	From CR 117 crossing to the upper end of the segment	bacteria	5c	2002

## Project Narrative

### Problem/Need Statement

#### Lampasas River

The Lampasas River (segment 1217 in the Brazos River Basin), rises in western Hamilton county 16 miles west of Hamilton and flows southeast for 75 miles, passing through Lampasas, Burnet, and Bell counties. In Bell County the river turns northeast and is dammed five miles southwest of Belton to form Stillhouse Hollow Lake (segment 1216). Below Stillhouse Hollow Lake, the Lampasas River flows to its confluence with Salado Creek and the Leon River to form the Little River.



The Lampasas River is commonly characterized by relatively low water levels and is situated within a predominantly rural and agricultural landscape. Land use within the watershed is dominated by rangeland and grasslands. Major agricultural interests include the production of beef cattle on rangeland, hay, wheat, oats, sorghum, corn, cotton, peanuts, and pecans.

Recreational uses of the waterbody are considered to be impaired. Bacteria exceed established criteria. These organisms are generally not harmful to human health, but may indicate the presence of pathogens that can cause disease or gastrointestinal illnesses. The Lampasas River above Stillhouse Hollow Lake is listed on the 2008 Texas 303(d) List for elevated bacteria levels.

The data used to assess bacterial concentrations in the Lampasas River is the result of sampling conducted in 1998 and 1999 through the Clean Rivers Program. Fecal coliform samples were taken at 5 designated sampling sites along the Lampasas River. It was observed that two of the five sampling sites indicated a use concern or non-support of contact recreation. While *E. coli* samples were collected, none have been assessed within the period for the 2008 303(d) List. TCEQ has initiated a twenty-four month monitoring project at Station 15770 in the upper portion of the watershed.

Although routine sampling indicates the presence of elevated bacteria levels in the Lampasas River, the origin of this source is unclear. In order to shed light on the sources contributing to the Lampasas River bacteria impairment, library-dependent BST is needed. This approach will utilize proven scientific methods that will discriminate between the various sources of bacteria. When the sources have been identified, appropriate management measures can be implemented for the respective sources.

Through TSSWCB project 07-11, *Lampasas River Watershed Assessment and Protection Project*, a WPP for the Lampasas River is being developed. AgriLife-TP serves as the TSSWCB-contracted watershed coordinator for this process. The development of the Lampasas River WPP will proceed independent of this BST project; however, conclusions from this BST project will be integrated into the WPP through adaptive management.

#### Leon River

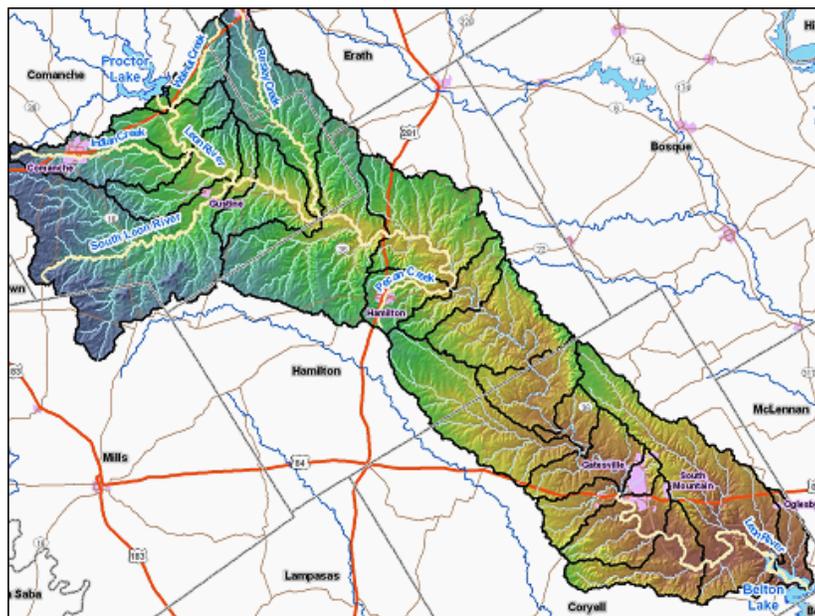
The Leon River watershed below Proctor Lake and above Belton Lake encompasses approximately 1,362 square miles in Bell, Hamilton, Coryell, Comanche, Erath and Mills counties. In 1996, the entire Leon River was placed on the Texas 303(d) List for bacteria levels that "sometimes exceed water quality standards". In 1996, the entire Leon River below Lake Proctor (Segment 1221) was placed on the 303(d) List for bacteria levels "Not Supporting Contact Recreation

## Project Narrative

### Problem/Need Statement

Use". The 2008 *303(d) List* identified all but two of the segment's assessment units as impaired or having a concern for near non-attainment resulting from elevated *E. coli* levels. Additionally, five tributaries of the Leon River are impaired for bacteria (1221A – Resley Creek, 1221B – South Leon River, 1221C – Pecan Creek, 1221D – Indian Creek, 1221F – Walnut Creek).

The Leon River watershed is a predominantly rural, agricultural watershed that primarily houses rangeland and row crop agricultural practices. Forests also cover a sizable amount of the watershed. A significant amount of dairy production also exists in the northern portion of the watershed.



A draft TMDL developed by TCEQ, but not adopted, identified sources of bacterial pollution in the Leon River watershed as wastewater treatment facility discharges, stormwater runoff, failing septic systems, wildlife and feral animals, as well as fecal deposition from livestock and pets. Water quality data support the assumption that these sources of bacterial contamination are present and contributing to the bacterial loading of the river. Ultimately, through the TMDL development process that utilized water quality monitoring, computer based modeling, watershed assessments and limited, library-dependent BST; TCEQ hypothesized that a 21% load reduction in bacteria levels would be needed to restore water quality in the Leon River.

In the midst of the TMDL development process, stakeholders sought to initiate the development of a WPP for the Leon River. Through TSSWCB project 06-12, *Leon River Watershed Protection Plan Project*, a WPP for the Leon River is being developed. The Brazos River Authority serves as the TSSWCB-contracted watershed coordinator for this process. The development of the Leon River WPP will proceed independent of this BST project; however, conclusions from this BST project will be integrated into the WPP through adaptive management.

In an effort to more accurately identify what potential sources truly are contributing to the bacterial loading of the Leon River, library-dependent BST will be re-employed. Advances in BST technologies and techniques since the original BST assessment was conducted for the TMDL and inclusion of additional sampling stations will produce higher certainty results which will be used to determine the most appropriate management measures needed.

**Project Narrative**

**General Project Description (Include Project Location Map)**

This project consists of two major components: 1) the collection of water samples in conjunction with streamflow measurements, and 2) the utilization of BST on those collected water samples. Building on work being conducted in the Lampasas River watershed (TSSWCB project 07-11) and the Leon River watershed (TSSWCB project 06-12), this project will apply portions of the TCEQ- and TSSWCB- approved Three-Tier Approach for Developing Bacteria TMDLs, as recommended by the joint Bacteria TMDL Task Force. This project will provide critical bacteria loading information as well as source identification information through the utilization of library-dependent BST which will be used to support the development and implementation of WPPs for the Lampasas and Leon Rivers watersheds.

AgriLife-TP will conduct all environmental water sample collection and monitoring. AgriLife-TP will obtain and maintain NELAC accreditation for laboratory methods used in this project. *E. coli* levels in collected water samples will be enumerated utilizing USEPA method 1603; flow rates and field parameters will be collected in conjunction with water samples. Samples will be collected at 30 sites - 15 in the Lampasas River watershed and 15 in the Leon River watershed - monthly for a period of 12 months. Tentative sampling locations in each watershed are listed in Tables 1 and 2; these will be assessed by sampling personnel and site selection will be finalized in the QAPP. After *E. coli* enumeration, AgriLife-TP will ship enumerated plates to AgriLife-EP for BST. Lastly, AgriLife-TP will collect 50 known source fecal samples per watershed (total of 100) from sources identified by AgriLife-EP; known source fecal samples will be collected, stored and shipped by AgriLife-TP to AgriLife-EP for processing using USEPA method 1603 to enumerate, culture and isolate *E. coli* colonies.

**Table 1. Tentative Leon River watershed BST sampling locations**

TCEQ Station ID	Location	Latitude	Longitude
11934	LEON RIVER AT US 67/US 377	31.95778	-98.4593
17379	WALNUT CREEK AT FM 1476	31.97312	-98.4367
18781	LEON RIVER AT HAMILTON CR 109	31.80540	-98.2280
11818	INDIAN CREEK AT CR 304	31.88658	-98.4381
11808	RESLEY CREEK AT COMANCHE CR394	31.81303	-98.2240
11930	LEON RIVER AT CR 431	31.60882	-97.8968
11817	SOUTH LEON RIVER AT SH 36	31.84813	-98.3708
11929	LEON RIVER AT CORYELL CR 183	31.52514	-97.8601
17547	PECAN CREEK AT SH 22	31.71031	-98.0563
18405	PLUM CREEK AT CORYELL CR 106	31.5126	-97.9001
11932	LEON RIVER AT US 281	31.78746	-98.1211
11804	CORYELL CREEK AT FM 107	31.39278	-97.5994
17501	LEON RIVER AT FAUNT LEROY PARK (GATESVILLE)	31.46250	-97.7492
11926	LEON RIVER AT SH 36	31.38369	-97.7017
11925	LEON RIVER AT FM 1829	31.33584	-97.6425

**Table 2. Tentative Lampasas River watershed BST sampling locations**

TCEQ Station ID	Location	Latitude	Longitude
15762	LAMPASAS RIVER AT US 84	31.48027	-98.2735
15770	LAMPASAS RIVER AT CR 105	31.37584	-98.1798
16404	LAMPASAS RIVER AT FM 2313	31.11900	-98.0565
11872	SULPHUR CREEK AT NARUNA RD	31.05040	-98.1852
15781	SULPHUR CREEK AT LAMPASAS CR 7	31.07091	-98.1353
18655	MESQUITE CREEK AT US 183	31.02181	-98.1235
11897	LAMPASAS RIVER AT US 190	31.08167	-98.0164
11724	ROCKY CREEK AT	30.98541	-97.9266
18759	REESE CREEK NR FM 2670 BR985	30.97930	-97.7847
11896	LAMPASAS RIVER AT SH 195	30.97248	-97.7786
11895	LAMPASAS RIVER AT FM 2484	30.95297	-97.7212
TBD	Clear Creek	TBD	TBD
TBD	Lucy Creek or School Creek	TBD	TBD
15763	Simms Creek	31.26815	-98.1746
15250	Sulphur Creek	31.08544	-98.0507

## Project Narrative

### General Project Description (Include Project Location Map)

Water samples collected, by AgriLife-TP will be enumerated for *E. coli* and shipped to AgriLife-EP for BST analysis. Library-dependent BST will be conducted on samples from both the Lampasas and Leon Rivers watersheds by analyzing *E. coli* isolates utilizing the enterobacterial repetitive intergenic consensus polymerase chain reaction (ERIC-PCR) and RiboPrinting (RP) combination method (ERIC-RP). As BST has previously been conducted in the Leon River watershed, this project will assist in assessing the temporal stability of the Texas *E. coli* BST Library. Known source fecal samples from the study area collected by AgriLife-TP will also be processed for ERIC-RP analysis by AgriLife-EP for inclusion in the Texas *E. coli* BST Library.

TWRI, AgriLife-EP, and AgriLife-TP will develop Technical Reports (one per watershed) summarizing water quality data collected and results of BST analysis conducted during the project. AgriLife-EP and AgriLife-TP will present results to the existing WPP stakeholder groups established through TSSWCB projects 06-12 and 07-11. AgriLife-EP will address and reconcile discrepancies between BST results from this project and modeling results from TSSWCB projects 06-12 and 07-11.

TWRI will transfer monitoring data (bacteria, field, and flow parameters), appropriately formatted, to TSSWCB for inclusion in the TCEQ Surface Water Quality Monitoring Information System (SWQMIS).

TWRI, AgriLife-TP, and AgriLife-EP will participate in Lampasas River and Leon River WPP meetings (TSSWCB projects 07-11 and 06-12), Clean Rivers Program Steering Committee meetings, and other meetings as appropriate in order to coordinate monitoring efforts and summarize activities and achievements made through this project.

TWRI will develop a Quality Assurance Project Plan (QAPP) for work conducted under Tasks 3 and 4 to ensure data of known and acceptable quality are generated and used in this project. The QAPP will be consistent with *EPA Requirements for Quality Assurance Project Plans (QA/R-5)*, the *TSSWCB Environmental Data Quality Management Plan*, TSSWCB-approved SOPs for BST methods (ERIC-PCR and RP), and various TCEQ guidelines for monitoring procedures and methods.

<b>Tasks, Objectives and Schedules</b>			
Task 1	Project Administration and Coordination		
Costs	\$26,331		
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 <sup>th</sup> of March, June, September, and December. QPRs shall be posted to the project website and distributed to all project partners.		
	Start Date	Month 1	Completion Date Month 24
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 24
Subtask 1.3	TWRI will host coordination meetings, conference calls, or TTVN meetings with the TSSWCB, AgriLife-TP, and AgriLife-EP, and include as appropriate BRA, 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. These coordination meetings may be held concurrently with TSSWCB project 06-12 or project 07-11 coordination meetings.		
	Start Date	Month 1	Completion Date Month 24
Subtask 1.4	TWRI, and AgriLife-TP and AgriLife-EP as appropriate, will attend and participate in public meetings as appropriate in order to communicate project goals, activities, and accomplishments to affected parties. Such meetings may include, but are not limited to, Clean Rivers Program Brazos River Basin Steering Committee meetings, Clean Rivers Program Brazos River Coordinated Monitoring meetings, Lampasas River Watershed Partnership Steering Committee and Work Groups meetings, Leon River WPP Working Committee and Focus Groups meetings, and TCEQ Leon River Bacteria TMDL Advisory Group meetings.		
	Start Date	Month 1	Completion Date Month 24
Subtask 1.5	TWRI, in collaboration with AgriLife-TP and AgriLife-EP, will develop and disseminate project informational materials, including, but not limited to, flyers, brochures, news releases, and other appropriate promotional publications. As appropriate, TWRI will include information at the project in the <i>tx H<sub>2</sub>O</i> , <i>New Waves</i> e-letter, and AgriLife News. AgriLife-TP and BRA may solicit informational material from TWRI and AgriLife-EP from time to time for inclusion in Leon River and Lampasas River stakeholder newsletters and other publications, and Clean Rivers Program Basin Highlights Reports or Basin Summary Reports. All announcements, letters and publications will be provided to the TSSWCB for review and comment prior to dissemination.		
	Start Date	Month 1	Completion Date Month 24
Subtask 1.6	TWRI will develop (Month 1-3), host and maintain (Months 4-24) a project website for dissemination of project materials. The project website will be linked to the project 06-12 website <a href="http://www.brazos.org/LeonRiverWPP.asp">http://www.brazos.org/LeonRiverWPP.asp</a> maintained by BRA and to the project 07-11 website <a href="http://www.lampasasriver.org/">http://www.lampasasriver.org/</a> maintained by AgriLife-TP.		
	Start Date	Month 1	Completion Date Month 24
Subtask 1.7	TWRI will work with AgriLife-TP and AgriLife-EP to prepare Technical Reports on collected water quality data and BST results (one for the Leon River watershed and one for the Lampasas River watershed). A draft of these reports will be submitted to TSSWCB for review prior to finalizing the documents. These reports will be permanently housed in the TWRI online Reports Database.		
	Start Date	Month 1	Completion Date Month 24

Tasks, Objectives and Schedules	
Task 1	Project Administration and Coordination
Deliverables	<ul style="list-style-type: none"> <li>Quarterly progress reports in electronic format</li> <li>Reimbursement Forms and necessary documentation in hard copy format</li> <li>List of action items needed from project coordination meetings</li> <li>Promotional materials, as developed and disseminated</li> <li>Project website</li> <li>Technical Reports (1 for Leon River and 1 for Lampasas River) (electronic format and 3 hard copies of each)</li> </ul>

Tasks, Objectives and Schedules					
Task 2	Quality Assurance				
Costs	\$5,000				
Objective	To develop data quality objectives (DQOs) and quality assurance/quality control (QA/QC) activities to ensure data of known and acceptable quality are generated through this project.				
Subtask 2.1	<p>TWRI, with assistance from AgriLife-EP and AgriLife-TP, will develop a QAPP for activities in Tasks 3 and 4 consistent with <i>EPA Requirements for Quality Assurance Project Plans (QA/R-5)</i> and the <i>TSSWCB Environmental Data Quality Management Plan</i>.</p> <p>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.</p> <p>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>.</p> <table border="1" data-bbox="261 1224 1521 1262"> <tr> <td>Start Date</td> <td>Month 1</td> <td>Completion Date</td> <td>Month 3</td> </tr> </table>	Start Date	Month 1	Completion Date	Month 3
Start Date	Month 1	Completion Date	Month 3		
Subtask 2.2	<p>TWRI, AgriLife-TP, and AgriLife-EP will implement the approved QAPP. TWRI will submit revisions and necessary amendments to the QAPP as needed.</p> <table border="1" data-bbox="261 1329 1521 1367"> <tr> <td>Start Date</td> <td>Month 4</td> <td>Completion Date</td> <td>Month 24</td> </tr> </table>	Start Date	Month 4	Completion Date	Month 24
Start Date	Month 4	Completion Date	Month 24		
Deliverables	<ul style="list-style-type: none"> <li>QAPP approved by TSSWCB in both electronic and hard copy formats</li> <li>Approved revisions and amendments to QAPP, as needed</li> <li>Data of known and acceptable quality as reported through Tasks 3 &amp; 4</li> </ul>				

Tasks, Objectives and Schedules			
Task 3	Water and Fecal Sample Collection		
Costs	\$268,059		
Objective	To collect surface water samples and stream flow data to be used to characterize <i>E. coli</i> loadings across varying flow regimes and temporal periods throughout the study areas.		
Subtask 3.1	AgriLife-TP, with assistance from project personnel on TSSWCB projects 06-12 and 07-11 and in consultation with AgriLife-EP, will conduct sampling site reconnaissance at the prospective sample sites (see tables in Project Narrative for proposed sites) to determine the suitability of sample collection at these locations.		
	TWRI in collaboration with AgriLife-TP will submit Station Location Requests (SLOCs) to TCEQ, as needed, to obtain TCEQ station numbers for new monitoring sites.		
	Start Date	Month 1	Completion Date
			Month 3
Subtask 3.2	AgriLife-TP will conduct routine, ambient monitoring at 15 sites in the Leon River watershed and 15 sites in the Lampasas River watershed monthly, collecting field, flow, and bacteria parameter groups. See tables in Project Narrative for proposed sites. The QAPP, as detailed in Task 2, will precisely identify sites.		
	Sampling period extends over 12 months. Total number of sample events scheduled for collection through this subtask is 360.		
	Field parameters are pH, temperature, conductivity, and dissolved oxygen. Flow parameters are flow collected by gage, electric, mechanical or Doppler, including severity. Bacteria parameters are <i>E. coli</i> .		
	Start Date	Month 4	Completion Date
			Month 15
Subtask 3.3	AgriLife-TP will enumerate <i>E. coli</i> colonies in water samples collected through subtask 3.2 using US EPA Method 1603. Enumeration results will be recorded in hard copy and electronic format.		
	Start Date	Month 4	Completion Date
			Month 15
Subtask 3.4	AgriLife-TP will store Method 1603 modified mTEC plates at 4°C for shipment to AgriLife-EP. AgriLife-TP will coordinate the shipment of these samples with AgriLife-EP such that they are received in El Paso within 3 days following enumeration.		
	Start Date	Month 4	Completion Date
			Month 15
Subtask 3.5	AgriLife-TP will collect approximately 100 known source fecal samples from the Lampasas (50) and Leon (50) Rivers watersheds. Fecal samples will be stored at 4°C and shipped to AgriLife-EP for <i>E. coli</i> isolation and analysis. AgriLife-TP will coordinate the shipment of these samples with AgriLife-EP such that they are received in El Paso within 3 days of collection. Sources of fecal samples will be selected in coordination with AgriLife-EP and the Leon and Lampasas Rivers watersheds coordinators.		
	Start Date	Month 4	Completion Date
			Month 15
Subtask 3.6	AgriLife-TP will collaborate with TWRI and AgriLife-EP to develop technical reports that present results of data collection and stream flow monitoring in each watershed.		
	AgriLife-TP will participate in appropriate Leon and Lampasas Rivers stakeholder meetings to present results from data collection activities.		
	Start Date	Month 16	Completion Date
			Month 24

Tasks, Objectives and Schedules			
Task 3	Water and Fecal Sample Collection		
Subtask 3.7	<p>TWRI, with assistance from AgriLife-TP, will transfer quarterly monitoring data from activities in Task 3 to TSSWCB for inclusion in TCEQ SWQMIS. 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 TCEQ <i>Surface Water Quality Monitoring Data Management Reference Guide</i>. Data Correction Request Forms will be submitted to TSSWCB whenever errors are discovered in data already reported. TWRI will also provide necessary information on this monitoring regime to BRA for inclusion in the Coordinated Monitoring Schedule.</p>		
	Start Date	Month 4	Completion Date
			Month 18
Deliverables	<ul style="list-style-type: none"> <li>• QA/QC data and water samples collected, recorded/processed and stored</li> <li>• Electronic data properly formatted and transmitted to TSSWCB for inclusion in SWQMIS</li> <li>• Known source fecal samples collected, stored and delivered to AgriLife-EP</li> <li>• Content for technical reports summarizing sampling/monitoring activities and results</li> </ul>		

Tasks, Objectives and Schedules			
Task 4	Bacterial Source Tracking		
Costs	\$133,515		
Objective	To conduct Bacterial Source Tracking to assess and identify different sources contributing to bacterial loading		
Subtask 4.1	<p>AgriLife-EP will conduct library-dependent BST on approximately 180 water samples (5 isolates per water sample) collected in the Lampasas River watershed and 180 water samples (5 isolates per water sample) from the Leon River watershed utilizing ERIC-RP (a total of approximately 1,800 <i>E. coli</i> isolates). Likely human and animal sources of the <i>E. coli</i> will be identified using the Texas <i>E. coli</i> BST Library. Water samples for this subtask shall be those collected by AgriLife-TP through subtask 3.2.</p>		
	Start Date	Month 4	Completion Date
			Month 18
Subtask 4.2	<p>AgriLife-EP will isolate <i>E. coli</i> from 100 known source fecal samples received from AgriLife-TP (Subtask 3.5). Approximately three isolates from each fecal sample will be screened using ERIC-PCR and approximately 200 isolates will be selected for RP and inclusion in the Texas <i>E. coli</i> BST Library.</p>		
	Start Date	Month 4	Completion Date
			Month 18
Subtask 4.3	<p>AgriLife-EP will collaborate with TWRI and AgriLife-TP to develop technical reports (1 for each watershed) detailing the results of BST conducted on water samples received from both the Lampasas and Leon Rivers. AgriLife-EP will participate in appropriate Leon and Lampasas Rivers stakeholder meetings to present BST results.</p>		
	Start Date	Month 19	Completion Date
			Month 24
Deliverables	<ul style="list-style-type: none"> <li>• Content for technical reports detailing the results of Bacterial Source Tracking</li> <li>• Bacteria isolates added to the Texas <i>E. coli</i> BST Library from collected known source fecal samples</li> </ul>		

**Project Goals (Expand from Summary Page)**

To provide supplemental information to support the development and implementation of WPPs through TSSWCB projects 06-12 and 07-11 to assist in assessing contact recreation use impairments in the Leon and Lampasas Rivers watersheds by:

- collecting water samples and stream flow data to aid in bacteria loading characterizations for each waterbody and for use in conducting BST
- collecting known source fecal samples from watersheds for inclusion in the Texas *E. coli* BST Library in order to bolster the accuracy of BST analysis conducted in these and other watersheds statewide
- conducting BST on water samples collected to assess and identify different sources contributing to the bacterial loading of each respective waterbody enabling stakeholders to utilize adaptive management to implement WPPs
- deliver BST results to established stakeholder groups in each watershed so that they will better understand the issues that must be addressed to restore water quality

**Measures of Success (Expand from Summary Page)**

- Data of known and acceptable quality are generated for surface water quality monitoring in the two watersheds and submitted to TCEQ for inclusion in SWQMIS for use in future water quality assessments
- Bacterial Source Tracking is conducted in the study area consistent with state approved methodologies that better identifies the sources contributing to the bacterial loading of the waterbodies
- Approximately 300 *E. coli* isolates from derived from 100 known source fecal samples collected within the study area added to the Texas *E. coli* BST Library
- Project results effectively delivered to established stakeholder groups enabling them to better manage identified sources contributing to the bacteria loading in each watershed

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

Goals and/or Milestone(s)

Element 1 – Explicit short- and long-term goals, objectives and strategies that protect surface...water

Long Term Goal: To protect and restore water quality from NPS pollution through assessment, implementation and education

- Objective A – Focus NPS abatement efforts...and available resources in watersheds identified as impacted by NPS pollution.
- Objective B – Support the implementation of state, regional, and local programs to prevent NPS pollution through assessment...and education.

Short Term Goal 1: Data Collection and Assessment: Coordinate with appropriate federal, state, regional, and local entities, private sector groups, and citizen groups and target...grant funds towards water quality assessment activities in high priority, NPS-impacted watersheds, ...or areas where additional information is needed

- Objective B – Ensure that monitoring procedures meet quality assurance requirements and are in compliance with EPA-approved... TSSWCB Quality Management Plans.
- Objective C – Conduct special studies to determine sources of NPS pollution and gain information to target...BMP implementation.
- Objective D – Develop... WPPs to...restore water quality in waterbodies impacted by NPS pollution.

Element 2 – Working Partnerships and linkages to appropriate, state, interstate, tribal, regional, and local entities, private sector groups, and Federal agencies.

Element 5 – The state program identifies waters and their watershed impaired by NPS pollution and identifies important unimpaired waters that are threatened or otherwise at risk. Further, the state establishes a process to progressively address these identified waters by conducting more detailed watershed assessments and developing watershed [protection] plans, and then by implementing the plans.

### Part III – Financial Information

<b>Budget Summary</b>	
<b>Category</b>	<b>Costs</b>
Personnel	\$ 139,477
Fringe Benefits	\$ 38,773
Travel	\$ 15,319
Equipment	\$ 38,650
Supplies	\$ 135,220
Contractual	\$ 0
Construction	\$ 0
Other	\$ 9,000
Total Direct Costs	\$ 376,439
Indirect Costs (≤15%)	\$ 56,466
<b>Total Project Costs</b>	<b>\$ 432,905</b>

<b>Budget Justification</b>		
Category	Costs	Justification
Personnel	\$ 139,477	AgriLife-TP Project Co-PI_Wolfe (.30 FTE annually) AgriLife-TP Research Associate TBD (1 FTE months 1 thru 18 only) TWRI PM_Gregory 1.75 mo/yr TWRI IT_Tech 1 mo in yr 1; 0.5 mo in yr 2 AgriLife-EP Postdoctoral Associate – support provided for through TSSWCB project 10-50
Fringe Benefits	\$ 38,773	salary * .171 + 494/mo for insurance
Travel	\$ 15,319	AgriLife-EP: travel to 2 stakeholder meetings in each watershed: \$2,400 AgriLife-TP: travel to 2 stakeholder meetings per watershed: \$550 AgriLife-TP: vehicle mileage: 48 individual sampling trips (2 per watershed per event) & 2 recon trips (total of 50) at ~467 mi ea.: \$11,669 TWRI: travel to 2 stakeholder mtgs per watershed: \$700
Equipment	\$ 38,650	<b>AgriLife-TP:</b> Doppler Stream Profiler: \$30,000 Autoclave: \$8,650
Supplies	\$ 135,220	<b>AgriLife-EP Supplies: \$113,700</b> Fecal sample E. coli isolations: 100 @ \$25 E. coli isolation from 360 water samples (5 isolates/sample) (1,800 total) @ \$8 ERIC-PCR supplies: 300 fecal isolates and 1800 water isolates @ \$8 RiboPrinting supplies: 1800 water isolates; 200 fecal isolates @ \$40  <b>AgriLife-TP Supplies: \$21,020</b> Field: sampling supplies: \$6,000 Portable incubator: \$1,000 Water Bath: \$2,500 Lab: Modified mTec supplies for 360 water samples @ \$24 Lab: Modified mTec supplies for 120 blanks @ \$24  <b>TWRI: Miscellaneous project supplies: \$500</b>
Contractual	\$ 0	N/A
Construction	\$ 0	N/A
Other	\$ 9,000	sample shipping to El Paso: 50 shipments: \$5,000 NELAC lab certification: \$2,000/yr
Indirect	\$ 56,466	15% of Total Direct Costs
SOURCE	TSSWCB will provide \$432,905 in non-federal funds sourced from state appropriations (FY2010 General Revenue) through the Nonpoint Source Grant Program to TWRI.	