



**Texas State Soil and Water Conservation Board  
 Total Maximum Daily Load Program  
 FY 2008 Project 08-54**

TMDL PROJECT SUMMARY PAGE			
Title of Project:	Assessment of Contact Recreation Use Impairments and Watershed Planning for Five Tributaries of the Little Brazos River [Short Title: LBR Tributaries Bacteria Assessment]		
Project Goals/Objectives:	To provide stakeholders and agencies with sufficient information to address bacteria impairments on five tributaries of the Little Brazos River through verification of use attainment, revision of water quality standards and/or designated uses, or development of a WPP or TMDL by 1) facilitating public participation and coordinating stakeholder involvement in decision-making, 2) developing a comprehensive GIS inventory and conducting a watershed source survey, 3) collecting water quality monitoring data, and 4) collecting information that can be used to evaluate attainability of recreational use.		
Project Tasks:	1) Project Administration; 2) Public Participation and Stakeholder Coordination; 3) Quality Assurance; 4) Survey and Inventory Possible Bacteria Sources; 5) Surface Water Quality Monitoring; 6) Assess Attainability of Recreational Use		
Measures of Success:	1) Decision-making for watershed planning activities, including data collection and analysis, is founded on local stakeholder input. 2) Data of known and acceptable quality are generated for surface water quality monitoring of the five segments in the study area. 3) Degree of public participation is measured by attendance at meetings and workshops. 4) Data collected supports recreational use assessments.		
Project Type:	Implementation ( ); Education ( ); Planning (X); Assessment (X)		
Status of Water Body: 2006 Water Quality Inventory and 303(d) List	<u>Segment ID:</u> 1242I – Campbells Creek 1242K – Mud Creek 1242L – Pin Oak Creek 1242M – Spring Creek 1242O – Walnut Creek	<u>Parameter:</u> bacteria bacteria bacteria bacteria bacteria	<u>Category:</u> 5c 5c 5c 5c 5c
Project Location: (Statewide or County and Watershed Name)	Robertson County, Little Brazos River Watershed		
Key Project Activities:	Hire Staff (X); Surface Water Quality Monitoring (X); Technical Assistance ( ); Education ( ); Implementation ( ); BMP Effectiveness Monitoring ( ); Demonstration ( ); Planning (X); Modeling ( ); Bacterial Source Tracking ( ); Other ( )		
NPS Management Program Elements:	<ul style="list-style-type: none"> <li>• Element One (STG 1B; STG 1C; STG 1D; STG 3B; STG 3D)</li> <li>• Element Two</li> <li>• Element Five</li> </ul>		
Project Costs:	\$ 262,232 (TSSWCB TMDL GR)		
Project Management:	Brazos River Authority		
Project Period:	June 1, 2008 – August 20, 2010		

## Part I – Applicant Information

Applicant							
Project Lead	Jay Bragg						
Title	Regional Environmental Planner						
Organization	Brazos River Authority						
E-mail Address	<a href="mailto:jbragg@brazos.org">jbragg@brazos.org</a>						
Street Address	4600 Cobbs Drive						
City	Waco	County	McLennan	State	Texas	Zip Code	76714
Telephone Number	(254) 761-3135			Fax Number	(254) 761-3205		

Project Partners	
Names	Roles & Responsibilities
Texas State Soil and Water Conservation Board (TSSWCB)	Provide state oversight and management of all project activities and ensure coordination of activities with related projects and TCEQ.
Brazos River Authority (BRA)	Coordinate all work described in Tasks.
Texas A&M University – Department of Biological and Agricultural Engineering (TAMU BAEN) (R. Karthikeyan)	Develop GIS inventory (Subtask 4.1) and perform LDC analysis (Subtask 5.7) and spatially explicit modeling (Subtask 4.3) through TSSWCB project 08-55
Texas AgriLife Research – Department of Soil and Crop Sciences – Soil and Aquatic Microbiology Laboratory (AgriLife SAML) (Terry Gentry)	Conduct Bacterial Source Tracking (Subtask 5.8) through TSSWCB project 09-52
Texas A&M University – Spatial Sciences Laboratory (TAMU SSL) (Raghavan Srinivasan)	Classify land use (Subtask 4.2) through TSSWCB project 08-52
Texas AgriLife Extension Service (AgriLife Extension) (Mark McFarland)	Deliver TWSP workshop (Subtask 2.4) through TSSWCB project 07-09
Texas A&M AgriLife – Texas Water Resources Institute (TWRI)	Coordinate all TAMU BAEN, AgriLife SAML, and TAMU SSL activities with BRA through TSSWCB projects 08-52, 08-55, and 09-52
Robertson County Soil and Water Conservation District (SWCD 451)	Collaborate as a critical local stakeholder and play a lead role in communicating with other local stakeholders

## Part II – Project Information

### Watershed Information

Watershed Name	Hydrologic Unit Code (8 Digit)	Segment ID	305(b) Category	Size (Acres)
Campbells Creek	12070101	1242I	5c	22,598
Mud Creek		1242K	5c	49,886
Pin Oak Creek		1242L	5c	25,979
Spring Creek		1242M	5c	23,174
Walnut Creek		1242O	5c	87,538

### Water Quality Impairment

Describe all known causes of water quality impairments from any of the following sources: 2006 Texas Water Quality Inventory and 303(d) List, or Other Documented Sources (i.e., Clean Rivers Program Basin Summary or Basin Highlights Reports).

#### 2006 TWQI & 303(d) List

- 1242I – bacteria impairment – source unknown
- 1242K – bacteria impairment – municipal point source discharges; source unknown
- 1242L – bacteria impairment – livestock NPS (grazing or feeding operations)
- 1242M – bacteria impairment – livestock NPS (grazing or feeding operations)
- 1242O – source unknown

#### 2007 BRA Clean Rivers Program Basin Summary Report

Sources of elevated bacteria levels prevalent through much of the watershed have not been determined. Rangeland runoff may be the main contributor, given the rural nature of most of the drainage area. Most of the unclassified waterbodies are small, rural streams with low to intermittent flow.

#### 2006 BRA Clean Rivers Program Basin Highlights Report

The potential sources of elevated bacteria levels prevalent throughout this watershed have not been investigated. A review of land use and potential sources of bacteria is recommended with additional monitoring locations as needed to isolate potential sources of impacts.

#### 2005 BRA Quality Water for the Brazos Community – Final Draft Management Plan

Possible sources [of fecal contamination] include inadequately treated sewage, improperly managed livestock waste, pet waste, aquatic birds and mammals, failing septic systems, and wildlife.

### Project Goals

To provide stakeholders and agencies with sufficient information to address bacteria impairments on five tributaries of the Little Brazos River through verification of use attainment, revision of water quality standards and/or designated uses, or development of a WPP or TMDL by 1) facilitating public participation and coordinating stakeholder involvement in decision-making, 2) developing a comprehensive GIS inventory and conducting a watershed source survey, 3) collecting water quality monitoring data, and 4) collecting information that can be used to evaluate attainability of recreational use.

### 2005 Texas Nonpoint Source Management Program References (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 B – Ensure that monitoring procedures meet quality assurance requirements...
  - Short-Term Goal One – Data Collection and Assessment – Objective C – Conduct special studies to determine sources of NPS pollution and gain information to target TMDL activities and BMP implementation.
  - Short-Term Goal One – Data Collection and Assessment – Objective D – Develop TMDLs, I-Plans and WPPs to maintain and restore water quality in waterbodies impacted by NPS pollution.
  - 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...

### Measures of Success

- Decision-making for watershed planning activities, including data collection and analysis, is founded on local stakeholder input.
- Data of known and acceptable quality are generated for surface water quality monitoring of the five segments in the study area.
- Degree of public participation is measured by attendance at meetings and workshops.
- Data collected supports recreational use assessments.

## Project Narrative

### Problem/Need Statement

The central watershed of the Brazos River consists of one classified water body, the Brazos River above Navasota River (Segment 1242), and a number of unclassified waterbodies on tributary systems. This segment extends from the Lake Brazos Dam in Waco 183 miles downstream to its confluence with the Navasota River southeast of College Station and its watershed encompasses approximately 2,705 mi<sup>2</sup>. With the exception of the Waco and Bryan/College Station urban areas, land use in the watershed is generally agricultural with a few large industrial facilities and quarries.

In 2002, a water quality data analysis determined that eight unclassified water bodies within the central watershed had bacteria concentrations that exceed state water quality standards for contact recreation. As a result, these waterbodies were placed on the *Texas §303(d) List of Impaired Waters*. Three additional unclassified segments were added to the 2006 §303(d) List bringing the total number of water quality impairments (bacteria) on segment 1242 to eleven.

Of those waterbodies impaired for bacteria, five are located within a very close proximity of each other in Robertson County and share similar land use and water quality characteristics. In addition, they are all tributaries to the Little Brazos River (Segment 1242E). The five waterbodies in this project's study area are Campbells Creek (Segment 1242I), Mud Creek (Segment 1242K), Pin Oak Creek (Segment 1242L), Spring Creek (Segment 1242M), and Walnut Creek (Segment 1242O). The study area encompasses 327 , almost entirely within Robertson County. The land use in the area is primarily agricultural (range and pastureland with mixed areas of cultivated cropland) with several small communities.

The 2006 §303(d) List identifies all five segments in the study area as Category 5c, meaning that the waterbody does not meet applicable water quality standards for one or more designated uses by one or more pollutants and that additional data and information will be collected before a TMDL is scheduled.

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 an updated joint-agency TMDL guidance document.

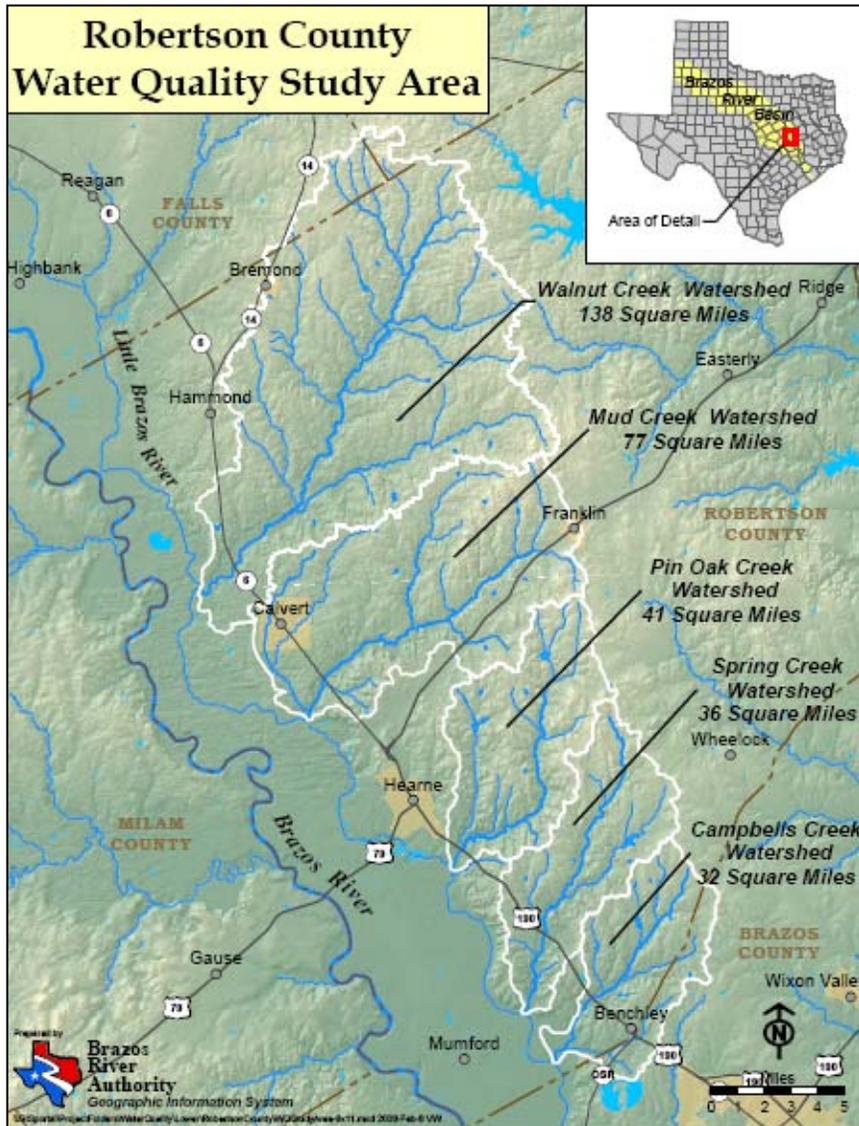
Major revisions to the Texas Surface Water Quality Standards are being drafted by TCEQ, including the establishment of numeric nutrient criteria for reservoirs and modifications to contact recreation use and bacteria criteria. As part of this process, TCEQ is developing procedures for conducting recreational Use Attainability Analyses (UAAs). In order for a new category of recreational use or a different bacteria water quality standard 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. Segments in this project's study area are 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 for the five segments in the study area. Through this and associated projects, the TSSWCB and BRA 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) waterbodies are achieving revised water quality standards, based on TCEQ triennial review process, 3) adequate data exists to support a UAA to change water quality standards, 4) adequate data exists to develop a Watershed Protection Plan, or 5) adequate data exists to develop a TMDL and I-Plan for TCEQ adoption.

## Project Narrative

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

BRA will facilitate public participation and coordinate stakeholder involvement to ensure that decision-making is founded on local input and that watershed planning activities are successful. BRA will provide logistical support for public meetings. At a minimum, public stakeholder meetings shall consist of an organizational/kick-off meeting, a source survey design meeting, a meeting presenting results from initial data analysis and the GIS inventory, a Texas Watershed Steward Program workshop, two project update meetings during the middle of the project, a meeting presenting data analysis results, and a meeting presenting final technical reports.



BRA will coordinate with AgriLife Extension to host a Texas Watershed Steward Program workshop focused on the study area through TSSWCB project 07-09, *Statewide Implementation of the Texas Watershed Steward Program*. BRA will develop and disseminate educational materials to watershed stakeholders, including, but not limited to, flyers, brochures, letters, and news releases. BRA will include information about the project in the Clean Rivers Program Basin Summary Report and the Basin Highlights Report. BRA will develop, host and maintain an internet webpage for the dissemination of project information.

BRA will develop a Quality Assurance Project Plan (QAPP) to ensure data of known and acceptable quality are generated and used in this project. The QAPP will be consistent with the *TSSWCB Environmental Data Quality Management Plan* and various TCEQ guidelines for monitoring procedures and methods.

TAMU BAEN through TSSWCB project 08-55 *Modeling Support for Little Brazos River Tributaries Bacteria Assessment*, will work with BRA to develop a comprehensive GIS inventory for the study area.

TSSWCB, in cooperation with TAMU SSL, will provide BRA a current land use classification, based on 2004-2006 imagery, for the study area through TSSWCB project 08-52, *Classification of Current Land Use/Land Cover for Certain Watersheds Where TMDLs or WPPs Are In Development*.

BRA will design and conduct a watershed survey that better characterizes the possible sources of bacteria loadings. Local stakeholders and technical experts will be consulted in the development of the source survey, which will represent warm and cool seasons and low and high flow conditions. Locations of possible bacteria sources identified during the source survey will be incorporated into the GIS inventory.

To provide sufficient water quality data to characterize bacteria loadings across the various flow regimes, BRA will

conduct routine ambient monitoring at 10 sites once every two weeks. Currently, routine ambient monitoring is conducted quarterly at 1 station by BRA (16395). BRA will conduct effluent monitoring at the outfalls of 3 wastewater treatment facilities (WWTFs) once every two weeks in an effort to estimate possible contributions from wastewater discharges. BRA will conduct biased-flow monitoring under high flow (storm event influenced) conditions at the 10 stream sites and the 3 WWTFs during at least 12 storm events. BRA will conduct biological monitoring on the Little Brazos River to assess the cumulative impact of the impaired segments on stream health and biological communities. BRA will post monitoring data to the BRA website in a timely manner.

To determine bacteria load reductions needed to achieve water quality standards, TAMU BAEN will conduct a Load Duration Curve (LDC) analysis of all historic and existing water quality monitoring data from the study area through TSSWCB project 08-55. Then, using water quality monitoring data collected through this project, BRA will assist in refining the developed LDCs. To estimate loadings from various sources and to identify critical loading areas within the watersheds, TAMU BAEN in collaboration with BRA will then conduct watershed modeling for the study area through TSSWCB project 08-55. Utilizing information from the GIS inventory, watershed source survey, and water quality monitoring, and in combination with the LDCs, TAMU BAEN through TSSWCB project 08-55 and in collaboration with BRA will develop a spatially explicit or mass balance model, such as SELECT, for each of the five watersheds in the study area.

Through TSSWCB project 09-52 *Bacterial Source Tracking for Little Brazos River Tributaries Bacteria Assessment*, AgriLife SAML will conduct bacterial source tracking (BST) in the study area to assess and identify different sources contributing to bacteria loadings. Library-independent BST utilizing the *Bacteroidales* PCR genetic test will be combined with limited library-dependent BST utilizing the ERIC-PCR and RP combination method. BRA will collect duplicate water samples from a subset of those collected through Task 5 and provide to AgriLife SAML for BST.

BRA will collect information that can be used to evaluate recreational uses in the waterbodies in the study area. Methods used shall be consistent with the latest version of the TCEQ staff draft *Recreational Use-Attainability Analyses (RUAs) – Procedures for a Comprehensive RUA and a Basic RUA Survey*. BRA shall conduct a thorough historical information review of the recreational uses of the waterbody back to November 28, 1975. BRA will conduct field surveys at selected sites during the period people would most likely be using the waterbody for contact recreation. Field surveys shall ascertain the suitability of the streams for contact recreation use and shall document the hydrological characteristics of the stream, such as width and depth of channel and substantial pools, flow/discharge, and bank access. BRA shall collect a digital photographic record of each selected site during the field surveys. In order to obtain information on existing and historical uses and stream characteristics, BRA 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.

<b>Tasks, Objectives and Schedules</b>			
Task 1:	Project Administration		
Costs:	\$ 4,048		
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:	BRA 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 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 24
Subtask 1.2:	BRA 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:	BRA will host coordination meetings or conference calls with TSSWCB, and any subcontractors or project partners as appropriate, at least quarterly to discuss project activities, project schedule, communication needs, deliverables and other requirements.		
	Start Date:	Month 1	Completion Date: Month 24
Deliverables	<ul style="list-style-type: none"> <li>• Quarterly Progress Reports in electronic format</li> <li>• Reimbursement Forms, and necessary supporting documentation, in either electronic or hard copy format</li> </ul>		

Tasks, Objectives and Schedules			
Task 2:	Public Participation and Stakeholder Coordination		
Costs:	\$ 2,912		
Objective:	To facilitate public participation and coordinate stakeholder involvement to ensure that decision-making is founded on local input and that watershed planning activities are successful.		
Subtask 2.1:	BRA will facilitate public participation activities and coordinate stakeholder involvement in the project. BRA will develop and maintain a list of stakeholders likely to be affected by this project.		
	Start Date:	Month 1	Completion Date: Month 24
Subtask 2.2:	BRA 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 organizational/kick-off meeting (month 3), a source survey design meeting (subtask 4.4) (month 4), a meeting presenting results from initial LDCs and the GIS inventory (month 6), Texas Watershed Steward Program workshop (subtask 2.4) (month 9), two project update meetings (months 12 and 18), a meeting presenting data analysis results (month 21), and a meeting presenting final technical reports (month 24).		
	Start Date:	Month 1	Completion Date: Month 24
Subtask 2.3:	BRA will attend and participate in other public meetings, such as city council meetings, county commissioners court meetings and SWCD meetings, in order to communicate project goals, activities and accomplishments to affected parties.		
	Start Date:	Month 1	Completion Date: Month 24
Subtask 2.4:	BRA will coordinate with AgriLife Extension to host a Texas Watershed Steward Program workshop focused on the study area through TSSWCB project 07-09, <i>Statewide Implementation of the Texas Watershed Steward Program</i> .		
	Start Date:	Month 1	Completion Date: Month 12
Subtask 2.5:	BRA will develop and disseminate educational materials to watershed stakeholders, including, but not limited to, flyers, brochures, letters, and news releases. BRA will include information about the project in the Clean Rivers Program Basin Summary Report and the Basin Highlights Report.		
	Start Date:	Month 1	Completion Date: Month 24
Subtask 2.6:	BRA will develop (months 1-3), host and maintain (months 4-24) an internet webpage for the dissemination of project information.		
	Start Date:	Month 1	Completion Date: Month 24
Deliverables	<ul style="list-style-type: none"> <li>• Stakeholder contact list, updated as appropriate</li> <li>• Public meeting notices, agendas, materials, summaries and lists of attendees</li> <li>• Educational materials, as developed and disseminated</li> <li>• Project webpage</li> </ul>		

Tasks, Objectives and Schedules			
Task 3:	Quality Assurance		
Costs:	\$ 3,319		
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 3.1:	BRA will develop a QAPP for activities in Tasks 5 and 6 consistent with <i>EPA Requirements for Quality Assurance Project Plans (QA/R-5)</i> (May 2006) and the <i>TSSWCB Environmental Data Quality Management Plan</i> (August 2008).		
	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> (October 2008) and <i>Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data (RG- 416)</i> (June 2007).		
Subtask 3.1:	All procedures and methods for Task 6 prescribed in the QAPP shall be consistent with the guidelines detailed in the latest version of the TCEQ staff draft <i>Recreational Use-Attainability Analyses (RUAAs) – Procedures for a Comprehensive RUA and a Basic RUA Survey</i> .		
	Start Date:	Month 1	Completion Date:
Subtask 3.2:	BRA will submit revisions and necessary amendments to the QAPP as needed.		
	Start Date:	Month 3	Completion Date:
Deliverables	<ul style="list-style-type: none"> <li>• QAPP for Tasks 5 and 6 approved by TSSWCB in both electronic and hard copy formats</li> <li>• Approved revisions and amendments to QAPP</li> </ul>		

Tasks, Objectives and Schedules			
Task 4:	Survey and Inventory Possible Bacteria Sources		
Costs:	\$ 34,834		
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.		
Subtask 4.1:	TAMU BAEN through TSSWCB project 08-55 <i>Modeling Support for Little Brazos River Tributaries Bacteria Assessment</i> , will work with BRA to 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 structures, 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 4.5, 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: Month 3
Subtask 4.2:	TSSWCB, in coordination with TAMU SSL, will provide BRA a current land use classification for the study area through TSSWCB project 08-52, <i>Classification of Current Land Use/Land Cover for Certain Watersheds Where TMDLs or WPPs Are In Development</i> .		
	Start Date:	Month 1	Completion Date: Month 3
Subtask 4.3	TAMU BAEN will work with BRA to conduct watershed modeling for the study area through TSSWCB project 08-55. Utilizing information from the GIS inventory (Subtask 4.1), the source survey (Subtask 4.5) and water quality monitoring (Task 5), a spatially explicit or mass balance model, such as SELECT, will be developed for each of the five watersheds in the study area to estimate loadings from various sources and to identify critical loading areas within the watersheds.		
	Start Date:	Month 7	Completion Date: Month 21
Subtask 4.4:	BRA will facilitate a meeting of local stakeholders and technical experts to design a source 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, U.S. Geological Survey, U.S. Fish and Wildlife Service, USDA Natural Resources Conservation Service, USDA Agricultural Research Service, and affected municipalities, counties and SWCDs.		
Subtask 4.5:	BRA will conduct watershed surveys in the study area as designed in Subtask 4.4.		
	Start Date:	Month 4	Completion Date: Month 15
Deliverables	<ul style="list-style-type: none"> <li>• Technical Report describing results from the source survey</li> </ul>		

Tasks, Objectives and Schedules			
Task 5:	Surface Water Quality Monitoring		
Costs:	\$ 196,625		
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:	BRA will conduct routine ambient monitoring at 10 sites once every two weeks, collecting field, flow and bacteria parameter groups. The QAPP, as detailed in Task 3, will precisely identify sites. Five of these sites shall be the same as those in Subtask 5.4. The sampling period extends over 22 months. Total number of sample events scheduled for collection through this subtask is 480. Currently, routine ambient monitoring is conducted quarterly at 1 station by BRA (16395). BRA will avoid duplicative routine ambient monitoring at site 16395.		
	Start Date:	Month 3	Completion Date: Month 24
Subtask 5.2:	BRA will conduct effluent monitoring at 3 WWTFs once every two weeks, collecting field, flow and bacteria parameter groups. The QAPP, as detailed in Task 3, will precisely identify sites. The sampling period extends over 22 months. Total number of sample events scheduled for collection through this subtask is 144. Coordination between TPDES permittees and the TCEQ Regional Office will be required.		
	Start Date:	Month 3	Completion Date: Month 24
Subtask 5.3:	BRA will conduct biased-flow monitoring under high flow (storm event influenced) conditions at the 10 stream sites (Subtask 5.1) and the 3 WWTFs (Subtask 5.2) during at least 12 storm events collecting field, flow and bacteria parameter groups (grab samples). The sampling period extends over 22 months. Total number of sample events budgeted for collection through this subtask is 156.		
	Start Date:	Month 3	Completion Date: Month 24
Subtask 5.4:	BRA will establish, and maintain, continuous flow monitoring gages at 5 sites (1 per segment). These sites shall be located as close to the confluence with the Little Brazos River as is feasible. Continuous sampling extends over 22 months.		
	Start Date:	Month 3	Completion Date: Month 24
Subtask 5.5:	BRA will conduct biological monitoring at least once on the Little Brazos River to assess the cumulative impact of the impaired segments on stream health and biological communities.		
	Start Date:	Month 3	Completion Date: Month 24
Subtask 5.6:	BRA will transfer monitoring data from activities in Task 5 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> . BRA will submit Station Location Requests as needed to obtain TCEQ station numbers for new monitoring sites. Data Correction Request Forms will be submitted to TSSWCB whenever errors are discovered in data already reported. BRA will post monitoring data from activities in Task 5 to the BRA website in a timely manner.		
	Start Date:	Month 3	Completion Date: Month 24
Subtask 5.7	BRA will cooperate with TAMU BAEN, through TSSWCB project 08-55, to 1) conduct an LDC analysis of all historic and existing water quality monitoring data from the study area, and 2) refine those LDCs using water quality monitoring data collected through this project (Subtasks 5.1-5.4).		
	Start Date:	Month 3	Completion Date: Month 21

Subtask 5.8:	<p>Through TSSWCB project 09-52, AgriLife SAML will conduct bacterial source tracking (BST) in the study area to assess and identify different sources contributing to bacteria loadings. Library-independent BST utilizing the <i>Bacteroidales</i> PCR genetic test will be combined with limited library-dependent BST utilizing the ERIC-PCR and RP combination method.</p> <p>BRA will collect duplicate water samples from a subset of those collected through Subtasks 5.1-5.3 and deliver those samples to AgriLife SAML for BST. This BST subset shall be precisely described in the 09-52 QAPP. BRA will work with AgriLife SAML to ensure sample collection activities employ adequate QA/QC mechanisms for BST as described in the 09-52 QAPP.</p> <p>Results from the source survey (Subtask 4.5) will be used by AgriLife SAML to make appropriate adjustments to the BST sampling design and to assess the adequacy of the Texas Known Source Library.</p>		
	Start Date:	Month 11	Completion Date: Month 21
Deliverables	<ul style="list-style-type: none"> <li>• Station Location Request Forms (as needed) in electronic format</li> <li>• Monitoring data files and Data Summary in electronic format</li> <li>• Data Correction Request Forms (as needed) in electronic format</li> <li>• Monitoring data updates posted to the BRA website</li> <li>• Technical Report characterizing trends and variability in historical water quality monitoring data</li> <li>• Technical Report characterizing trends and variability in collected water quality monitoring data</li> </ul>		

Tasks, Objectives and Schedules			
Task 6	Assess Attainability of Recreational Use		
Costs	\$ 20,539		
Objective	To collect information that can be used to evaluate attainability of recreational use in tributaries of the Little Brazos River.		
Subtask 6.1	Utilizing information from Task 4 (comprehensive GIS inventory and current land use classification) and other relevant information, BRA 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, where practical, distributed such that there are 3 sites for every 5 miles of stream. Sites shall be identified for the entirety of each of the five segments in the study area. Proposed sites shall at least include those from Subtask 5.1. The QAPP, as detailed in Task 3, will precisely identify selected sites. BRA will submit Station Location Requests as needed to obtain TCEQ station numbers for new monitoring sites.		
	Start Date	Month 11	Completion Date Month 22
Subtask 6.2	BRA 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. Texas Parks and Wildlife Department and commercial providers of outdoor recreation goods and services should be consulted for historical information.		
	Start Date	Month 11	Completion Date Month 22
Subtask 6.3	BRA will conduct 2 field surveys at each site, as defined in the QAPP (Subtask 6.1). 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, weekends).		
	<p>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 TCEQ staff draft <i>Recreational Use-Attainability Analyses (RUAs) – Procedures for a Comprehensive RUAA and a Basic RUAA Survey</i>.</p> <p>BRA shall document and describe antecedent (prior to fieldwork) rainfall conditions (approximately 30 days) at each selected site.</p>		
Start Date	Month 11	Completion Date	Month 22
Subtask 6.4	BRA 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 11	Completion Date Month 22
Subtask 6.5	In order to obtain information on existing and historical uses and stream characteristics, BRA 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. Survey instrument shall include at least those questions found on the Interview Form from the latest version of the TCEQ staff draft <i>Recreational Use-Attainability Analyses (RUAs) – Procedures for a Comprehensive RUAA and a Basic RUAA Survey</i> .		
	Start Date	Month 11	Completion Date Month 22

Deliverables	<ul style="list-style-type: none"><li>• Station Location Request Forms (as needed) in electronic format</li><li>• Contact Information Form from the latest version of the TCEQ staff draft <i>Recreational Use-Attainability Analyses (RUAAs) – Procedures for a Comprehensive RUAA and a Basic RUAA Survey</i></li><li>• Field Data Sheets and Data Summary in electronic format</li><li>• Digital photographic record, cataloged in an appropriate manner</li><li>• Interview Forms and Data Summary in electronic format</li><li>• Technical Report summarizing historical information review, field surveys, and user interviews; Technical Report shall at least include those contents described for a Comprehensive RUAA in the the latest version of the TCEQ staff draft <i>Recreational Use-Attainability Analyses (RUAAs) – Procedures for a Comprehensive RUAA and a Basic RUAA Survey</i></li></ul>
--------------	--

**Part III – Financial Information**

<b>Budget Summary</b>	
<b>Category</b>	<b>Costs</b>
Personnel	\$ 108,273
Fringe Benefits	\$ 31,928
Subtotal Personnel & Fringe	\$ 140,201
Travel	\$ 24,200
Equipment	\$ 21,008
Supplies	\$ 0
Contractual	\$ 0
Construction	\$ 0
Other	\$ 60,626
Subtotal	\$ 105,834
Total Direct Costs	\$ 246,035
Indirect Costs (≤15%)	\$ 16,197
<b>Total Project Costs</b>	<b>\$ 262,232</b>

<b>Budget Justification</b>			
<b>Category</b>	<b>Costs</b>	<b>Justification</b>	
Personnel & Fringe	\$ 140,201	Field Technician	2,080 hr @ \$16.50/hr \$ 34,320
		Sr. Field Technician	2,080 hr @ \$19.66/hr \$ 40,893
		Quality Assurance & Data Mgr	100 hr @ \$26.33/hr \$ 2,633
		Environmental Lab Mgr	--- @ \$30.97/hr ---
		Cen Basin Environmental Planner	80 hr @ \$32.17/hr \$ 2,574
		Environmental Specialist	56 hr @ \$17.80/hr \$ 997
		ES Manager	16 hr @ \$34.86/hr \$ 558
Travel	\$ 24,200	44,000 miles @ \$0.55/mile	
Equipment	\$ 21,008	Field Equipment Usage 146 events @ \$300 per event	
Supplies	\$ 0		
Contractual	\$ 0		
Construction	\$ 0		
Other	\$ 60,626	BRA Lab Services – laboratory analysis of collected water samples	
Indirect	\$ 16,197	15% of Personnel	