Texas State Soil and Water Conservation Board
Clean Water Act §319(h) Nonpoint Source Grant Program
FY 2009 Project Workplan 09-10

NONPOINT SOURCE SUMMARY PAGE for the CWA §319(h) Agricultural/Silvicultural Nonpoint Source Grant Program			
Title of Project:	Development of a Watershed Protection Plan for Attoyac Bayou		
Project Goals:	To assess the current water quality conditions and impairments in the Attoyac Bayou watershed thru 1) targeted water quality sampling and analysis, 2) conducting a watershed source survey and developing a comprehensive GIS inventory, 3) analyze water quality data using Load Duration Curves and spatially explicit modeling, 4) conduct bacteria source tracking, 5) conduct a Use Attainability Analysis, 6) establish and provide direction for a stakeholder group that will serve as a decision making body in the assessment of the Attoyac Bayou and facilitate the development of a Watershed Protection Plan (WPP) that satisfies EPA's nine key element requirement and will guide any further assessment or planning activities.		
Project Tasks:	(1) Project Administration; (2) Quality Assurance; (3) Public Participation and Stakeholder Coordination; (4) Watershed Survey and GIS Information Update ; (5) Surface Water Quality Monitoring; (6) LDC and SELECT Data Analysis; (7) Recreational Use Attainability Analysis (RUAA); (8) Bacterial Source Tracking; (9) Watershed Protection Plan Development		
Measures of Success:	(1) Coordination and engagement of a watershed stakeholder committee; (2) Completed GIS and LU/LC update of the watershed with potential pollutant sources identified; (3) Collection and analysis of quality assured data generated for watershed sampling sites; (4) Completion of LDC and SELECT analysis; (5) Completed UAA submitted to TSSWCB and TCEQ; (6) completed BST analysis; (7) Completed WPP approved by stakeholders, TSSWCB and EPA		
Project Type:	Implementation ( ); Education (X); Planning (X); Assessment (X); Groundwater ( )		
Status of Water Body: 2008 Texas Water Quality Inventory and 303(d) List	Segment ID: Attoyac Bayou (0612): Segments 0612_01, 0612_02, 0612_03	Parameter: Bacteria (geomean) Bacteria (single sample) Nutrient criteria	Category: 5a CN CS
Project Location (Statewide or Watershed and County)	The Attoyac Bayou Watershed upstream of Sam Rayburn Reservoir in San Augustine, Nacogdoches, Shelby and Rusk Counties.		
Key Project Activities:	Hire Staff ( ); 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:	Element One (LTG Objectives 1, 2, 5, 6, & 7; STG 1B, STG 1C, STG 3A, STG 3B, STG 3D) Element Two Element Five		

Project Costs:	Federal:	$617,829	Non-Federal:	$414,621	Total:	$1,032,450
Project Management:	Texas AgriLife Research, Texas Water Resources Institute					
Project Period:	November 1, 2009 – April 30, 2014					

Part I – Applicant Information

Applicant							
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Project Co-Lead	Dr. Terry Gentry						
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Project Co-Lead	Dr. Matthew McBroom						
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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.
Texas AgriLife Research, Texas Water Resources Institute (TWRI)	Project Coordination and Administration, QAPP Development, Project Reporting, Provide assistance for Stakeholder relations, support the development of task final reports (BST, GIS inventory and sanitary survey, LU/LC, LDC/SELECT, UAA and WPP)
Texas AgriLife Research – Department of Biological and Agricultural Engineering (BAEN)	LDC and SELECT Analysis, LDC and SELECT report development
Stephen F. Austin State University College of Forestry and Agriculture (SFASU)	Environmental instrumentation installation, maintenance and sampling, field data management and transmission to ANRA, field data summary, UAA development and technical report
Stephen F. Austin State University Water for East Texas Center (SFA WET)	Preparation of *E. coli* isolates from fecal and water samples for BST analysis using USEPA 1603 method
Castilaw Environmental Services, LLC (CES)	Sanitary Survey, GIS Inventory, LU/LC Update, Coordinate Stakeholder relations, WPP development
Angelina-Neches River Authority (ANRA)	Water quality analysis, data assimilation, data submission to TSSWCB.
Texas AgriLife Research – Department of Soil and Crop Sciences (SCSC) Soil and Aquatic Microbiology Lab (SAML)	BST sample analysis, compilation of final report summarizing BST findings
Pineywoods RC&D	Project Cooperator and assist with stakeholder facilitation

Part II – Project Information

Project Type

Surface Water	X	Groundwater					
Does the project implement recommendations made in a completed Watershed Protection Plan or an adopted TMDL or Implementation Plan?				Yes		No	X
If yes, identify the document.							
If yes, identify the agency/group that developed and/or approved the document.				Year Developed			

Watershed Information				
Watershed Name(s)	Hydrologic Unit Code (8 Digit)	Segment ID	305 (b) Category	Size (Acres)
Attoyac Bayou	12020005	0612	5a	426,880

Water Quality Impairment

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

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

Segment 0612: Attoyac Bayou: From a point 2.4 miles downstream of Curry Creek in Nacogdoches/San Augustine Counties to FM 95 in Rusk County

	Impairment	Category	Year Listed
0612_01: Mouth to 8.2 miles downstream of SH 7	bacteria (geomean)	5a	2004
0612_02: 8.2 miles below SH 7 to Bear Creek confluence	bacteria (geomean)	5a	2004
0612_03: Bear Creek to headwaters	bacteria (geomean)	5a	2004

CONCERNS (*2008 Texas Water Quality Inventory*)

		Level of Concern	
0612_01	bacteria single sample	CN	(concern for near non-attainment)
0612_02	nutrient screening	CS	(concern screening levels)
0612_03	bacteria single sample	CN	
	nutrient screening	CS	

2008 Upper Neches Basin Highlights Report; Angelina-Neches River Authority

"The contact recreation use is not supported in the upper and lower portions of the segment. The *E. coli* geometric mean was exceeded at both locations. All other uses are fully supported; however, there is a nutrient enrichment concern for elevated levels of ammonia…."

Project Narrative

Problem/Need Statement

The Neches River Basin in East Texas originates in Van Zandt County southeast of Dallas and flows in a southeastern direction through the Pineywoods of East Texas to the Gulf of Mexico. The river basin has been divided into an upper and lower portion for management and monitoring purposes. The Angelina-Neches River Authority (ANRA) is responsible for the Upper Neches River Basin (4,768,640 ac.) which extends from the headwaters of the Neches River down stream to its confluence with the Angelina River at B.A. Steinhagen Lake in Tyler and Jasper Counties. Within this area, there are 9 classified segments, 13 monitored tributaries and 4 water supply reservoirs. The watershed is largely situated within the Southern Central Plains eco-region and agricultural and silvicultural related industries and operations dominate the landscape and undoubtedly play a significant role in the watershed's hydrology and quality. Urban sprawl coupled with an increasing number of rural residents and land subdivision is also currently impacting the watershed and its hydrological processes.

The Attoyac Bayou, Segment 0612, is one sub-watershed within the Upper Neches River Watershed that is experiencing changes in its hydrologic regime, and subsequent changes in water quality. Watershed dynamics have changed over time and environmental stressors have been exacerbated thru expanded human influences and increasing demand for water resources, increasing pollutant load and the concentration of pollutant loads. These changes have resulted in the elevation of bacteria and nutrient levels relative to Texas Surface Water Quality Standards. The Bayou extends approximately 82 miles from its headwaters in Rusk County and flows through Nacogdoches, San Augustine and Shelby Counties before emptying into Sam Rayburn Reservoir. The watershed contains several named communities including Chireno, Attoyac, Martinsville, Grigsby, Garrison and others; however, these are small rural communities. Chireno and Garrison are the only two with Census Bureau estimated populations for 2007 of 419 and 858 respectively. The remainder of the area is predominantly managed for agricultural (cattle and poultry), silvicultural, recreational and wildlife uses and contains many rural residents and four known permitted wastewater discharges totaling a maximum of 338,000 gallons per day.

The Attoyac Bayou watershed is one of many rural watersheds that are included in the *Texas Water Quality Inventory and 303(d) List* as an impaired water body due to excessive *E. coli* levels. In many cases the assessed data set includes a

relatively small number of water quality samples collected over a 5 to 7 year period. Two Clean Rivers Program (CRP) monitoring sites are operated on a quarterly basis by the ANRA at the US 59 (Station 16076) and SH 7 (Station 15253) road crossings and are used to assess water quality in the Bayou. Another water quality monitoring station is located at the SH 21 crossing (Station 10636) and has been operated by ANRA, Texas Commission on Environmental Quality (TCEQ) and the U.S. Geological Survey (USGS); it is currently being operated by TCEQ. A review of the exisiting water quality data reveals that in many cases the reported *E. coli* levels are elevated above the *E. coli* single sample limit of 394 cfu/100ml and the geometric mean of all samples collected exceed the state standard of 126 cfu/100ml at all three sites.

Previous projects conducted in the area have laid the ground work and produced project outcomes that will be incorporated into this effort. Specifically, the TSSWCB funded (04-06) project entitled *Modeling Nutrient Loads from Poultry Operations in Toledo Bend Reservoir and Sam Rayburn Reservoir Watersheds* utilized the SWAT model to simulate flow and nutrient loading in the Sam Rayburn Reservoir watershed (includes the Attoyac Bayou). These data will provide critical flow and nutrient loading information that will aid in the development of feasible BMPs to address bacteria and nutrient loadings and develop expected load reductions for each constituent. In addition, the TSSWCB funded (05-04) project entitled *Texas Silvicultural Nonpoint Source Pollution Abatement and Prevention Project* was carried out by the Texas Forest Service (TFS) in the greater East Texas area to assess the implementation and effectiveness of forestry related BMPs targeted to improve water quality. Under the proposed effort, TFS will collaborate and provide information on BMP effectiveness and strategies to encourage voluntary implementation of these BMPs.

Although these data tend to justify the currently listed impairment, limited flow data has been collected on the Bayou and as a result, it is difficult to calculate an accurate *E. coli* loading rate and the most likely sources of *E. coli* contamination. The needs for a bolstered data set and comprehensive data analysis arise as management options are considered. Without adequate data, uncertainty increases in properly identifying the sources of contamination in the watershed while comprehensive data analysis is needed to hone in on potential sources of watershed pollutants. Collecting two years of additional water quality and streamflow data along with input from local stakeholders will provide much needed information that will enable more accurate watershed pollutant source assessments and the development of a focused and effective watershed protection plan (WPP).

Project Narrative

General Project Description (Include Project Location Map)

This project shall serve as a means for establishing and engaging a watershed stakeholder group to assist in the development and future implementation of a WPP for the Attoyac Bayou watershed (Figure 1). This project will utilize portions of the “Three-Tier Approach for Bacteria TMDL Development” as recommended in the Bacteria TMDL Task Force Report submitted to TCEQ and TSSWCB. Tier 1 and Tier 2 recommended tasks will be combined to develop a better understanding of the hydrology, water quality, potential causes and sources for the impairment and will cultivate stakeholder ideas to include in the development of a WPP for the Attoyac Bayou.

Public participation and stakeholder involvement will be handled primarily by CES who will serve as the Watershed Coordinator and will be assisted by ANRA, BAEN, Pineywoods RC&D, SCSC, SFASU and TWRI. A diverse group of landowners, public officials, special interest groups and agencies have been identified as potential participants in a stakeholder group and will be asked to provide guidance for the direction of the project and development of the WPP. Input from stakeholders is critical to the success of all watershed planning and implementation efforts. Stakeholder input will be sought throughout this project extensively. Insight provided by the stakeholders will supply much needed information and greatly assist in identifying potential impairment sources and in determining best management strategies for future implementation. Routine stakeholder meetings will be held to provide information about the project objectives, data analysis results, GIS inventory updates and the final results of the project. Project information will be presented through other avenues as well (ANRA CRP meetings, Regional Water Planning meetings, Special Interest Meetings, project website, etc.).

A comprehensive GIS inventory of the watershed will be developed primarily by CES, utilizing their extensive prior knowledge of the watershed and GIS mapping expertise. They will seek input from local stakeholders, public officials,

agency personnel and other means necessary to develop a comprehensive GIS inventory of the watershed that illustrates waterbodies, roadways, permitted point-source dischargers, animal feeding operations and other points of concern. Additionally, CES will update current land use/land cover maps for the watershed and will utilize ground-truthed data points collected for the GIS inventory to verify the accuracy of the LULC map. These data will be provided to BAEN for inclusion in the SELECT model analysis.

Table 1. *Attoyac Bayou Water Quality Sampling Stations*

Site #	***Station #***	***Location***
1	10636	Attoyac Bayou @ SH 21
2	15253	Attoyac Bayou @ SH 7
3	20841	Attoyac Bayou @ FM 138
4	16076	Attoyac Bayou @ US 59
5	20842	Attoyac Bayou @ US 84
6	16083	Waffelow Creek @ FM 95
7	16084	Terrapin Creek @ FM 95
8	20843	Naconiche Creek @ FM 95
9	20844	Big Iron Ore Creek @ FM 354
10	20845	West Creek @ CR 2913

A targeted water quality monitoring approach will be employed through this project. This effort will be led by SFASU and coordinated with ANRA CRP personnel to ensure that as much continuity as possible is maintained between sampling efforts. Bi-weekly (twice per month) sampling will be conducted at 10 sampling sites listed in Table 1. This increased spatial and temporal sampling will allow for more accurate and realistic comparisons between prior collected data and data collected during this project period. In-situ water quality monitoring collected using a YSI multi-probe will include pH, conductivity, dissolved oxygen (DO), and Temperature (^{o}C). Flow measurements will also be taken at each monitoring site and will be critical for the development of LDCs. Water samples will be collected by SFASU and delivered to ANRA to be analyzed for *E. coli* (IDEXX method), ammonia, nitrate, total phosphorus, dissolved orthophosphorus and total suspended solids. Additional water samples collected by SFASU will be taken to the WET Lab at SFASU and prepared and stored utilizing the USEPA 1603 method for *E. coli* analysis; samples will later be transferred to the SAML for BST analysis. These routine data will be supplemented with stormflow samples automatically collected using ISCO automated sampling devices calibrated to collect samples based on water level changes resulting from storm events. Stormflow samples will be collected from a minimum of 10 storm events at 2 locations. SFASU will transfer all collected water samples to the ANRA labs within their prescribed holding times. The National Environmental Laboratory Accreditation Conference (NELAC) approved ANRA Lab will be responsible for conducting water quality analyses. Data will be stored in a master database maintained by ANRA; field data collected by SFASU will also be transmitted to ANRA for inclusion in their database. ANRA will manage and prepare data consistent with the TCEQ Data Management Reference Guide (DMRG) for submittal to TSSWCB and transmittal to TCEQ for inclusion in Surface Water Quality Monitoring Information System (SWQMIS).

Analyzing historic data and data collected during the 2-year monitoring period will be conducted through this project. BAEN will develop Load Duration Curves (LDCs) for *E. coli* and ammonia using available historic data and estimated flow readings for each of the three previously monitored sites and will develop updated LDCs for all sampling sites after water quality sampling and flow monitoring has been completed. The developed LDCs will be consistent with EPA's *Approach for Using Load Duration Curves in the Development of TMDLs* and EPA's *Options for Expressing Daily Loads in TMDLs* and EPA's *Development of Duration-Curve Based Methods for Quantifying Variability and Change in Watershed Hydrology and Water Quality*. This analysis will provide a goal for needed *E. coli* and ammonia load reductions and aid in identifying potential sources of *E. coli* and ammonia based on flow conditions.

BAEN will also be responsible for evaluating *E. coli* contamination sources in Attoyac Bayou watershed using Spatially Explicit Load Enrichment Calculation Tool (SELECT). Information collected in the development of the GIS inventory, LU/LC update, SWQM and LDC development will be incorporated into SELECT to determine *E. coli* loads for specific areas of the watershed. The SELECT approach will also provide an appropriate ranking of each pollutant source based on its potential to contribute to the overall *E. coli* loading in the watershed.

To assess and identify different sources contributing to bacteria loadings, SAML will conduct Bacterial Source Tracking (BST) in the study area. SAML will conduct library-independent BST utilizing the *Bacteroidales* PCR genetic test for human, ruminant, horse, and swine markers. Additionally, SAML will conduct limited library-dependent BST and analyze *E. coli* isolates utilizing the ERIC-PCR and RiboPrinting combination method. 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 may need to be supplemented with known fecal samples from the study area. The WET Lab will provide SAML a subset of water samples. Additionally, the WET Lab will prepare known fecal samples for inclusion in the Texas Known Source Library. Results from the source survey will be used by SAML to make appropriate adjustments to the BST sampling design and to assess the adequacy of the Texas Known Source Library. SAML will work with BAEN to integrate BST results into the model, to the extent possible, and address and reconcile discrepancies between BST and modeling results.

CES and SFASU will conduct a Comprehensive Recreational Use Attainability Analysis to assess the physical, chemical, biological, and economic factors affecting attainment of recreation use in the Attoyac Bayou (Segment 0612), Terrapin Creek (Segment 0612A), Waffelow Creek (Segment 0612B), Naconiche Creek, Little Iron Ore Creek and West Creek. Methods used shall be consistent with the TCEQ staff draft *Recreational Use-Attainability Analyses (UAAs) – Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey*. CES and SFASU shall conduct a thorough historical information review of the recreational uses of the waterbody that occurred on and/or after November 28, 1975. CES and SFASU will conduct field surveys at selected sites during the period people would most likely be using the waterbody for contact recreation (Spring and Summer). 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, flow/discharge, and bank access. A digital photographic record of each selected site shall be collected during the field surveys. To aid in documenting existing uses, SFASU shall install, operate, and maintain motion-capture cameras at selected monitoring locations. In order to obtain information on existing and historical uses and stream characteristics, 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; shall be conducted.

The culminating deliverable for the project will be the development of a stakeholder driven WPP for the Attoyac Bayou that satisfies EPA's nine key elements for developing WPPs. This plan will include information and results from all project tasks and will be based on decisions made by the stakeholder group as a means to manage their watershed resources in the best manner that they see fit while achieving water quality goals and standards.

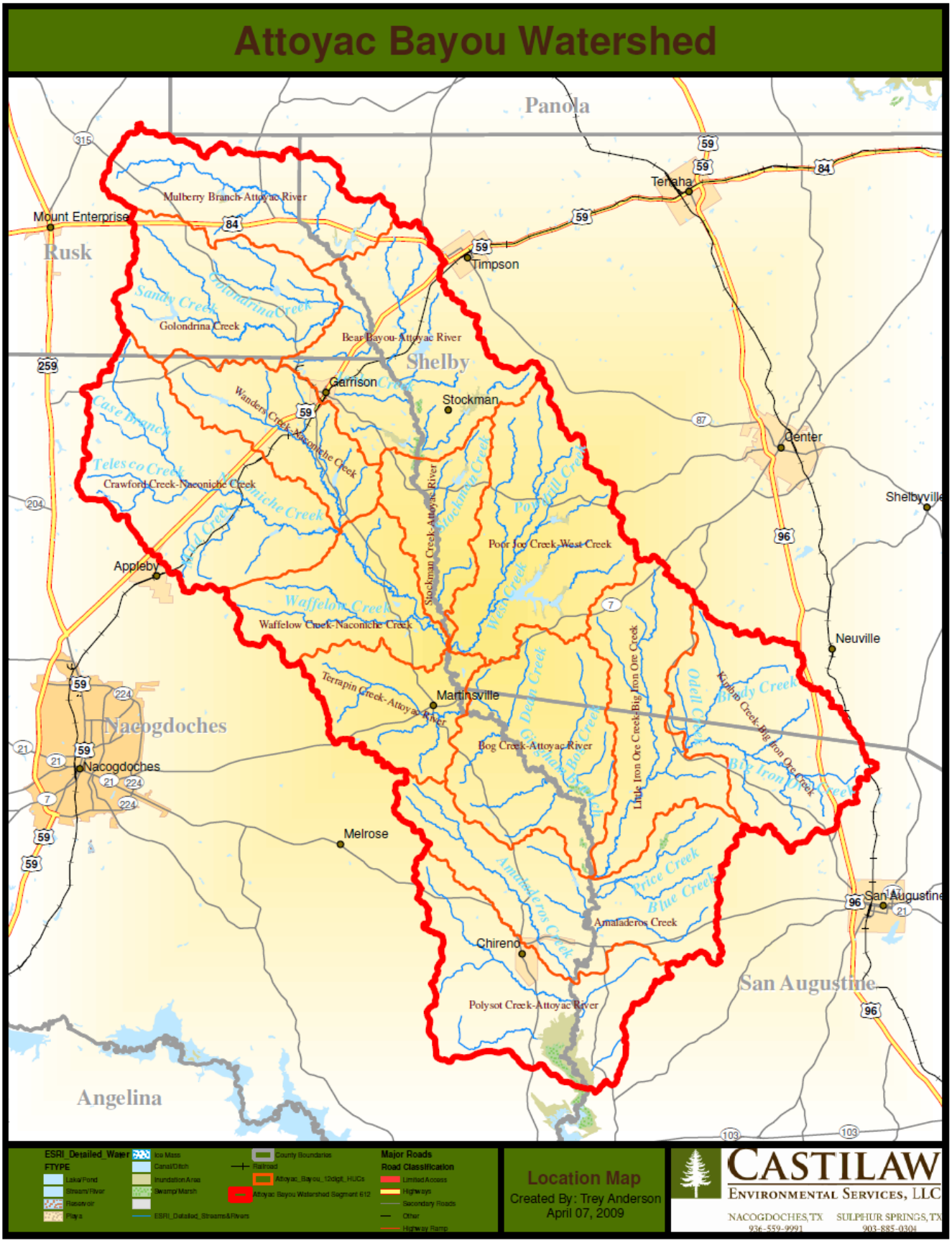

Figure 1. Attoyac Bayou watershed as delineated by Castilaw Environmental Services

Tasks, Objectives and Schedules						
Task 1:	Project Administration					
Costs:	Federal:	$65,294	Non-Federal:	$29,162	Total:	$94,456
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 15th of January, April, July and October. QPRs shall be distributed to all project partners.					
	Start Date:	Month 1	Completion Date:	Month 54		
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 54		
Subtask 1.3:	TWRI will participate in meetings as appropriate in order to efficiently and effectively achieve project goals, coordinate monitoring efforts and summarize activities and achievements made throughout the course of this project.					
	Start Date:	Month 1	Completion Date:	Month 54		
Subtask 1.4:	TWRI will work with project personnel from ANRA, BAEN, CES, SAML, SFASU to prepare technical reports as required by project Tasks into published technical reports. These reports will be housed in the TWRI online Reports Database in definitely.					
	Start Date:	Month 12	Completion Date:	Month 54		
Deliverables	• Quarterly progress reports in electronic format • Reimbursement Forms and necessary documentation in hard copy format					

Tasks, Objectives and Schedules						
Task 2:	Quality Assurance					
Costs:	Federal:	$10,500	Non-Federal:	$4,500	Total:	$15,000
Objective:	To develop 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:	TWRI, with assistance from ANRA, BAEN, CES and SFASU will develop a QAPP for activities in Tasks 4, 5, 6, 7 and 8 consistent with *EPA Requirements for Quality Assurance Project Plans (QA/R-5)* and the *TSSWCB Environmental Data Quality Management Plan*. Consistency with Title 30, Chapter 25 of the Texas Administrative Code, *Environmental Testing Laboratory Accreditation and Certification*, 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 *TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue (RG-415)* and *Volume 2: Methods for Collecting and Analyzing Biological Community and Habitat Data (RG-416)*. All procedures and methods for Task 7 prescribed in the QAPP shall be consistent with the guidelines detailed in the latest version of the TCEQ staff draft *Recreational Use-Attainability Analyses (RUAAs) – Procedures for a Comprehensive RUAA and a Basic RUAA Survey*.					
	Start Date:	Month 1	Completion Date:	Month 6		
Subtask 2.2:	TWRI will submit revisions and necessary amendments to the QAPP as needed.					
	Start Date:	Month 6	Completion Date:	Month 54		

Deliverables	• QAPP approved by TSSWCB and EPA Region 6 in both electronic and hard copy formats • Approved revisions and amendments to QAPP, as needed. • Data of known and acceptable quality as reported through Tasks 4-8.

Tasks, Objectives and Schedules						
Task 3:	Public Participation and Stakeholder Coordination					
Costs:	Federal:	$86,800	Non-Federal:	$54,400	Total:	$141,200
Objective:	To coordinate and facilitate public involvement in a local watershed stakeholder group that will provide local input into the decision making process for the Attoyac Bayou watershed.					
Subtask 3.1:	CES, with assistance from ANRA, BAEN, Pineywoods RC&D, SAML, SFASU and TWRI, will facilitate public participation and stakeholder involvement in project meetings and activities. A master list of participants and potentially affected parties will be compiled and maintained by CES. Special care will be taken to engage a diverse group of stakeholders from throughout the watershed.					
	Start Date:	Month 1	Completion Date:	Month 54		
Subtask 3.2:	CES, with assistance from TWRI, will coordinate meetings, secure meeting locations, prepare and disseminate meeting notices and agendas. Meeting summaries will be prepared as appropriate and posted to the project website. It is anticipated that at a minimum, quarterly public meetings will be sufficient; however, if more meetings are deemed necessary, they will be scheduled accordingly. Meeting frequency may be adjusted throughout the course of the project to accomplish project goals. TSSWCB will review and approve all meeting notices, agendas, and meeting summaries prior to public dissemination.					
	Start Date:	Month 1	Completion Date:	Month 54		
Subtask 3.3:	As needed, other public meetings will be attended by appropriate project personnel, usually the Watershed Coordinator (CES), in order to communicate the goals and objectives of the project, activities and accomplishments to affected parties. These may include, city council, county commissioner's court, regional water planning, CRP meetings, SWCD meetings and others.					
	Start Date:	Month 1	Completion Date:	Month 54		
Subtask 3.4:	TWRI and CES will work to develop and disseminate educational materials to watershed stakeholders. These materials will include flyers, letters, brochures, news releases and others. All documents, educational materials, press releases, etc. will be reviewed and approved by the TSSWCB project manager prior to dissemination.					
	Start Date:	Month 1	Completion Date:	Month 54		
Subtask 3.5:	TWRI will develop, host and maintain a project website that will be used as a clearing house for all project related information. All presentations, documents and results will be posted to this website. It will also serve as a means to disseminate information to stakeholders and the general public.					
	Start Date:	Month 1	Completion Date:	Month 54		
Deliverables	• Stakeholder contact list • Meeting notices, materials, agendas, attendance lists • Educational materials developed and distributed • Project website developed and maintained					

Tasks, Objectives and Schedules						
Task 4:	Watershed Survey and GIS Information Update					
Costs:	Federal:	$48,240	Non-Federal:	$39,300	Total:	$87,540
Objective:	To develop a comprehensive GIS inventory of the watershed including a survey of potential pollutant contributing areas and a Land Use/Land Cover update.					
Subtask 4.1:	CES will collaborate with other project partners, local agencies and stakeholders to develop a comprehensive GIS inventory of the Attoyac Bayou watershed. This GIS will include the most recent information available on land use, elevation, soils, stream networks, reservoirs, roads, 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. Locations of possible bacteria sources, identified in Subtask 4.3, should be incorporated. The cumulative impact of TSSWCB-certified WQMPs on the management of agricultural lands as modeled in TSSWCB project 04-06 will also be documented. TWRI will facilitate watershed map printing for project meetings.					
	Start Date:	Month 3	Completion Date:	Month 28		
Subtask 4.2:	CES will work to update existing Land Use/Land Cover for the watershed to a level that is representative of current watershed conditions.					
	Start Date:	Month 6	Completion Date:	Month 15		
Subtask 4.3:	CES will collaborate with other project partners, especially ANRA and SFASU, and local stakeholders to conduct source survey that accurately characterizes the potential sources of contamination in the watershed during varying spatial and temporal monitoring periods.					
	Start Date:	Month 3	Completion Date:	Month 24		
Subtask 4.4:	CES will combine findings from the watershed survey, GIS update and LU/LC update into a task final report.					
	Start Date:	Month 20	Completion Date:	Month 28		
Deliverables	• Technical report that provides details on the components of the GIS inventory and the source survey; to be included in the technical report • Updated LU/LC maps for the Attoyac Bayou watershed and delivered to BAEN for use in SELECT modeling • Watershed maps highlighting GIS inventory items documented					

Tasks, Objectives and Schedules						
Task 5:	Surface Water Quality Monitoring					
Costs:	Federal:	$144,606	Non-Federal:	$97,010	Total:	$241,616
Objective:	To collect additional surface water quality data to characterize *E. coli* and ammonia loadings across varying flow regimes and temporal periods.					
Subtask 5.1:	SFASU, with help from other project partners (ANRA and CES), will conduct sampling site reconnaissance at the prospective sample sites listed in Table 1 (Project Narrative) to determine the suitability of sample collection at these locations. Once site selection has been finalized; those needing TCEQ station numbers will be submitted for a Station Location request (SLOC request) by SFASU.					
	Start Date:	Month 1	Completion Date:	Month 3		
Subtask 5.2:	SFASU will conduct routine, bi-weekly (twice monthly), ambient water quality monitoring at 10 locations throughout the Attoyac Bayou watershed (see Table 1 in the Project Narrative) over the course of 2 years. Sampling will include routine field parameters (Temp, pH, DO, conductivity, flow) and collection of water samples of the volume required by the QAPP. Water samples will be delivered to ANRA within the appropriate holding time for bacteriological and nutrient analysis (these analysis will include ammonia N, nitrate-nitrite N, dissolved Ortho-P, Total P, Total Suspended Solids, and *E. coli* enumeration utilizing the IDEXX method). 52 sampling events are scheduled for a total of 520 samples. Sampling efforts will be coordinated with ANRA and TCEQ. Additionally, a subset of water samples (250) will be collected for BST analysis. All 250 samples will be prepared for *Bacteroidales* analysis (Subtask 8.1) and a 100 sample subset of the 250 total samples collected will be prepared for *E. coli* analysis (Subtask 8.2). SFASU will deliver these samples to the WET Lab at SFASU for preparation and storage utilizing the USEPA 1603 method. Samples will be periodically transferred to the SAML at TAMU for BST analysis (Task 8).					
	Start Date:	Month 6	Completion Date:	Month 35		
Subtask 5.3:	SFASU will utilize automated sampling devices to collect stormflow samples at two locations (Attoyac Bayou @ SH 7 and Little Iron Ore Creek @ FM 354). These samples will be picked up by SFASU and delivered to ANRA for analysis. It is anticipated that a minimum of 10 stormflow events will be sampled from each selected site yielding at least 20 total stormflow samples. These samples will be analyzed for the same parameters as listed in Subtask 5.2.					
	Start Date:	Month 6	Completion Date:	Month 35		
Subtask 5.4:	SFASU will collect water quality samples quarterly for five quarters from the four identified point source dischargers in the watershed. Sampling will include routine field parameters (Temp, pH, DO, conductivity) nutrient parameters and bacteria parameters. Water samples will be delivered to ANRA within the appropriate holding time for bacteriological and nutrient analysis. 20 samples have been budgeted for.					
	Start Date:	Month 6	Completion Date:	Month 21		
Subtask 5.5:	ANRA will maintain a master database for housing all environmental water quality data collected through the project. SFASU will maintain a database of field parameter data collected under the project and transmit this data to ANRA for inclusion into the master database. Data collected and analyzed will be included ANRA's CRP database and submitted to TSSWCB for transmittal to TCEQ for inclusion in SWQMIS. Data will be formatted consistent with TCEQ DRMG. A Station Location (SLOC) Request for any new monitoring stations will be submitted to TCEQ by SFASU (Subtask 5.1).					
	Start Date:	Month 6	Completion Date:	Month 48		
Subtask 5.6:	ANRA and SFASU will collaborate to develop a technical report summarizing water quality data findings. ANRA will focus on describing the analytical analysis of water samples and streamflow while SFASU will focus on describing field conditions and parameters. This report will be incorporated in the WPP developed for the Attoyac Bayou watershed.					
	Start Date:	Month 24	Completion Date:	Month 42		

Deliverables	• Completed SLOC request • Electronic monitoring data files and data summary • Technical Report summarizing water quality data findings.

Tasks, Objectives and Schedules						
Task 6:	LDC and SELECT data analysis					
Costs:	Federal:	$70,050	Non-Federal:	$52,786	Total:	$122,836
Objective:	To analyze stormflow, *E. coli*, and ammonia data using LDCs and SELECT to determine needed load reductions for ammonia and *E. coli* levels to achieve environmental goals established by stakeholders in the WPP and to estimate potential loadings from identified pollutant sources.					
Subtask 6.1:	BAEN, with cooperation from other project partners, will develop LDCs on currently available ammonia and bacteria data for each monitoring site on the Attoyac Bayou. LDCs developed will be consistent with EPA's *An Approach for Using Load Duration Curves in the Development of TMDLs*, EPA's *Options for Expressing Daily Loads in TMDLs*, and *Development of Duration-Curve Based Methods for Quantifying Variability and Change in Watershed Hydrology and Water Quality*.					
	Start Date:	Month 6	Completion Date:	Month 12		
Subtask 6.2:	BAEN, with cooperation from other project partners, will update LDCs developed using historic water quality data with water quality data collected under Task 5. LDCs will be used to estimate needed load reduction for ammonia and bacteria at each monitoring site in the waterbody.					
	Start Date:	Month 24	Completion Date:	Month 36		
Subtask 6.3:	BAEN, with cooperation from other project partners, will conduct watershed modeling using the SELECT approach for the Attoyac Bayou. Information collected in Tasks 4, 5, 7 and 8 will be incorporated with information from LDC analyses to estimate pollutant loadings from various sources within the watershed and identify potentially critical loading areas.					
	Start Date:	Month 24	Completion Date:	Month 36		
Subtask 6.4:	BAEN will combine results from LDC and SELECT analysis into a technical report that summarizes Task 6 findings.					
	Start Date:	Month 28	Completion Date:	Month 38		
Deliverables	• Technical report detailing the results of LDC and SELECT analyses					

Tasks, Objectives and Schedules						
Task 7	Recreational Use Attainability Analysis (RUAA)					
Costs	Federal:	$58,718	Non-Federal:	$41,604	Total:	$100,322
Objective	To conduct a Comprehensive Recreational Use Attainability Analysis to assess the physical, chemical, biological, and economic factors affecting attainment of recreation use in the Attoyac Bayou (Segment 0612), Terrapin Creek (Segment 0612A) and Waffelow Creek (Segment 0612B).					
Subtask 7.1:	Utilizing information from Task 4 (comprehensive GIS inventory and current land use classification) and other relevant information, CES and SFASU 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, if possible. Sites shall be identified for the Attoyac Bayou and the Terrapin, Waffelow, Naconiche, Little Iron Ore and West Creeks. Proposed sites shall at least include those from Task 5. The QAPP, as detailed in Task 2, will precisely identify selected sites. SFASU will submit Station Location Requests as needed to obtain TCEQ station numbers for new monitoring sites.					
	Start Date	Month 16	Completion Date	Month 28		

Subtask 7.2:	CES and SFASU shall conduct a thorough historical information review of the recreational uses of the waterbody that occurred on and/or after 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 & Wildlife Department and commercial providers of outdoor recreation goods and services should be consulted for historical information.			
	Start Date	Month 16	Completion Date	Month 40
Subtask 7.3:	CES and SFASU will conduct 2 field surveys at each selected RUAA site. Surveys shall be conducted during a normal (average) warm season (air temperature ≥ 70°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 or 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, 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 TCEQ staff draft *Recreational Use-Attainability Analyses (UAAs) – Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey*. CES and SFASU shall document and describe antecedent (prior to fieldwork) rainfall conditions (approximately the previous 30 days) at each selected site.			
	Start Date	Month 16	Completion Date	Month 36
Subtask 7.4:	CES and SFASU 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. To aid in documenting existing uses, CES and SFASU shall install, operate, and maintain motion-capture cameras at selected monitoring locations from Task 5. (only those locations where bi-weekly sampling is conducted).			
	Start Date	Month 16	Completion Date	Month 36
Subtask 7.5:	In order to obtain information on existing and historical uses and stream characteristics, CES and SFASU 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 TCEQ staff draft *Recreational Use-Attainability Analyses (UAAs) – Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey*.			
	Start Date	Month 16	Completion Date	Month 40
Subtask 7.6:	CES and SFASU will combine findings from historical review, field surveys, web searches and interviews into a technical report that meets criteria set forth in TCEQ's *Recreational Use-Attainability Analyses (UAAs) – Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey*. Results from this report will be included in the Attoyac Bayou WPP.			
	Start Date	Month 28	Completion Date	Month 42
Deliverables	• Station Location Request Forms (as needed) in electronic format (if needed; see Task 5) • Field Data Sheets and Data Summary in electronic format • Digital photographic record • Interview Forms and Data Summary in electronic format • Technical Report summarizing historical information review, field surveys, and user interviews			

Tasks, Objectives and Schedules						
Task 8	Bacterial Source Tracking					
Costs	Federal:	$82,196	Non Federal:	$53,250	Total:	$135,446
Objective	To conduct Bacterial Source Tracking to assess and identify different sources contributing to bacteria loadings.					
Subtask 8.1	SAML will conduct library-independent BST on 250 water samples utilizing the *Bacteroidales* PCR genetic test for human, ruminant, horse, and swine markers. The number of samples collected from each location may be adjusted depending on the size of each watershed in the study area and the complexity of sources as identified in the source survey (Task 4). Budgeted number of samples is 20 from each of Terrapin, Waffelow, Naconiche, Little Iron Ore and West Creeks for a total of 100 samples from the tributaries; 125 samples will be collected and analyzed from the Attoyac Bayou (25 from each sampling site); 21 stormflow samples as collected by automated equipment; 4 samples collected from WWTFs; in total, 250 samples will be analyzed utilizing *Bacteroidales* PCR. 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 SFASU under Task 5.					
	Start Date	Month 6	Completion Date	Month 36		
Subtask 8.2	SAML will conduct limited library-dependent BST and analyze *E. coli* isolates from 100 water samples (1 isolate per water sample) from across the study area utilizing the ERIC-PCR and RiboPrinting combination method. Isolates will be obtained from water samples collected at: each sampling site (8 samples from each, total of 80 samples), automated stormflow samples (8 samples from each, total of 16 samples) and 1 from each of the 4 WWTFs; yielding a total of 100 samples. This will serve to 1) confirm that the sources of *E. coli* and *Bacteroidales* are comparable and 2) assess the spatial and temporal adequacy of the Texas Known Source Library.					
	Start Date	Month 6	Completion Date	Month 36		
Subtask 8.3	SAML will add up to 30 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. Samples for this subtask shall be collected by CES or SFASU under Task 5.					
	Start Date	Month 6	Completion Date	Month 36		
Subtask 8.4	SAML will assist CES in designing a watershed source survey (also known as a sanitary survey) (Task 4) that better characterizes possible sources of bacteria loadings in the study area. Results from the source survey will be used by SAML to make appropriate adjustments to the BST sampling design and assess the adequacy of the Texas Known Source Library.					
	Start Date	Month 1	Completion Date	Month 15		
Subtask 8.5	BAEN will conduct watershed modeling for the study area (Task 6). SAML will work with BAEN 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 7	Completion Date	Month 21		
Subtask 8.6:	CES and SFASU, as appropriate, will collect known source fecal samples from fresh road kill (less than 48 hrs old), known live sources, and other opportunistic sample sources (game taken by hunting or donated by stakeholders) in or very near the watershed. Samples will be delivered to the WET Lab at SFA for processing before being sent to the SAML at Texas A&M University in College Station.					
	Start Date	Month 6	Completion Date:	Month 36		
Deliverables	• Technical Report detailing the results of Bacterial Source Tracking • Known source fecal isolates added to the Texas BST Library					

Tasks, Objectives and Schedules						
Task 9:	Watershed Protection Plan Development					
Costs:	Federal:	$51,425	State:	$42,609	Total:	$94,034
Objective:	CES with assistance from TWRI will facilitate the development of a WPP for the Attoyac Bayou watershed through a stakeholder driven process. The WPP will contain the nine elements fundamental to a potentially successful WPP.					
Subtask 9.1:	CES will develop a WPP for the Attoyac Bayou watershed based on criteria set forth in the USEPA *FY2004 NPS Program and Grants Guidelines for States and Territories*. Findings from Tasks 4-8 and stakeholder input obtained from Task 3 will be utilized to develop the plan.					
	Start Date:	Month 1	Completion Date:	Month 54		
Subtask 9.2:	TWRI, TSSWCB, ANRA, BAEN, Pineywoods RC&D, SAML, SFASU, and local SWCDs will assist with composition, editing, and publication of the final WPP, as needed.					
	Start Date:	Month 1	Completion Date:	Month 54		
Deliverables	• Draft Nine element Watershed Protection Plan to TSSWCB (Month 32) • Final Nine element Watershed Protection Plan to EPA (Month 36)					

Project Goals (Expand from NPS Summary Page)

To assess the current water quality conditions and impairments in the Attoyac Bayou watershed thru 1) targeted water quality sampling and analysis, 2) conducting a watershed source survey and developing a comprehensive GIS inventory, 3) analyze water quality data using Load Duration Curves and spatially explicit modeling, 4) conduct bacterial source tracking, 5) conduct a Use Attainability Analysis, 6) establish and provide direction for a stakeholder group that will serve as a decision making body in the assessment of the Attoyac Bayou and facilitate the development of a WPP that satisfies EPA's nine key element requirement and will guide any further assessment or planning activities.

Measures of Success (Expand from NPS Summary Page)

(1) Coordination and engagement of a watershed stakeholder committee; this committee will be established so that it equally represents all stakeholder groups in the watershed and gives them a platform to dictate future management of their watershed
(2) Completed GIS and LU/LC update of the watershed with potential pollutant sources identified: this information will provide the most up-to-date source of watershed characteristics to be utilized in watershed modeling, load reduction estimates, needed management strategies and WPP development
(3) Collection and analysis of quality assured data generated for watershed sampling sites; data will be vital to the correct recreational use assessment of the Attoyac Bayou watershed and its tributaries
(4) Completion of LDC and SELECT analysis to be used to develop needed pollutant load reductions and aid in identifying key areas in the watershed where management should be focused
(5) Completed UAA submitted to TSSWCB and TCEQ; the properly conducted and submitted UAA for the Attoyac Bayou will highlight the historical and current uses of the water body and indicate its appropriate recreational use
(6) Completed Bacterial Source Tracking analysis with known source samples from the watershed added to the Texas Known Source Library; this information will further identify what sources of bacterial contamination should receive priority management
(7) Completed WPP approved by stakeholders, TSSWCB and EPA; the WPP will outline the voluntary management approach desired by Attoyac Bayou watershed landowners and stakeholders

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

Goals and/or Milestone(s)

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

LTG Objectives

- 1 – Focus NPS …available resources in watersheds identified as impacted by NPS pollution in the latest state approved *Texas Water Quality Inventory and 303(d) List.*
- 2 – Support the implementation of state, regional and local programs to prevent NPS pollution through assessment… and education.
- 5 – Develop partnerships, relationships… to facilitate collective, cooperative approaches to manage NPS pollution.
- 6 – Increase overall public awareness of NPS issues and prevention activities.
- 7 – Enhance public participation and outreach by providing forums for citizens and industry to contribute their ideas and concerns about the water quality management process.

Short-term Goals

Goal One – Data Collection and Assessment: Coordinate with appropriate federal, state, regional and local entities, private sector groups, and citizen groups and target CWA §319(h) grant funds toward water quality assessment activities in high priority, NPS-impacted watersheds…

- Objective B – Conduct special studies to determine sources of NPS pollution and gain information to target TMDL and BMP implementation activities.
- Objective C – Develop and adopt at the state level, … WPPs for watersheds identified as impacted by NPS pollution on the latest state approved CWA §303(d) List.

Goal Three – Education: Conduct education… activities to help increase awareness of NPS pollution and prevent activities contributing to the degradation of water bodies… by NPS pollution.

- Objective A – Enhance existing outreach programs at the state, regional, and local levels to maximize the effectiveness of NPS education.
- Objective B – Administer programs to educate citizens about water quality and their potential role in causing NPS pollution.
- Objective D – Conduct outreach through CRP, Extension, SWCDs and others to facilitate broader participation and partnerships [that] enable stakeholders and the public to participate in decision-making and provide a more complete understanding of water quality issues and how they relate to each citizen.

Element Two – Working partnerships and linkages with appropriate state, … regional, and local entities, private sector groups and Federal agencies.

Element Five – The state program identifies waters and their watersheds impaired by NPS pollution …and establishes a process to progressively address these identified waters by conducting more detailed watershed assessments…

Milestone A: Employ or develop a local watershed committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.

Milestone B: Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point/nonpoint sources, land use data, and all known stressors influencing water quality

Milestone C: Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.

Milestone D: Develop and apply models to determine numerical load allocations…

Milestone E: Develop a detailed action plan (WPP) which establishes overall goals and objectives, load allocation, strategy for load allocation, timetable for implementation, and a list of expected results.

Part III – Financial Information

Budget Summary			
Federal	$ 617,829	% of total project	59.84%
Non-Federal	$ 414,621	% of total project	40.16%
Total	$ 1,032,450	Total	100%

Category	Federal	Non-Federal	Total
Personnel	$ 106,077	$ 43,456	$ 149,533
Fringe Benefits	$ 30,720	$ 10,352	$ 41,072
Travel	$ 6,656	$ 0	$ 6,656
Equipment			
Supplies	$ 36,040	$ 0	$ 36,040
Contractual	$ 266,949	$ 165,595	$ 432,544
Construction			
Other	$ 90,800	$ 16,960	$ 107,760
Total Direct Costs	$ 537,242	$ 236,363	$ 773,605
Indirect Costs (≤15%)	$ 80,587	$ 178,258	$ 258,845
Total Project Costs	$ 617,829	$ 414,621	$ 1,032,450

The TSSWCB CWA §319(h) Nonpoint Source Grant Program has a 60/40% match requirement. The cooperating entity will be reimbursed 60% from federal funds and must contribute a minimum of 40% of the total costs to conduct the project. The 40% match must be from non-federal sources and should be described in the budget justification. Reimbursable indirect costs are limited to 15% of total federal direct costs. The project budget generally covers a three year period.

Budget Justification (Federal)		
Category	Total Amount	Justification
Personnel	$ 106,077	TWRI Project Manager (Gregory): 2mo/yr TWRI IT Associate (Tech) 5% effort annually BAEN Assistant Professor (Karthi): 1 mo/yr in yrs 2 & 3 BAEN Graduate Research Assistant (TBD): 4.05 mo/yr in yrs 2 & 3 SCSC Postdoctoral Associate (TBD): 1.5 mo in yr 1 & 3; 5 mo in yr 2
Fringe Benefits	$ 30,720	TWRI Project Manager (Gregory): 2mo/yr TWRI IT Associate (Tech) 5% effort annually BAEN Assistant Professor (Karthi): 1 mo/yr in yrs 2 & 3 BAEN Graduate Research Assistant (TBD): 4.05 mo/yr in yrs 2 & 3 SCSC Postdoctoral Associate (TBD): 1.5 mo in yr 1 & 3; 5 mo in yr 2
Travel	$ 6,656	TWRI Project Manager 8 trips annually @ 356 mi & $.505/mi + lodging & per diem BAEN 2 watershed tours @ 495 mi & $.505/mi SCSC lodging and per diem for 4 trips
Equipment	$ 0	N/A
Supplies	$ 36,040	TWRI Miscellaneous supplies: $1,000 annually BAEN Miscellaneous supplies: $900/ yr in yrs 2 & 3 SCSC Analysis: Bacteriodales supplies: $100/sample: 250 samples: $25,000 E. coli isolate samples: $48/sample: 100 samples: $4,800 Known source isolate: samples: $48/ sample: 30 samples: $1,440
Contractual	$ 266,949	Castilaw Environmental Services LLC: $72,601 SFASU: $194,348
Construction	$ 0	N/A
Other	$ 90,800	ANRA Lab analysis: Ammonia-N: 560 samples @ $20ea.: $11,200 ANRA Lab analysis - Nitrate-Nitrite-N: 560 samples @ $25 ea.: $14,000 ANRA Lab analysis - Dis. Ortho-P: 560 samples @ $20 ea. : $11,200 ANRA Lab analysis - Total P: 560 samples @ $25 ea. : $14,000 ANRA Lab analysis - E. coli IDEXX: 560 samples @ $20 ea. : $11,200 ANRA Data Assimilation & Management @ 10,800 Postage: $1,350 annually Printing: $1,750 annually Publications: $5,000 in yr 3 BAEN: Graduate Research Assistant Tuition Reimbursement: $4,100
Indirect	$ 80,587	15% of Total Federal Direct Costs

Budget Justification (Non-Federal)		
Category	Total Amount	Justification
Personnel	$ 43,456	TWRI Project Manager (Gregory): 0.5mo/yr TWRI Acting Director (Harris): 4% effort annually BAEN Assistant Professor (Karthi) : 0.5 mo/yr in yrs 2 & 3 SCSC Assistant Professor (Gentry): 5% effort annually
Fringe Benefits	$ 10,352	TWRI Project Manager (Gregory): 0.5mo/yr TWRI Acting Director (Harris): 3% effort annually BAEN Assistant Professor (Karthi) : 0.5 mo/yr in yrs 2 & 3 SCSC Assistant Professor (Gentry): 5% effort annually
Travel	$ 0	N/A
Equipment	$ 0	N/A
Supplies	$ 0	N/A
Contractual	$ 165,595	Castilaw Environmental Services, LLC: $41,481 SFASU: $124,114
Construction	$ 0	N/A
Other	$ 16,960	ANRA Lab analysis - TSS: 560 samples @ $11 ea. ANRA Data Assimilation & Management @ 10,800
Indirect	$ 109,908	46.5% of Total Non-federal Direct Costs

Un-recovered Indirect Costs	$ 68,350	31.5% of Total Federal Direct Costs

Contractual Budget Justification (Federal) - Stephen F. Austin State University		
Category	Total Amount	Justification
Personnel	$ 74,881	Graduate Student @ MS Level: 6mo in yrs 1 & 3, 12 mo in yr 2 Hourly student workers: $10/hr @ 30hrs/wk: 35wks in yr 1, 25 wks in yr 2; 40hrs/wk in yr 2 @ 40 wks SFASU Assistant Professor: 1 mo/yr in yrs 1 & 2
Fringe Benefits	$ 8,435	Graduate Student @ MS Level: 6mo in yrs 1 & 3, 12 mo in yr 2 Hourly student workers :$10/hr @ 30hrs/wk: 35wks in yr 1, 25 wks in yr 2; 40hrs/wk in yr 2 @ 40 wks SFASU Assistant Professor: 1 mo/yr in yrs 1 & 2
Travel	$ 16,800	190 watershed trips @ 175 mi each & $.505/mile (for SWQM and UAAs)
Equipment	$ 52,500	Sterlizer Chemclave: $9,000 SondTek SL Streamflow Meters: 2 @ $9,250 ea. YSI EcoNet Telemetry System: 2 @ $7,000 ea. Isco Pumping Samplers: 2 @ $2,500 ea. YSI EcoNet Service: 2 years @ 2 sites: $6,000
Supplies	$ 8,500	SFASU misc. supplies: $1,500 RUAA Supplies: $4,000 SWQM Expendable Field Supplies $3,000
Contractual	$ 0	N/A
Construction	$ 0	N/A
Other	$ 22,000	Expendable Lab Supplies (1603 method): $9,700 1603 sample preparation costs: 410 isolates @ $30 ea.: $12,300
Indirect	$ 11,232	15% of Salaries and Wages (Federal)

Contractual Budget Justification (Non-Federal) - Stephen F. Austin State University		
Category	Total Amount	Justification
Personnel	$ 41,850	WET Center Technician @ 30% effort SFASU Assistant Professor: 1 mo in yr 3
Fringe Benefits	$ 10,881	WET Center Technician @ 30% effort SFASU Assistant Professor: 1 mo in yr 3
Travel	$ 0	N/A
Equipment	$ 0	N/A
Supplies	$ 0	N/A
Contractual	$ 0	N/A
Construction	$ 0	N/A
Other	$ 24,250	Doppler flow meter daily usage: 120 days @ $30/day Water bath incubator: $8,000 2 CR-10X data loggers, daily usage of $2.50 for 730 days: $3,650 YSI multiprobe daily usage: $75/day for 120 days: $9,000
Indirect	$ 20,925	50% of Salaries and Wages (Non-federal)
Un-recovered Indirect Costs	$ 26,208	35% of Salaries and Wages (Federal)

Contractual Budget Justification (Federal) - Castilaw Environmental Services		
Category	Total Amount	Justification
Personnel	$ 51,232	Watershed Coordinator: 180 hours @ $73.09/hr GIS Technician: 660 hours @ $57.69/hr
Fringe Benefits	$ 15,369	Watershed Coordinator: 180 hours @ 30% of salary GIS Technician: 660 hours @ 30% of salary
Travel	$ 4,500	9,000 miles @ $.50/mi
Equipment	$ 0	N/A
Supplies	$ 1,500	CES misc. office supplies
Contractual	$ 0	N/A
Construction	$ 0	N/A
Other	$ 0	N/A
Indirect	$ 0	N/A

Contractual Budget Justification (Non-Federal) - Castilaw Environmental Services		
Category	Total Amount	Justification
Personnel	$ 29,601	Watershed Coordinator: 124 hours @ $73.09/hr GIS Technician: 356 hours @ $57.69/hr
Fringe Benefits	$ 8,880	Watershed Coordinator: 124 hours @ 30% of salary GIS Technician: 356 hours @ 30% of salary
Travel	$ 0	N/A
Equipment	$ 0	N/A
Supplies	$ 0	N/A
Contractual	$ 0	N/A
Construction	$ 0	N/A
Other	$ 3,000	Postage: 3,000 items @ $.50 each: $1,500 Printing: 3,000 items @ $.50 each: $1,500
Indirect	$ 0	N/A
Un-recovered Indirect Costs	$ 0	N/A