

**Summary Page for the  
Agricultural/Silvicultural Nonpoint Source Program  
CWA Section 319(h)**

1. **Title of Project:** The Impact of Proper Organic Fertilizer Management in Production of Agriculture.
  
2. **Project Goals/Objectives:** The Leon River basin is located adjacent to the Bosque River basin, in which water quality impairment has been attributed to excess nutrients. Because the Leon River basin contains similar types of nutrient sources (such as dairies and associated manure application sites, farming and ranching sites with commercial fertilizer application, WWTP's, and urban runoff), stakeholders in the Leon River watershed are paying careful attention to emerging water quality issues. As a result, the overall objective of this project is to demonstrate the soil and water quality benefits of using proper organic fertilizer management techniques. This project will focus on reaching several groups including 3<sup>rd</sup> party applicators of dairy and other manures and other producers considering using animal manures in their fertilizer programs. Both major land uses in the basin (cultivated agriculture and pasture/range) will be addressed in an effort to expand the number of potential application sites. This is important as problems generally occur where high application rates are used; thus, increasing the available area for application will tend to lessen the detrimental effects.

The potential benefits of organic fertilizer management are substantial, but the magnitude of these benefits is not fully understood. A recent study in Central Texas by Harmel et al. (2004)<sup>1</sup>, however, did show that low rate poultry litter application with the recommended practices produced runoff water quality similar to fields with well-managed commercial fertilization. This study also illustrated high levels of P in runoff from high litter rates, even on new application sites, thus illustrating the importance of proper organic fertilizer management. The monitoring conducted to support this project, which will be funded under the USDA CEAP watershed assessment project, will assist in quantifying these benefits.

The Natural Resources Conservation Service (NRCS) and the Agricultural Research Service (ARS) recently initiated the Conservation Effects Assessment Project (CEAP) to quantify the environmental effects of conservation practices implemented under The Farm Security and Rural Investment Act of 2002, known as the 2002 Farm Bill (Mausbach and Dedrick 2004)<sup>2</sup>. This cooperative project is designed to evaluate effects at individual watersheds (Watershed Assessment) and at the national scale (National Assessment). The results should provide valuable guidance in the

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<sup>1</sup> Harmel, R.D., Torbert, H.A., Haggard, B.E., Haney, R., Dozier, M. 2004. Water quality impacts of converting to a poultry litter fertilization strategy. *Journal of Environmental Quality*. 33(6):2229-2242.

<sup>2</sup> Mausbach, M.J., and A.R. Dedrick. 2004. The Length We Go: Measuring Environmental Benefits of Conservation Practices. *Journal of Soil and Water Conservation* 59(5):96-103.

allocation of conservation funds based on a comparison of costs and measured benefits.

In 2003, the Upper Leon River watershed was designated as a CEAP Benchmark Watershed and thus a Watershed Assessment site. These Benchmark Watersheds will provide in-depth data on the environmental effects of conservation practices at the field- to watershed-scale. In the Leon watershed, environmental concerns are generally associated with the management of animal byproducts and municipal wastewater, as water quality impairment result from runoff and point source discharge contaminated with pathogens and/or nutrients. Therefore, the CEAP effort in this watershed will focus on agricultural nutrient management.

3. **Project Tasks:** (1) Implement various organic fertilizer management practices on cultivated and pasture fields to demonstrate the importance of using proper management relating to application method, timing, and rate, (2) conduct demonstration and educational activities on the importance of proper organic fertilizer management, (3) demonstrate the difference in water quality for areas impacted and non-impacted by excessive nutrients.
4. **Measures of Success:** Increased landowner use of proper organic fertilizer management practices will result in improved water quality in Leon River basin, which is threatened by excess nutrients and impaired by excess bacteria, and prevent future impairment by providing an alternative to application on historically over-utilized sites. Increased awareness of the availability and benefits of manure fertilization on pasture and cropland will provide dairy producers alternatives to utilize the by-product resource value. The quality of runoff water quality can have serious implications for agricultural producers. With that in mind, water quality differences for well-managed and mis-managed application sites will be used to emphasize the importance of proper organic fertilizer management to protect water resources.
5. **Project Type:** Statewide ( ) Watershed (X) Demonstration ( ) TMDL ( )
6. **Waterbody Type:** River (X) Groundwater ( ) Other ( )
7. **Project Location:** Leon River Below Proctor Lake (1221), Proctor Lake (1222), Resley Creek (1221A), Leon River Below Leon Reservoir (1223)
7. **NPS Management Program Reference:** State of Texas Agricultural/Silvicultural Nonpoint Source Management Program, approved February 25, 2001.
8. **NPS Assessment Report Status:** Impaired (X) Impacted ( ) Threatened ( )
10. **Key Project Activities:** ( ) Hire Staff ( ) Monitoring ( ) Regulatory Assistance ( ) Technical Assistance (X) Education (X) BMP Implementation ( ) Demonstration Project ( ) Other ( )

- 11. NPS Management Program Elements:** This proposed project should support the mission of the Texas Nonpoint Source Program, which is to protect the quality of water resources in Texas from adverse effects due to nonpoint sources of pollution through the cooperative implementation of a diverse range of strategies based on common sense, good science, and fiscal responsibility. This project focuses most directly on **Element 4a** - by abating water quality impairments from nonpoint source pollution but also addresses some aspect of most of the Nine Key Elements of an Effective State Program established by EPA.
  
- 12. Project Costs:** Federal (\$186,352); State/Local (\$126,579); Total (\$312,931)
  
- 13. Project Contractor:** Texas Cooperative Extension
  
- 14. Project Period:** September 1, 2005 – August 31, 2008

## WORKPLAN

### Agricultural/Silvicultural Nonpoint Source Program

The Impact of Proper Organic Fertilizer Management in Production Agriculture

CWA Section 319(h)

9/1/05 – 8/31/08

#### Problem/Need Statement:

Several stream segments within the Leon River basin in Central Texas have been identified by TCEQ in its 2002 draft 303(d) list of impaired waters and in the 2002 draft Texas Water Quality Inventory. Currently, data collection on bacterial contamination is underway to support future TMDL development in the basin to address exceedences of water quality standards for bacteria levels and their impact on contact recreation. Excessive nutrients are also listed as water quality concerns in the basin because of their negative impacts on aquatic life due to depressed dissolved oxygen and increased algal growth.

Agriculture has the potential to contribute to the problems of excessive nutrients and bacteria in surface water, especially if recommended management practices are not utilized. The need for proper use of management practices is increasingly important, as the animal production industry continues to expand their application areas to 3<sup>rd</sup> party application sites to manage their by-products. In the Bosque and Leon River Basins, programs have been established to encourage manure export to better distribute dairy production by-products, which will also encourage manure application on new sites. This expansion to new application sites has presented an opportunity to be pro-active and demonstrate the importance of proper management to minimize or avoid agricultural contribution to water quality degradation.

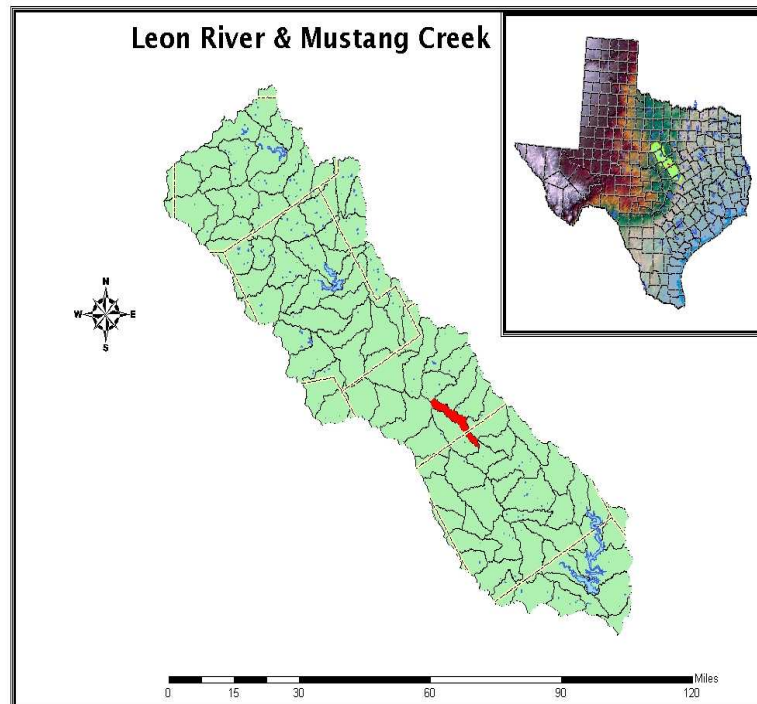


Figure 1: Project Location - Leon River Basin and Mustang Creek Subwatershed

## **General Project Description:**

In this project, demonstration sites will be established on cultivated and pasture fields in the Mustang Creek watershed located between Purmela and Hamilton, Texas (Figure 1). Application of dairy manure and commercial fertilizer and collection of management practice information will be coordinated by USDA-ARS personnel (**Task 1**). Data collection, focusing on nutrient and bacteria impacts on water and soil quality, will be collected by USDA-ARS personnel under the Conservation Effects Assessment Project (CEAP) to support the demonstration efforts in this project. The benefits of organic fertilizer management practices will be illustrated at demonstration in the Mustang Creek watershed, and the resulting benefits will be described and presented for the Leon River basin by TCE personnel (**Task 2**). A comparison between impacted and unimpacted watersheds will be conducted by USDA-ARS, TCE, and TIAER personnel to support the need for organic fertilizer management for all potential sources (**Task 3**). Details on these project tasks are given below in Project Tasks.

## **Project Objectives:**

The overall goal of this project is to improve water quality in the Leon River Watershed through the implementation of BMPs. This will be accomplished through the following objectives:

- 1.) Implement various organic fertilizer management practices on cultivated and pasture fields to demonstrate the importance of using proper management relating to application method, timing, and rate.
- 2.) Conduct demonstration and educational activities on the importance of proper organic fertilizer management.
- 3.) Demonstrate the difference in water quality for areas impacted and non-impacted by excessive nutrients.
- 4.) Organize an integrated team among the multiple agencies and groups involved with the project to develop a comprehensive work plan to efficiently achieve project goals and to summarize activities and achievements made throughout the course of the project.

## **Objectives, Tasks, Schedules, and Estimated Costs:**

**OBJECTIVE 1:** Implement various organic fertilizer management practices on cultivated and pasture fields to demonstrate the importance of using proper management relating to application method, timing, and rate. **Costs:** \$64,500 (Federal), \$21,273 (Non-federal Match), \$85,773 (Total).

**Task 1.1** - establish demonstration sites in the Mustang Creek watershed near Aleman in Hamilton County TX.

**Task 1.2** - compensate landowners for use of private lands as demonstration sites (management costs, record keeping, insure yield goal, etc.)

**Task 1.3** - collect and manage land management and nutrient practice information for the demonstration sites

**Deliverables:**

Report on the impacts of various management practices

**OBJECTIVE 2:** Conduct demonstration and educational activities on the importance of proper organic fertilizer management. **Costs:** \$92,690 (Federal), \$102,506 (Non-federal Match), \$195,196 (Total).

**Task 2.1** - coordinate with the existing Mustang Creek landowner's group (desire to import manure from Bosque River watershed with EQIP funds)

**Task 2.2** - coordinate with existing Leon Watershed stakeholder group(s) such as the Clearwater Underground Water Conservation District and local SWCD's

**Task 2.3** - present field days on demonstration sites

**Task 2.4** - develop an extension publication on the environmental impacts of management practices

**Deliverables**

Field Days

Extension Publication

**OBJECTIVE 3:** Demonstrate the difference in water quality for areas impacted and non-impacted by excessive nutrients. **Costs:** \$7,000 (Federal), \$2,800 (Non-federal Match), \$9,800 (Total).

**Task 3.1** - compare water quality between Resley Creek (Impacted) to Mustang Creek (Unimpacted)

**Task 3.2** - prepare/format data previously collected by TIAER for use in evaluating nutrient management tools

**Deliverables**

Extension Publications

Website

Published Papers

**OBJECTIVE 4:** TWRI will organize an integrated team among the multiple agencies and groups involved with the project to develop a comprehensive work plan to efficiently achieve project goals and to summarize activities and achievements made throughout the course of the project. **Costs:** \$22,162 (Federal), \$0 (Non-federal Match), \$22,162 (Total).

**Task 4.1** - conduct annual meetings as appropriate with project participants (TWRI, TCE, TSSWCB, SWCDs, USDA-ARS, TIAER, etc.) to discuss project schedule, completion of deliverables, outreach and participation strategies, communication needs and other requirements.

**Task 4.2** - TWRI will prepare electronic quarterly reports. All progress reports will be provided to TSSWCB, local SWCDs, USDA-ARS and TIAER.

**Task 4.3** - TWRI and TCE will develop an electronic final report. TSSWCB, USDA-ARS and TIAER will be requested where appropriate to provide composition, editing and publication of yearly reports.

#### **Deliverables**

Progress Reports  
Final Report

#### **Project Management:**

Participating organizations and agencies along with their roles in this project include:

- **Texas Cooperative Extension (TCE) project lead** - TCE personnel will provide the project lead and coordinate demonstration and educational activities including the extension publication.
- **USDA - Agricultural Research Service (USDA-ARS)** - USDA-ARS personnel will manage practice implementation on demonstration sites, assist with demonstration and educational activities, and coordinate/approve all tours/visits to demonstration sites.
- **Texas State Soil and Water Conservation Board (TSSWCB)** - personnel will assist with organic fertilizer management practice guidance.
- **Texas Water Resources Institute (TWRI)** - personnel will conduct annual project meetings, coordinate project reporting, and disseminate project material/communications.
- **Texas Institute for Applied Environmental Research (TIAER)** - personnel will prepare previously collected data for use in this project.

#### **Cooperating entities include, but are not limited to the following:**

Texas State Soil and Water Conservation Board, Texas Cooperative Extension, Soil and Water Conservation Districts, USDA-NRCS, USDA-ARS, and the Environmental Protection Agency, Region VI.

### **Project Coordination:**

Public participation will be the basis for this project, and all **Project Objectives and Tasks** will support or focus on public participation through education, demonstration, and technology transfer. Existing forums for public input and involvement will be utilized. These include: Clearwater Underground Water Conservation District, local SWCD's and other producer groups, TCE county extension activities, and the TWRI water program. The accomplishment of **Project Goals/Objectives** rely on landowner use of proper management practices; therefore, their involvement is essential.

### **Measures of Success:**

An increase in BMP implementation, mainly due to educational activities and technical assistance is expected. An increase in voluntary BMP implementation is expected from successful implementation and outreach efforts with local producers.

### **TSSWCB Project Lead:**

Name: TJ Helton  
Address: P.O. Box 658  
Temple, Texas 76503  
Phone #: (254) 773-2250 ext. 234  
Affiliation: Texas State Soil and Water Conservation Board  
E-Mail: thelton@tsswcb.state.tx.us

### **Project Leads:**

Name: Russell A. Persyn, Ph.D., P.E.  
Address: 2117 TAMU  
College Station, Texas 77843-2117  
Phone #: (979) 458-8054  
Fax #: (979) 862-3442  
Affiliation: Texas Cooperative Extension  
E-mail: rap@tamu.edu

Name: R. Daren Harmel, Ph.D.  
Address: 808 E. Blackland Rd.  
Temple, Texas 46502  
Phone #: (254) 770-6521  
Affiliation: United States Department of Agriculture – Agricultural Research Service  
E-mail: dharmel@spa.ars.usda.gov



## PROJECT BUDGET

Category	Federal				Non-Federal Match				
	Year 1	Year 2	Year 3	Total	Match Yr1	Match Yr2	Match Yr3	Total	
<i>Personnel (Salaries and Wages)</i>									
<b>Co-Primary Investigator</b>									
<i>Bruce J. Lesikar-TCE (1.98, 1.77, 1.79 Mos)</i>	\$0	\$0	\$0	\$0	\$19,210	\$17,199	\$17,354	\$53,763	
<i>Daren Harmel-USDA-ARS</i>	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
<b>Cooperators</b>									
<i>Clint Wolfe-TWRI Project Manager (2 Mos)</i>	\$ 5,610	\$ 5,778	\$ 5,952	\$17,340	\$0	\$0	\$0	\$0	
<i>Extension Assistant- (3 Mos Sal, 2 Mos Match)</i>	\$ 8,033	\$ 8,274	\$ 8,522	\$24,829	\$ 5,355	\$ 5,516	\$ 5,681	\$16,552	
<i>Student</i>	\$ 4,200	\$ 4,014	\$ 3,999	\$12,213	\$0	\$0	\$0	\$0	
<b>Total Personnel</b>	<b>\$17,843</b>	<b>\$18,066</b>	<b>\$18,473</b>	<b>\$54,382</b>	<b>\$24,565</b>	<b>\$22,715</b>	<b>\$23,035</b>	<b>\$70,315</b>	
<i>Fringe Benefits</i>									
<i>@ 15.6% of salaries</i>	\$ 2,128	\$ 2,192	\$ 2,258	\$ 6,578	\$ 3,832	\$ 3,543	\$ 3,593	\$10,968	
<i>@ 8.35% wages</i>	\$ 351	\$ 336	\$ 334	\$ 1,021	\$0	\$0	\$0	\$0	
<i>Health Insurance (\$435 per mo.)</i>	\$ 2,175	\$ 2,175	\$ 2,175	\$ 6,525	\$ 1,740	\$ 1,641	\$ 1,649	\$ 5,030	
<b>Total Fringe Benefits</b>	<b>\$ 4,654</b>	<b>\$ 4,703</b>	<b>\$ 4,767</b>	<b>\$14,124</b>	<b>\$ 5,572</b>	<b>\$ 5,184</b>	<b>\$ 5,242</b>	<b>\$15,998</b>	
<b>Subtotal Personnel &amp; Fringe</b>	<b>\$22,497</b>	<b>\$22,769</b>	<b>\$23,240</b>	<b>\$68,506</b>	<b>\$30,137</b>	<b>\$27,899</b>	<b>\$28,277</b>	<b>\$86,313</b>	
<i>Travel</i>									
<b>TCE</b>									
<i>Travel to establish demonstration sites and attend field days</i>									
<i>Mileage: 6 trips x 200 miles/trip @ \$ .35 mile</i>	\$ 420	\$ 420	\$ 420	\$ 1,260					
<i>Lodging: 6 trips x 1 days @ \$80/day</i>	\$ 480	\$ 480	\$ 480	\$ 1,440					
<i>Meals: 6 trips x 1 days @ \$30/day</i>	\$ 180	\$ 180	\$ 180	\$ 540					
<i>Out of State Travel: 4 trips @ \$1,400</i>	\$ 0	\$ 2,800	\$ 2,800	\$ 5,600					
<b>Total Travel</b>	<b>\$ 1,080</b>	<b>\$ 3,880</b>	<b>\$ 3,880</b>	<b>\$ 8,840</b>					
<b>Equipment None</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	
<i>Supplies</i>									
<i>Expendables – paper and office supplies to support Public and Stakeholders meetings</i>	\$ 1,000	\$ 1,000	\$ 1,000	\$ 3,000					
<b>Total Supplies</b>	<b>\$ 1,000</b>	<b>\$ 1,000</b>	<b>\$ 1,000</b>	<b>\$ 3,000</b>					
<i>Contractual</i>									
<b>USDA-ARS</b>									
<i>Establishment and management of demonstration sites</i>	\$21,500	\$21,500	\$21,500	\$64,500					
<i>Miscellaneous</i>									
<b>TCE</b>									
<i>1 extension document</i>	\$0	\$0	\$ 5,000	\$ 5,000					
<i>Field days ( 2 per year @ \$1,000 ea.)</i>	\$0	\$ 2,000	\$ 2,000	\$ 4,000					
<i>1 referred journal article</i>	\$0	\$0	\$ 1,200	\$ 1,200					
<i>TIAER</i>									
<i>Data preparation</i>	\$ 7,000	\$0	\$0	\$ 7,000					
<b>Total Miscellaneous</b>	<b>\$ 7,000</b>	<b>\$ 2,000</b>	<b>\$ 8,200</b>	<b>\$17,200</b>					
<b>Subtotal Other Direct Costs</b>	<b>\$30,580</b>	<b>\$28,380</b>	<b>\$34,580</b>	<b>\$93,540</b>					
<b>I. Total Direct Costs</b>	<b>\$53,077</b>	<b>\$51,149</b>	<b>\$57,820</b>	<b>\$162,046</b>	<b>\$30,137</b>	<b>\$27,899</b>	<b>\$28,277</b>	<b>\$86,313</b>	
<b>J. Indirect Costs (15%)</b>									
<b>Unrecovered IDC</b>	<b>\$ 7,961</b>	<b>\$ 7,672</b>	<b>\$ 8,673</b>	<b>\$24,307</b>	<b>\$ 7,836</b>	<b>\$ 7,254</b>	<b>\$ 7,352</b>	<b>\$22,441</b>	
<b>Total Indirect Costs</b>	<b>\$ 7,961</b>	<b>\$ 7,672</b>	<b>\$ 8,673</b>	<b>\$24,307</b>	<b>\$13,764</b>	<b>\$12,880</b>	<b>\$13,712</b>	<b>\$40,266</b>	
<b>K. Total Project Costs</b>									
	<b>Year 1</b>	<b>Federal Funds</b>				<b>Non-Federal Funds</b>			
	<b>\$61,038</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>	<b>Match Yr 1</b>	<b>Match Yr 2</b>	<b>Match Yr 3</b>	<b>Total</b>	
		<b>\$58,821</b>	<b>\$66,493</b>	<b>\$186,353</b>	<b>\$43,811</b>	<b>\$40,779</b>	<b>\$41,989</b>	<b>\$126,579</b>	

## **Itemized Budget Justification**

### *Salaries and Wages*

No salary and wage for Co-Project Directors is being charged to the project; however, 3 months of match from Dr. Russell Persyn will be devoted to the project annually.

Two months salary is included for project management at the Texas Water Resources Institute (Clint Wolfe). Three months salary and two months match are included for an Extension Assistant who will be responsible for organizing educational deliverables. Student salary is included to assist with publications and presentations.

### *Fringe Benefits*

Fringe benefits were charged at 8.35% for students and 15.6% for all salary employees. Health insurance was charged at a rate of \$380 per month for a 12-month appointment.

### *Travel*

Project personnel are expected to make at least 6 trips per year to the watershed.

### *Supplies*

Office supplies and costs for developing and printing materials for public meetings.

### *Contractual*

USDA-ARS personnel will establish and maintain demonstration site, manage practice implementation, assist with demonstration and educational activities, and coordinate/approve all tours/visits to demonstration sites. Contractual funds will be used for these functions.

### *Miscellaneous*

Costs for developing an Extension publication on project results, conducting 2 field days in years 2 and 3, and publishing a journal article on project results are included in this section.

TIAER personnel will prepare previously collected data from a nutrient impacted stream and from field plots for comparison purposes and to use in nutrient management tool implementation.