Texas State Soil and Water Conservation Board
State Nonpoint Source Grant Program
FY 2021 Workplan 21-53

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• Determine most effective management practices in conservation/regenerative agriculture;
• Utilize workshops, field days and hands-on demonstration of best management practices and ensure availability of education materials through website.</td></tr>
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• Reduced sediment and nutrient losses;
• Increased awareness of conservation tillage, regenerative agriculture, crop rotation, and cover crops</td></tr>
<tr><td>Project Type</td><td colspan="3">Implementation (X); Education (X); Planning ( ); Assessment ( ); Groundwater ( )</td></tr>
<tr><td>Status of Waterbody on 2020 Texas Integrated Report</td><td><u>Segment ID</u>
0206B_01
0214_05
0214A_01
0214A_02
0214B_01
0230A_01</td><td><u>Parameter of Impairment or Concern</u>
Bacteria
Bacteria
Bacteria
Bacteria
Bacteria
Bacteria</td><td><u>Category</u>
5b
5c
5c
5b
5b
5b</td></tr>
<tr><td>Project Location (Statewide or Watershed and County)</td><td colspan="3">Wilbarger County, including Beaver Creek, Buffalo Creek, Paradise Creek, and Wichita River watersheds</td></tr>
<tr><td>Key Project Activities</td><td colspan="3">Hire Staff (X); Surface Water Quality Monitoring ( ); Technical Assistance ( ); Education (X); Implementation ( ); BMP Effectiveness Monitoring (X); Demonstration (X); Planning ( ); Modeling ( ); Bacterial Source Tracking ( ); Other ( )</td></tr>
<tr><td>2017 Texas NPS Management Program Reference</td><td colspan="3">• Component 1: LTG Objectives 1, 2, 3, 6, 7
STG 1 Objectives B, E; STG 2 Objectives B, D; STG 3 Objectives A, B, C, D, G</td></tr>
<tr><td>Project Costs</td><td colspan="3">$109,643</td></tr>
<tr><td>Project Management</td><td colspan="3">Texas A&M AgriLife Research</td></tr>
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</table>

Part I – Applicant Information

Applicant							
Project Lead	Paul DeLaune						
Title	Professor of Environmental Soil Science						
Organization	Texas A&M AgriLife Research						
E-mail Address	pbdelaune@ag.tamu.edu						
Street Address	11708 HWY 70S						
City	Vernon	County	Wilbarger	State	TX	Zip Code	76384
Telephone Number	940-647-3898	Fax Number					

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 A&M AgriLife Research	Construct, establish, monitor, and analyze runoff water from catchments and small plots (Task 3); present project findings to stakeholders through field days and/or workshops (Task 4);

Part II – Project Information

Project Type				
Surface Water	X	Groundwater	X	
Does the project implement recommendations made in (a) a completed WPP, (b) an adopted TMDL, (c) an approved I-Plan, (d) a Comprehensive Conservation and Management Plan developed under CWA §320, (e) the *Texas Coastal NPS Pollution Control Program*, or (f) the *Texas Groundwater Protection Strategy*?	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 or Aquifer Name(s)	Hydrologic Unit Code (12 Digit)	Segment ID	Category on 2020 IR	Size (Acres)
Wichita River below diversion dam	111302060201 thru 111302060204; 111302060301 thru 111302060304; thru 111302060401 thru 111302060407; 111302060501 thru 111302060503	0214	5c	489,549
Beaver Creek	11302070301 to 11302070307 and 111302070401 to 11302070403	0214A	5c	226,620
Buffalo Creek	111302060402 to 11302060404	0214B	5b	65,012
Paradise Creek	11130105	0230A	5b	38,900

Water Quality Impairment

Describe all known causes (i.e., pollutants of concern) and sources (e.g., agricultural, silvicultural) of water quality impairments or concerns from any of the following sources: *2020 Texas Integrated Report*, Clean Rivers Program Basin Summary/Highlights Reports, or other documented sources.

0214_05 Wichita River from the confluence with Beaver Creek upstream to the Diversion Lake Dam
CS Chlorophyll-a; Sources NPS - Agriculture; NPS - Aquaculture (Permitted); NPS - Crop Production (Crop Land or Dry Land); NPS - Grazing in Riparian or Shoreline Zones; NPS - Municipal (Urbanized High Density Area); NPS - Non-irrigated Crop Production; NPS - Rangeland Grazing; NPS - Unrestricted Cattle Access; NPS - Urban Runoff/Storm Sewers
NS Bacteria; Sources NPS - Aquaculture (Permitted); NPS - Grazing in Riparian or Shoreline Zones; NPS - Municipal (Urbanized High Density Area); NPS - On-site Treatment Systems (Septic Systems and Similar Decencentralized Systems); NPS - Rangeland Grazing; NPS - Unrestricted Cattle Access; NPS - Urban Runoff/Storm Sewers

Beaver Creek 0214A_01 From the confluence with the Wichita River upstream to the confluence with Bull Creek
CN Dissolved Oxygen; Sources UNK - Source Unknown Bacteria Geomean Assessment Method LOS NS E. coli Parameter Sources NPS - Crop Production (Crop Land or Dry Land); NPS - Grazing in Riparian or Shoreline Zones; NPS - Rangeland Grazing; NPS - Unrestricted Cattle Access
0214A_02 From the confluence with Bull Creek upstream to the Santa Rosa Lake dam
CS Dissolved Oxygen; Sources PS - Drought-related Impacts Bacteria Geomean Assessment Method
NS E. coli; Sources NPS - Crop Production (Crop Land or Dry Land); NPS - Grazing in Riparian or Shoreline Zones; NPS - Rangeland Grazing; NPS - Unrestricted Cattle Access Nutrient Screening Levels Assessment Method LOS CS Chlorophyll-a Parameter Sources NPS - Upstream Source

0214B Buffalo Creek Buffalo Creek - from the confluence of the Wichita River upstream to the headwater east of Electra
CS Chlorophyll-a; Sources NPS - Crop Production (Crop Land or Dry Land); NPS - Irrigated Crop Production; NPS - Non-irrigated Crop Production; NPS - Rural (Residential Areas)
CS Nitrate; Sources NPS - Crop Production (Crop Land or Dry Land); NPS - Irrigated Crop Production; NPS - Non-irrigated Crop Production; NPS - Rural (Residential Areas)
CS Total Phosphorus; Sources NPS - Crop Production (Crop Land or Dry Land); NPS - Irrigated Crop Production; NPS - Non-irrigated Crop Production; NPS - Rural (Residential Areas)
NS Bacteria; Sources NPS - On-site Treatment Systems (Septic Systems and Similar Decentralized Systems); NPS - Rural (Residential Areas) Nutrient Screening Levels Assessment Method LOS CS Ammonia Parameter Sources NPS - Crop Production (Crop Land or Dry Land); NPS - Irrigated Crop Production; NPS - Non-irrigated Crop Production; NPS - Rural (Residential Areas)

0230A_01 Paradise Creek from the confluence of the Pease River east of Vernon upstream to a point 400m upstream of the intersection of FM 433 and Wilbarger CR 97
CS Chlorophyll-a; Sources NPS - Agriculture; NPS - Auction Barns; NPS - Crop Production (Crop Land or Dry Land); NPS - Grazing in Riparian or Shoreline Zones; NPS - Irrigated Crop Production; NPS - Non-irrigated Crop Production; NPS - On-site Treatment Systems (Septic Systems and Similar Decentralized Systems); NPS - Rangeland Grazing; NPS - Unrestricted Cattle Access
NS Bacteria; Sources NPS - Agriculture; NPS - Auction Barns; NPS - Manure Runoff; NPS - On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)

Project Narrative

Problem/Need Statement

Healthy soils help optimize inputs and maximize nutrient and water use efficiencies. Converting cropping systems from conventional tillage to conservation or no-till enhances soil health by increasing soil organic matter content and carbon. In order to increase soil carbon and potentially reduce irrigation water requirements and improve water quality, soil health promoting practices such as conservation tillage, cover crops, and irrigation management practices must be incorporated. In 2009, the United States accounted for 25% or nearly 70 million acres of the World's acres in no-till (Derpsch et al., 2010). However, practice adoption in Texas remains low. Within the US, recent reports estimate that conservation tillage is used on the majority of acres planted to wheat (67%), corn (65%), and soybeans (70%); whereas only 40% of cotton acres were under conservation tillage (Claassen et al., 2018). Furthermore, cotton under conservation tillage within the Southern Great Plains region was less than 30% compared to nearly 70% in the Southeastern US (Claassen et al., 2018). This report also highlighted that over 60% of planted cotton acres followed a low-residue crop, suggesting continuous cotton cropping systems. Realized time, labor and fuel savings yield higher economic returns relative to unsustainable tillage practices are the driving forces for adoption. The numerous environmental benefits that improved soil health produces are an added bonus.

Conservation tillage has long been promoted as a practice to promote soil and water conservation (Unger et al., 1991). Such practices are critical in semi-arid environments where water is often the limiting factor to crop production. While this is even more critical in rainfed environments, it is also important under irrigated agriculture where depleting aquifer supplies leads to deficit irrigation and/or the transition to dryland agriculture that could make producers more reliant on conservation management practices (Baumhardt et al., 2009). Excessive tillage with low residue input and retention degrades soil physical quality, decreases soil organic carbon (SOC), and potentially reduces crop yield (Lal, 2003, 2015; Blanco-Canqui et al., 2004).

Incorporating cover crops into cropping systems that promote soil health and water infiltration can further reduce soil erosion, increase nutrient use efficiency, increase soil carbon, improve soil physical properties, increase water infiltration into soil, increase soil organic carbon, protect water quality, and aid in weed control. Research has validated these effects; however, results can vary by location and season. Potential reductions in soil moisture may occur when implementing cover crops (Dabney et al., 2001; Balkcom et al., 2007), but are dependent on rainfall distribution relative to crop development. Rainfall events following cover crop termination enables soil surface water recharge and usually provides adequate soil moisture in humid regions to facilitate cash crop planting (Balkcom et al., 2007). Winter cover crops have been increasingly used to scavenge residual N in the soil after crop harvest to reduce NO_3 leaching and increase N supply for succeeding crops. Studies have shown that non-legume cover crops, such as rye and annual ryegrass, are more effective in reducing residual soil N (Kuo et al., 1997; Vyn et al., 1999) and N leaching (McCracken et al., 1994; Bergstrom and Kirchmann, 2004) than legumes or non-cover cropped soil. This impact is even more important in regions such as the proposed demonstration area in Texas where elevated NO_3 levels in groundwater are widespread.

Regenerative agriculture has recently gained much attention and has numerous definitions varying upon the source defining the term. In short, regenerative agriculture promotes the use of crop rotation, cover crops, and no-tillage with decreased use of pesticides and inorganic fertilizer and eventual eradication. Hence, another staple of regenerative agriculture is the use of animal manure or compost. Mismanagement of animal manures has led to numerous water quality issues, thus management of manure and/or compost applications must be closely managed and monitored, especially in areas with little experience with organic amendments. The Rodale Institute (https://rodaleinstitute.org/why-organic/issues-and-priorities/water-pollution/) states that organic amendments holds soil together and holds water better due to increased organic matter.

Initial research in the proposed study area has shown that no-till and cover crops can increase infiltration rates, increase irrigation water use efficiency, reduce runoff volumes, reduce soil erosion, reduce sediment bound phosphorus and ammonium, and affect bacteria levels in surface runoff. However, producers continue to question the advantages of no-till and cover crops as evident through low adoption rates. Although adoption rates have been low, interest in soil health promoting practices continue to increase. Expressed concerns continue to be costs associated with cover crop implementation, conservation tillage, and cover crop water use. Although sediment and sediment bound nutrient losses have been reduced due to soil health promoting practices, the impact on dissolved nutrients (which are directly bioavailable in surface waters) have been mixed. Demonstrations evaluating the effectiveness of these practices could spur further interest and adoption within the region and across similar environments, providing important information to producers and downstream end users.

Project Narrative

General Project Description (Include Project Location Map)

Our Primary Objective is to: Demonstrate and quantify the effects of improved soil health generated by implementing conservation tillage with cover crops and regenerative agriculture by measuring changes infiltration rates, soil water holding capacities, surface runoff volume, erosion, off-site agrochemical transport, crop yield, crop quality, and economics across Southern Great Plains production systems.

Previous research and demonstrations in the proposed region have shown initial crop production and off-site impact reduction successes using cover crops, conservation tillage, and/or regenerative agriculture in semi-arid agricultural environments. However, adoption of soil health promoting practices remain low in the Southern Great Plains, thus increasing the need for expanded demonstration and technology transfer to producers. We propose to incorporate cover crops and practices into long-term conservation tillage systems to demonstrate how soil health promoting practices can improve water capture and water quality while sustaining agronomic and economic goals. Collectively, widespread adoption of soil health promoting practices will improve water quality by improving water infiltration rates, soil water holding capacity, soil moisture conditions, and reducing irrigation water needs.

The demonstration site will evaluate the impact of crop rotation, cover crops, and grazing on water quality within an integrated crop/livestock system. Our goal is to construct 12 1.5+ acre catchments equipped with automatic water samplers. Soil health promoting practices will be evaluated and compared to a standard management practice. Evaluated practices include 1) no-till; 2) no-till with a legume cover crop; 3) no-till with a mixed species cover crop; and 4) regenerative agriculture. Treatments 3 and 4 will be similar; however, treatment 4 will receive organic amendments and reduced pesticide inputs. The cropping system will consist of a cotton-wheat system, with the wheat utilized for graze and grain (dual-use) when conditions allow for adequate forage. Cover crops will be grazed as conditions allow. The mixed species will consist of a legume/grass mix comprising of the most regionally successful cover crops as evident from past research.

All water samples will be analyzed for nitrate, ammonium, total bound nitrogen, dissolved organic phosphorus, total phosphorus, total suspended solids, total solids, soluble organic carbon, and total carbon. Edge of field water samples will also be analyzed for *E. coli*. Soil samples will be analyzed for nitrate, ammonium, phosphorus, organic C, and other nutrients of interest. Cover crops will be clipped to determine C:N nitrogen content and total accumulated nitrogen.

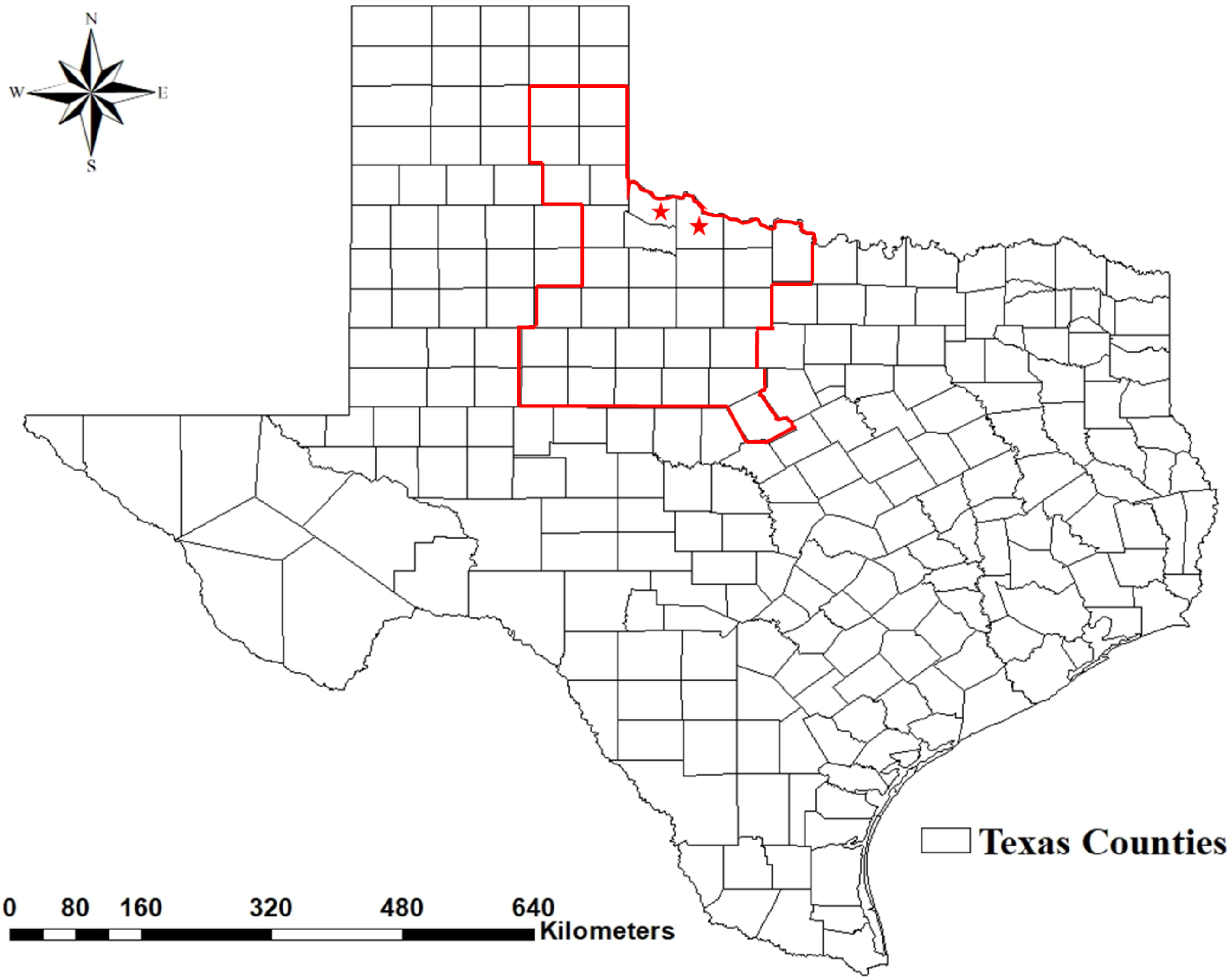

Figure 1. Map of proposed study region. The Texas Rolling Plains boundary is outlined in red. Monitoring sites will be located within the northern Texas Rolling Plains).

Tasks, Objectives and Schedules				
Task 1	Project Administration			
Costs	$3,780			
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	Texas A&M AgriLife Research 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 1st of December, March, June and September. QPRs shall be distributed to all Project Partners.			
	Start Date	Month 1	Completion Date	Month 28
Subtask 1.2	Texas A&M AgriLife Research 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 28
Subtask 1.3	Texas A&M AgriLife Research will host meetings or conference calls, at least quarterly, with Project Partners to discuss project activities, project schedule, communication needs, deliverables, and other requirements. Texas A&M AgriLife Research will develop lists of action items needed following each project coordination meeting and distribute to project personnel.			
	Start Date	Month 1	Completion Date	Month 28
Subtask 1.4	Texas A&M AgriLife Research will develop a Final Report that summarizes activities completed and conclusions reached during the project and discusses the extent to which project goals and measures of success have been achieved.			
	Start Date	Month 20	Completion Date	Month 28
Deliverables	• QPRs in electronic format • Reimbursement Forms and necessary documentation in hard copy format • Final Report in electronic and hard copy formats			

Tasks, Objectives and Schedules				
Task 2	Quality Assurance			
Costs	$4,500			
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	Texas A&M AgriLife Research will develop a QAPP for activities in Task 3 consistent with the most recent versions of *EPA Requirements for Quality Assurance Project Plans (QA/R-5)* and the *TSSWCB Environmental Data Quality Management Plan*. 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 Assemblage and Habitat Data (RG-416)*. [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 (NELAC) standards, shall be required where applicable.]			
	Start Date	Month 1	Completion Date	Month 6
Subtask 2.2	Texas A&M AgriLife Research will implement the approved QAPP. Texas A&M AgriLife Research will submit revisions and necessary amendments to the QAPP as needed.			
	Start Date	Month 6	Completion Date	Month 28
Deliverables	• QAPP approved by TSSWCB and EPA in both electronic and hard copy formats • Approved revisions and amendments to QAPP, as needed • Data of known and acceptable quality as reported through Task 3			

Tasks, Objectives and Schedules				
Task 3	Demonstrate soil health promoting practices to improve water quality from agricultural settings in Texas Rolling Plains Integrated Crop/Livestock Systems			
Costs	$98,863			
Objective	Monitor the effectiveness of soil health promoting practices on surface water quality.			
Subtask 3.1	Quantify effectiveness of crop rotation, conservation tillage, regenerative agriculture, and cover crops on water quantity and quality in integrated livestock-cropping systems using automatic water samplers. Monitor effectiveness of no-till and no-till with legume and mixed species cover crops on water quantity and quality in cotton/wheat cropping systems compared to conventionally tilled and regenerative agriculture systems using automatic water samplers and soil samples. Water samples will be analyzed for sediment and nutrients. Cover crops will be analyzed for herbage mass and carbon and nitrogen content. Soil samples will be analyzed for nutrients.			
	Start Date	Month 6	Completion Date	Month 28
Subtask 3.2	Texas A&M AgriLife Research will coordinate with stakeholders to establish control and treatment plots within a livestock-cropping system.			
	Start Date	Month 6	Completion Date	Month 12
Deliverables	• Effectiveness of practices on water quality and field-level measurement will be summarized and included in the Final Report.			

Tasks, Objectives and Schedules				
Task 4	Demonstration and Program Delivery			
Costs	$2,500			
Objective	Utilize field days, workshops, and/or hands-on demonstration of soil health promoting practices and ensure education materials are available through appropriate avenues.			
Subtask 4.1	Texas A&M AgriLife Research will host a field day at the demonstration site as applicable.			
	Start Date	Month 12	Completion Date	Month 28
Subtask 4.2	Texas A&M AgriLife Research will present findings to stakeholders at regional or national workshops/conferences.			
	Start Date	Month 12	Completion Date	Month 12
Deliverables	• Conduct field days, workshops, and/or seminars for soil health promoting practices and improved water quality.			

Project Goals (Expand from Summary Page)

Demonstrate and quantify the effects of improved soil health generated by implementing conservation tillage with cover crops by measuring changes in irrigation water application volumes and efficiencies, infiltration rates, soil water holding capacities, surface runoff volume, erosion, off-site agrochemical transport, crop yield, crop quality, and economics across Southern Great Plains production systems.

Goal 1. Monitor effectiveness of soil health promoting practices on surface water quality.

- Obtained through construction of small basin catchments in various agricultural production systems.
- Production systems include cotton, wheat, and livestock systems with conservation tillage and cover crops.

Goal 2. Determine most effective management practices in conservation agriculture;

- Through evaluation and data analysis of collected water quality data in conjunction with soil and cover crop quality.

Goal 3. Utilize workshops, field days and hands-on demonstration of best management practices and ensure availability of education materials through website.

- Hands-on training and presentation of collected data at various stakeholder meetings.

Measures of Success (Expand from Summary Page)

• Reduced sediment and nutrient losses;
- Quantified through water quality monitoring; evaluation of varying and diverse soil health promoting practices.

• Increased awareness of conservation tillage, crop rotation, regenerative agriculture, and cover crops.
-Through education events at demonstration sites.

• Ultimate measure of success will be an observed changed in management practices among stakeholders and an increase in acreage of demonstrated practices.

***2017 Texas NPS Management Program* Reference (Expand from Summary Page)**
Components, Goals, and Objectives
Component 1 – Explicit short- and long-term goals, objectives, and strategies to restore and protect surface and groundwater, as appropriate. Long-term Goal (LTG): To protect and restore water quality affected by NPS pollution through assessment, implementation and education 1. Focus nonpoint source abatement efforts, implementation strategies, and available resources in watersheds and aquifers identified as impacted by nonpoint source pollution. 2. Support the implementation of state, regional, and local programs to prevent nonpoint source pollution through assessment, implementation, and education. 3. Support the implementation of state, regional, and local programs to reduce nonpoint source pollution, such as the implementation of strategies defined in TMDL I-Plans, WPPs, and other water quality planning efforts in the state. 6. Develop partnerships, relationships, memoranda of agreement, and other instruments to facilitate collective, cooperative approaches to manage nonpoint source pollution. 7. Increase overall public awareness of nonpoint source issues and prevention activities. Short-term Goal (STG) One – Data Collection and Assessment: Coordinate with appropriate federal, state, regional, and local entities, and stakeholder groups to target water quality assessment activities...where additional information is needed. Objectives: B. Ensure that monitoring procedures meet quality assurance requirements and are in compliance with EPA-approved TCEQ or TSSWCB Quality Management Plans. E. Conduct monitoring to determine the effectiveness of TMDL I-Plans, WPPs, and BMP implementation. STG Three – Education: Conduct education and technology transfer activities to increase awareness of NPS pollution and activities which contribute to the degradation of water bodies… by NPS pollution. Short-term Goal (STG) Two – Implementation: Implement TMDL I-Plans and/or WPPs and other state, regional, and local plans/programs to reduce nonpoint source pollution by targeting implementation activities to the areas identified as impacted or potentially degraded by nonpoint source pollution with respect to use criteria. Objectives: B. Develop and implement BMPs to address constituents of concern or water bodies not meeting water quality standards in watersheds identified as impacted by nonpoint source pollution. D. Implement TMDL I-Plans, WPPs, and other state, regional, and local plans developed to restore and maintain water quality in water bodies identified as impacted by nonpoint source pollution. Short-term Goal (STG) Three – Education: Conduct education and technology transfer activities to increase awareness of nonpoint source pollution and activities which contribute to the degradation of water bodies, including aquifers, by nonpoint source pollution. Objectives: A. Enhance existing outreach programs at the state, regional, and local levels to maximize the effectiveness of nonpoint source education. B. Administer programs to educate citizens about water quality and their potential role in causing nonpoint source pollution. C. Expedite development of technology transfer activities to be conducted to increase BMP implementation. D. Conduct outreach through the CRP, SWCDs, and others to 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. G. Implement public outreach and education to maintain and restore water quality in water bodies impacted by nonpoint source pollution.

Part III – Financial Information

Category	Total
Personnel	$ 17,876
Fringe Benefits	$ 8,704
Travel	$ 600
Equipment	$ 12,786
Supplies	$ 41,448
Contractual	$ 0
Construction	$ 0
Other	$ 15,595
Total Direct Costs	$ 97,009
Indirect Costs (≤ 15%)	$ 12,634
Total Project Costs	$ 109,643

Budget Justification Texas A&M AgriLife Research

Category	Total Amount	Justification
Personnel	$ 17,876	Research Technician (2 mo/yr in yr 1 ($5,064); 2 mo/yr in yr 2 ($5,216); 3 mo/yr in yr3 ($7,596)) Other Personnel salary is budgeted with a 3% pay increase in years after year 1 *(Salary estimates are based on average monthly percent effort for the entire contract. Actual percent effort may vary more or less than estimated between months; but in the aggregate, will not exceed total effort estimates for the entire project.)
Fringe Benefits	$ $8,704	Salaried Employee Fringe Benefits Calculated at: 18.5% salary + $771/mo insurance. *(Fringe benefits estimates are based on salary estimates listed. Actual fringe benefits will vary between months coinciding with percent effort variations; but in the aggregate, will not exceed the overall estimated total.)
Travel	$ 600	Travel for the PI to travel to regional meetings (TSSWCB, Texas Watershed Roundtables, etc.); up to three trips at $200 per trip, including lodging and per diem.
Equipment	$ 12,786	2 Avalanche Samplers ($12,786)
Supplies	$ 41,448	730 flow modules ($26,837), sampler accessories (bottles, tubing, strainers, cables, data transfer device - $3,611), batteries for samplers ($2,500), cover crop seed ($2,000), fuel for vehicles and farm equipment ($1,500), construction materials for flume pads and approaches ($2,000), and consumables for water analysis ($3,000).
Contractual*	$ 0	N/A
Construction	$ 0	N/A
Other	$ 15,595	Fees for farm equipment and state vehicle maintenance and upkeep ($1,500), 12 1’ H Flumes ($9,760), solar panel for samplers ($735), equipment rental for watershed construction ($500), and stormboxes for sampler housing ($3,100).
Indirect	$ 12,634	15% of Modified Total Direct Cost