

CONTINUED IMPLEMENTATION OF THE MILL CREEK  
WATERSHED PROTECTION PLAN

Final Report  
TSSWCB Project #19-12



October 2021

Texas A&M AgriLife Extension Service

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## **List of Abbreviations**

CEA	County Extension Agent
EPA	Environmental Protection Agency
H-GAC	Houston-Galveston Area Council
LSHS	Lone Star Healthy Streams
NRCS	Natural Resources Conservation Service
QAPP	Quality Assurance Project Plan
RUAA	Recreational Use Attainability Analysis
SWCD	Soil and Water Conservation District
TSSWCB	Texas State Soil and Water Conservation Board
TWON	Texas Well Owner Network
TWRI	Texas Water Resources Institute
TWS	Texas Watershed Steward
WQMP	Water Quality Management Plan

## Introduction

The Mill Creek watershed is a 263,450-acre area in the Brazos River Basin (Figure 1). Since 2014, Segment 1202K of Mill Creek has been listed on the Texas Integrated Report 303(d) List due to bacterial contamination. Between September 2005 and November 2012, 26 samples were taken to assess the levels of *E. coli* bacteria in Mill Creek. The geometric mean of these data indicated 192 colony forming units per 100 milliliters (cfu/100 mL), which exceeded the state standard of 126 cfu/100mL for contact recreation.

In 2013, the Texas State Soil and Water Conservation Board (TSSWCB) and Texas A&M AgriLife Extension Service (Extension) identified Mill Creek for the development of the watershed protection plan (WPP) due to two primary factors:

- 1) it had been listed as impaired due to bacteria levels exceeding the standard for contact recreation;
- 2) the Recreational Use Attainability Analysis (RUAA) concluded that recreational contact use designation and concurrent water quality standards were appropriate.



Figure 1. Mill Creek watershed

The TSSWCB Projects 14-57 and 15-54 entitled *Phase 1: Data Collection and Development of Essential Components for the Mill Creek Watershed Protection Plan*, and *Phase 2: Development of a Watershed Protection Plan for Mill Creek*, respectively, began in 2014. These projects included water quality monitoring, water quality modeling, and WPP development.

The WPP development was a stakeholder-driven process facilitated by Extension with vital support from TSSWCB. The Mill Creek Watershed Partnership Steering Committee included local officials, land and business owners, and citizens, and was supported by state and federal agency partners. With technical assistance from project staff, the Steering Committee identified issues that are of particular importance to the surrounding communities, contributed information on land use and activities that helped to identify potential sources of bacteria, and guided development of the WPP. Through the WPP development process, stakeholders identified three categories of potential nonpoint sources of bacteria in the watershed: urban, on-site wastewater, and agricultural. The SELECT analysis was utilized to estimate distributions and the degree of contribution of these potential pollutant sources within the watershed. Management measures were identified to address each of the potential sources. The timeline for full implementation of management measures identified in the Mill Creek WPP is 10 years. The WPP was approved and signed

by the Steering Committee in January 2016 and accepted by the Environmental Protection Agency (EPA) in February 2016.

### **Project Overview**

The TSSWCB Project 16-11, *Implementation of the Mill Creek Watershed Protection Plan*, began in November 2016 and involved the following management measures: Partnership meetings, Texas Well Owner Network (TWON) workshops, Homeowner Maintenance of Septic System classes, a Lone Star Healthy Streams (LSHS) workshop, a Texas Watershed Steward (TWS) workshop, and a Riparian and Stream Ecosystem Workshop. Extension worked with the Austin and Washington Soil and Water Conservation District Technician to encourage stakeholders to consider water quality management plans (WQMPs). In addition, Extension contracted with the Houston-Galveston Area Council (H-GAC) for water quality monitoring to complete the project. As part of TSSWCB Project 16-11, Extension and H-GAC conducted a 10-month water quality monitoring task that included eight sites in the watershed.

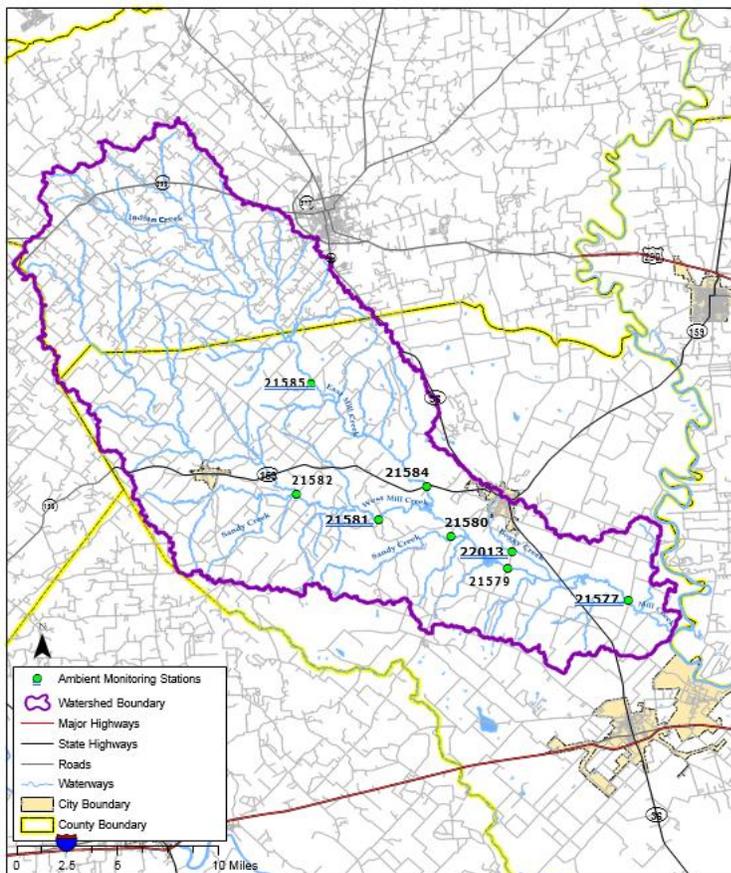


Figure 2. TSSWCB Project 16-11 sampling locations

Following the completion of the TSSWCB Project 16-11, the TSSWCB Project 19-12, *Continued Implementation of the Mill Creek Watershed Protection Plan*, began in October 2019. Public outreach and education efforts continued to be the focus of the Mill Creek WPP implementation. In fall 2020, a new Watershed Coordinator was hired who continued to support coordination of activities and events within the WPP.

During the project period, Extension contracted with Texas Water Resources Institute (TWRI) to conduct routine water quality monitoring in Mill Creek. In November 2019, TWRI and Extension visited the Mill Creek sampling locations and determined that the number of sites should be adjusted due to low or no measured flow at three sampling locations. A Quality Assurance Project Plan (QAPP) was developed reflecting five monitoring sites (Figure 3), which was later approved by the TSSWCB and EPA. Following these events, the water quality monitoring in Mill Creek resumed in April 2020 through the partnership between Extension and TWRI.

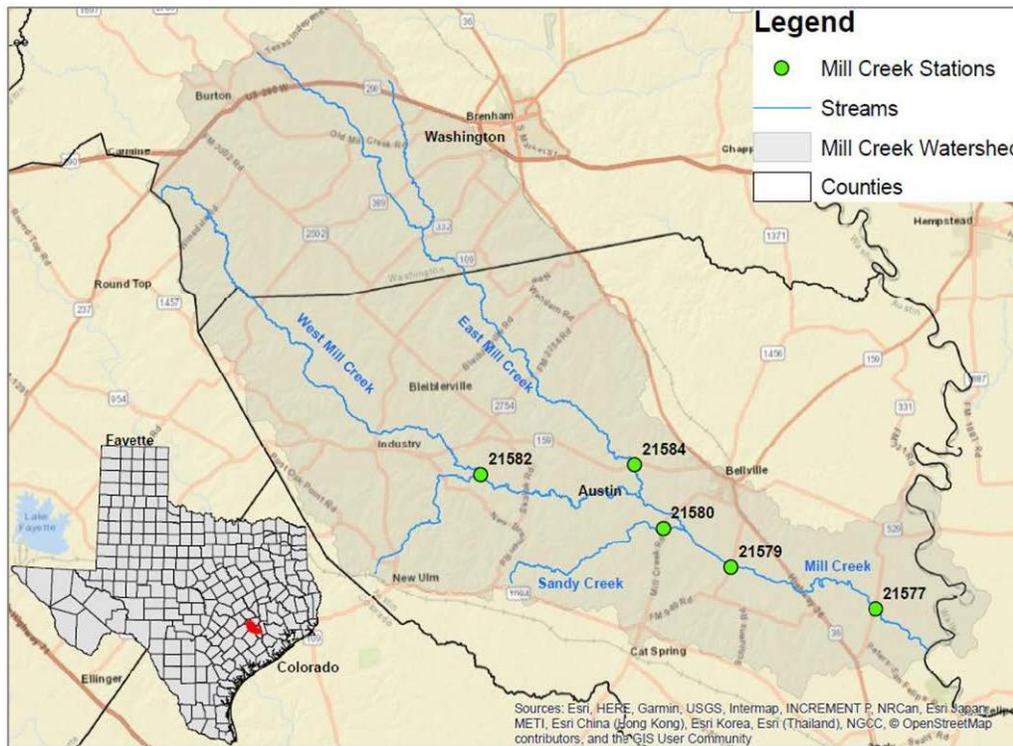


Figure 3. TSSWCB Project 19-12 sampling locations

The implementation efforts were conducted largely within constraints and uncertainties imposed by the Covid-19 pandemic and resultant public health guidelines. Many scheduled in-person events had to be temporarily postponed during the early period of the pandemic. In compliance with the safety guidelines from the Center for Disease Control and Texas A&M University, Extension did not host any face-to-face events from April 2020

until August 2021. Despite these unprecedented circumstances, seven educational programs, two Partnership meetings, and the first watershed-wide cleanup event were successfully conducted via distance or within social distancing guidelines. Implementation of the Mill Creek WPP was further facilitated through the newsletter production, maintaining the project website, development of the new brochure, and creation of the project's Facebook page.

## **Project Highlights**

### ***Project Administration***

Throughout the project period, Extension remained in continuous contact with project partners including the TSSWCB, Austin and Washington County Extension Agents (CEAs), TWRI, local municipalities, and other Partnership members. In-person and virtual meetings, phone calls, and emails were shared between Extension and project partners regarding activities related to planning of educational workshops and stakeholder meetings, facilitation and development of grant proposals, and other project-related activities.

In summer 2020, the Watershed Coordinator for the project resigned. Starting September 2020, Extension hired a new Watershed Coordinator to facilitate the implementation of the WPP. The new Watershed Coordinator spent a significant amount of time training with the predecessor, established relationships with partners and stakeholders, and received training through participation in professional development opportunities.

### ***Technical Assistance***

Extension coordinated efforts with the project's Field Technician from the Soil and Water Conservation District (SWCD) in Austin and Washington Counties. Extension and the Technician regularly communicated and coordinated regarding Partnership events and workshops to raise public awareness about the WQMP program. These activities helped to publicly promote the role of the Technician, resulting in greater awareness by agricultural producers and increased enrollment in the WQMPs and Natural Resources Conservation Service (NRCS) programs.

### ***Water Quality Management Plans***

Over the course of this project, eleven local producers received assistance with preparation of requests for water quality management planning. Eight WQMPs have been certified and four are currently in progress. The certified plans cover a total of 665.9 acres, with additional 1,071.5 acres in planning to be certified. A total of 95% of these acres are utilizing rotational grazing with beef cattle. The other 5% are managed for wildlife or serve as the operation headquarters.

Through this cost-share funding program, producers received assistance for the following practices:

- Construction of a 7,272-foot fence
- Installation of a 1,796 livestock pipeline.
- 41.5 acres of forage and biomass planting.
- Brush control practices covering 12.2 acres.



Figure 4. Implemented WQMPs: grass planting and fence installation. *(Photo credit: Faith Chase)*

### *Water Quality Monitoring*

Routine water quality monitoring was conducted at five sampling locations in the watershed. The water quality data were further summarized and presented to stakeholders at each in-person and virtual event.



Figure 5. Water quality monitoring in Mill Creek.

*Water Quality Data*

Throughout the project, water quality in Mill Creek was monitored for the following chemical and physical parameters: *E. coli*, total suspended solids, ammonia, nitrate, nitrite, orthophosphate, phosphorous, dissolved oxygen, specific conductance, pH, stream flow, and temperature. The trends in these water quality indicators are depicted in the charts attached in Appendix A.

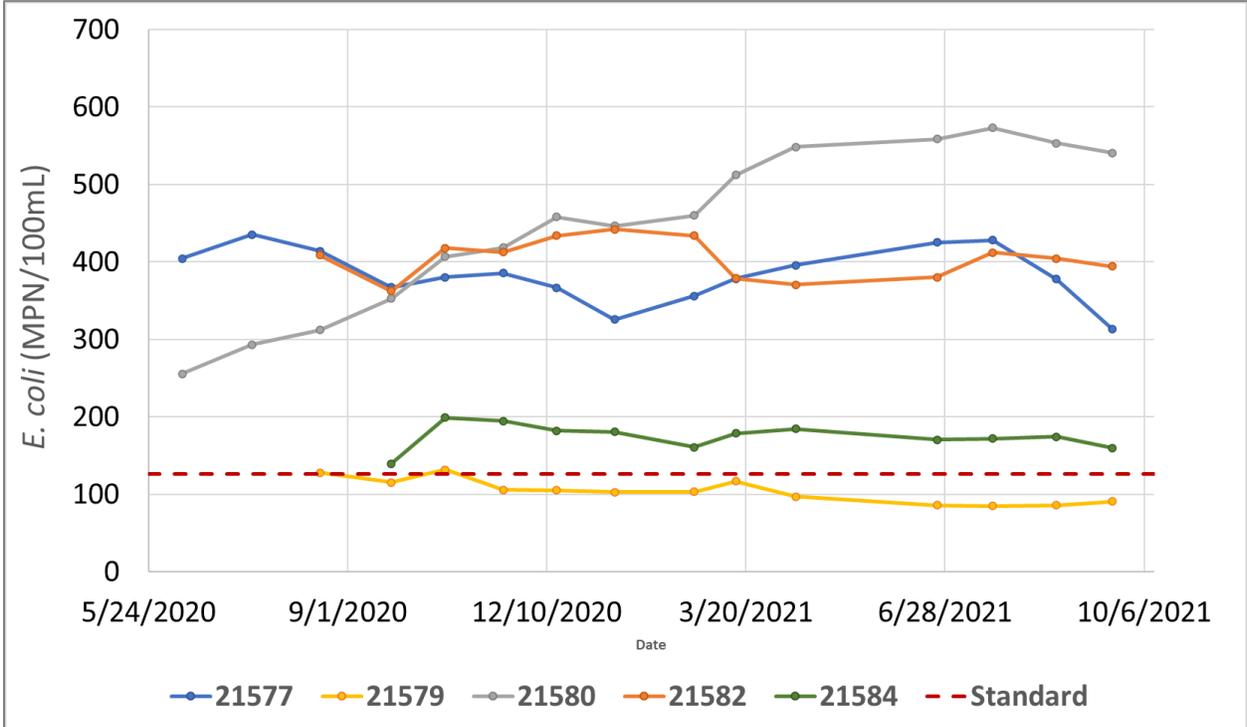


Figure 6. *E. coli* trends in Mill Creek, May 2020 – October 2021.

Figure 5 illustrates the current *E. coli* trends found throughout the Mill Creek watershed. These data represent a rolling 20-sample geomean. Due to a variety of site and climatic variables, *E. coli* concentrations ranged from 10 MPN/100mL up to 4,000 MPN/100mL. Sites 21577 and 21579 were observed to be very stable and consistently had the lowest *E. coli* concentrations, while sites 21582 and 21584 were more variable. Meanwhile, *E. coli* concentrations at site 21580 have steadily increased over time and may warrant further inspection. The 20-sample geomean of site 21579 has been below the standard of 126 MPN/100mL since November 2020 representing the only site to remain below this standard.

### **Education and Outreach Activities**

#### *Mill Creek WPP Implementation Updates*

The Mill Creek WPP updates were delivered to stakeholders at each workshop and meeting, whether in-person or virtual. At the beginning of each program, the Watershed Coordinator presented the WPP updates which included the project overview, water quality data summaries, and information about upcoming events. Attendees had an opportunity to provide their input related to the WPP implementation. Table 1 summarizes the occasions when stakeholder received the updates.

<b>Program</b>	<b>Date</b>	<b>Location</b>	<b>Attendance</b>
Texas Well Owners Network	December 9, 2019	Brenham	46
Steering Committee Meeting	February 27, 2020	Bellville	N/A
Stakeholder Meeting	January 12, 2021	Virtually, via Zoom	10
Texas Well Owner Network	August 27, 2021	Brenham	34
Homeowner Maintenance of Septic Systems	August 27, 2021	Brenham	18
Texas Riparian & Stream Restoration Training	October 1, 2021	Sealy	14
Healthy Lawns Healthy Waters	August 20, 2020	Virtually, via Zoom	29

Table 1. Dates and events when the Mill Creek WPP updates were presented.

### *Educational Programming*

Education and outreach activities performed by Extension during the course of this project were vital for the effective implementation of the WPP. Extension facilitated the delivery of a variety of workshops educating the public about nonpoint source pollution and local water quality.

The Covid-19 pandemic impacted the implementation efforts by restricting face-to-face delivery of educational events, and multiple workshops planned to take place in 2020 had to be temporarily postponed due to safety concerns (Table 2).

<b>Program</b>	<b>Date</b>
Texas Riparian & Stream Ecosystem Training	April 7, 2020
Mill Creek Cleanup Event	April 18, 2020
Homeowner Maintenance of Septic Systems	May 27, 2020

Table 2. List of the events postponed due to Covid-19.

### Texas Well Owner Network (TWON)

The TWON program was offered on two occasions. The 4-hour TWON program took place on December 9, 2019, and the shortened 1-hour version of this program was offered on August 27, 2021. Forty-six and 34 people attended these events, respectively.

The TWON program is an educational training designed for residents who depend on household wells for their drinking water needs. The half-day program provides training on topics such as Texas' groundwater sources, water quality, water treatment, and well maintenance issues. In addition, the program includes training focused on the operation and maintenance of septic systems which are critical to be properly maintained by all who have a well on their property. Attendees were encouraged to bring water samples to the trainings, so they could be screened for total dissolved solids, nitrates, pH, and *E. coli* bacteria. Those well owners whose water tested positive for bacteria received follow-up contact from Extension on how to resolve the issue.



Figure 7. TWON workshop in Brenham, August 27, 2021.

### Texas Riparian and Stream Ecosystem Training

The Texas Riparian and Stream Ecosystem training was initially scheduled to take place on April 7, 2020, but had to be postponed due to Covid-19 safety guidelines. In partnership with TWRI, Extension hosted this program on October 1, 2021 (Figure 8). This program gathered 14 people who participated to learn about watershed hydrology and water quality, riparian zone vegetation and management, and other topics.



Photo credit: Stacie Villarreal



Figure 8. Texas Riparian and Stream Ecosystem program in Sealy, October 1, 2021.

### Healthy Lawns and Healthy Waters (virtual)

Due to the pandemic, the Healthy Lawns and Healthy Waters (HLHW) program was conducted via distance on August 20, 2020. A total of 29 people attended this workshop.

Attendees learned about the design and installation of residential rainwater harvesting systems and appropriate turf and landscape species based on local conditions.

### Homeowner Maintenance of Septic Systems

The 6-hour Homeowner Maintenance of Septic Systems course was scheduled in Brenham on May 27, 2020. However, it had to be canceled due to the Covid-19 concerns. The short 2-hour version of this course was offered in Brenham on August 27, 2021 as an in-person event (Figure 9). Eighteen local residents attended this program to learn about the operation and maintenance of conventional and aerobic septic systems, and how activities in the home can impact proper functioning of septic systems. Treatment processes, health and safety considerations, and a general overview of how to inspect and maintain septic systems were among the topics covered in this class.

To continue providing exceptional public outreach and education during the pandemic, some AgriLife Extension courses, such as the Homeowner Maintenance of Septic Systems class, had to switch to the virtual method of instruction. Extension worked closely with the online class developers and participated in the pilot testing of this course. Extension further facilitated communication between the course instructors and the Environmental Health Offices in Austin and Washington Counties. Upon reviewing the online curriculum, representatives of the Environmental Health Offices in both counties found this course sufficient to certify local homeowners to maintain their septic systems. The virtual Homeowner Maintenance of Septic Systems course has been available on the AgriLife Learn platform at <https://agrilifelearn.tamu.edu> since April 1, 2021 and will continue to be offered in the foreseeable future.



Figure 9. Homeowner Maintenance of Septic Systems in Brenham, August 27, 2021.

### *Partnership Meetings*

A Steering Committee meeting occurred in Bellville on February 27, 2020. The topics of discussion included the Mill Creek WPP implementation updates provided by the Watershed Coordinator, identification of the desired programs in the watershed, introduction of the Field Technician, overview of WQMPs, and updates related to the new water quality monitoring program focusing on 5 sampling locations.

A stakeholder meeting took place via Zoom on January 12, 2021. Ten stakeholders attended the meeting. The agenda included the Mill WPP project overview and updates, and the public discussion to gather stakeholders' input regarding desired educational opportunities to be offered in the area.

### *Other Outreach Activities*

#### Cleanup Event

The first Mill Creek Cleanup Event occurred on Saturday, April 10 (Figure 10). This event was coordinated through effective collaboration with multiple partners and sponsors. Since most of the land in the watershed is privately-owned, the Cleanup Event targeted local landowners. Participants were invited to clean up their properties and bring all collected items to the centralized trash drop-off spot. The canvas totes containing cleanup supplies – work and vinyl gloves and trash bags – were available at the Austin and Washington County Extension Offices for pick up two weeks prior to the day of the Cleanup Event.

Though the event was well advertised via local media, social media, and CEA mediated word of mouth, participation numbers were low. However, two property owners took advantage of this opportunity during the pandemic and brought 600 pounds of trash collected from their property.



Figure 10. Mill Creek Cleanup Event, April 2021.

**Public Communication**

*Project Brochure*

During this project, Extension updated the Mill Creek WPP brochure and distributed it at the public agencies and businesses around the project area. Additionally, to continue raising awareness of the Mill Creek WPP, Extension disseminated the brochures at public events including educational workshops supported through this project and county- and state-wide events. The new brochure can be found in Appendix B.

*Newsletters*

Extension continued disseminating information about the upcoming events as well as news related to the WPP implementation via the electronic newsletter. Since the beginning of this project, 7 newsletters have been sent via email to the list of 162 recipients.

### Advertisement of Programs

Extension utilized a variety of methods to reach the public about workshops, creek cleanup event, public meetings, and other programs. Outreach included press releases, newspapers (electronic and print), radio ads, distribution of flyers, and the use of social media along with the project's webpage (Figure 11).

## *Mill Creek Watershed to meet*

The Mill Creek Watershed Partnership will be hosting a virtual stakeholder meeting on Tuesday, Jan. 12, from 6-7 p.m. This meeting will be open to the public, providing updates to the Mill Creek Watershed Protection Plan. Participants are invited to discuss local water quality issues and meet the new Watershed Coordinator, Evgenia Spears. A link will be sent via email the week before the meeting. Voluntary stakeholder engagement is imperative for the restoration and future protection of the Mill Creek Watershed. To learn more about the project or how to get involved, please visit our website at <https://millcreek.tamu.edu>, or contact the Watershed Coordinator, Evgenia Spears, at [millcreek@tamu.edu](mailto:millcreek@tamu.edu) or (979) 845-2862. For more information on the meeting and agenda please visit the website: <https://millcreek.tamu.edu/event/stakeholder-meeting/>. If you have any questions, please contact the Texas A&M AgriLife Extension Agent Stacie Villarreal at 979-865-2072.



**Call 865-3131  
To Subscribe  
To The  
Times**

Figure 11. Public meeting announcement in The Bellville Times.

### Project Webpage

Extension continued to maintain the project's webpage, <https://millcreek.tamu.edu> (Figure 12). In addition to the electronic copy of the Mill Creek WPP and project-related information, other resources - including newsletters, announcements of upcoming events, and copies of past meeting presentations - were posted on the webpage.



Figure 12. Mill Creek Watershed Partnership website.

## Social Media

During the project, Extension created a new Facebook page with the handle “@MillCreek-Water” to improve the online presence of the Mill Creek Watershed Partnership (Figure 13). The Facebook page allowed to expand the channels of communication with stakeholders and partners and have gained 37 followers since the time it was created at the end of 2020. The total of 42 of posts have been added to the timeline reaching 2,505 people. These numbers are expected to increase with the continuous advertisement of the page through newsletters and presentations, as well as the consistent use of the page for advertisement of programs.

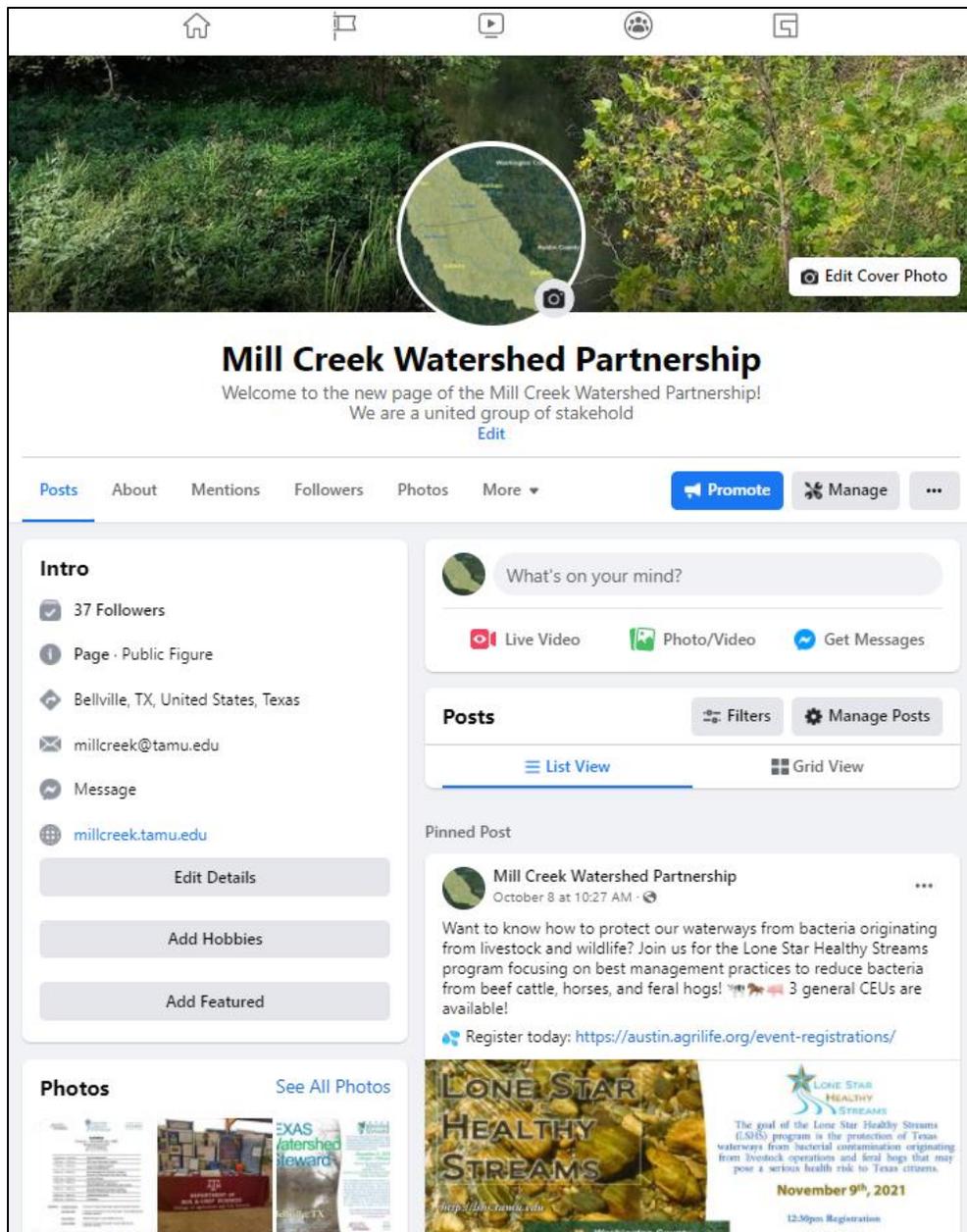


Figure 13. Mill Creek Watershed Partnership Facebook page.

### ***Collaboration with Partners***

Extension continued collaborating with partners to facilitate the implementation of the Mill Creek WPP. Extension remained in contact with Austin County Judge and the representative from the City of Bellville Planning and Development to find the most efficient solution to the issue of failing septic systems in Kenney. The local homeowners were invited to a public meeting scheduled for December 8, 2021 to discuss the available financial assistance options to decommission and replace the malfunctioning septic systems. If targeted

homeowners are interested in replacing their systems, Extension will assist the Austin County Office and City of Bellville with development of grant proposals to secure funds for decommissioning and replacement of failing septic systems.

### ***Continuation of the Project***

Extension prepared and submitted a grant proposal to facilitate continued implementation of the Mill Creek WPP. The funding was received, and the new project titled *Extending Implementation of the Mill Creek Watershed Protection Plan* began on September 1, 2021.

### **Conclusion**

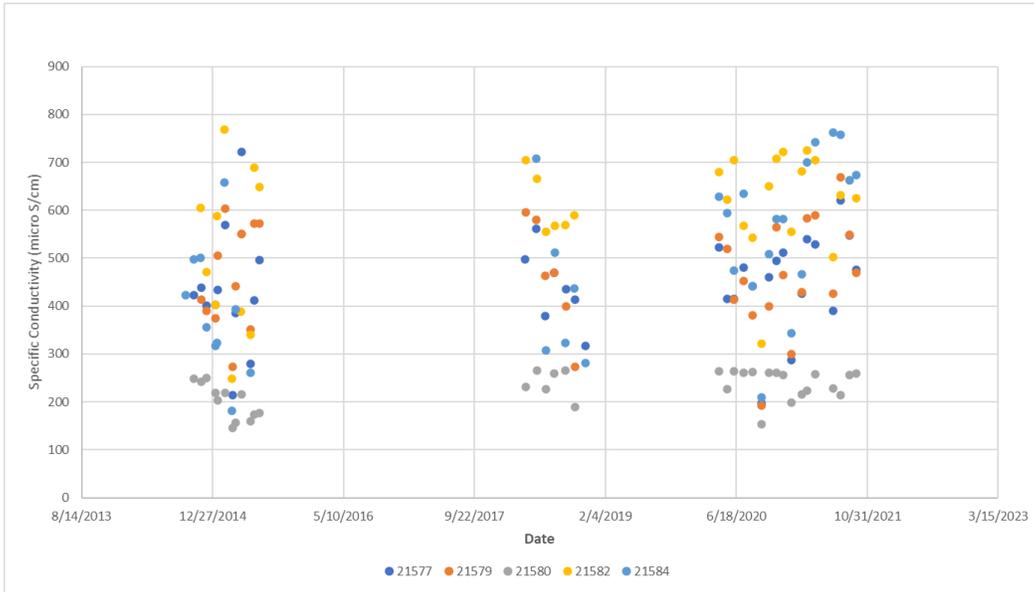
In summary, TSSWCB Project 19-12, *Continued Implementation of the Mill Creek Watershed Protection Plan*, has been completed and successfully achieved its goals for implementation of the Mill Creek WPP. Facilitation of the Partnership was maintained, and stakeholders were engaged in implementation through a variety of educational workshops, meetings, and events. Outreach to the stakeholders was accomplished through a variety of methods including email, newsletters, press releases, newspaper and radio ads, the project webpage, and social media.

Implementation of the Mill Creek WPP will continue through TSSWCB Project 21-11, *Extending Implementation of the Mill Creek Watershed Protection Plan*. This work plan facilitates continued implementation of management measures contained in the WPP. The work plan will continue to support the watershed coordinator position, who will coordinate outreach and education efforts, assist project partners in grant proposal development, and communicate water quality conditions to the public in order to support adaptive management. Additionally, the project will support continued water quality sampling and data analysis to be conducted through the partnership with TWRI.

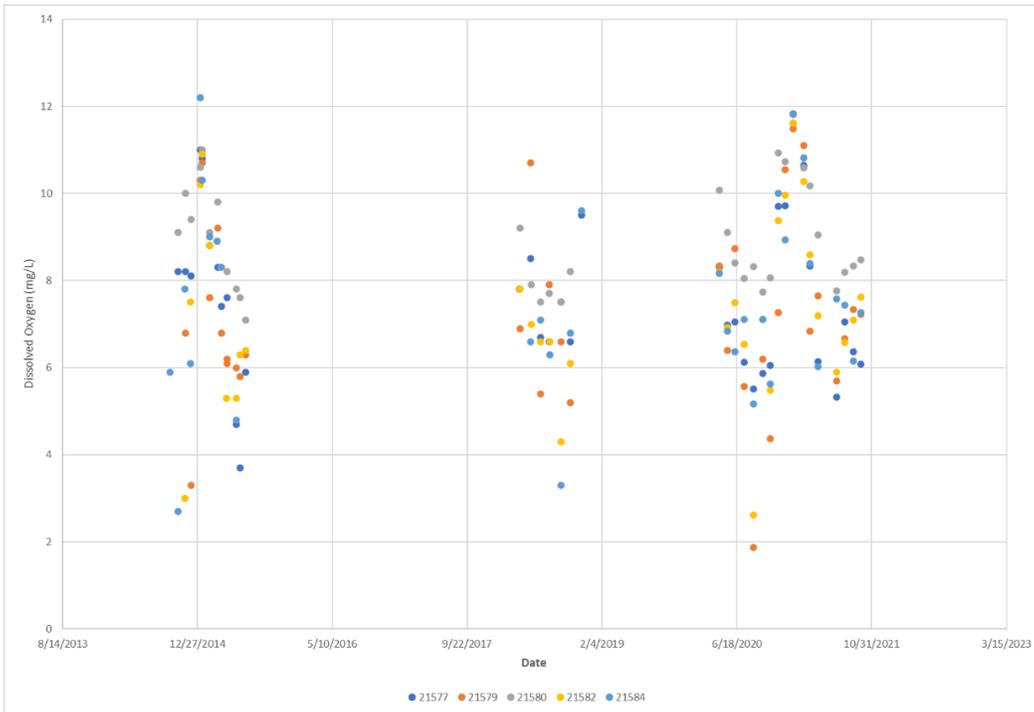
## Appendix A. Mill Creek Water Quality data.

(Some charts may look sparse due to multiple overlapping points of data.)

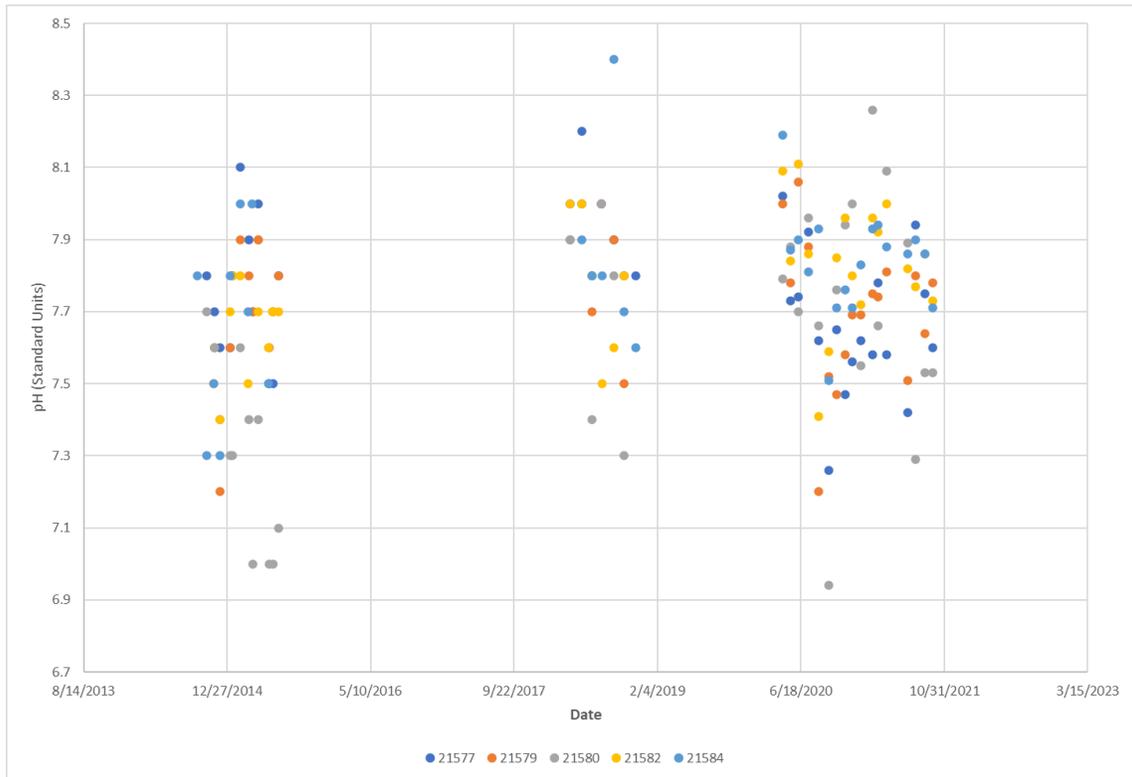
### Specific Conductance



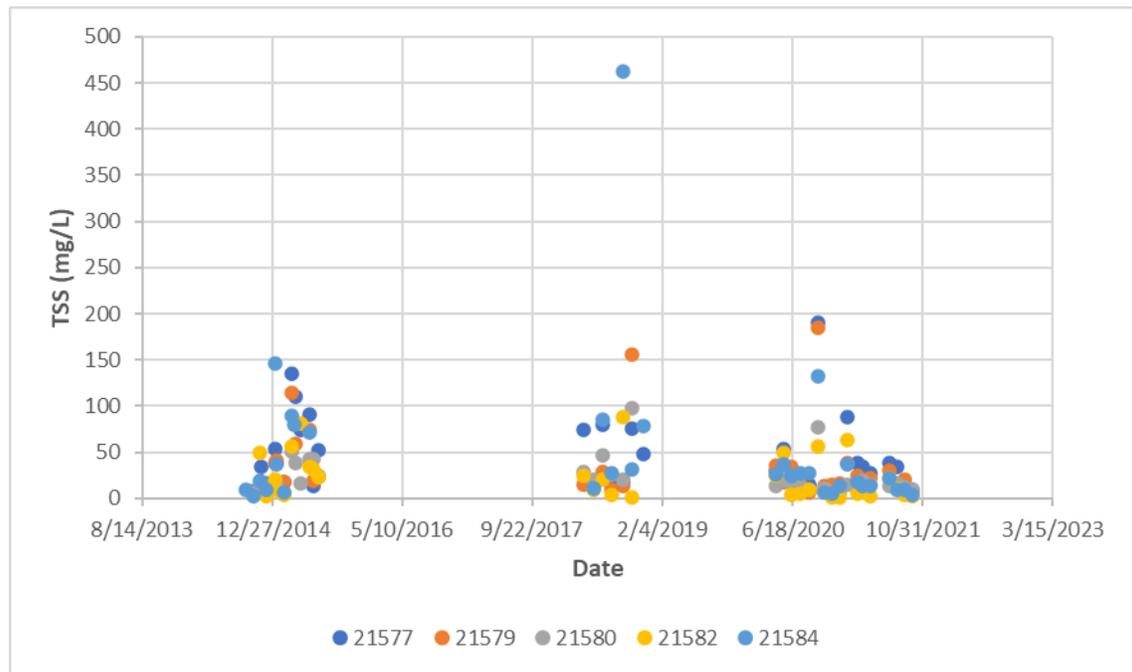
### Dissolved Oxygen



## Levels of pH

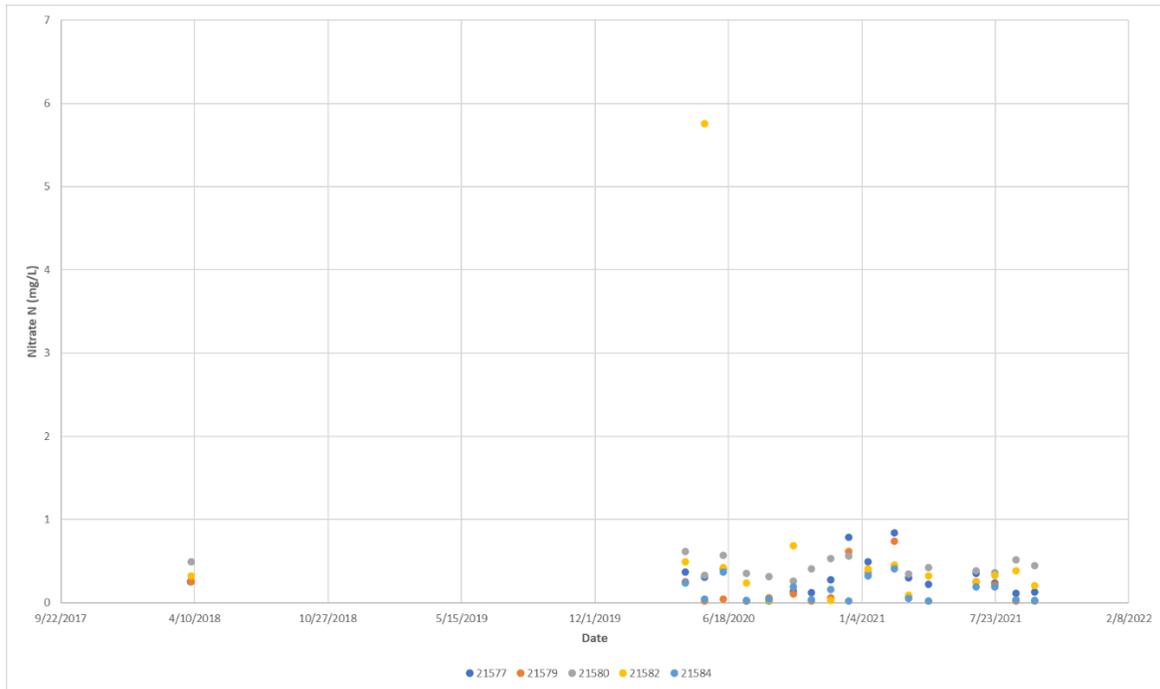


## Total Suspended Solids

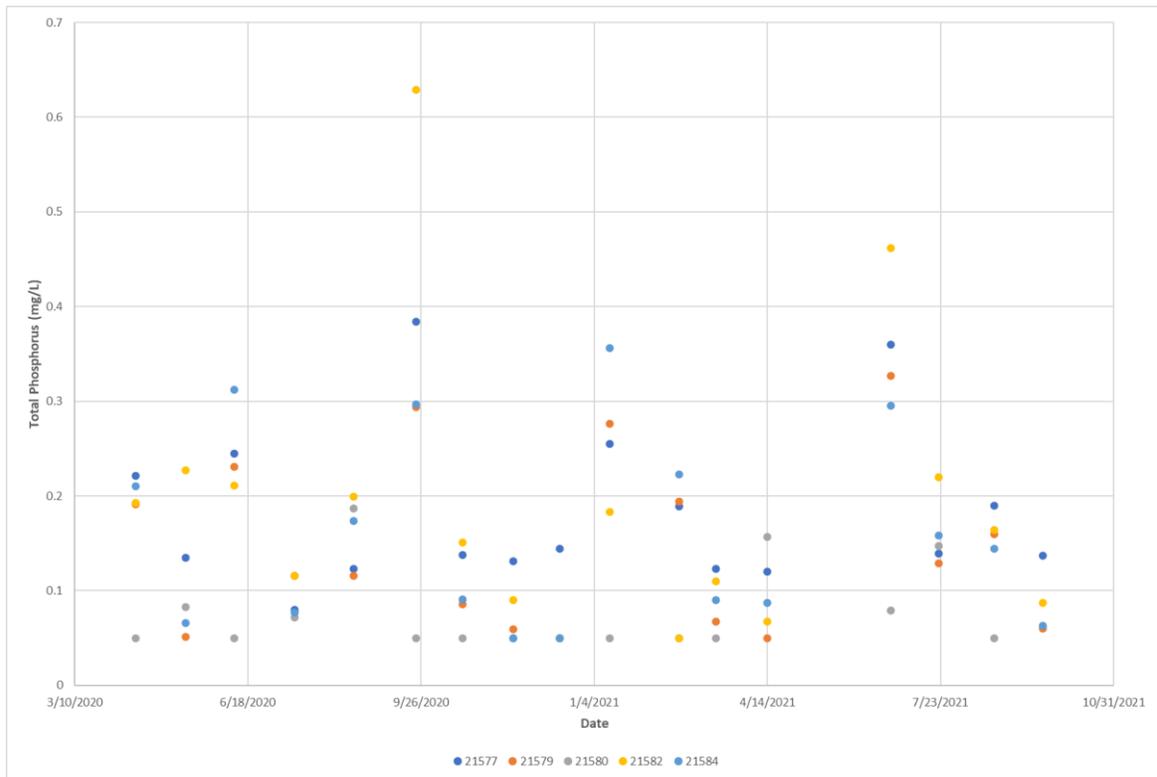




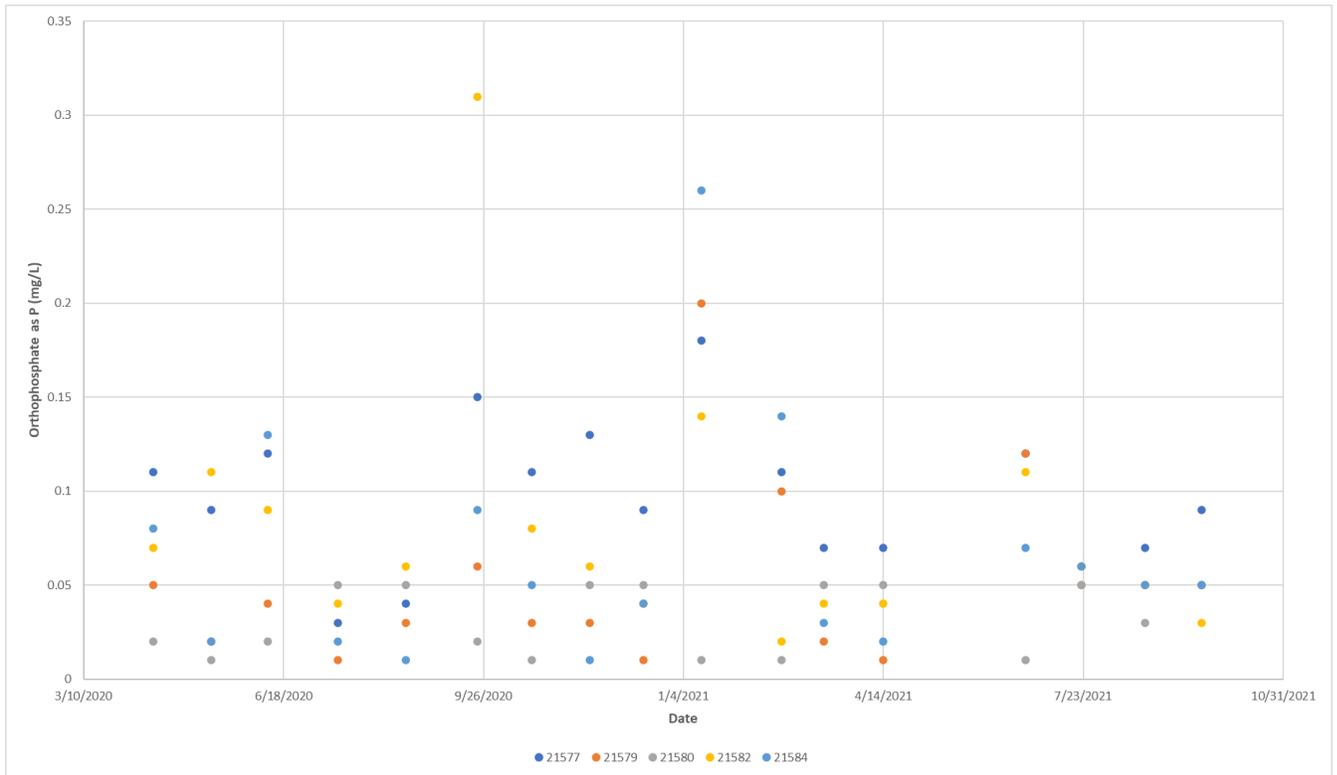
## Levels of Nitrate-Nitrogen



## Total Phosphorous Data



# Levels of Orthophosphate as P



## Appendix B. Mill Creek Watershed Partnership brochure.

### How can I get involved?

Whether you want to voice your opinion or participate in our events and workshops, we will be happy to have you on board!

Reach out to the Watershed Coordinator to learn more about how you can make a difference:

#### **Evgenia Spears**

Watershed Coordinator  
Texas A&M AgriLife Extension Service

 (979) 845-2862

 millcreek@tamu.edu



Texas A&M AgriLife Public Education Program

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For more information about the Partnership, upcoming programs and events, visit our website:

<http://millcreek.tamu.edu>

Follow us on Facebook and Twitter:

[@MillCreekWater](https://www.facebook.com/MillCreekWater)

Funding for this effort is provided through a Clean Water Act §319(h) Nonpoint Source Grant administered by the Texas State Soil and Water Conservation Board from the U.S. Environmental Protection Agency.

## Mill Creek Watershed Partnership

Working together to restore and protect the Mill Creek Watershed

<http://millcreek.tamu.edu>

## About the Partnership

The Mill Creek Watershed Partnership is a voluntary, stakeholder-driven initiative that was formed in response to the urgent need to restore water quality in Mill Creek.



## Project Goals

- 💧 Restore and protect water quality in Mill Creek
- 💧 Raise public awareness
- 💧 Facilitate public participation and education

## Why Mill Creek?

Texas Commission on Environmental Quality identified Mill Creek as impaired due to levels of *E. coli* bacteria that exceeded state criteria.

## Nonpoint-source Pollution

Nonpoint-source water pollution occurs when rainfall events pick up and transport pollutants across the landscape from humans and other natural sources, depositing them into surface waters such as the Mill Creek. Identified nonpoint sources of bacteria in the Mill Creek are:



## What is being done?

The Texas A&M AgriLife Extension Service and the Texas State Soil and Water Conservation Board provide technical and financial assistance to local stakeholder groups. Some of our programs include:

- 💧 Texas Well Owner Network
- 💧 Homeowner Septic System Maintenance Workshop
- 💧 Riparian and Stream Ecosystem Workshop
- 💧 Healthy Lawns Healthy Waters
- 💧 Feral Hog Management
- 💧 Water Quality Management Plans
- 💧 Annual Stream Cleanup Events

*...and many more!*

**Dedicated to success through collaboration with all who live, work, and recreate in the Mill Creek Watershed!**