Coordinating Implementation of the Tres Palacios Watershed Protection Plan Final Report

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Coordinating Implementation of the Tres Palacios Watershed Protection Plan

Final Report

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TEXAS A&M AGRILIFE RESEARCH

Contents

Abbreviations

BMP	Best Management Practice
CCN	Certificate of Convenience and Necessity
CMP	Coastal Management Program
CRP	Clean Rivers Program
DO	Dissolved Oxygen
HGAC	Houston Galveston Area Council
I-Plan	TMDL Implementation Plan
LCRA	Lower Colorado River Authority
MPN	Most Probable Number
NCRS	Natural Resources Conservation Service
OSSF	On-Site Sewage Facilities
SWCDs	Soil and Water Conservation Districts
TCEQ	Texas Commission on Environmental Quality
TSSWCB	Texas State Soil and Water Conservation Board
TWRI	Texas Water Resources Institute
TWON	Texas Well Owner Network
TMDL	Total Maximum Daily Load
USEPA	U.S. Environmental Protection Agency
WPP	Watershed Protection Plan
WS Coord.	Watershed Coordinator

Abstract

The Tres Palacios Creek is a rural coastal Texas water body that drains a watershed home to generations of farmers, ranchers, small businesses, and various communities. In 2006, water quality monitoring conducted by the Texas Commission on Environmental Quality indicated that fecal indicator bacteria levels and 24-hour dissolved oxygen levels were not meeting state water quality standards. To combat this issue, the Texas Water Resources Institute conducted efforts to review the Tres Palacios Creek's land and water resources to gather adequate information to develop the Tres Palacios Creek Watershed Protection Plan. The goal of the Tres Palacios Creek Watershed Protection Plan is to restore water quality in the Tres Palacios Creek through long-term conservation and stewardship of the watershed's resources. To assist with this goal, Texas Water Resources Institute secured the Coastal Management Program Cycle 22 funds to continue the Tres Palacios Creek Watershed Protection Plan implementation strategy efforts.

Executive Summary

Tres Palacios Creek is a rural coastal Texas water body that drains a watershed home to generations of farmers, ranchers, small businesses, and various communities. The Tres Palacios Creek watershed drains approximately 268 square miles of mainly rural and agricultural land. Tres Palacios Creek, which starts near the town of El Campo, meanders generally south through Wharton and Matagorda counties before draining into Tres Palacios Bay and the Matagorda Bay System. Along the way, Tres Palacios Creek provides an important water resource for agriculture, livestock, wildlife, businesses, and residents.

In 2006, water quality monitoring conducted by the Texas Commission on Environmental Quality (TCEQ) indicated that fecal indicator bacteria levels are often above the state's recreational water quality standard. Furthermore, 24-hour dissolved oxygen (DO) monitoring indicated that average and minimum DO levels fall below state water quality standards. As a result, the tidal portion of Tres Palacios Creek was listed as impaired for elevated bacteria and depressed DO in the *2014 Texas Integrated Report 303(d) List*. The recently approved *2016 Texas Integrated Report 303(d) List* revealed that the tidal portion of Tres Palacios Creek continues to be listed for the depressed DO impairment, but no longer for the bacteria impairment as a result of the development of the Total Maximum Daily Load (TMDL) in 2018. However, the tidal portion of Tres Palacios Creek still does not meet water quality standards. With the impairment listing comes a need to plan and implement corrective actions to restore instream water quality and ensure a safe, healthy Tres Palacios Creek for residents and visitors. To meet this need, an assessment and planning project was undertaken to develop the Tres Palacios Creek Watershed Protection Plan (WPP).

Starting in 2016, an extensive review of the watershed's land and water resources was carried out, providing stakeholders with up-to-date information on watershed characteristics and uses. Potential sources of bacteria pollution were identified and quantified based on data from local, state, and federal databases as well as local stakeholder knowledge. Data were integrated into several simplistic watershed models to determine the types and sources of impairment-causing pollutants in the watershed with the highest potential to impact water quality.

Thanks to the review and efforts, a WPP was officially developed and approved by the U.S. Environmental Protection Agency (USEPA) in May 2018. The goal of the WPP and purpose for implementing recommended practices is to restore water quality in the tidal portion of Tres Palacios Creek through long-term conservation and stewardship of the watershed's resources. Goals for bacteria reduction, increases in average DO concentration and increases in minimum DO concentration were developed that are to be achieved after a five-year implementation phase. Interim reduction and programmatic goals were developed to serve as milestones and progress indicators after implementation begins.

The WPP also hopes to help meet outstanding conditions for the state's Coastal Nonpoint Source Pollution Control Program as set forth in Section 6217 of the Coastal Zone Management Act. Since the majority of the impairment on Tres Palacios Creek falls within the coastal zone, the plan will also work to mitigate malfunctioning On-Site Sewage Facilities (OSSF) and reduce runoff pollutant concentration and volumes from entering into the creek and coastal zone.

Despite the extensive amounts of information gathered during the development and implementation of this WPP, a better understanding of the watershed and the effectiveness of management measures will undoubtedly develop. As such, the WPP is a living document that will evolve as needed through the adaptive management process.

Project Description

As stated above, the TCEQ classified the tidal segment of Tres Palacios Creek as impaired for elevated bacteria concentrations. In 2016, watershed stakeholders, aided by the Texas Water Resources Institute (TWRI), developed a WPP to address sources of bacteria within the watershed. With the Tres Palacios WPP complete, it is important to maintain connections with stakeholders to successfully implement the management measures outlined in the WPP.

TWRI used the Coastal Management Program (CMP) Cycle 22 funds to continue stakeholder engagement, expand educational programs, and assess water quality data in Tres Palacios Creek with the goal of meeting established water quality standards. TWRI coordinated with stakeholder groups to update and identify water quality project needs and worked with state and federal agencies to acquire technical and financial resources to implement WPP management measures.

TWRI developed publications, newsletters, fact sheets, website content, and other materials that promote watershed pollution prevention. TWRI coordinated and conducted water resources education and outreach efforts across the Tres Palacios Creek watershed and organized educational programs such as the Texas Well Owner Network (TWON) and Septic System Education. Success was evaluated based on the number of educational programs brought to the watershed and attendance at these programs. Progress toward achieving milestones established in the WPP was tracked to determine when to implement of the Tres Palacios Total Maximum Daily Load (TMDL) Implementation Plan (I-Plan), upon the TCEQ's approval. Progress was tracked through water quality data collected by the Clean Rivers Program (CRP) on Tres Palacios Creek.

Task 1: Program Material Development and Issue Identification

TWRI facilitated communication with stakeholders in the Tres Palacios watershed throughout the duration of the project using email and a project website. Emails were sent to a stakeholder listserv to alert them of any upcoming events or meetings. All upcoming stakeholder meetings, education events, and documents developed for the implementation project were housed on the Tres Palacios Creek website (http://matagordabasin.tamu.edu/tres-palacios/). TWRI developed and disseminated information via flyers, letters, fact sheets, and news releases. Flyers and news releases were provided to stakeholders for every education event that was hosted in the watersheds. The fact sheets that TWRI created pertained to septic system maintenance and signs of failure and a general overview of the Tres Palacios WPP. These fact sheets and a fall newsletter detailing water quality updates and upcoming events were distributed to stakeholders via email, the project website, and at the stakeholder meeting. Following the creation of the fact sheets, TWRI also developed a pocket guide for stakeholders that combined the information on the two fact sheets.

In addition to facilitating communication and developing education materials, TWRI assisted governmental and nongovernmental organizations in identifying and acquiring resources and funding opportunities to implement the WPP. TWRI worked with state and federal agencies to bring technical and financial resources to the Tres Palacios watershed and tracked progress toward achieving milestones identified in the WPP. Over the course of the project, TWRI submitted eight proposals for funding in the watersheds. TWRI tracked all of the proposals that were submitted by developing a database. This database also includes information regarding tracking and evaluating the progress toward achieving milestones identified in the Tres Palacios WPP. TWRI also included in the database identified data gaps from assessing water quality data collected through the CRP.

Task 2: Facilitate Stakeholder Meetings

TWRI hosted two stakeholder meetings to facilitate public participation and stakeholder involvement. During these meetings, stakeholders were given the opportunity to provide input on needed projects, request assistance for project implementation, and receive updates on watershed water quality conditions. TWRI coordinated meetings, secured locations, and prepared and disseminated meeting notices and agendas.

For both the stakeholder meetings, TWRI was the primary coordinator, assisted the county extension agents in securing a location, and prepared and disseminated the meeting notice and agenda to all known stakeholders. Notices, agendas, meeting materials, attendance lists, and summaries were sent to the Texas General Land Office project manager after each meeting occurred.

Task 3: Stakeholder Education and Outreach

TWRI increased awareness of water quality impairments, facilitated information exchange, and encouraged local participation in bacteria contamination control efforts. TWRI coordinated and conducted water resource and environmental outreach and education across the watersheds. TWRI worked with collaborating entities to organize the following training programs: Septic System Education (1 event); Riparian Area Management Workshops for landowners and land managers (1 event); Texas Watershed Steward Program (1 event); TWON training and well screening (1 event), and Feral Hog Management Workshop (1 event). A Lone Star Healthy Streams workshop was scheduled for November 15, 2019 in Bay City, Texas; however, due to low RSVP response, the Lone Star Healthy Streams program coordinator decided to cancel the event.

For all education events, TWRI helped distribute flyers and news releases to ensure stakeholder awareness of the event and attendance. TWRI also assisted county extension agents and program coordinators with securing event locations. Notices and attendance lists from the workshops and educational events were also sent to the Texas General Land Office project manager after each event.

Task 4: Project Monitoring and Reporting

To track project progress, TWRI submitted quarterly progress reports to the Texas General Land Office. Quarterly reports contained an overview of project activities completed during each quarter, an overview of activities to be completed in the next quarter, and highlighted related issues or problems associated with the project.

In addition to the quarterly progress reports, TWRI also provided technical and fiscal oversight to ensure tasks and deliverables were acceptable and completed as scheduled and within budget. Fiscal oversight consisted of submitting reimbursement forms per the schedule that was established in the request.

Conclusion

The Coordinating Implementation of the Tres Palacios Protection Plan project was a great success. TWRI worked diligently to complete the tasks laid out in the project. As a result, WPP management measures were met and implementation schedule continues to be on track.

The development of the septic system educational materials, facilitation of stakeholder meetings, and coordination of water resources education programs were crucial steps in implementing the Tres Palacios Creek WPP. This, in turn. has helped maintain connections with stakeholders and set forth an approach to improve stewardship of the watershed resource that allows stakeholders to continue relying on the watershed as their livelihood while also restoring the quality of its water resources. Management measures will continue to be met as WPP implementation continues for Tres Palacios Creek.

When examining the existing water quality data available (TCEQ CRP data from 2008-2017), no statistically significant increase or decrease could be observed from *Enterococcus* bacteria concentrations found in the Tres Palacios tidal segment or *E.coli* bacteria concentrations found in the Tres Palacios above tidal segment. However, *Enterococcus* levels remain above the water quality standard (35 MPN/100mL) in the tidal segment while *E. coli* levels are approaching the standard (126 MPN/100mL) in the above tidal segment. The current data available from the CRP data is from two stations along the Tres Palacios Creek where water quality sampling is done on a quarterly basis. To get a better understanding of the conditions of the creek and fill gaps in the existing data, TWRI received funding to conduct monthly monitoring efforts along the Tres Palacios Creek at four stations: two in Tres Palacios tidal segment and two in Tres Palacios above tidal segment. TWRI started monthly monitoring efforts in June 2019 and hopes to grasp a better understanding of water quality conditions from this effort.

Projects such as this are why accomplishments are being made in the Tres Palacios Creek Watershed. The need for such projects in the future is crucial for continued success.

Appendix A- Task 1: Program Material Develop and Issue Identification

- TWRI developed and finalized a general Tres Palacios WPP fact sheet during Quarter 2 of project: January-March 2018
- TWRI developed and finalized a "Maintenance Tips for a Longer Lasting Septic System" flyer during Quarters 6 & 7: January-April 2019
- TWRI developed and finalized an "Is Your Septic System Failing" flyer on during Quarters 6 & 7: January-April 2019
- TWRI developed and finalized a "Septic System Maintenance & Inspection Pocket Guide" book during Quarters 6-Present
- TWRI developed a 2018 Tres Palacios Creek WPP newsletter during Quarters 4 & 5: August-November 2018.
- TWRI spoke at the Matagorda Soil Water Conservation District meeting to gain support and work with them on project publicity: January 12, 2018
- TWRI presented at the Lower Colorado River Authority (LCRA) Water Quality Advisory Committee meeting about the Tres Palacios WPP, water quality, and needed best practices: March 8, 2018
- TWRI spoke with the City of El Campo's City Manager and staff to gain support, and discuss applying for funding for potential educational and outreach projects: June 7, 2018
- TWRI met with the City of Bay City's Environmental Health Coordinator and staff to gain support and discuss WPPs OSSF remediation efforts: June 21, 2018
- TWRI communicated via phone with the Houston Galveston Area Council (HGAC) to gain support and discuss future collaboration opportunities: May 1,10 & June 5, 2018
- TWRI submitted a proposal to TCEQ to bring potential funding for educational and outreach projects for the City of El Campo. Project would include the development of educational signage and pet waste stations to educate citizens on urban stormwater runoff and pet waste management: July 31, 2018
    - Said project has been approved and fully executed as of November 8, 2019
- TWRI submitted a proposal to TCEQ and Texas State Soil and Water Conservation Board (TSSWCB) to bring potential funding for targeted and direct delivery of education and outreach materials to decrease rural landowners' nonpoint source loadings. Proposal targets four watersheds; with Tres Palacios Watershed being one of them: July 31, 2018
- TWRI submitted a proposal to TSSWCB to bring potential funding for development of a small, new, and absentee landowner education program. This program will aim to bring education to landowners on good land management techniques, which would result in improved water quality. The Tres Palacios Watershed would fall within the proposed target area for this project: September 30, 2018
- TWRI worked with HGAC and the City of Palacios to obtain six pet waste stations and six cases of pet waste bags to install along the Palacios waterfront: July-August, 2018
- TWRI met with the Matagorda County Extension Agent, Aaron Sumrall, to discuss Tres Palacios WPPs implementation strategies currently being executed and plans for future implementation efforts: October 11, 2018
- TWRI met with city officials and key stakeholder during a First Friday breakfast meeting to inform attendees of the Tres Palacios WPPs efforts and goals and to give an update

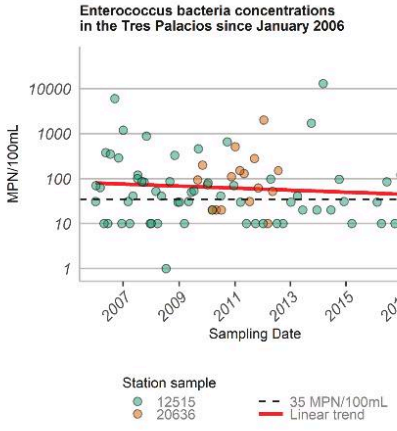
about implementation measures occurring in the Tres Palacios Watershed: December 7, 2018

- TWRI submitted applications to TCEQ and TSSWCB for potential funding for 1) further available stormwater educational resources to Non-MS4 areas within Tres Palacios Watershed and 2) direct delivery program of educational and outreach materials to Tres Palacios Watershed landowners for increasing adoption of best management practices to improve water quality: July-August 2019.

Appendix B: Tres Palacios Creek WPP Fact Sheet

The Tres Palacios watershed includes 268 square miles of largely agricultural land that provides important freshwater inflows to Tres Palacios Bay. The land and water resources of this watershed contribute to vital agricultural, fishery and recreational industries.

The tidal portion of the Tres Palacios, however, suffers from elevated levels of bacteria and low dissolved oxygen. These water quality parameters are established by Texas to ensure water bodies are safe for recreation and aquatic life. Swimmers and other recreational users in water bodies with high levels of fecal bacteria, such as Tres Palacios, have an increased risk of contracting a gastrointestinal illness. Low dissolved oxygen can negatively impact the types and abundance of aquatic species in the water body.



Enterococcus bacteria sampling since 2006 indicates a slightly declining trend in elevated bacteria concentrations. The dotted line shows the 35 MPN/100 mL water quality standard for recreation.

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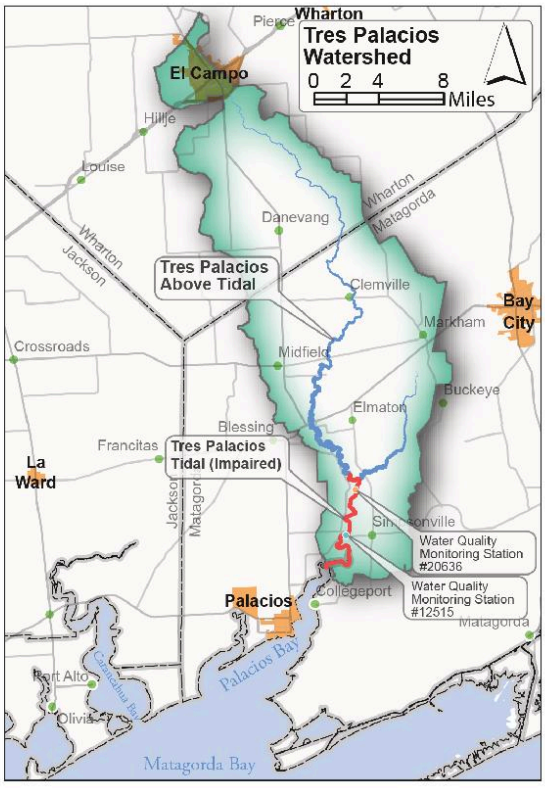
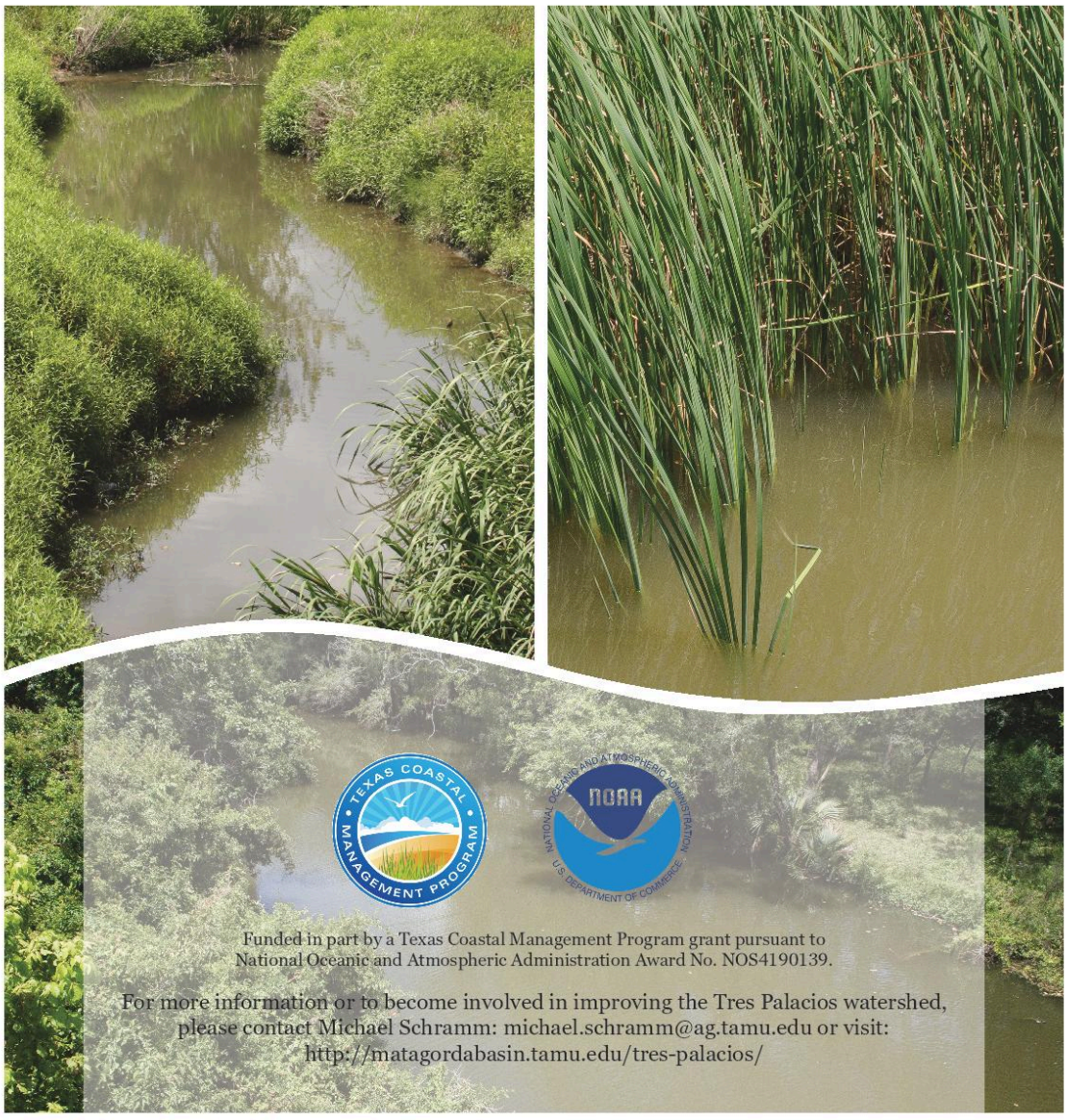
In 2015, the Texas Water Resources Institute, part of the Texas A&M AgriLife Research and Extension Service, began working with local stakeholders to develop a plan of action to improve water quality. The resulting watershed protection plan outlines eight voluntary management practices local stakeholders can implement to improve water quality over the next five years. Because the recommendations in the plan are strictly voluntary, the Tres Palacios is relying on everyone to do what they can to improve water quality.



Tres Palacios Watershed

Recommended Voluntary Actions

Septic Systems – Repair or replace 25 failing septic systems
Livestock – Enroll 45 operations into conservation plans
Feral hogs – Decrease the feral hog population by 20%
Illegal dumping – Reduce trash and carcass disposal in streams
Stormwater runoff – Treat 50 acres with stormwater BMPs
Pet waste – Increase proper pet waste disposal and install pet waste stations
Wastewater treatment – Develop wastewater reuse capabilities
Sanitary Sewer Overflows – Continue testing and replacing aging wastewater infrastructure



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For more information or to become involved in improving the Tres Palacios watershed, please contact Michael Schramm: michael.schramm@ag.tamu.edu or visit: http://matagordabasin.tamu.edu/tres-palacios/

Appendix C: Maintenance Tips for a Longer Lasting Septic System Fact Sheet

Maintenance Tips for a Longer Lasting Septic System

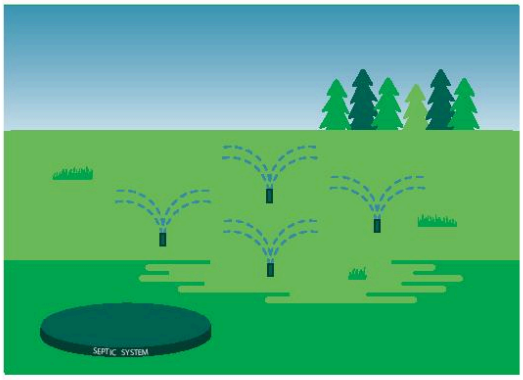
Regular maintenance and upkeep of your septic system is crucial to ensure its proper function and longevity. Not maintaining your septic system can result in economic and ecological harm to your local environment and property. The following are standard maintenance practices that will help keep your system healthy:

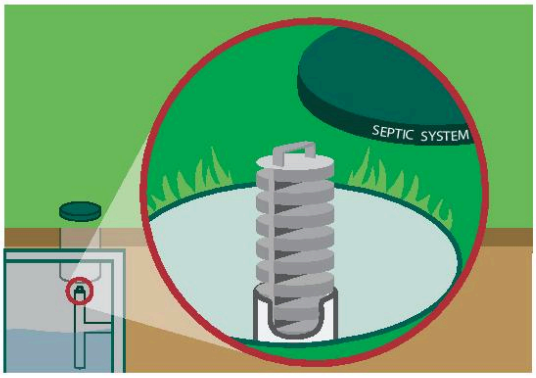
Regular Septic Tank Pumping

- Contact a septic service technician to measure the level of solids in your tank.
- Septic tanks should be pumped out every 3-5 years or when total solids in the tank reach 25-33% of tank capacity.
- If your tank needs to be pumped, make sure pumping is done during dry seasons to reduce the risk of tank flotation.

Maintain Your Drainfield/Sprayfield

- Your drainfield/sprayfield removes contaminants from the water that comes out of your septic tank.
- Never park or drive on your drainfield/sprayfield to ensure that it continues to function properly.
- A healthy grass cover will help uptake moisture and nutrients while stabilizing the soil.
- Plant trees and other woody vegetation far enough away from your tanks and drainfield/sprayfield to keep roots from growing into your septic system.
- Diverting rainwater away from your tanks and drainfield/sprayfield will keep the soil surrounding the system from becoming too saturated and not allowing water to properly flow out of it.



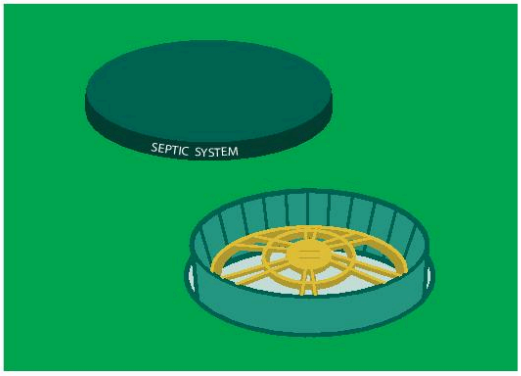


Tank Accessibility

- Having a readily accessible septic tank lid will make performing maintenance easier.
- Adding a septic tank riser can make locating, inspecting and pumping your septic tank more convenient.
- Lids and risers must be properly secured to prevent unwanted access by kids and animals.
- Your septic tank access ports should be free of encroachment.

Clean Effluent Screens

- Conventional septic systems have effluent screens installed at the septic tank outlet to protect the drainfield by preventing solids from leaving the tank.
- Wash these screens directly over the inlet compartment of the septic tank every 1-2 years.



Keep Detailed Maintenance Records

- It is important to keep a detailed record of all inspections, pumpouts, permits, repairs and any other maintenance on your system.
- Having a sketch of where your system is located can also save you time and money during service visits.

For more information, contact:

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https://ossf.tamu.edu/

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Appendix D: Is Your Septic System Failing? Fact Sheet

Is Your Septic System Failing?

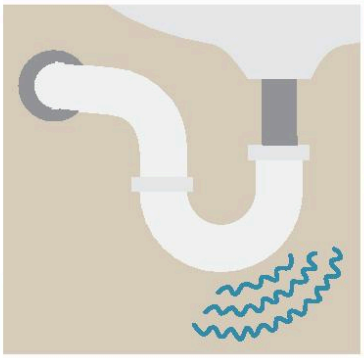
On-site septic facilities, also known as septic systems, are systems designed to treat and dispose of wastewater effluent on the same property that produces the wastewater, hence the term "on-site." When septic systems begin to fail, not only do they not function properly, but they can damage your property and are costly to replace. The key is to catch the warning signs early on.

Signs of a failing septic system:

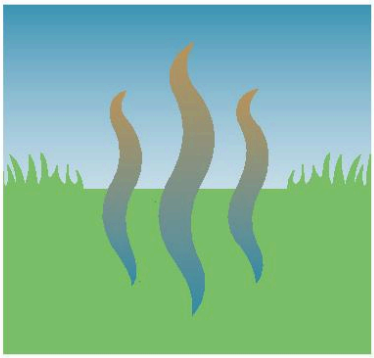
Standing water or damp spots near your septic tank or drainfield/sprayfield

Water and sewage from toilets, drains and sinks are backing up into your home

Your bathtubs, showers and sinks are draining slowly



Gurgling sounds in your plumbing system



Bad odors around your septic tank or drainfield/sprayfield

What to Avoid

Using garbage disposals

- Pumping is required 1-2 years sooner
- Organic matter has not been digested, so it will take longer to break down

Using cleaning products on toilets, sinks or baths that kill bacteria

- Look at the warning label: "caution" means the product will have little effect; "warning" means limited use; and "danger" means the chemical will kill the bacteria

Pouring paints, solvents and unused medicine down the drain

- Can kill microbes living in the system
- Increases maintenance due to fewer microbes breaking down solids

Flushing excessive or treated toilet paper down the drain

- Causes faster sludge build up
- Toilet paper containing moisturizers may result is excessive scum accumulation

Flushing wet wipes

- May accumulate in the tank as scum or sludge
- Wet wipes do not break up in a septic system; flushing them can lead to blockages that cause sewage overflow

Using septic system additives

- Many have not been proven to be beneficial to system performance
- Can resuspend particles that are settled at the bottom, potentially harming the drainfield/ sprayfield

Doing multiple loads of laundry a day

- Causes hydraulic overloading in the septic system and more water than the system can handle
- Avoid over-using bleach and detergents by following the instructions on product labels

Pouring excessive fats, oils and grease down the drain

- Be mindful to limit the amount of fats, oils and grease going down the drain
- Fats separate in water resulting in excessive scum accumulation but will not kill wastewater system bacteria
- Oils have trouble separating in water but will not kill wastewater system bacteria
- Moisturizes, bath oils and solid material on pans are examples of grease; petroleum-based products may be toxic to the system

For more information, contact:

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Appendix E: Tres Palacios WPP Fall 2018 Newsletter

Tres Palacios
Watershed Protection Plan

Fall 2018 Newsletter

Watershed Plan News

The Tres Palacios Watershed Protection Plan received official acceptance in May 2018. A big thank you to all the individuals and organizations who helped develop the plan. Now, we need to make the goal of improved water quality in the Tres Palacios happen. This newsletter is an update on the efforts made by local and regional partners to meet that goal.

State of the Water

The State of Texas establishes water quality standards to measure how suitable the Tres Palacios is for safe recreation and how well it supports aquatic life.

Fecal Bacteria

We measure *E. coli* and Enterococcus bacteria to evaluate the presence of fecal waste in the water. Elevated levels of these bacteria can indicate the water is contaminated with fecal waste, increasing the risk of becoming ill if you swim in the water. The tidal section of Tres Palacios does not meet the water quality standard for fecal bacteria. The above tidal section (above the confluence with Wilson's Creek) currently meets state water quality standards.

Elevated bacteria comes from many sources. The watershed plan identified failing septic systems, livestock, stormwater runoff, pet waste and feral hogs as some of the major contributors to bacteria that we can feasibly address.

Dissolved Oxygen

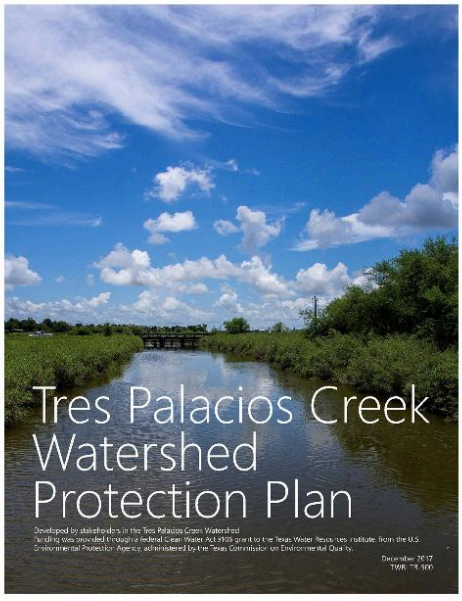
When dissolved oxygen becomes too low, aquatic organisms (such as fish, shellfish and aquatic insects) cannot survive. Currently, the tidal section of Tres Palacios does not meet water quality standards for dissolved oxygen.

A mix of natural factors and human activity influence dissolved oxygen. Some natural factors can include temperature swings, decreased flows, salinity, aquatic plant growth and much more. Excessive fertilizer or sediment in runoff can increase nutrients reaching the Tres Palacios, resulting in excessive algae growth and decreased dissolved oxygen. Removal of vegetation along stream banks can increase water temperature and allow more nutrients to reach the Tres Palacios, contributing to decreased dissolved oxygen.

Draft 2016 Texas Integrated Report

The Texas Commission on Environmental Quality (TCEQ) published the Draft 2016 Texas Integrated Report (https://www.tceq.texas.gov/waterquality/assessment/public_comment) in May. The Integrated Report evaluates if water bodies met water quality standards from December 2007 through November 2014.

According to the data, the tidal segment of Tres Palacios remained impaired due to elevated bacteria and depressed dissolved oxygen. The good news is that the average bacteria count decreased slightly from the 2014 Integrated Report. The dissolved oxygen impairment remained the same because there was no new data for TCEQ to assess.



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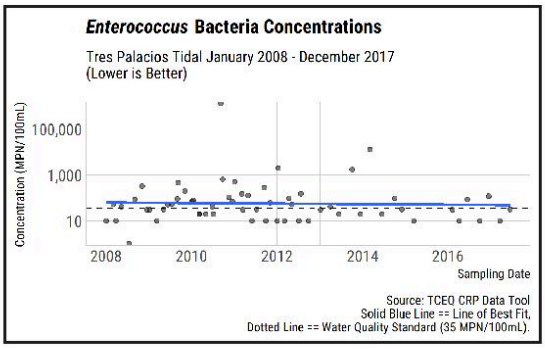
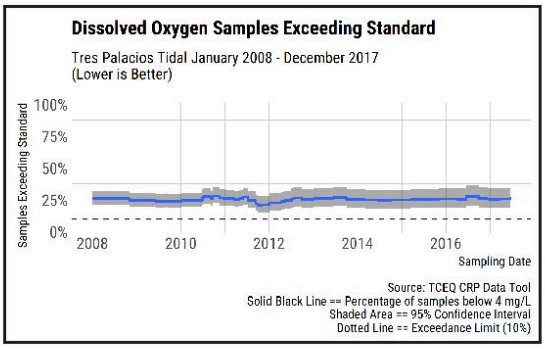
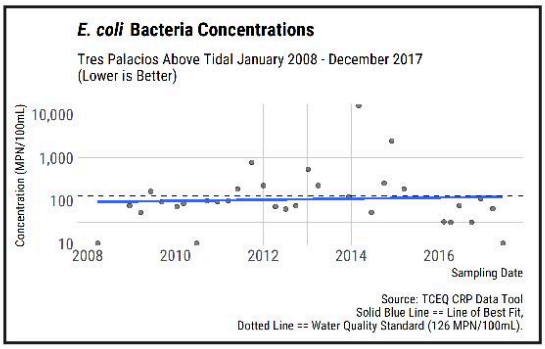
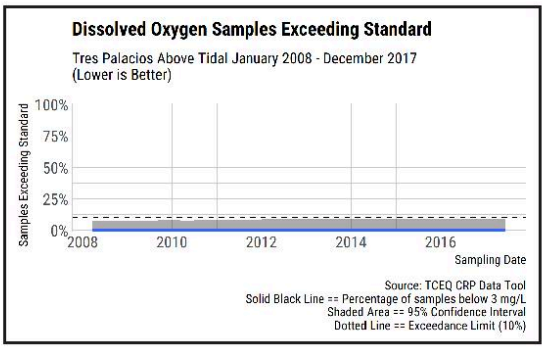








The above tidal segment of Tres Palacios remains unimpaired for *E. coli* bacteria. The bad news is that the average *E. coli* bacteria count increased from 73 MPN/100mL in the 2014 Integrated Report to 120 MPN/100mL in the 2016 Integrated Report. The increase brings us close to exceeding the water quality standard of 126 MPN/100mL.

The Plan

The Tres Palacios Watershed Protection Plan recommends a range of structural and planning solutions to water quality. The plan also recommends increased education and outreach to inform people in the watershed how they can reduce their own impact on downstream water quality. The sources of water quality issues are diverse and require a diverse set of solutions. To download the Tres Palacios Watershed Protection Plan, visit: http://matagordabasin.tamu.edu/media/685704/tr-500.pdf

Updates

The Texas Water Resources Institute (TWRI) is working with local stakeholders to kick off implementation thanks in part to grant funding from the Texas General Land Office and TCEQ. We are already seeing progress toward milestones identified in the watershed protection plan.

- A kick-off meeting was held on June 21, 2018 to discuss the plan, upcoming projects and identify project needs.
- TCEQ, TWRI and Texas A&M AgriLife Extension Service are starting a septic system replacement project with a goal to replace 15 failing septic systems.
- TWRI is working with TCEQ to provide additional monthly water quality monitoring at three sites in the Tres Palacios.
- The City of El Campo obtained funding to install a stormwater pond south of town to manage stormflows entering the Tres Palacios.

- The Palacios Beautification Committee and TWRI obtained funding through a TCEQ nonpoint source grant to install education kiosks at the Palacios Pavilion. (See photo below for an example of the educational kiosks)
- The U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS) and local producers have enrolled 11,317 acres of agricultural land into 47 conservation plans with water quality protection measures. NRCS also provided technical assistance for 37 additional conservation plans with water quality protection measures that did not receive financial incentives.
- There are 17 active Water Quality Management Plans thanks to efforts by the Texas State Soil and Water Conservation Board (TSSWCB) and local soil and water conservation districts.
- TWRI and El Campo applied for grant funding to obtain and install stormwater education signs and pet waste stations for Legacy Park.
- Houston-Galveston Area Council and Palacios will install six pet waste stations along the waterfront.
- Bill Balboa of Texas Sea Grant applied for funding to expand volunteer water quality monitoring efforts.

Resources

While some solutions require large-scale projects, many opportunities are available for individual residents to take part and make a difference. The following are resources available to help you take part.

Feral Hogs

Texas A&M Natural Resource Institute's new feral hog website: https://wildpigs.nri.tamu.edu/

Concept Drawing of Educational Exhibit

Report feral hogs: https://wildpigs.nri.tamu.edu/report-wild-pigs/

We plan to schedule a feral hog workshop for landowners in the watershed later this year.

Producer Assistance

TSSWCB, USDA NRCS and AgriLife Extension provide technical and/or financial resources for producers to implement practices that improve production and protect water quality.

Water Quality Management Plans – This program, administered by TSSWCB, is a site-specific plan developed through and approved by your local soil and water conservation district for agricultural land. The plan includes practices designed to protect water quality while meeting goals of the producer. Contact your local soil and water conservation district for more information.

Conservation Technical Assistance – NRCS can assist you with the development of conservation plans that include practices to improve land management, protect and improve water quality, improve wildlife production and help you meet other goals on your land. These plans serve as a gateway to NRCS financial incentive programs. Contact your local NRCS service office for more information.

Financial Assistance – NRCS administers a number of financial incentive programs for producers to implement best practices and conservation systems on their operations. Popular programs include Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP) that help producer install, maintain and improve practices by providing financial and technical assistance. Contact your local NRCS service office for more information.

Septic Systems

If you have a septic system, it is your responsibility to keep it maintained and running properly. Failing septic systems can discharge high concentrations of fecal bacteria and nutrients. AgriLife Extension provides a website for about operations and maintenance, requirements and upcoming education programs: https://ossf.tamu.edu/

In case you missed it

Texas A&M Natural Resources Institute - The Wild Pig Newsletter: https://wildpigs.nri.tamu.edu/media/1297/wild-pig-newsletter-vol-32-summer-2018.pdf

Lower Colorado River Authority - Colorado River Basin Highlights Report: https://www.lcra.org/water/quality/texas-clean-rivers-program/Documents/2018_BasinHighlights_Report_FINAL.pdf

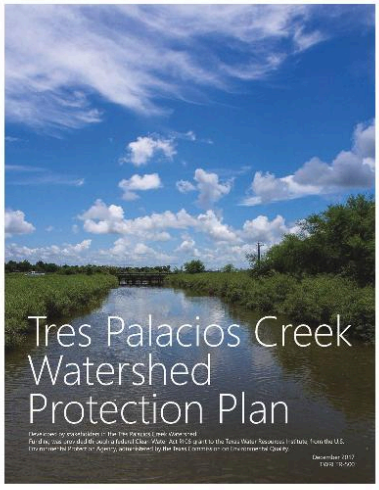
Get Involved

Successful water quality improvement requires everyone's assistance! Are you interested in volunteer water quality monitoring, expanding water quality education or implementing best management practices on your property? Contact us to discuss how you can get involved:
Michael Schramm – michael.schramm@ag.tamu.edu
or Nathan Glavy – nathan.glavy@ag.tamu.edu

Acknowledgments

Thank you to the residents and landowners that made the Tres Palacios Watershed Protection Plan a reality. We also thank the following groups and agencies for taking part in the planning process:

- City of El Campo
- City of Palacios
- Matagorda County
- Matagorda Soil and Water Conservation District
- Palacios Chamber of Commerce
- Texas A&M AgriLife Extension Service
- Texas Commission on Environmental Quality
- Texas Parks and Wildlife Department
- Texas Sea Grant
- Texas State Soil and Water Conservation Board
- U.S. Department of Agriculture Natural Resources Conservation Service
- Wharton Soil and Water Conservation District



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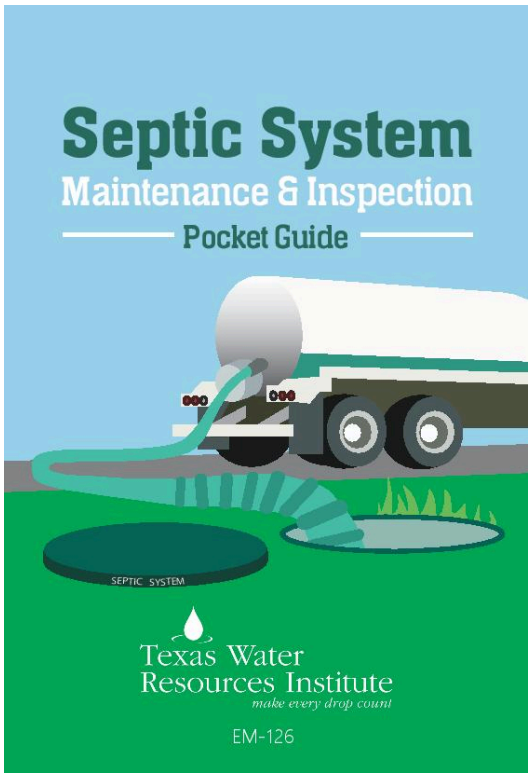
578 John Kimbrough Blvd.
2260 TAMU • College Station, TX 77843
http://matagordabasin.tamu.edu/tres-palacios
michael.schramm@ag.tamu.edu • nathan.glavy@ag.tamu.edu

Appendix F: Septic System Maintenance & Inspection Pocket Guide



Texas Water Resources Institute
make every drop count

twri.tamu.edu

Septic System
Maintenance & Inspection
Pocket Guide
EM-126
November 2019

Funding provided by a Texas Coastal Management Program Grant approved by the Texas Land Commissioner pursuant to National Oceanic and Atmospheric Administration Award No. NA17NOS4190139.

Septic System
Maintenance & Inspection
Pocket Guide

November 2019

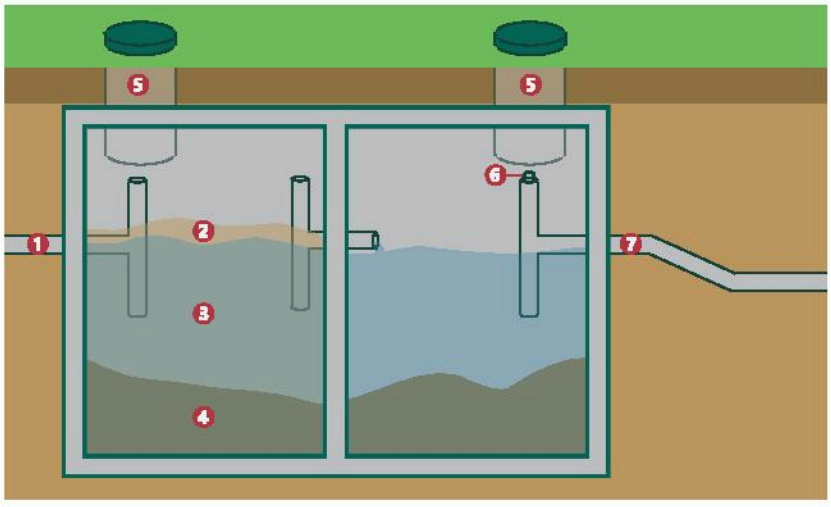
Table of Contents

Septic Systems:

- Are designed to treat wastewater "on-site"
- Have various components depending on which type of system you have
- Require regular maintenance to ensure proper functionality
- Should be inspected regularly for signs of failure

1

Conventional Septic System



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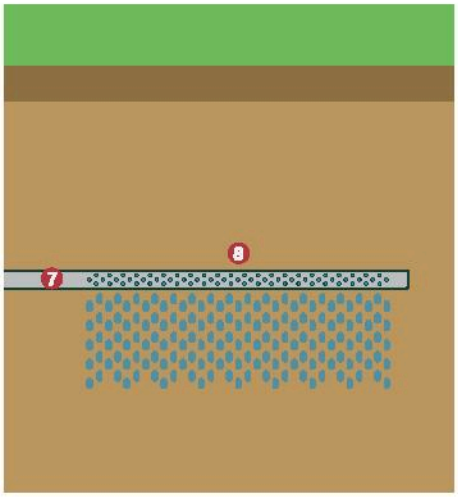
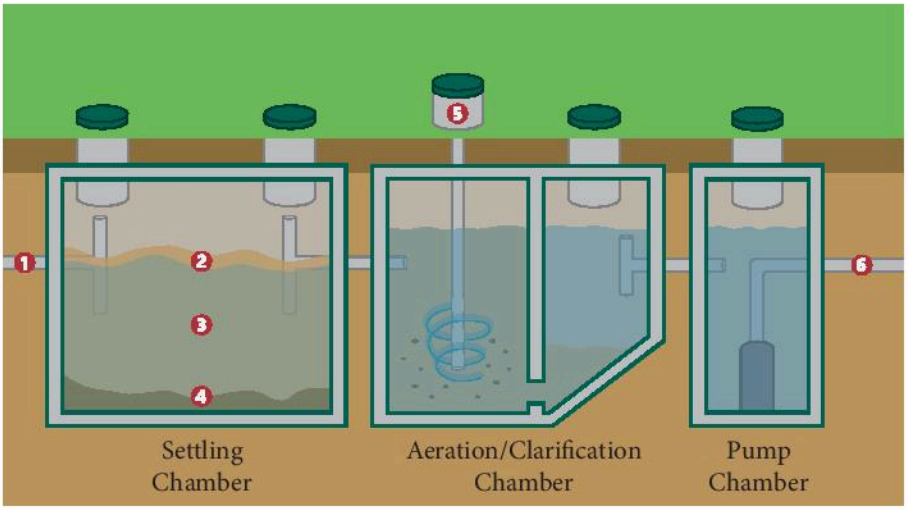


1. Inlet
2. Scum layer
3. Settling layer
4. Sludge layer
5. Access riser
6. Effluent screen
7. Outlet
8. Drainfield

3

Aerobic Treatment System



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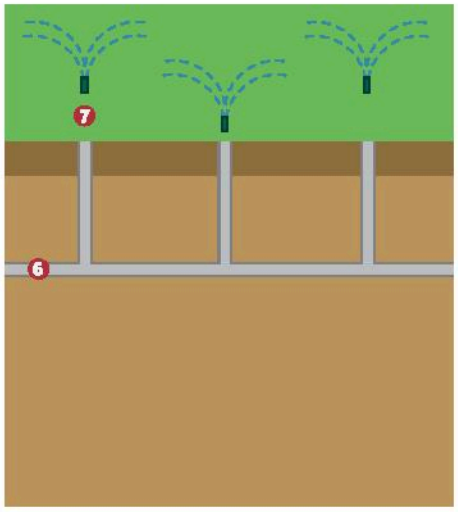


1. Inlet
2. Scum layer
3. Settling layer
4. Sludge layer
5. Access riser
6. Outlet
7. Sprayfield

Maintenance Tips for a Longer Lasting Septic System

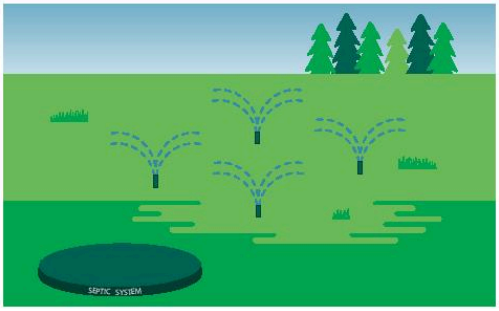
The following are standard maintenance practices that will help keep your system healthy:

Regular Septic Tank Pumping

- Contact a septic service technician to measure the level of solids in your tank.
- Pump out septic tanks every 3-5 years or when total solids in the tank reach 25-33% of tank capacity.
- Make sure pumping is done during dry seasons to reduce the risk of tank flotation.

Maintain Your Drainfield/Sprayfield

- Never park or drive on your drainfield/sprayfield to ensure that it continues to function properly.
- Establish a healthy grass cover around your drainfield/sprayfield to help uptake moisture and nutrients, remove contaminants and stabilize soil.
- Plant trees and other woody vegetation far enough away from your tanks and drainfield/sprayfield to keep roots from growing into your septic system.
- Divert rainwater away from your tanks and drainfield/sprayfield to keep the soil surrounding the system from becoming too saturated and not allowing water to properly flow out of it.



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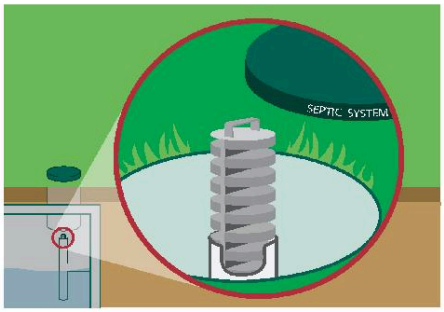
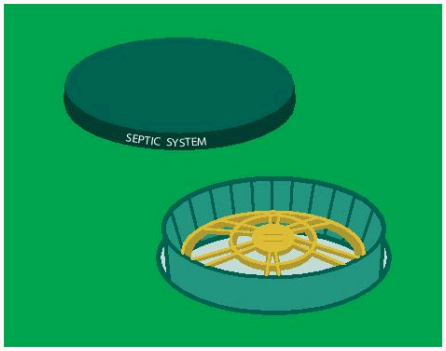
Clean Effluent Screens

- Conventional septic systems have effluent screens installed at the septic tank outlet to protect the drainfield by preventing solids from leaving the tank.
- Wash these screens directly over the inlet compartment of the septic tank every 1-2 years.



Tank Accessibility

- Having a readily accessible septic tank lid will make performing maintenance easier.
- Adding a septic tank riser can make locating, inspecting and pumping your septic tank more convenient.
- Lids and risers must be properly secured to prevent unwanted access by children and animals.
- Your septic tank access ports should be free of encroachment.



9

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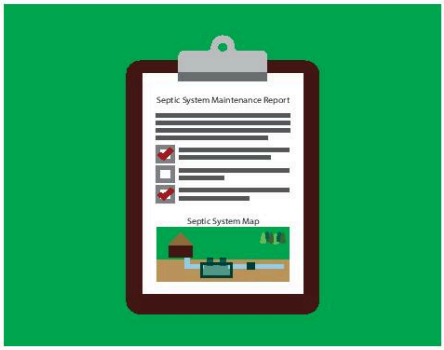
Keep Detailed Maintenance Records

- It is important to keep detailed records of your septic system to help track scheduled and unscheduled maintenance (see pages 17-18).
- Having a sketch of where your system is located can also save you time and money during service visits.



Is Your Septic System Failing?

When septic systems begin to fail, not only do they not function properly, but they can damage your property and are costly to replace. The key is to catch the warning signs early on.

Signs of a failing septic system:

Standing water or damp spots near your septic tank or drainfield/sprayfield

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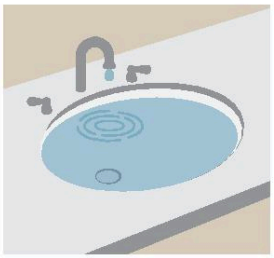
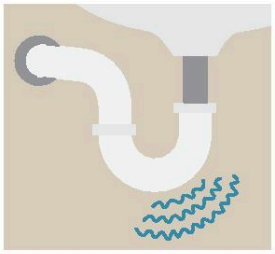
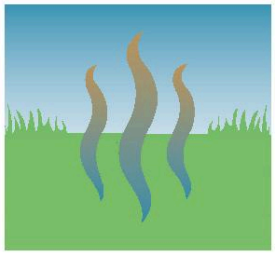
Water and sewage from toilets, drains and sinks are backing up into your home



Your bathtubs, showers and sinks are draining slowly



Gurgling sounds in your plumbing system



Bad odors around your septic tank or drainfield/sprayfield

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What to Avoid

Using cleaning products on toilets, sinks or baths that kill bacteria

- Look at the warning label: "caution" means the product will have little effect; "warning" means limited use; and "danger" means the chemical will kill the bacteria

Using septic system additives

- Many have not been proven to be beneficial to system performance
- Can resuspend particles that are settled at the bottom, potentially harming the drainfield/sprayfield

Pouring excessive fats, oils and grease down the drain

- Be mindful to limit the amount of fats, oils and grease going down the drain
- Fats separate in water resulting in excessive scum accumulation but will not kill wastewater system bacteria
- Oils have trouble separating in water but will not kill wastewater system bacteria
- Moisturizes, bath oils and solid material on pans are examples of grease; petroleum-based products may kill wastewater system bacteria

Using garbage disposals

- Pumping is required 1-2 years sooner
- Organic matter has not been digested, so it will take longer to break down

Pouring paints, solvents and unused medicine down the drain

- Can kill bacteria living in the system
- Increases maintenance due to fewer bacteria breaking down solids

Doing multiple loads of laundry a day

- Causes mixing of layers (see pages 2-5) and hydraulic overloading in the settling chamber, disrupting proper system function and damaging system components
- Avoid over-using bleach and detergents by following the instructions on product labels

Flushing excessive or treated toilet paper down the drain

- Causes faster sludge build up
- Toilet paper containing moisturizers may result in excessive scum accumulation

Flushing wet wipes

- May accumulate in the tank as scum or sludge
- Wet wipes do not break up in a septic system; flushing them can lead to blockages that cause sewage overflow

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For more general septic system information visit:

ossf.tamu.edu
or
www.tceq.texas.gov/assistance/water/fyiossfs.html

For septic system permitting information visit:

www.tceq.texas.gov/permitting/ossf

To contact your local representative for septic system questions visit:

www6.tceq.texas.gov/oars/index.cfm?fuseaction=search.county

TEXAS A&M AGRILIFE RESEARCH | EXTENSION

Septic System Maintenance Record

Permit Number: _____ TMS Number: _____
Issued To: _____ Date Issued: _____
Address: _____
System Description: _____
Drainfield Type: _____
Septic Tank Size (gallons): _____
Pump Tank Size (gallons): _____
Drainfield Dimensions: _____
Number of Trenches: _____ Trench Length: _____

Septic System Installer:

Name: _____
Address: _____
Telephone: _____
Date System Installed: _____

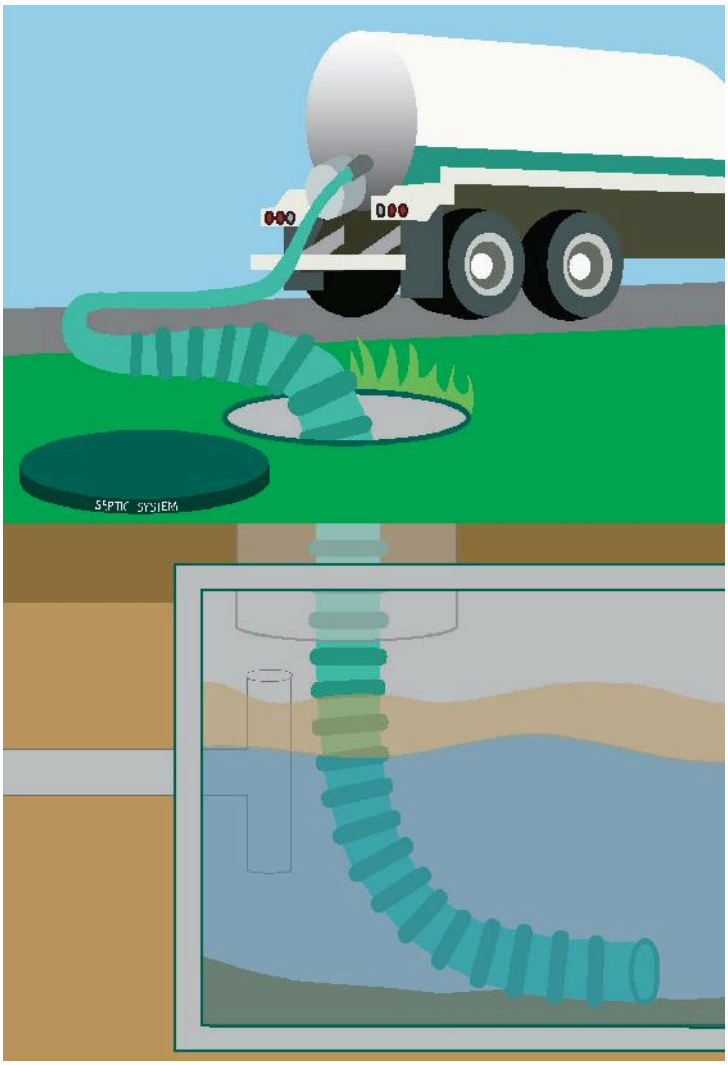
Septic System Pumper:

Name: _____
Address:_____
Telephone: _____

17

18

System Maintenance	
Date	
Work Description	
Cost	
Next Service Date	
Comments	


SEPTIC SYSTEM

Appendix G: Resources Opportunities Identified, Applied For and Obtained

Project/Application Name	Primary Contact	Award Status	ID #	Anticipated Start	Anticipated Finish	Direct Costs	Indirect Costs
Tres Palacios WPP Implementation (GLO FY17)	Nathan Glavy	Awarded	06-505637	10/1/2017	11/30/2019	$ 95,816.00	$ -
Tres Palacios WPP Implementation (TCEQ FY17)	Nathan Glavy	Awarded	06-505528	9/1/2017	*8/31/2020	$ 311,956.00	$ 41,844.00
Tres Palacios OSSF (TCEQ FY17)	Nathan Glavy	Awarded	06-505647	7/9/2018	*8/31/2020	$ 284,662.00	$ 42,699.00
Stormwater Education (TCEQ FY19)	Nathan Glavy	Rejected	1809661	9/1/2019	8/31/2021	$ 118,810.00	$ 33,267.00
Targeted Education (TCEQ FY19)	Allen Berthold	Rejected	1809658	9/1/2019	8/31/2021	$ 133,203.00	$ 33,267.00
El Campo Education (TCEQ FY19)	Michael Schramm	Awarded	1809663	11/8/2019	8/31/2022	$ 31,378.00	$ 8,786.00
Targeted Education (TSSWCB FY19)	Allen Berthold	Rejected	1809658	9/1/2019	8/31/2022	$133,203.00	$ 37,297.00
Matagorda Targeted Education (TCEQ FY20)	Allen Berthold	Submitted/Pending	1909507	9/1/2020	8/31/2023	$162,969.00	$48,890.00
Stormwater Education (TCEQ FY20)	Nathan Glavy	Submitted/Pending	1909503	9/1/2020	8/31/2023	$131,120.00	$39,337.00
						*subject to change	

Appendix H: Tres Palacios WPP Implementation Database

Implementation Activities Tres Palacios WPP			
Management Measure	**Responsible Party**	**Implementation Milestone**	**Progress Indicator**
Agricultural Nonpoint Source Management Measure			
Number of Conservation Plans Developed	Soil and Water Districts (SWCDs), Natural Resources Conservation Service (NRCS)	Develop 45 Total Conservation Plans	Since acceptance of Tres Palacios WPP, 11 Conservation Plans have been developed across the watershed (numbers provided by USDA-NRCS and TSSWCB) Proposal looking to be submitted with local SWCD to hire technician to assist with future development and implementation of Conservation Plans.
Wildlife and Non Domestic Animal Management Measure			
Number of Feeded Exclusion	Landowners	Develop ____ feeded exclusions	Unknown number of exclusions needed
On-Site Septic System Facility Management Measure			
Identify Failing OSSFs	Counties	1 person paid for identifying OSSFs	TWRI has been working with counties and County Agents to identify areas in watershed; specifically people in the Tres Palacios Oaks and Tidewater Oaks Subdivisions in Palacios, Texas. TWRI has met with respective individuals from two subdivisions to distribute applications. First Cycle of applicants have been received with efforts to send out applicants for Cycle 2 by the end of 2020 to all residents of Tres Palacios Oaks and Tidewater Oaks
Maintain Database	Counties	Maintenance of One Database	TWRI is overseeing database of program applicants for OSSF repair/replacement program. Database continues to be updated as TCEQ OSSF programs moves forward.
Administer Replacement Programs	Counties	Annual Administration of Program	TWRI is overseeing administration of current OSSF project; TCEQ funded.
Repair/Replace 30 systems	Contractor	Address 6 systems for a period of 5 years across watershed counties	No systems have been replaced. First site visits have been conducted to determine final eligibility before moving on to bidding process. Looking to break ground around in early 2020.
Illegal Dumping Management Measure			

Implement Signage, etc. and maintenance	Counties	Implement measures at 5 crossings over 6 years across watershed counties	TWRI will continue to work with counties to lessen the amount of illegal dumping that occurs at bridge crossings and educate on how to properly dispose of animal carcasses. TWRI is looking at different funding opportunities to help counties acquire equipment for necessary enforcement and education signage at bridge crossings.
Urban Management Measures			
Stormwater Permit Planning	City of El Campo	Estimated to begin planning process around 2020 (El Campo focus)	Process has not started yet; planning will commence in 2020.
Implement Best Management Practices (BMPs)	City of El Campo	Capture 50ac of urban area (El Campo focus)	City of El Campo is exploring options for appropriate BMPs. City has shown interest with establishment of a retention pond. TWRI is looking to assist with providing different funding options for BMP implementation and education.
Pet Waste Stations	1 per CCN	Install 3 pet waste stations (1 per CCN)	City of Palacios has installed 6 pet waste stations along waterfront as of April 10, 2019. The City of El Campo will be working with TWRI to install five pet waste stations in El Campo with upcoming TCEQ funded project to bring stormwater educational resources to the area; project has been executed and started as of November 8, 2019.
Wastewater Treatment Facility Strategies			
Planning for Reuse	City of El Campo	Begin planning process based on resources availability	El Campo is still in process for planning for reuse. This milestone is a long-term project that will take 5-10 years to fully implement. The City continues to look at different land options across city limits to see if any are viable options for wastewater reuse.

Implement Reuse	City of El Campo	Initiate planning and acquire resources to implement wastewater reuse options in El Campo (5-10 year implementation milestone)	El Campo is still in process for planning for reuse. This milestone is a long-term project that will take 5-10 years to fully implement. The City continues to look at different land options across city limits to see if any are viable options for wastewater reuse.
Sanitary Sewer Overflow Management Measure			
Replace aging infrastructure	All CCNs	Identify and replace aging infrastructure (All CCNs)	CCNs will continue to identify problematic areas of the collection systems and schedule necessary repair/replacements. This will be done to ensure proper operation and prevent and episodic releases of untreated wastewater.
Education and Outreach: Tres Palacios WPP			
Management Measure	**Responsible Party**	**Implementation Milestone**	**Progress Indicator**
Agricultural Nonpoint Source Management Measure			
Lone Star Healthy Streams	Watershed Coordinator (WS Coord.)/AgriLife Extension	Provide 3 workshops over the course of 5 years	TWRI scheduled Lone Star Healthy Streams Workshop on November 15, 2019 in Bay City, Texas; however, the program coordinator had to cancel event. Looking at options to reschedule workshop.
Management Practice Field Days	WS Coord./AgriLife Extension	Provide 3 workshops over the course of 5 years	not available at this time
Riparian & Stream Ecosystem Management	WS Coord./TWRI	Provide 2 workshops in the course of 5 years	TWRI conducted Riparian training on May 6, 2018 in Bay City, Texas to 50 people.
Wildlife and Non-Domestic Animal Management Measure			
Feral Hog Management	WS Coord./AgriLife Extension	Provide 3 workshops over the course of 5 years	Feral Hog Workshop was conducted in Bay City, Texas on Sept. 6, 2018 to 20 people.
Wildlife Management	WS Coord./AgriLife Extension/ Texas Parks and Wildlife Department	Provide 3 workshops over the course of 5 years	not available at this time
On-Site Septic System Facility Management Measure			
OSSF Operation & Maintenance Workshop	WS Coord./AgriLife Extension	Provide 3 workshops over the course of 5 years	2 Workshops were conducted on Dec 6, 2018 in Palacios, Texas to 22 people and Dec 7, 2018 in Bay City, Texas to 17 people

OSSF Installer and Maintenance Provider Workshop	WS Coord./AgriLife Extension	Provide 3 workshops over the course of 5 years	2 Workshops were conducted on Dec 6, 2018 in Palacios, Texas to 22 people and Dec 7, 2018 in Bay City, Texas to 17 people
Texas Well Owner Network	WS Coord./AgriLife Extension	Provide 2 workshops in the course of 5 years	TWRI conducted Texas Well Owners Workshop on November 5, 2019 in Bay City, Texas to 28 participants.
Illegal Dumping Management Measure			
Illegal Dumbing Education	WS Coord./AgriLife Extension	Development of an illegal dumping and animal carcass disposal education program	TWRI continues to work with respective parties to help provide educational opportunities regarding illegal dumping management.
Urban Management Measure			
Stormwater Education Programs	City of El Campo	Provide 5 workshops over the course of 5 years (El Campo focus)	TWRI received approval for a grant to educate City of El Campo's local park visitors about urban storm water runoff and increase pet waste management. Development and installation of interpretive signs about water quality and stormwater runoff for park visitors will occur. Project has been funded and fully executed to start on November 8, 2019.
Pet Education Program	1 per CNN Annually	Deliver 15 programs over the course of 5 years	City of Palacios has installed 6 pet waste stations along waterfront as of April 10, 2019. The City of El Campo will be working with TWRI to install five pet waste stations in El Campo with new TCEQ funded project that was fully executed on November 8, 2019. Educational signage and materials will be developed with funding from said program.
Sanitary Sewer Overflow Management Measure			
Education	TEEX	Deliver 5 staff workshops over the course of 5 years.	TEEX classes continue to be offered in-person or online depending on the type of course and certification the City of El Campo and its WWTF staff and operators need. These classes continue to help operators and staff on identifying gaining infrastructure and maintenance in the area.

Appendix I: Tres Palacios Creek WPP Data and Project Gaps

Tres Palacios Creek WPP Data Gaps	
When TWRI first examined the available monitoring data for Tres Palacios Creek, it was discovered that the Texas Clean Rivers Program (CRP), an entity of the Texas Commission on Environmental Quality, conducted monitoring at two sites; Station 12515 (tidal section) and 12517 (non-tidal section) both on Tres Palacios Creek; Segment ID: 1501. However, CRP was only collecting data at these two sites on a quarterly basis. To expand on these monitoring efforts, TWRI secured funding from TCEQ to further implement the management measures listed out in the Tres Palacios WPP; including collecting more surface water quality data from Tres Palacios Creek to help track WPP implementation measures. With the TCEQ project, which will continue this project's tasks, TWRI secured funding to conduct monthly monitoring at the two CRP sites and an additional two sites; Station 15325 (non-tidal section) and 20636 (tidal section) along Tres Palacios Creek for 3 years. This additional monitoring will help fill in the immediate data gaps to get a better understanding of the condition of the creek during WPP implementation and make sure creek conditions are headed toward potential delisting in the future. Monitoring done by TWRI is coded as RTWD currently. In the long-term future, monitoring conducted on the creek should be done as RT to get the Tres Palacios Creek officially delisted of the Texas Integrated Report 303(d) list.	

Appendix J: Task 2- Facilitate Stakeholder Meetings

- TWRI coordinated and conducted a stakeholder meeting for the Tres Palacios Watershed in Palacios, Texas at the First United Methodist Church during Quarter 3- June 21, 2018
- TWRI conducted a stakeholder meeting on April 10, 2019 at the Matagorda County Navigation District in Palacios, Texas. TWRI used this meeting to inform attendees about current progress of the Tres Palacios Creek WPP and upcoming educational events/opportunities during Quarter 7- April 10, 2019
- Notices, agendas, meetings materials (educational materials developed in above appendixes), attendance list and summaries of meetings were provided to Texas General Land Office upon completion of meetings

Appendix K: Meeting Notices for Tres Palacios Creek Stakeholder Meetings

Institute to hold June 21 meeting in Palacios

today.agrilife.org/2018/06/08/institute-to-hold-june-21-meeting-in-palacios/

June 8, 2018

Focus will be implementing Tres Palacios Creek watershed protection plan

Contact: Michael Schramm, 979-458-9191, michael.schramm@ag.tamu.edu

Allen Berthold, 979-845-2028, taberthold@ag.tamu.edu

Nathan Glavy, 979-458-5915, nathan.glavy@ag.tamu.edu

PALACIOS – The Texas Water Resources Institute, or TWRI, is hosting a meeting June 21 in Palacios to discuss implementation of the Tres Palacios Watershed Protection Plan.

The institute is part of Texas A&M AgriLife Research, the Texas A&M AgriLife Extension Service and the College of Agriculture and Life Sciences at Texas A&M University.

A meeting on the Tres Palacios Watershed Protection Plan will be held June 21 in Palacios. (Texas Water Resources Institute photo)

The meeting will be 1:30 p.m. at the First United Methodist Church, 209 Lucas Ave.

Michael Schramm, research associate with TWRI, said the Tres Palacios Watershed Protection Plan recently received acceptance by the U.S. Environmental Protection Agency.

"We are now working with local stakeholders to assist in the implementation of management measures identified in the plan to reduce bacteria and nutrient loads reaching the creek," Schramm said.

He said the Tres Palacios has been classified impaired by the state of Texas due to excessive bacteria and low dissolved oxygen.

"However, local stakeholders worked extensively to develop a plan that identifies voluntary management actions that will gradually improve water quality," he said.

Schramm said the meeting will provide an update on recent water quality conditions and a discussion about ongoing and upcoming projects. The goal of the meeting is to provide stakeholders with an overview of implementation status and identify where local stakeholders can get involved to improve water quality.

"We're encouraging residents of the region to attend this meeting as their input is essential

for identifying land and water issues and ensuring appropriate and desirable management measures are addressed," he said.

For more information, contact Schramm at michael.schramm@ag.tamu.edu.

-30-

Tres Palacios Creek watershed protection plan meeting set April 10 in Palacios

today.agrilife.org/2019/03/19/tres-palacios-creek-watershed-protection-plan-meeting-set-april-10-in-palacios/

March 19, 2019

Tres Palacios Creek. (Texas Water Resources Institute photo)

PALACIOS – The Texas Water Resources Institute, or TWRI, is hosting a meeting April 10 in Palacios to discuss the implementation of the Tres Palacios Watershed Protection Plan.

The meeting will be held at 1 p.m. at the Matagorda County Navigation District, 1602 Main St.

The institute is part of Texas A&M AgriLife Research, the Texas A&M AgriLife Extension Service and the College of Agriculture and Life Sciences at Texas A&M University.

Michael Schramm, TWRI research associate in College Station, said the Tres Palacios Watershed Plan was recently accepted by the U.S. Environmental Protection Agency.

“We are now working with local stakeholders to assist in implementing management measures identified in the plan to reduce bacteria and nutrient loads reaching the creek,” Schramm said.

Schramm said the Tres Palacios was classified impaired by the state of Texas due to excessive bacteria and low dissolved oxygen levels.

“However, local stakeholders worked extensively to develop a plan that identifies voluntary management actions that will gradually improve water quality,” he said.

Schramm said the meeting will provide an update on recent water quality conditions and a discussion about ongoing and upcoming projects.

“The goal of the meeting is to provide stakeholders with a picture of plan implementation status and to identify where local stakeholders can get involved to improve water quality,” he said.

For more information, contact Schramm at michael.schramm@ag.tamu.edu.

This meeting is funded by a Texas Coastal Management Program Grant approved by the Texas Land Commissioner pursuant to National Oceanic and Atmospheric Administration.

-30-

Contacts: Michael Schramm, 979-458-9191, michael.schramm@ag.tamu.edu

Nathan Glavy, 979-458-5915, nathan.glavy@ag.tamu.edu

Appendix L: Tres Palacios WPP Stakeholder Meeting Presentation- June 21, 2018

TRES PALACIOS WATERSHED PROTECTION PLAN

Michael Schramm – Texas Water Resources Institute
June 21, 2018

Texas Water Resources Institute
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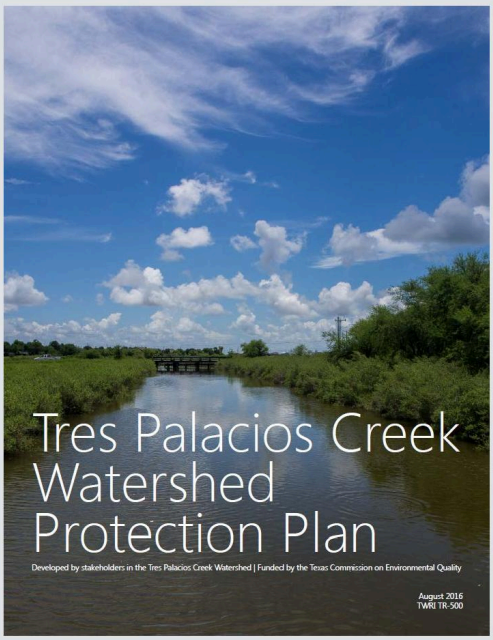
Tres Palacios Watershed Protection Plan

- Developed in coordination with Tres Palacios bacteria TMDL and TMDL I-Plan
- TIAER provided water quality modeling used in both documents
- Heavy focus on bacteria nonpoint source reductions



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Texas Water Resources Institute
make every drop count

Tres Palacios Watershed Protection Plan

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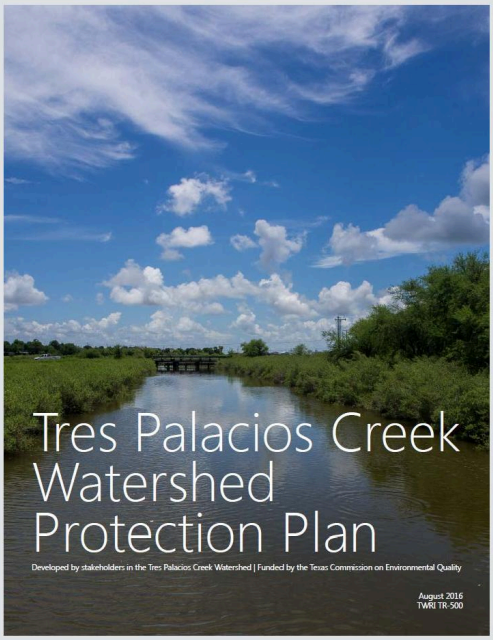
- Submitted to EPA January 2017
- Summer 2017 – EPA requests revisions
- May 2018 – EPA accepts!



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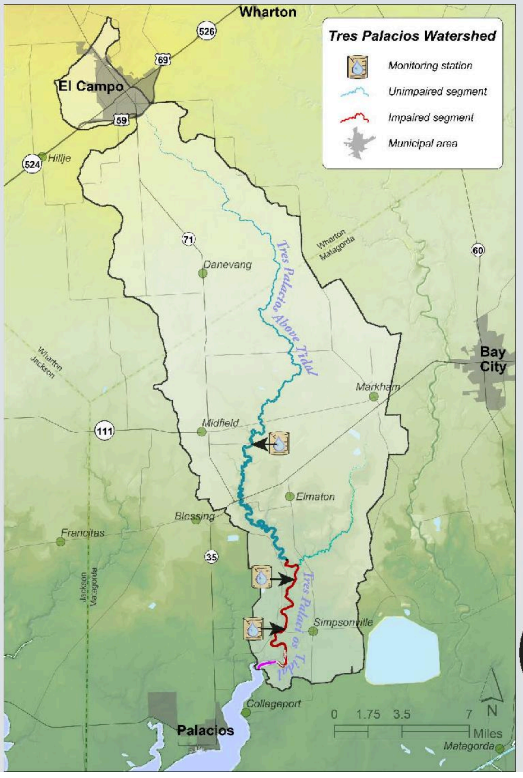
Tres Palacios Watershed Protection Plan

- Segments –
  - Tres Palacios Creek Tidal (1505_01)
  - Tres Palacios Creek Above Tidal (1505_02)
  - Wilson's Creek
- Approximately 268 sq miles
- 81% cropland (52%) or pasture (29%)
- Approximately 5% developed
- Permitted wastewater outfalls –
  - City of El Campo 2.62 MGD
  - Markham MUD 0.3 MGD
  - Midfield 0.03 MGD



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Tres Palacios
Watershed Protection Plan

- **Milestones**
  - Repair or replace 25 failing septic systems
  - Develop conservation plans or water quality management plans on 45 operations
  - Decrease feral hog populations by 20%
  - Reduce illicit dumping at bridges
  - Treat 50 acres with stormwater BMPs
  - Increase proper pet waste disposal, install at least five pet waste stations
  - Develop wastewater reuse capabilities in El Campo
  - Continue testing and replacing aging sanitary sewer infrastructure

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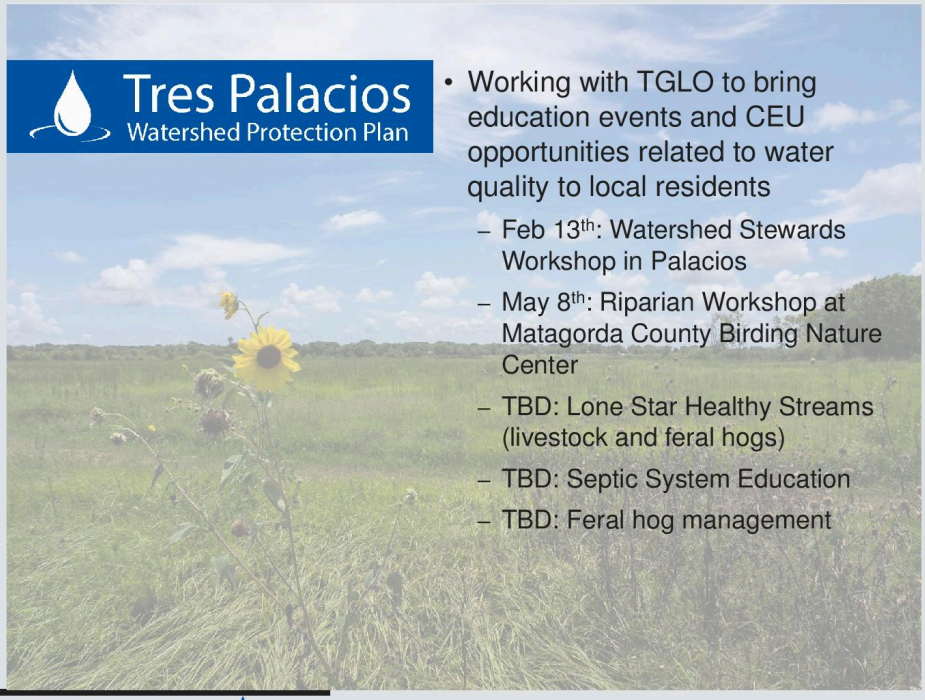

- Working with TGLO to bring education events and CEU opportunities related to water quality to local residents
  - Feb 13th: Watershed Stewards Workshop in Palacios
  - May 8th: Riparian Workshop at Matagorda County Birding Nature Center
  - TBD: Lone Star Healthy Streams (livestock and feral hogs)
  - TBD: Septic System Education
  - TBD: Feral hog management

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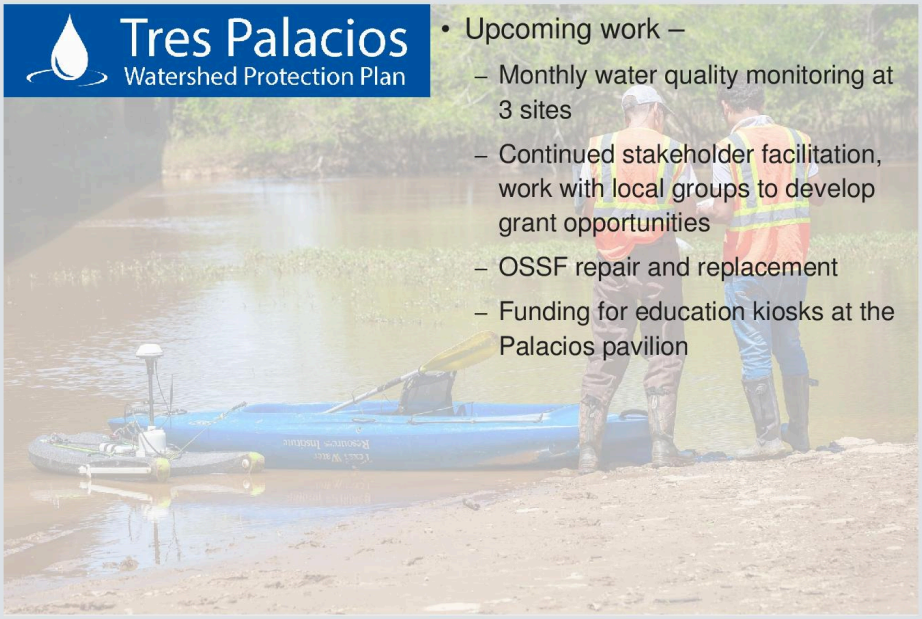

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2014 Integrated Report: Assessment Results

Dec 2005-Nov 2012

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    - Dissolved oxygen 24-hr minimum*
  - Category 5c:
    - Enterococcus bacteria
  - Concerns:
    - Dissolved oxygen grab screening level
    - Chlorophyll-a
- Segment 1502 – Tres Palacios Creek Above Tidal
  - Concerns:
    - Chlorophyll-a
    - Dissolved oxygen grab screening level*

* Listings carried forward from previous assessments due to inadequate data

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Texas Water Resources Institute
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Some Comparisons

Tres Palacios Tidal	Bacteria (Enterococcus)	Dissolved Oxygen (24-hr)	Chlorophyll-a
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Tres Palacios Above Tidal	Bacteria (E. coli)	Dissolved Oxygen (grab)	Chlorophyll-a
2014 Report	73.22 MPN/100mL	No exceedances	13 exceedances out of 25 samples (52%)
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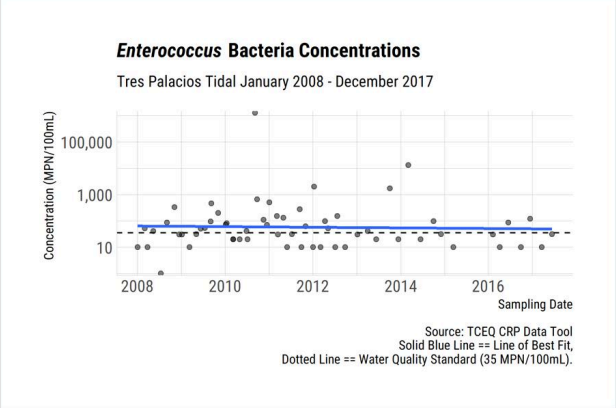
Texas Water Resources Institute

Recent Trends



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Texas Water Resources Institute
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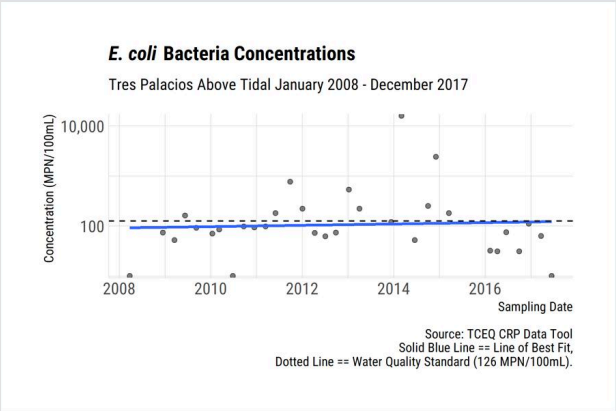
Recent Trends



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Texas Water Resources Institute
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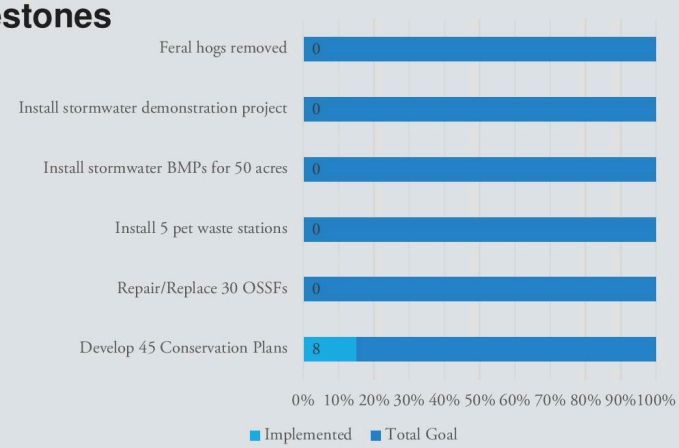
Tres Palacios
Watershed Protection Plan

Progress toward milestones



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Tres Palacios
Watershed Protection Plan

Conservation Plans

- In 2016 –
  - 39 active conservation plans with financial assistance
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- Acres covered through May 2018
  - 11,317 acres
- Practices with financial assistance
  - Brush management, pipelines, forage and biomass planting, prescribed grazing, watering facility, fence, and more.

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Tres Palacios
Watershed Protection Plan

Repair/Replace Septic Systems

- Goal to replace 30 failing systems
  - Secured funding for replacement of 15 systems over the next 3 years
  - Project starts this summer in Tres Palacios Oaks and Tidewater Oaks

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Tres Palacios
Watershed Protection Plan

Pet Waste Stations

- Goal of 5 stations
  - Submitting grant with El Campo to buy and install stations
  - HGAC working with Palacios to secure stations along waterfront

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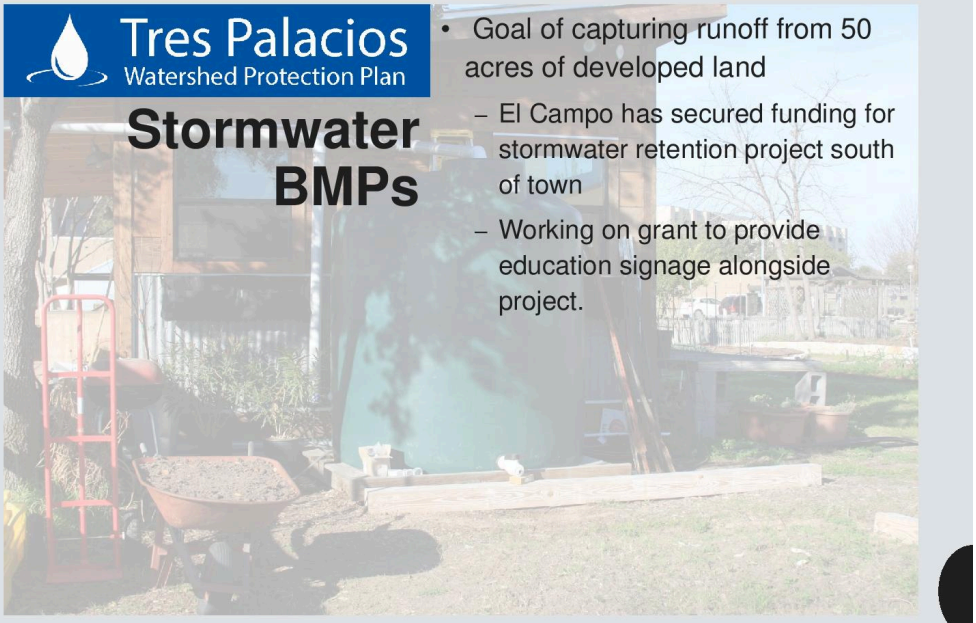

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Texas Water Resources Institute
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Tres Palacios
Watershed Protection Plan

Feral Hogs

- 20% population reduction goal
- No tracking setup

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Texas Water Resources Institute
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Appendix M: Tres Palacios WPP Stakeholder Meeting Presentation- April 10, 2019

TRES PALACIOS WATERSHED PROTECTION PLAN

Michael Schramm – Texas Water Resources Institute
April 10, 2019

Texas Water Resources Institute
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Texas A&M AgriLife Research | Extension

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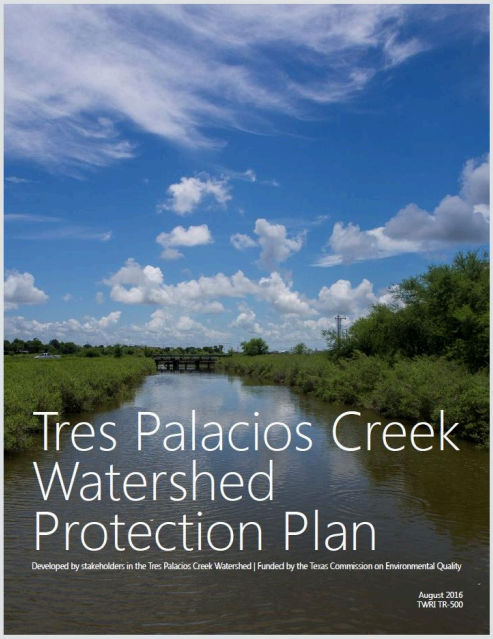

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Texas Water Resources Institute
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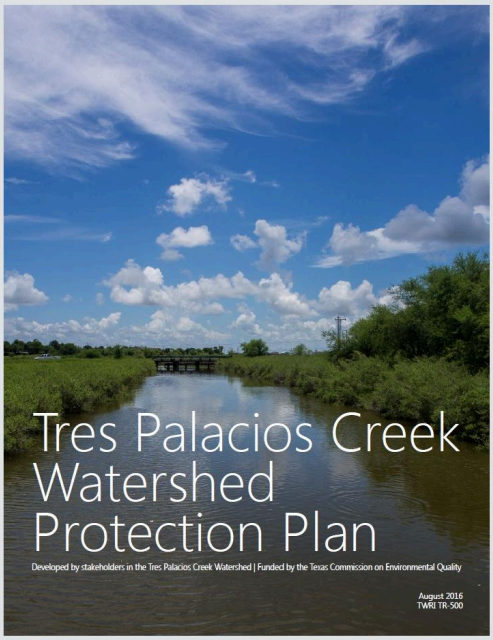

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Texas Water Resources Institute
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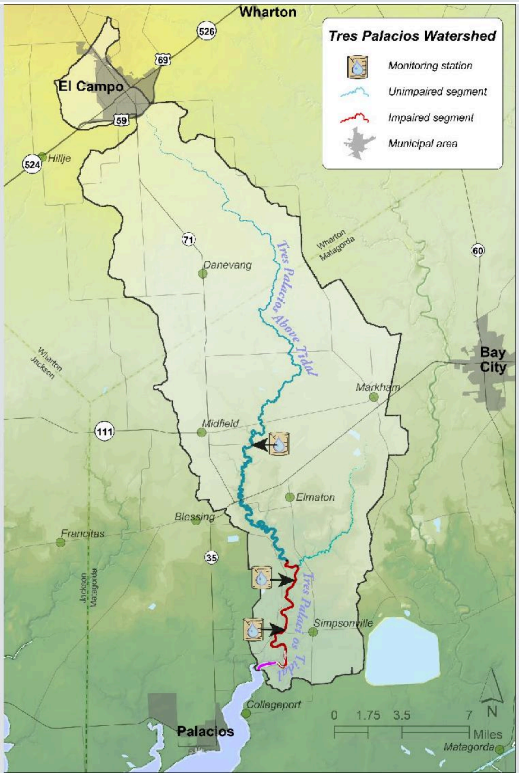

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make every drop count

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Tres Palacios Watershed Protection Plan

- Working with TGLO to bring education events and CEU opportunities related to water quality to local residents
  - Watershed Stewards Workshop in Palacios- Done on Feb 13, 2018
  - Riparian Workshop at Matagorda County Birding Nature Center- Done on May 8, 2018
  - Septic System Education- Done on Dec. 6, 2018 in Palacios and Dec. 7, 2018 in Bay City
  - Feral hog management- Done on Oct. 23, 2018 in Bay City
- Upcoming Educational Events:
  - TBD: Lone Star Healthy Streams (livestock and feral hogs)
  - TBD: Texas Well Owners Network

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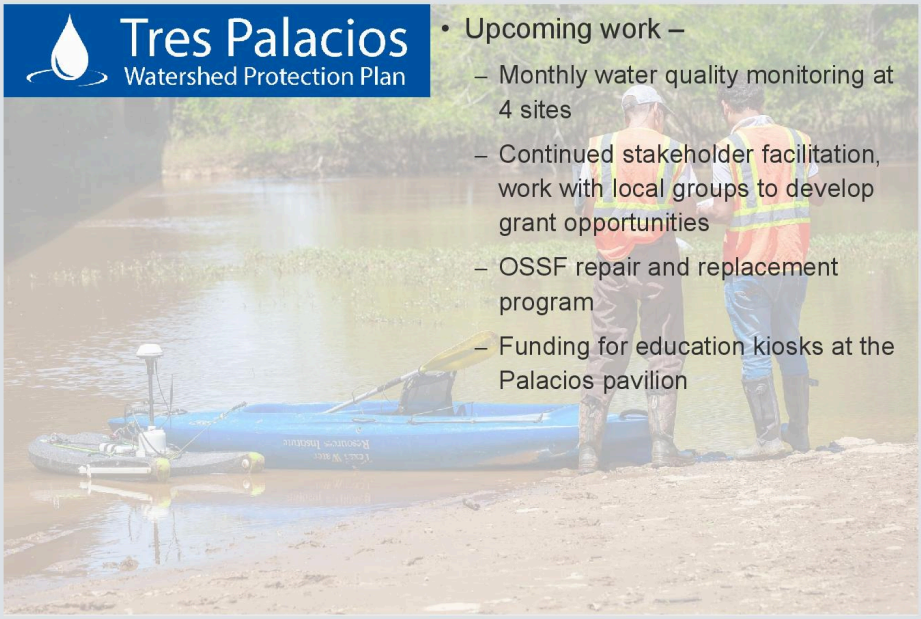
Texas Water Resources Institute



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Texas Water Resources Institute

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Texas A&M AgriLife Research | Extension

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Texas Water Resources Institute

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Texas Water Resources Institute

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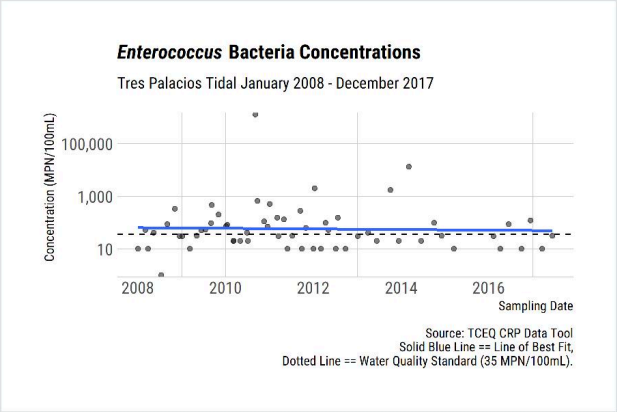

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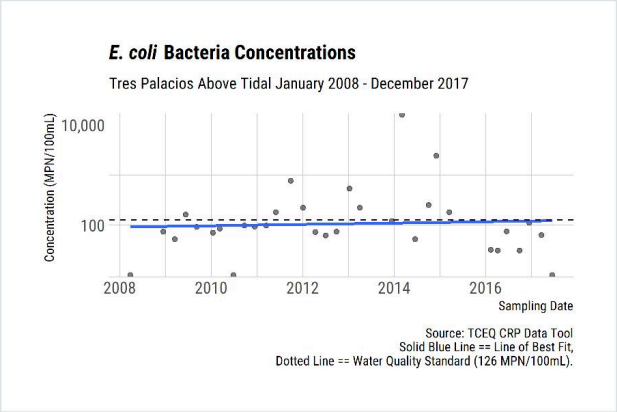
TEXAS A&M AGRILIFE RESEARCH | EXTENSION

Texas Water Resources Institute

Recent Trends



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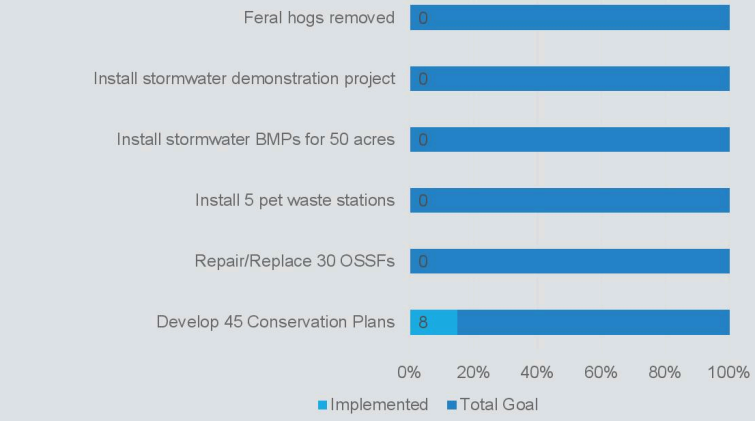
TEXAS A&M AGRILIFE RESEARCH | EXTENSION

Texas Water Resources Institute

Tres Palacios
Watershed Protection Plan

Progress toward milestones



TEXAS A&M AGRILIFE RESEARCH | EXTENSION

Texas Water Resources Institute

Tres Palacios
Watershed Protection Plan

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TEXAS A&M AGRILIFE RESEARCH | EXTENSION

Texas Water Resources Institute

Tres Palacios
Watershed Protection Plan

Repair/Replace Septic Systems

- Goal to replace 30 failing systems
  - Secured funding for replacement of 15 systems over the next 3 years
  - Project started this summer in Tres Palacios Oaks and Tidewater Oaks
  - Called for first round of applications in Dec 2018.
    - Closed application in Feb. 2018
  - In process now of running needs-criteria on applicants to determine program participation

Texas A&M AgriLife Research | Extension

Texas Water Resources Institute
make every drop count

Tres Palacios
Watershed Protection Plan

Pet Waste Stations

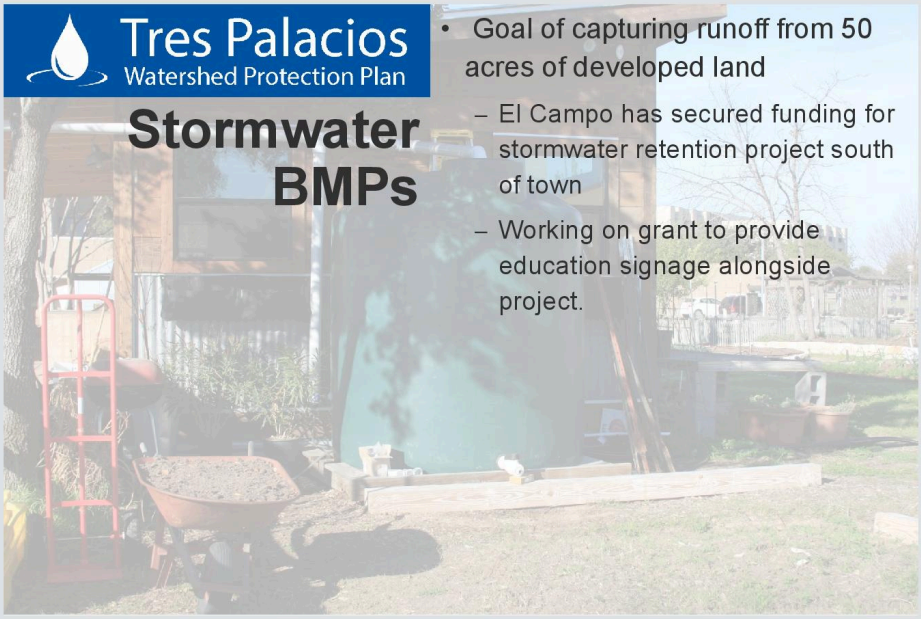
- Goal of 5 stations
  - Submitting grant with El Campo to buy and install stations
  - Grant was accepted for funding by TCEQ
  - HGAC working with Palacios to secure stations along waterfront

Texas A&M AgriLife Research | Extension

Texas Water Resources Institute
make every drop count

Tres Palacios
Watershed Protection Plan

Stormwater BMPs



- Goal of capturing runoff from 50 acres of developed land
  - El Campo has secured funding for stormwater retention project south of town
  - Working on grant to provide education signage alongside project.

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Texas Water Resources Institute
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Tres Palacios
Watershed Protection Plan

Stormwater Demonstration Projects

- Nothing currently planned

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Texas Water Resources Institute
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Tres Palacios
Watershed Protection Plan

Feral Hogs

- 20% population reduction goal
- No tracking setup

Texas A&M AgriLife Research | Extension

Texas Water Resources Institute

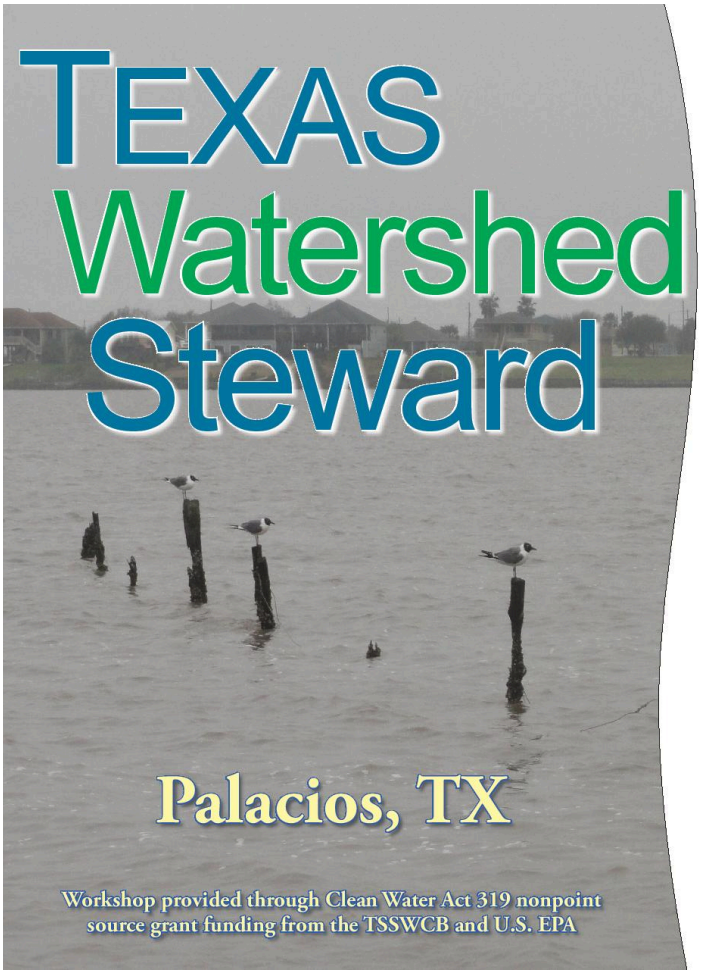
Appendix N: Task 3- Stakeholder Education and Outreach

- TWRI coordinated and helped facilitate a Texas Watershed Stewards Workshop in Palacios, Texas during Quarter 2: February 18, 2018 to 25 participants
- TWRI coordinated and conducted a Texas Riparian and Stream Ecosystems Workshop in Bay City, Texas during Quarter 3: May 2, 2018 to 50 participants
- TWRI coordinated and promoted a Feral Hog Education Workshop in Bay City, Texas during Quarter 5: October 3, 2018 to 20 participants
    - Note: The May 2, 2018 Texas Riparian and Stream Ecosystem Workshop and the November 15, 2019 Lone Star Healthy Stream Workshop had a feral hog management component in their workshops as well.
- TWRI coordinated and helped facilitate a Septic System Education Workshop during Quarter 5; December 6, 2018 in Palacios, Texas to 22 participants.
- TWRI coordinated and helped facilitate a TWON Workshop in Bay City, Texas during Quarter 9: November 5, 2019 to 28 participants
- A Lone Star Healthy Streams workshop was scheduled for November 15, 2019 in Bay City, Texas; however, due to low RSVP response, the Lone Star Healthy Streams program coordinator decided to cancel the event.
- Notices, agendas, meetings materials (educational materials developed in above appendixes), attendance list and summaries of meetings were provided to Texas General Land Office upon completion of meetings

Appendix O: Stakeholder Education and Outreach Schedule of Events

Date	Program	Location	Attendees	Length (Hours)	Contact Hours	Cumulative Attendees	Cumulative Contact Hours	Cumulative Programs
15-Feb-18	Texas Watershed Stewards	Palacios, Texas	25	4	100	25	100	1
8-May-18	Riparian and Stream Ecosystem	Bay City, Texas	50	7	350	75	450	2
23-Oct-18	Feral Hog Workshop	Bay City, Texas	20	2	40	95	490	3
6-Dec-18	Septic System Education Workshop	Palacios, Texas	22	2	44	117	534	4
5-Nov-19	Texas Well Owners Network	Bay City, Texas	28	4	112	162	680	5

Appendix P: Texas Watershed Stewards Promotional Flyer



TEXAS Watershed Steward

The Texas Watershed Steward program is a free educational workshop designed to help watershed residents improve and protect their water resources by getting involved in local watershed protection and management activities.

February 15, 2018:
1:00 pm - 5:00 pm

First United Methodist Church
209 Lucas Avenue
Palacios, TX 77465

The workshop will provide an overview of water quality and watershed management in Texas, including a discussion on the Carancahua Bay and Tres Palacios watersheds along with efforts to improve and protect them. Light refreshments will be provided. Free continuing education credits are offered for a wide variety of professional disciplines ranging from licensed Texas Department of Agriculture pesticide applicators to select TCEQ occupational license holders. For a complete list of CEUs offered, or to register, visit our website or call the number below.

http://tws.tamu.edu/

Pre-register for the workshop by going to:
http://tws.tamu.edu/workshops/registration/ or calling 979.862.4457

TEXAS A&M AGRILIFE EXTENSION

Soil Water TSSWCB

Appendix Q: Texas Riparian and Stream Ecosystems Promotional Flyer

texasriparian.org

Texas Riparian & Stream Ecosystem Workshop

Tres Palacios Creek and Lower Colorado River

May 8, 2018 | 8:00 a.m. - 4:00 p.m.

Matagorda County Nature and Birding Center
1025 TX-35
Bay City, Texas 77414

Online RSVP and Agenda: http://texasriparian.org/upcoming-training-locations/

For more information and to register please contact Clare Entwistle at 210-277-0292 ext 205 or clare.entwistle@ag.tamu.edu.

Continuing Education Units available: Texas Department of Agriculture Pesticide Applicators License – 3 CEUs; Texas Water Resources Institute – 1 CEU; Certified Crop Advisor - 7 CEUs; Texas Nutrient Management Planning Specialists – 6 hours; Texas Floodplain Management Association – 7 CECs; Texas Board of Professional Land Surveying - 7 hours; Texas Board of Architectural Examiners "Acceptable for HSW credit"; and may also be used for CEUs for Professional Engineers.

The free workshop will include both indoor classroom and outdoor presentations by multiple natural resource agency experts and an outdoor field portion on a creek to discover how it functions and the role of riparian vegetation in properly functioning systems. RSVPs by May 1 2018 at the link above or by contacting Entwistle. The workshop is being co-hosted by the Lower Colorado River Authority, the AgriLife Extension OFfice in Matagorda County and the Texas Water Resources Institue.

First name: _____ Last name: _____

Email address: _____ Phone: _____

Org./Employer: _____ Lunch Options: ___ I will have the catered lunch
___ I will bring my own

Funding provided through a Clean Water Act Nonpoint Source Grant from the Texas State Soil and Water Conservation Board and U.S. Environmental Protection Agency

Appendix R: Feral Hog Management Promotional Flyer

TEXAS A&M AGRILIFE EXTENSION

OCTOBER 23RD, 2018
WILD PIG BIOLOGY AND MANAGEMENT WORKSHOP

Presented By: Aaron Sumrall Ph.D.

Texas A&M AgriLife Extension in Matagorda County will be hosting a Wild Pig Biology and Management Workshop on Tuesday, October 23rd at the Multipurpose Building of the Matagorda County fairgrounds beginning at 6:00 PM. Registration for the event will be $20.00 and there will be 2 CEUs available at the event for anyone attending that holds a pesticide applicators license. RSVP to the Extension office at (979) 245-4100.

FEE: $20.00

CHECK OR MONEY ORDER TO RESERVE SPOT

(MAKE CHECK PAYABLE TO "LAB")

RSVP by: October 19th

Located at Multipurpose Building of the Matagorda County Fairgrounds

CALL NOW!!

(979) 245-4100

TEXAS A&M AGRILIFE EXTENSION OFFICE
2200 7TH ST. 3RD FLOOR
BAY CITY, TX. 77414
(979) 245-4100

Appendix S: Homeowner Septic System Maintenance Course Promotional Flyer

Texas Water Resources Institute
make every drop count

Interested in learning how to keep your septic system functioning properly?

Free Septic System Maintenance Course!

The Homeowner Maintenance of Septic Systems Course provides a basic understanding of the operational and maintenance activities of a conventional septic system, and explains how activities within the home impact septic systems. Presentations will cover the treatment processes, health and safety considerations, how to inspect, and maintain the system. This course also provides answers to the most frequently asked septic system questions, including when to pumpout a tank and what can or cannot go down the drain.

Course Information:

THURSDAY, DECEMBER 6, 2018 6:30PM - 8:30PM

Palacios Educational Pavilion
693 S. Bay Blvd.
Palacios, TX 77465

-OR-

FRIDAY, DECEMBER 7, 2018. 9:30AM - 11:30AM

Matagorda County Fairgrounds–
Multi-Purpose Room
2604 Nichols Ave.
Bay City, TX 77414

Registration:

Please RSVP to: (979) 245-4100

Cost: Free!

Why Should You Attend?

Septic systems are not flush and forget systems! Therefore maintenance is essential to ensure proper function and longevity of your septic system. Attendees will gain a better understanding of how to maintain their septic system to protect the health of their family and the environment.

For More Information Contact:

Ryan Gerlich, Extension Program Specialist
(979) 458-4185 | RAGerlich@ag.tamu.edu

OR

Aaron Sumrall, County Extension Agent
(979) 245-4100 | sasumrall@ag.tamu.edu

This program is made possible by funding ("in part" if appropriate) by a Texas Coastal Management Program Grant by the Texas Land Commissioner pursuant to National Oceanic and Atmospheric Administration Award No. NA17NOS4190139 and by funding provided through a Clean Water Act nonpoint source grant from the Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency.

Appendix T: Texas Well Owners Network Promotional Flyer

Water Well Owners Educational Event

Tuesday, November 5, 2019
8:30 a.m. — 12:30 p.m.

Wharton Co. Junior College
4000 Avenue F
Bay City, TX 77414

TEXAS WELL OWNER NETWORK PROGRAM **TRES PALACIOS WPP**

The Texas Well Owner Network (TWON) program is a free, educational training for Texas residents who depend on household wells for their water needs. TWON is for private well owners who want to become familiar with groundwater resources, septic system maintenance, well maintenance, water quality and water treatment. Private well owners are independently responsible for monitoring the quality of their wells. Essentially, they are the operators of their own water system and are responsible for ensuring that their water is safe.

BRING YOUR WELL WATER SAMPLES!

Well owners may bring water samples to the training to be screened for nitrate–nitrogen, total dissolved solids (TDS), and *E. coli* bacteria for $10. Pick up approved sample containers with instructions at the Texas A&M AgriLife Extension office in Matagorda County, 2200 7th Street, Bay City or Wharton County, 315 E. Milam Street, Wharton.

Bring your samples and $10 to the training on November 5.

Pre-register for the workshop at
http://twon.tamu.edu/training/
or call **979-845-1461**

TWON TEXAS Well Owner NETWORK

Texas A&M AgriLife Extension

Texas Water Resources Institute

TEXAS STATE Soil & Water CONSERVATION BOARD

RCAP www.rcap.org

Funding for the Texas Well Owner Network is through a Clean Water Act nonpoint source grant provided by the Texas State Soil and Water Conservation Board and the U.S. Environmental Protection Agency.

Appendix U: Task 4- Project Reporting

- TWRI submitted the first quarterly report on January 10, 2018
- TWRI submitted the second quarterly report on April 9, 2018
- TWRI submitted the third quarterly report on July 10, 2018
- TWRI submitted the fourth quarterly report on October 4, 2018
- TWRI submitted the fifth quarterly report on January 9, 2019
- TWRI submitted the sixth quarterly report on April 9, 2019
- TWRI submitted the seventh quarterly report on July 10, 2019
- TWRI submitted the eighth quarterly report on October 10, 2019
- TWRI requested and was granted a 5 month No Cost Extension, which will move the end date of the project to August 31, 2019
- TWRI requested and was granted a 3 month No Cost Extension, which will move the end date of the project to November 30, 2019
- TWRI requested and was granted a budget revision request during Quarter 7 & 8.
- AgriLife submitted Invoice #R108011, covering October 1, 2017-March 31, 2018, for a total of $6,996.45
- AgriLife submitted Invoice #R108366, covering April 1, 2018-May 31, 2018, for a total of $4,422.00
- AgriLife submitted Invoice #R108972, covering June 1, 2018-August 31, 2018, for a total of $9,062.65
- AgriLife submitted Invoice #R109590, covering September 1, 2018-November 30, 2018, for a total of $6,996.45
- AgriLife submitted Invoice #R110386, covering December 1, 2018-March 31, 2019, for a total of $6,996.45
- AgriLife submitted Invoice #R110950, covering April 1, 2019-June 30, 2019, for a total of $6,996.45
- AgriLife submitted Invoice #R111542, covering July 1, 2019-September 30, 2019, for a total of $13,616.88