

# Mission and Aransas Rivers TMDL I-Plan Implementation Final Report

Texas Water Resources Institute TR-515  
November 2019



# Mission and Aransas Rivers TMDL I-Plan Implementation Final Report

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Prepared for the Texas General Land Office

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## Abbreviations

BMP	Best Management Practice
CCN	Certificate of Convenience and Necessity
CRP	Clean Rivers Program
<i>E. coli</i>	<i>Escherichia coli</i>
I-Plan	TMDL Implementation Plan
OSSF	On-Site Sewage Facilities
TCEQ	Texas Commission on Environmental Quality
TEEX	Texas A&M Engineering Extension Service
TMDL	Total Maximum Daily Load
TSSWCB	Texas State Soil and Water Conservation Board
TWON	Texas Well Owner Network
TWRI	Texas Water Resources Institute
WPP	Watershed Protection Plan
WWTF	Wastewater Treatment Facility

## Executive Summary

The Mission and Aransas rivers, located adjacent to each other along the Texas Gulf Coast, are both comprised of two segments — the upstream segment of each river, designated as “Above Tidal,” and the downstream segment designated as simply “Tidal.” The above tidal portions of both the Mission and Aransas rivers are perennial freshwater streams, while the below tidal portions are influenced by seawater from Mission and Copano bays. There are also two segments in the Aransas River watershed that flow directly into the above tidal segment, Poesta Creek and Aransas Creek.

The Mission River Above Tidal begins at the confluence of Blanco and Medio creeks in Refugio County and is approximately 11 miles in length. Mission River Tidal begins downstream of U.S. 77 in Refugio County and flows approximately 16 miles into Mission Bay. The headwaters of Poesta Creek begin in Bee County, northwest of Beeville, and flow 28.7 miles southeast to Aransas Creek forming the Aransas River Above Tidal, which is approximately 35 miles in length. Aransas River Tidal begins upstream of U.S. 77 on the Refugio/San Patricio County line and flows approximately 28 miles into Copano Bay.

Water quality monitoring throughout the past two decades indicates that sections of the Mission and Aransas rivers and Poesta Creek do not meet water quality standards for recreation because of elevated levels of *Escherichia coli* (*E. coli*) and Enterococci. The tidal segments of the Mission and Aransas rivers were first identified as impaired in the *2004 Texas Integrated Report 303(d) List* followed by Aransas Creek being identified in the *2006 Texas Integrated Report 303(d) List*. The Aransas River Above Tidal and Poesta Creek segments were first identified as impaired in the *2014 Texas Integrated Report 303(d) List*. According to the *2016 Texas Integrated Report 303(d) List*, Aransas Creek is now the only segment in the watersheds listed for a bacteria impairment. All of the other segments were delisted from the *2016 Texas Integrated Report 303(d) List* because of the development of the Total Maximum Daily Load (TMDL) for the watersheds, which was approved by the Texas Commission on Environmental Quality (TCEQ) in 2016. However, these segments still do not meet water quality standards for bacteria and still appear on the *2016 Texas Integrated Report* lists for impairments and concerns. There are also concerns for nitrate and total phosphorus in the Aransas River Above Tidal segment and there is a concern for depressed dissolved oxygen in Poesta Creek.



With the identification of water quality issues in the Mission and Aransas rivers watersheds, TCEQ began the stakeholder process in spring 2006 with a series of stakeholder meetings. An extensive review of the watershed’s land and water resources was carried out, enabling stakeholders to make decisions based on up-to-date information on watershed characteristics and land uses. Potential sources of bacteria pollution were identified and quantified based on data from the best available data sources and were then integrated into simplistic pollutant load assessment tools. The results of these tools provided information to determine the types and sources of bacteria in the watershed with the highest potential to impact water quality in addition to the sources that could be readily addressed. After this process was completed, there was a need to plan and implement actions that would restore water quality and ensure safe and

healthy water for stakeholders. To meet this need, a TMDL Implementation Plan (I-Plan) was developed.

With the completion of the I-plan, maintaining stakeholder connections and drawing in new participants is crucial to ensuring its successful implementation. With this in mind, the Texas Water Resources Institute (TWRI) proposed to acquire funding for education programs, stakeholder meetings for continued local engagement, and for writing grants to provide more technical and financial resources to the watersheds.

## Project Description

The primary objectives of this project were to facilitate implementation of the management measures outlined in the I-Plan, engage local stakeholders, expand educational programs, and assess water quality progress with the goal of improving water quality in the Mission and Aransas rivers. Throughout the project, TWRI coordinated with stakeholder groups at meetings to update and identify water quality project needs and worked with state and federal agencies to acquire technical and financial resources to implement I-Plan management measures. These efforts led to TWRI obtaining funding for a water quality monitoring project as well as project to develop a watershed protection plan (WPP), which will allow for more funding opportunities in the future.

The education of area landowners and agricultural producers was an integral part of this project. The project focused on pollution control best management practices and helping landowners and producers identify opportunities to implement practices that mitigate water quality impacts. One way that TWRI was able to provide education was through the development of two septic system fact sheets that provided information on maintenance and signs of failure. Those fact sheets were then combined and turned into a convenient pocket guide for landowners. A newsletter containing information on upcoming educational events and water quality updates was also distributed to stakeholders in the watersheds. Additionally, TWRI organized educational programs such as the Texas Well Owner Network (TWON), Texas Watershed Stewards, and a Riparian Area Management workshop.

## Task 1: Program Material Development and Issue Identification

TWRI facilitated communication with stakeholders in the Mission and Aransas watersheds 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 Copano Bay website (<https://twri.tamu.edu/our-work/restoring-protecting/copano-bay-watershed/>). TWRI also developed and disseminated project information via flyers, fact sheets, and news releases. Flyers and news releases were provided to stakeholders for every education event hosted in the watersheds. The fact sheets that TWRI created pertained to septic system maintenance and signs of failure. These fact sheets and a spring 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 also helped government and non-government organizations identify and acquire resources, grants and funding to implement the I-Plan and worked with state and federal agencies to bring technical and financial resources to the watersheds. Over the course of the project, TWRI submitted eight proposals for funding in the watersheds. Out of those eight proposals, three projects were funded, three were rejected, and two are still pending. The funded projects include an additional water quality monitoring project, a WPP development project, and a targeted education project. TWRI tracked all of the submitted proposals by developing a database. This database also includes information regarding tracking and evaluating the progress toward achieving milestones identified in the Mission and Aransas Rivers I-Plan. TWRI also included in the database identified data gaps from assessing water quality data collected through the Clean Rivers Program (CRP).

## Task 2: Facilitate Stakeholder Meetings

In order to keep local stakeholders up to date on project progress for the Mission and Aransas rivers, TWRI hosted two stakeholder meetings in the watersheds. At the first meeting in August 2018 stakeholders were presented with both a water quality update as well as an update on implementation progress. They were also given an opportunity to provide input on funding opportunities being pursued for projects supporting implementation efforts. At the second stakeholder meeting in May 2019, stakeholders were once again given implementation and water quality updates. Information regarding the WPP that was being developed was also presented to stakeholders.

For both of 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

One of the primary goals of this project was to increase stakeholder awareness of water quality impairments through the facilitation of education programs. These programs were also meant to encourage local participation in bacteria contamination control efforts. To meet these goals, 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, a Riparian Area Management Workshop for landowners and land managers, a Feral Hog Management Program, a Texas Watershed Steward Program, and a TWON well educated training. In lieu of a Lone Star Healthy Streams Program, TWRI hosted a TWON well screening event in Refugio, Texas.

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 Mission and Aransas Rivers TMDL I-Plan Implementation project was a great success. TWRI worked diligently to complete all project tasks and turn in deliverables on time to the Texas General Land Office project manager. As a result, progress on I-Plan management measures was achieved and funding for completing future implementation milestones has been secured.

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 management measures outlined in the Mission and Aransas Rivers TMDL I-Plan.

These actions helped maintain connections with stakeholders throughout the duration of the project and provided them with educational resources to better their understanding of water quality issues in the watersheds.

One of the most significant successes observed through this project was the improvement of water quality trends in the watersheds. When the project began the Mission River Tidal, Aransas River Tidal, Aransas River Above Tidal, Poesta Creek, and Aransas Creek segments were all listed on the *2014 Texas Integrated Report 303(d) List* for elevated levels of bacteria. After consulting with stakeholders, TWRI wrote a proposal to conduct additional monitoring to get a more current and in-depth understanding of the water quality in the watersheds. In 2017, TCEQ funded a water quality monitoring project for both tidal segments. Through data collected for that project, it is apparent that the bacteria geomeans for the Mission River Tidal and Aransas River Tidal segments have been improving and moving closer to meeting the water quality standard. While there currently no projects being funded regarding water quality monitoring in the non-tidal segments, data collected through the CRP shows a decline in bacteria levels for all of those segments as well.

Projects such as this are why accomplishments are being made in the Mission and Aransas rivers watersheds. The need for such projects in the futures is crucial for continued success.



## Appendix A

### Task 1: Program Material Development and Issue Identification

- 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 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 spring 2019 Mission and Aransas Rivers I-Plan newsletter during Quarters 5 & 6: October 2018-March 2019.
- TWRI submitted a proposal to TCEQ for a water quality monitoring project in the watersheds. For this project, TWRI would be monitoring three sites twice a quarter to supplement monitoring done through CRP: Funded September 2017
- TWRI received a grant from TCEQ to develop a WPP for the Mission and Aransas rivers: Funded September 2018
- 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. The proposal targets four watersheds; including the Mission and Aransas rivers watersheds: Funded June 2019
- 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 Mission and Aransas rivers watersheds would fall within the proposed target area for this project: Submitted September 2018 and September 2019

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



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:

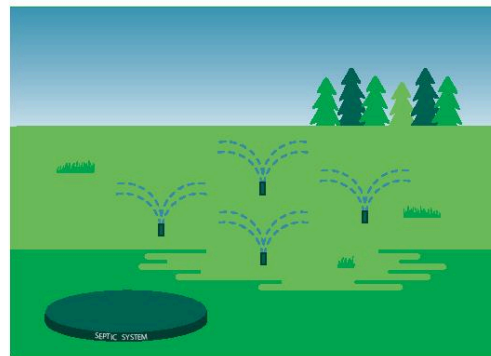


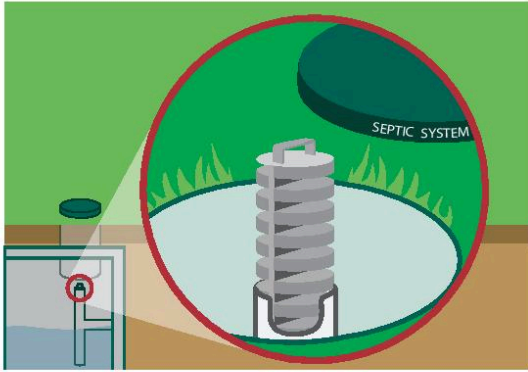
### Regular Septic Tank Pumping

- 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.



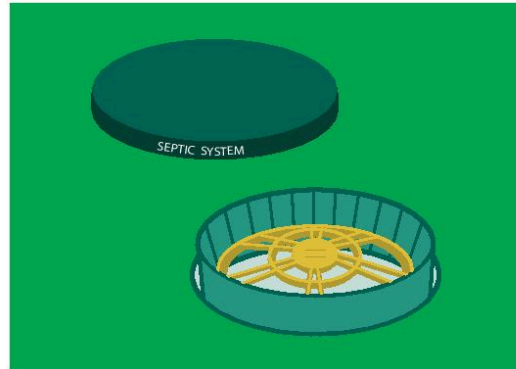


### Clean Effluent Screens

- 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 kids and animals.
- Your septic tank access ports should be free of encroachment.



### 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 C: Is Your Septic System Failing? Fact Sheet



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:



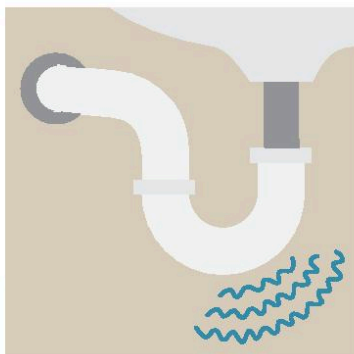
Standing water or damp spots near your septic tank or drainfield/sprayfield



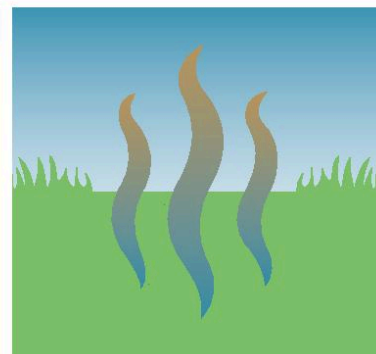
Water and sewage from toilets, drains and sinks are backing up into your home



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 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

### 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
- Moisturizers, bath oils and solid material on pans are examples of grease; petroleum-based products may be toxic to the system

## For more information, contact:

Ryan Gerlich, Extension Program Specialist  
(979) 458-4185 | [rgerlich@tamu.edu](mailto:rgerlich@tamu.edu)  
<https://ossf.tamu.edu/>

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# Appendix D: Mission and Aransas TMDL I-Plan Implementation Spring 2019 Newsletter



## Mission and Aransas Rivers TMDL I-Plan Implementation

Spring 2019 Newsletter

### New Projects News

The Texas Water Resources Institute (TWRI) began two projects in Fall 2018 for the Mission and Aransas Rivers. The first project is the development of a watershed protection plan (WPP). Both the approved total maximum daily load (TMDL) and TMDL implementation plan (I-Plan) for the Mission and Aransas Rivers will be used as source material for development. The primary goal of developing the WPP is to become eligible for implementation funds for the management measures discussed in the TMDL I-Plan. The TMDL, TMDL I-Plan, and other supporting documents can be found at <https://www.tceq.texas.gov/waterquality/tmdl/42-copano.html>.

The second project is an 18-month long monthly monitoring project conducted at one station on the Mission River and two stations on the Aransas River. This project will provide additional data that will aid implementation and provide an updated condition of the water quality in the watersheds.

### State of the Water

The State of the Texas establishes water quality standards to measure how suitable the Mission and Aransas Rivers are for safe recreation and how well they support aquatic life.

#### Fecal Bacteria

We measure *E. coli* and *Enterococcus* bacteria to evaluate the presence of fecal waste in the water. *E. coli* is typically measured in fresh water streams and rivers while *Enterococcus* is measured in tidal segments, both having different standards for safe recreation. Elevated levels of these bacteria

can indicate that the water is contaminated with fecal waste, increasing the risk of becoming ill if you swim in the water.

The tidal segments and the above tidal segment of Aransas River do not meet the water quality standard for fecal bacteria. Aransas and Poesta Creeks also do not meet the standard. Elevated bacteria comes from many sources. The TMDL 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.

#### 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](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 segments and the above tidal segment of the Aransas River as well as Aransas and Poesta Creeks remained impaired as a result of elevated levels of

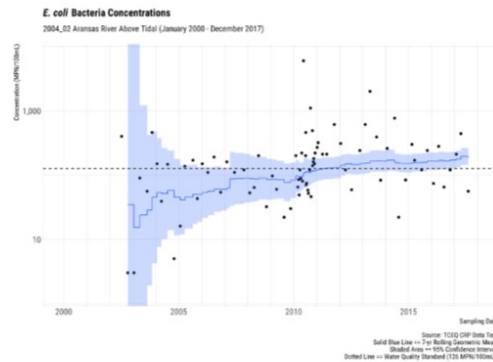
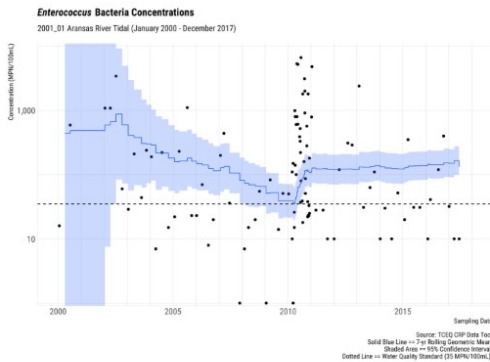
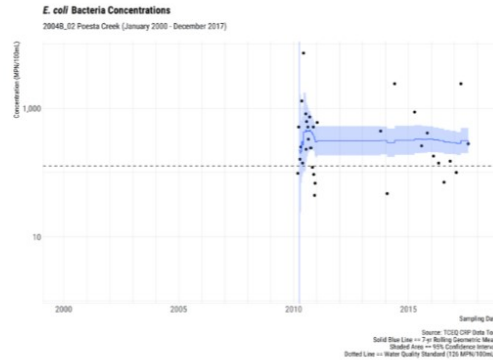
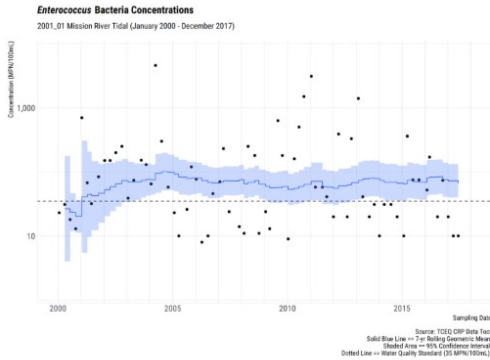
Segment	2014 Integrated Report average bacteria count (MPN/100mL)	Draft 2016 Integrated Report average bacteria count (MPN/100mL)	Recreation Standard for <i>E. coli</i> bacteria (MPN/100mL)	Recreation Standard for <i>Enterococcus</i> bacteria (MPN/100 mL)
Aransas River Tidal	64	90	-	35
Mission River Tidal	71	68	-	35
Aransas River Above Tidal	166	181	126	-
Poesta Creek	310	306	126	-

The Mission and Aransas Rivers TMDL I-Plan Implementation project is funded in part by a Texas Coastal Management Program grant pursuant to National Oceanic and Atmospheric Administration Award No. NOS4190139.



# Mission and Aransas Rivers

## TMDL I-Plan Implementation



bacteria. The good news is that the average *E. coli* bacteria count decreased slightly for Poesta Creek as well as the average *Enterococcus* bacteria count for Mission River Tidal. However, the average *Enterococcus* bacteria count for Aransas River Tidal and the average *E. coli* bacteria count for Aransas River above Tidal have increased between the 2014 Integrated Report and the Draft 2016 Integrated Report. Values for all segments are still above the standard for recreation but vary greatly between measurements.

### Updates

TWRI is working with local stakeholders to kick off implementation of the TMDL I-Plan thanks in part to grant funding from the Texas General Land Office and the Texas Commission

on Environmental Quality. We are already seeing progress towards milestones identified in the TMDL I-Plan.

- A Riparian Education Program was held April 25 in Goliad. This training focuses on promoting healthy watersheds and improving water quality.
- Texas Watershed Stewards workshop was held July 17 in Beeville. The workshop focuses on water quality and watershed management in Texas.
- A stakeholder meeting was held Aug.15 in Refugio to discuss updates on the Mission and Aransas Rivers TMDL I-Plan. Water quality updates were also provided at the meeting.
- A Texas Well Owner Network (TWON) program was held Oct. 18 in Beeville. The



## Mission and Aransas Rivers TMDL I-Plan Implementation

training focuses on educating private Texas well owners to become familiar with septic systems and well maintenance as well as Texas groundwater resources.

- Two TWON programs will be held May 14 in Victoria and May 15 in Refugio.
- TWRI applied for grant funding to develop a small, new, and absentee landowner education program. This would include the Mission and Aransas Rivers watersheds.
- TWRI applied for grant funding to target key stakeholders in priority watersheds with direct mailings, including the Mission and Aransas Rivers watersheds.
- There are currently 81 active voluntary Water Conservation Plans in the Mission River watershed as well as 122 active plans in the Aransas River watershed.

### Resources

While some solutions require large-scale projects, many opportunities are available for individual stakeholders 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/>

Report feral hogs:

<https://wildpigs.nri.tamu.edu/report-wild-pigs/>

#### *Producer Assistance*

The Texas State Soil and Water Conservation Board (TSSWCB), United States Department of Agriculture Natural Resources Conservation Service (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 producers 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 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/1303/wild-pig-newsletter-vol-33-fall-2018.pdf>

Lower Colorado River Authority — Colorado River Basin Highlights Report:

[https://www.lcra.org/water/quality/texas-clean-rivers-program/Documents/2018\\_Basin\\_Highlights\\_Report\\_FINAL.pdf](https://www.lcra.org/water/quality/texas-clean-rivers-program/Documents/2018_Basin_Highlights_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:

Allen Berthold - [taberthold@ag.tamu.edu](mailto:taberthold@ag.tamu.edu)

or Stephanie deVilleneuve -

[stephanie.devilleneuve@ag.tamu.edu](mailto:stephanie.devilleneuve@ag.tamu.edu)

## Acknowledgements

Thank you to the residents and landowners that made the Mission River and Aransas River TMDL and TMDL I-Plan a reality. We also thank the following groups and agencies for taking part in the planning process:

- Texas A&M AgriLife Extension Service
- Texas A&M AgriLife Research
- Texas Commission on Environmental Quality
- Texas Parks and Wildlife Department
- U.S. Department of Agriculture Natural Resources Conservation Service
- Bee Soil and Water Conservation District
- Goliad Soil and Water Conservation District
- San Patricio Soil and Water Conservation District
- Copano Bay Soil and Water Conservation District
- Coastal Bend Bays and Estuaries Program
- Nueces River Authority



### Texas Water Resources Institute

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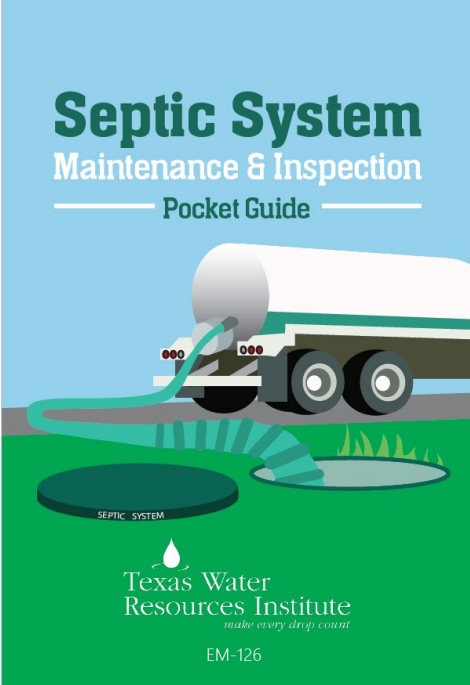
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<http://copanobay-wq.tamu.edu/>

[taberthold@ag.tamu.edu](mailto:taberthold@ag.tamu.edu) • [stephanie.devilleneuve@ag.tamu.edu](mailto:stephanie.devilleneuve@ag.tamu.edu)



# Appendix E: Septic System Maintenance & Inspection Pocket Guide

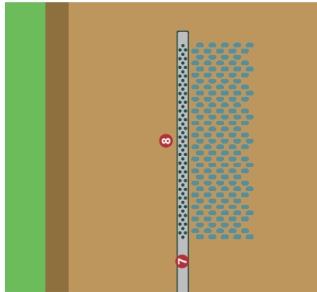
<p><b>Septic System Maintenance &amp; Inspection</b> Pocket Guide</p> <p>Texas Water Resources Institute <i>make every drop count</i></p> <p>EM-126</p>	<p> Texas Water Resources Institute <i>make every drop count</i></p> <p>twri.tamu.edu</p> <p>Septic System Maintenance &amp; Inspection Pocket Guide EM-126 November 2019</p> <p>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.</p>
<p><b>Septic System Maintenance &amp; Inspection</b> Pocket Guide</p> <p>November 2019</p>	<p><b>Table of Contents</b></p> <p>What is a Septic System? ..... 1</p> <p>Maintenance Tips for a Longer Lasting Septic System ..... 6</p> <p>Is Your Septic System Failing? ..... 11</p> <p>What to Avoid ..... 14</p> <p>Resources, Maintenance Record ..... 16</p>

### 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

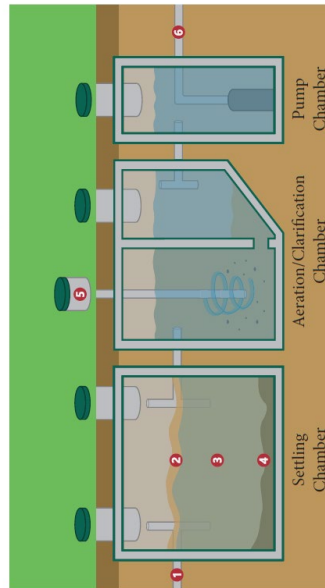
1

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



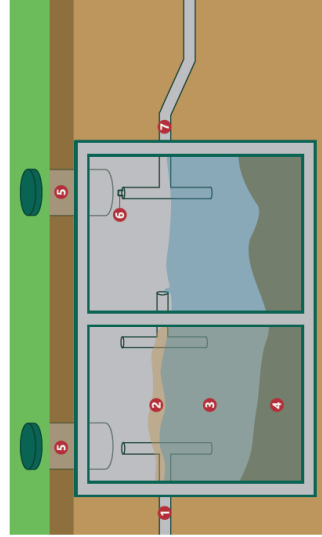
3

### Aerobic Treatment System



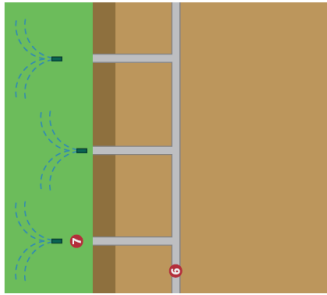
4

### Conventional Septic System



2

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



5

6

## 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

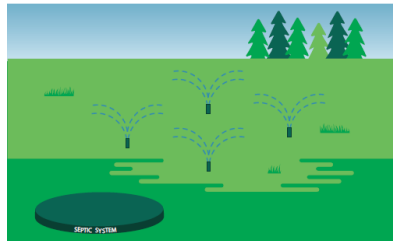
- Contact a septic service technician to measure the level of solids in your tank.
- Pump out septic tanks every 3-5 years or when total solids in the tank reach 25-33% of tank capacity.
- Make sure pumping is done during dry seasons to reduce the risk of tank flotation.



8

## Maintain Your Drainfield/Sprayfield

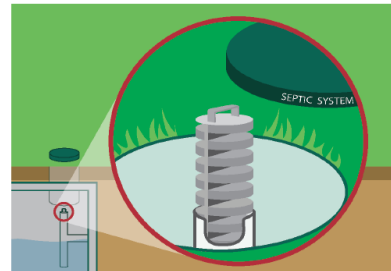
- Never park or drive on your drainfield/sprayfield to ensure that it continues to function properly.
- Establish a healthy grass cover around your drainfield/sprayfield to help uptake moisture and nutrients, remove contaminants and stabilize soil.
- Plant trees and other woody vegetation far enough 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.



7

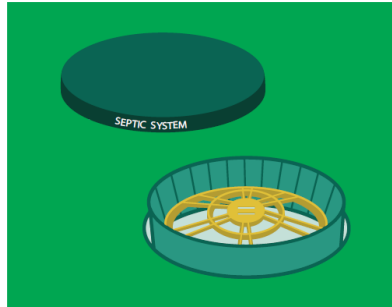
## Clean Effluent Screens

- 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.



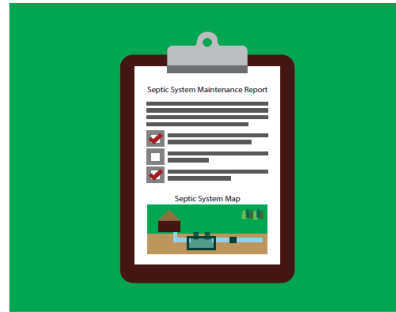
### Tank Accessibility

- 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.



### 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:



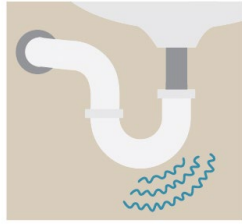
Standing water or damp spots near your septic tank or drainfield/sprayfield



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

13

#### 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

15

14

### 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
- Moisturizers, bath oils and solid material on pans are examples of grease; petroleum-based products may kill wastewater system bacteria

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#### For more general septic system information visit:

[ossf.tamu.edu](http://ossf.tamu.edu)

or

[www.tceq.texas.gov/assistance/water/fyiossfs.html](http://www.tceq.texas.gov/assistance/water/fyiossfs.html)

#### For septic system permitting information visit:

[www.tceq.texas.gov/permitting/ossf](http://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](http://www6.tceq.texas.gov/oars/index.cfm?fuseaction=search.county)



TEXAS A&M  
AGRI LIFE  
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: \_\_\_\_\_

### System Maintenance

Date	
Work Description	
Cost	
Next Service Date	
Comments	



## Appendix F: Resources Opportunities Identified, Applied For and Obtained

Project/Application Name	Primary Contact	Award Status	ID #	Anticipated Start	Anticipated Finish	Direct Costs	Indirect Costs
Copano (WO 4) (TCEQ FY19)	Stephanie deVilleneuve	Completed	07-486548	9/7/2018	8/31/2019	\$23,438	\$6,562
Copano Monitoring (TCEQ FY 17)	Ed Rhodes	Awarded	06-505532	9/1/2017	8/31/2020	\$74,783	\$11,218
Copano Implementation (GLO FY17)	Stephanie deVilleneuve	Awarded	06-505636	10/1/2017	3/31/2019	\$83,979	\$0
Small Acreage Landowner (TSSWCB FY19)	Stephanie deVilleneuve	Rejected	1900730	9/1/2019	8/31/2022	\$413,011	\$61,952
Targeted Education (TSSWCB FY19)	Stephanie deVilleneuve	Awarded	06-408750	6/4/2019	5/31/2021	\$62,525	\$9,379
Stormwater Education (TCEQ FY19)	Nathan Glavy	Rejected	1809661	9/1/2019	8/31/2022	\$118,810	\$33,267
Targeted Education (TCEQ FY19)	Nathan Glavy	Rejected	1809658	9/1/2019	8/31/2022	\$133,203	\$37,297
Stormwater Education (TCEQ FY20)	Nathan Glavy	Pending	1909503	9/1/2020	8/31/2023	\$131,120	\$39,337
Small Acreage Landowner (TSSWCB FY20)	Stephanie deVilleneuve	Pending	1911045	9/1/2020	8/31/2023	\$422,451	\$63,368



## Appendix G: Mission and Aransas Rivers TMDL I-Plan Implementation Database

Management Measure	Implementation Milestone	Progress Indicator	Progress Achieved
<b>Develop and Implement Conservation Plans in Priority Areas of the Watersheds</b>			
1	The number of landowners contacted	-	Unknown
1	The number of conservation plans developed	Develop 122 total conservation plans for the Aransas River watershed and 81 total conservation plans for the Mission River watershed	54 conservation plans have been developed for the Mission River watershed and 53 conservation plans have been developed for the Aransas River watershed.
1	The number of education/outreach programs delivered and materials developed	Provide a total of 6 workshops over 5 years and develop education materials	A Riparian Education Program was held in Goliad, Texas, on April 25, 2018. A Texas Watershed Stewards workshop was held in Beeville, Texas on July 17, 2018.
<b>Explore Feasibility of Altering Tax Exemption Requirements for Small Acreage Landowners</b>			
2	The number of times that responsible parties convene to discuss the available alternatives for property tax exemptions	-	Not yet completed
2	Development of a framework for altering these tax exemptions	-	Not yet completed
2	Development of a proposal for changes submitted to various tax authorities or elected officials	-	Not yet completed
2	Changes implemented	The number of individuals educated and the number of educational events held	Not yet completed

<b>Promote the Management of Feral Hogs and Control Their Populations</b>			
3	The number of feral hogs removed from the watershed on an annual basis	Remove 4,784 feral hogs from the Aransas River watershed and a total of 5,959 feral hogs from the Mission River watershed over 5 years	Unknown
3	The number of sightings	-	Unknown
3	The number of educational programs delivered	Provide a total of 5 Feral Hog workshops over 5 years.	Not yet completed
3	The number of education materials developed and disseminated	-	Not yet completed
3	The number of individuals reached	-	Unknown
<b>Promote the Reduction of Illicit Dumping and Proper Disposal of Animal Carcasses</b>			
4	The number of illicit dumping citations issued	5% increase the number of fines written for illicit dumping in the first year of implementation	Unknown
4	The number of complaints made to responsible parties	An annual 5% reduction in the number of reports/complaints to responsible parties for 5 years	Unknown
4	The amount of illicitly dumped material removed from the bridge crossings and illicit dump sites	-	Unknown
4	The number of educational materials developed	-	Not yet completed
4	The number of educational materials disseminated	-	Not yet completed

<b>Identify On-Site Sewage Facilities (OSSF), Prioritize OSSF Problem Areas, and Systematically Work to Bring Failing OSSF Systems into Compliance</b>			
5	The number of OSSF owners contacted for inspections and/or outreach	A total of 8% of OSSF owners contacted	Not yet completed
5	The number of OSSF inspections made	Inspection of 1% of all OSSFs in the watersheds annually for 4 years	Not yet completed
5	The number of OSSFs replaced	Replace a total of 76 failing OSSFs in the Mission River watershed and 486 in the Aransas River watershed	Not yet completed
5	The number of educational materials developed and distributed	-	Two flyers have been developed. One concerning septic system maintenance and the other signs of failure in septic systems. The information on the fliers was also developed into a pocket guide for landowners. Two TWON events were hosted in the watersheds as well. On October 18, 2018 a half-day training was held in Beeville, Texas. A well owner screening event was held on May 15, 2019 in Refugio, Texas.
<b>Promote the Improved Quality and Management of Urban Stormwater</b>			
6	The number of urban stormwater Best Management Practices (BMPs) adopted (structural and non-structural)	Urban BMP installation covering a total of 74 acres in the Mission River watershed and 517 acres in the Aransas River watershed	Unknown
6	The number of comprehensive stormwater assessments	1 assessment per county	Unknown
6	The number of educational materials developed	-	Not yet completed

6	The number of individuals reached through educational activities	Provide a total of 1 urban pollution workshops per Certificate of Convenience and Necessity (CCN) area for 3 years. Also have 1 pet waste program per CCN annually for 3 years.	Not yet completed
<b>Coordinate Efforts to Reduce Unauthorized Discharges</b>			
7	The number of documented replacements and repairs of wastewater conveyance infrastructure	-	Unknown
7	The number of educational materials developed and delivered	-	Not yet completed
7	The number of wastewater infrastructure failings occurring	In the first year of implementation, 5% fewer unauthorized discharges occurring annually. In the following 4 years of implementation, a total reduction of 10% in unauthorized discharges.	There have been 51 separate SSO events in the Mission and Aransas rivers watersheds between 2009 and 2019. The average for 2009-2016 was 1.3 per year in the Mission River watershed and 2.6 per year in the Aransas River watershed. The average for 2016-2019 in the Mission River watershed was 1.5 and 4.5 for the Aransas River watershed.
7	The number of wastewater infrastructure failures reported to appropriate authorities by both citizens and city personnel	-	51 failures have been reported for both watersheds between 2009 and 2019.

<b>Reduce Wastewater Treatment Facility (WWTF) Contributions by Meeting Half of the Permitted Bacteria Limit</b>			
8	The number of WWTFs that have adopted voluntary reductions in bacteria effluent concentrations to half of permitted bacteria limits	Work with TCEQ and Texas A&M Engineering Extension Service (TEEX) to evaluate the possibility of meeting half the permitted amount of bacteria in treated effluent	Not yet completed
8	The number of educational materials developed and delivered	-	Not yet completed
<b>Coordinate and Expand Existing Water Quality Monitoring in the Watershed</b>			
9	The number of education meetings for stakeholders on various types of monitoring projects	-	TWRI hosted a stakeholder meeting in Refugio, Texas on August 15, 2018 and discussed the progress of the water quality monitoring project that was funded for the watersheds in 2017. A similar meeting was hosted on May 28, 2019 to give stakeholders more updates the on monitoring project.
9	Developed website where data can be easily accessed	-	Not yet completed
9	Developed proposal for funding of monitoring projects	-	TWRI received funding for a water quality monitoring project from TCEQ in 2017. The project funds water quality monitoring to supplement data already being collected by CRP so that a monthly data set can be developed for 18 continuous months.
9	Establishment of a volunteer monitoring program	-	Not yet completed

<b>Improved Monitoring of WWTF Effluent to Ensure Permit Compliance</b>			
Control Action 1	Number of scheduled WWTF sampling events not reported quarterly and/or annually, with the goal of reducing this number	For year 1 of implementation have a 5% reduction in the number of sampling events not reported. For the following 4 years of implementation have an additional 5% reduction from the previous years.	Not yet completed
<b>Improve and Upgrade WWTFs</b>			
Control Action 2	Number of upgraded WWTFs	-	In 2016, Taft City Council approved a project to upgrade the Taft Wastewater Treatment Plant. The city of Beeville plans to upgrade both the Chase Field WWTF and the Moore Street WWTF.
Control Action 2	Amount of expanded wastewater treatment capacity in the watersheds	-	Not yet completed
Control Action 2	Successfully secured funds for treatment improvements as appropriate	-	\$2.8 million to upgrade the Taft Wastewater Treatment Plant. The city of Beeville plans to sell \$10 million in bonds to fund WWTF upgrades.

## Appendix H: Mission and Aransas Rivers TMDL I-Plan Implementation Data Gaps

### Mission and Aransas Rivers TMDL I-Plan Implementation Data Gaps

Before this project began, CRP was conducting quarterly monitoring at two tidal stations and three non-tidal stations in the Mission and Aransas rivers watersheds. These stations were 12943 (Mission River Tidal), 12947 (Aransas River Tidal), 12944 (Mission River Above Tidal), 12952 (Aransas River Above Tidal), and 12937 (Poesta Creek). To expand on these monitoring efforts, TWRI secured funding from TCEQ to collect more surface water quality data from the Mission and Aransas rivers tidal segments. The project also added another monitoring station to CRPs monitoring schedule, 12948 (Aransas River Tidal). It also provided funds to TWRI to collect water quality data in the months between CRP monitoring, creating a monthly data set for 20 months.

This additional monitoring will help fill in the water quality data gaps for the tidal segments and give stakeholders a current knowledge of the condition of those segments during I-Plan implementation. One apparent data gap discerned from this project is the lack of data for the non-tidal segments in the watersheds. Both Poesta Creek and the Aransas River Above Tidal segments are only being monitored at one station each quarterly. CRP also added station 12941 (Aransas Creek) to their 2020 quarterly monitoring schedule. Adding more stations and increasing the frequency of monitoring the non-tidal segments would help to fill the data gap. It would also assist watershed coordinators and stakeholders with future implementation efforts because they would have a current and more robust data set of all the water bodies in the watersheds.

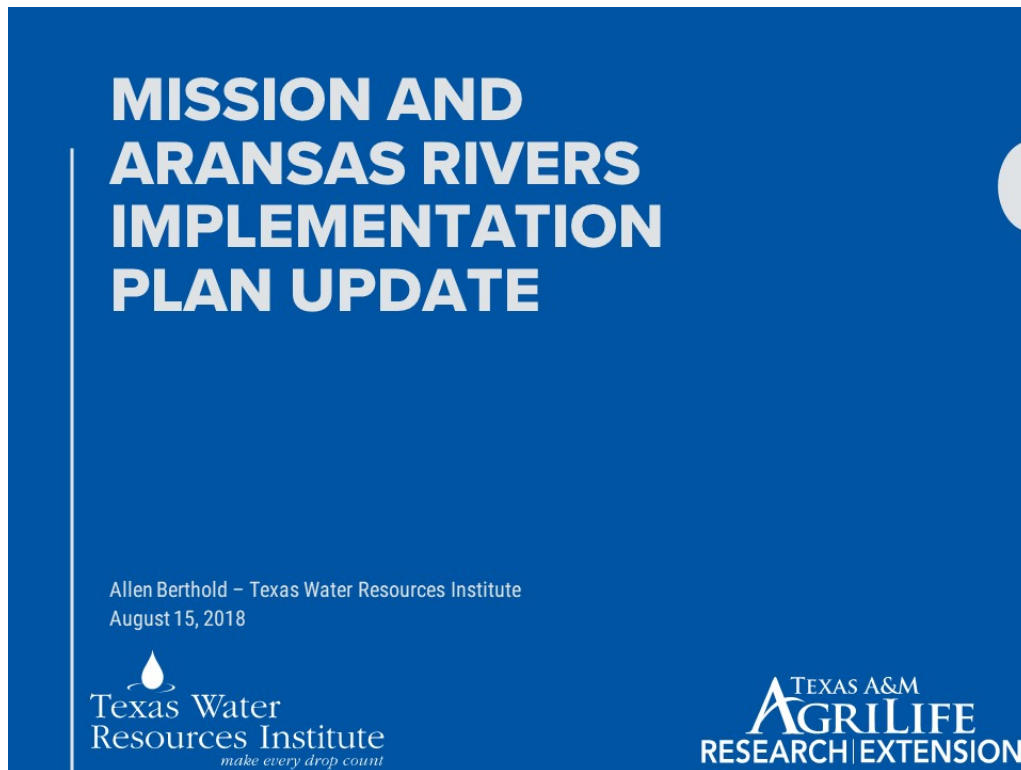
# Appendix I

## Task 2: Facilitate Stakeholder Meetings

- TWRI coordinated and conducted the first stakeholder meeting for the Mission and Aransas rivers watersheds in Refugio, Texas on August 15, 2018. The meeting was held at the Refugio County Fairgrounds during Quarter 4.
- TWRI coordinated a second stakeholder meeting on May 28, 2019 in Refugio, Texas. The meeting was held at the Refugio County Fairgrounds during Quarter 7.
- 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 J: Mission and Aransas Rivers TMDL I-Plan Implementation Stakeholder Meeting Presentation- August 15, 2018

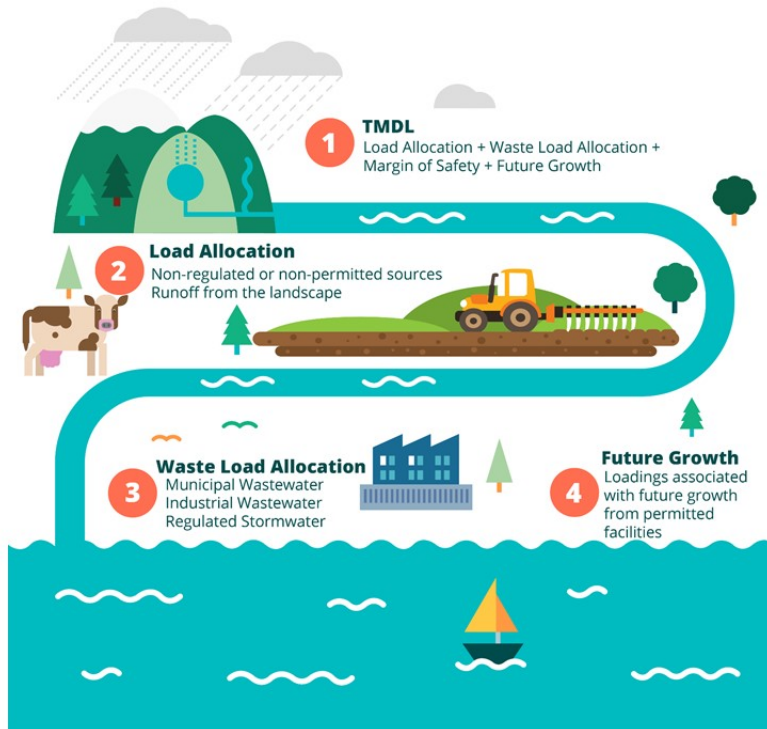
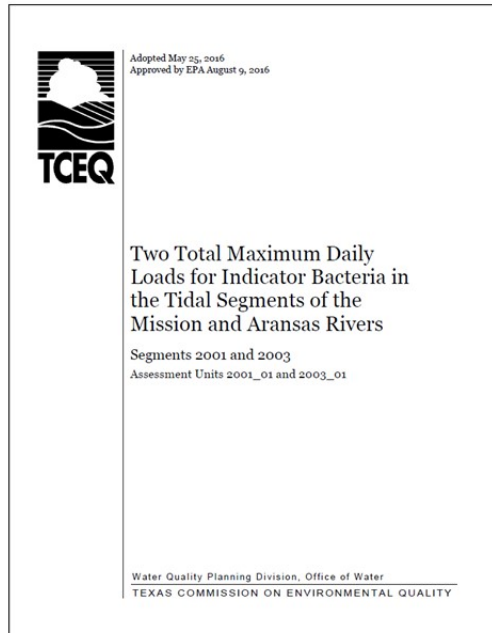


## Agenda

- Total Maximum Daily Load (TMDL) and Total Maximum Daily Load Implementation Plan (I-Plan) Recap
- Overview of WPP
- Implementation Update
- Water Quality Update
- Questions From Last Meeting
- Discussion

# TMDL Recap

- Defines the "pollution" budget for the waterbody.
- Identifies pollutant of concern, sources, and allowable load.
- Adopted in 2016 by TCEQ.
- Updated in 2017 to include Load Allocations for Aransas River Above Tidal and Poesta Creek.



# Load Allocations

AU	TMDL	WLA <sub>wwtf</sub>	WLA <sub>sw</sub>	LA	MOS
2001_01 (Mission River Tidal) <sup>1</sup>	370.543	1.291	0.213	350.512	18.527
2003_01 (Aransas River Tidal) <sup>1</sup>	150.321	10.081	0.050	132.674	7.516
2004_02 (Aransas Above Tidal) <sup>2</sup>	319.170	28.500	0.206	274.505	15.959
2004B_02 (Poesta Creek) <sup>2</sup>	63.89	15.183	0.066	45.447	3.195

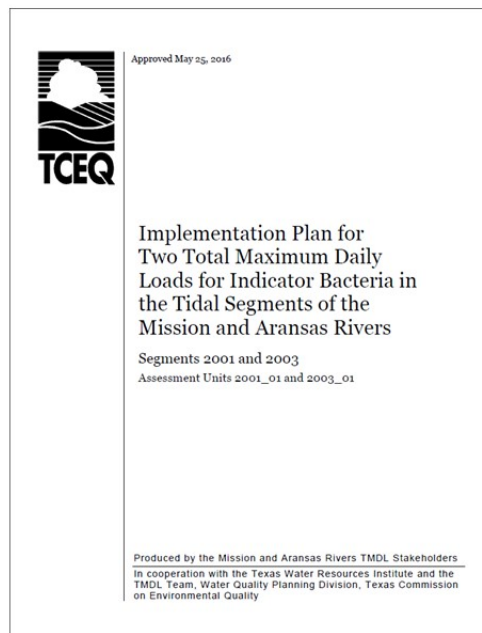
<sup>1</sup> Units are billion MPN/Day Enterococcus bacteria (35 MPN/100 mL standard)

<sup>2</sup> Units are billion MPN/Day *E. coli* bacteria (126 MPN/100 mL standard)



## I-Plan Recap

- Developed with stakeholders
- Nine Voluntary Management Measures
- Two point source Control Actions.



# I-Plan Summary

	Description	# in Mission River	# in Aransas River
MM #1	Promote Voluntary Conservation Plans	81	122
MM #2	Tax Exemption Evaluation	NA	NA
MM #3	Feral Hog Control	745	598
MM #4	Reduce Illicit Dumping	NA	NA
MM #5	Increase Septic System Compliance	76	486
MM #6	Promote Urban Stormwater BMPs	74	517
MM #7	Reduce Unauthorized Discharges	15%	15%
MM #8	Voluntary Adoption of Half Bacteria Limits by WWTFs	0	4
MM #9	Expand Monitoring	NA	NA
CA #1	Increase WWTF Effluent Monitoring	NA	NA
CA #2	Upgrade WWTFs	0	2



Allen Berthold – Texas Water Resources Institute

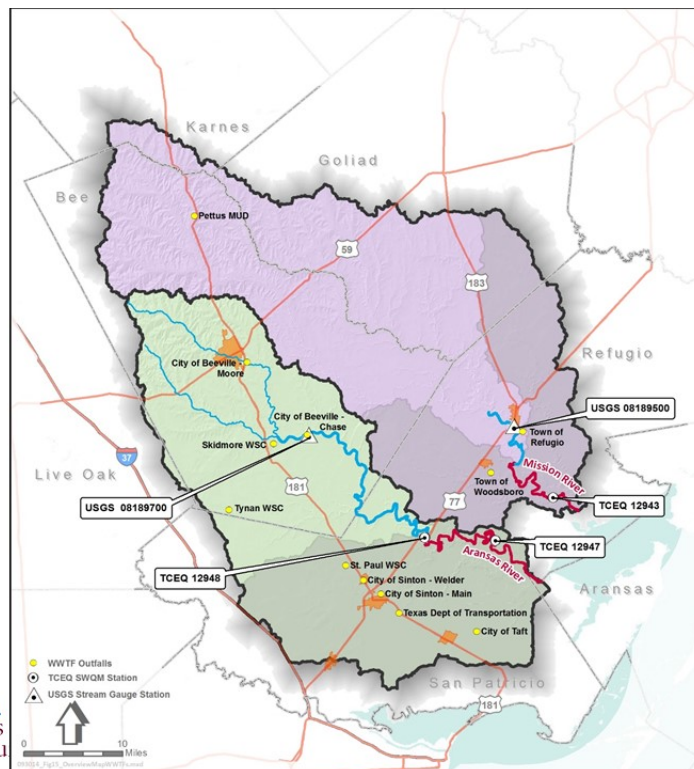
# IMPLEMENTATION UPDATE

# General Land Office Implementation Grant

- Communications (Education Flyers, direct mailing, etc.)
- Grant Writing
  - Monitoring
  - Targeted Education
  - Stormwater Education
- Public Meetings
  - Twice annually
- Education and Outreach (still need Septic, LSHS, Feral Hog)
  - Riparian Education – Goliad, April 25
  - Texas Watershed Stewards – Beeville, July 17
  - Texas Well Owner Network – Beeville, October 18
- Progress Tracking since 2016
  - Mission (81) – 53 (145) Conservation Plans, 1 (51) WQMPs – Total = 54
  - Aransas (122) – 51 (153) Conservation Plans, 2 (79) WQMPs – Total = 53

## Water Quality Monitoring Grant

- Quality Assurance
- 18 months of monitoring
- Begin September
- 3 sites, monthly
- Final Report



# Grant Writing

- Targeted Education
- Expand municipal stormwater education programs
- Other Ideas?
  - Small Acreage Landowner
- Other Funding Sources?

## FATS, OILS & GREASE



Don't Feed the Grease Monster PDF JPG  
 F.O.G. Pledge (for signatures) PDF  
 F.O.G. Pledge Bandit Sign PDF (upon request) JPG

## NONPOINT SOURCE POLLUTION (RESIDENTIAL)



When It Rains, Your Yard Drains PDF JPG  
 LID Pledge (for signatures) PDF  
 LID Pledge Bandit Sign PDF JPG

## ON-SITE SEWAGE FACILITIES (SEPTIC SYSTEMS)



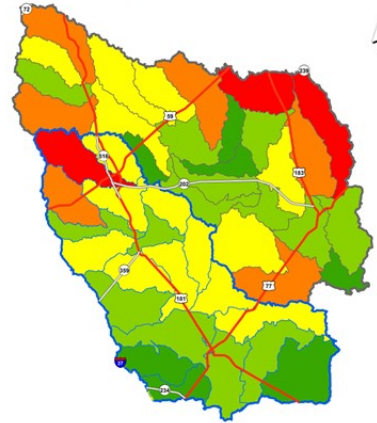
The EPA has a variety of outreach materials available for download on their website. Some are available in English and Spanish.  
 A Homeowner's Guide to Septic Systems PDF English Spanish  
 Do's and Don'ts Homeowner's Brochure PDF English Spanish  
 H-GAC has compiled a list of OSSF fact sheets and resources online. Many are also available in Spanish.

## CURBSIDE DEBRIS SEPARATION (DISASTER DEBRIS)



A Category 4 Hurricane with winds up to 155 mph would create an estimated 12 million tons of debris. Disasters such as this create problems, as they are usually costly to clean up and require a large amount of space in area landfills for debris. H-GAC recognizes the need for communities to perform efficient and timely cleanup of debris generated by natural disasters and/or major storm events.  
 Curbside Debris Flyer PDF English Spanish  
 Curbside Debris Flyer PNG English Spanish

## GENERAL WATER QUALITY



Michael Schramm – Texas Water Resources Institute

# WATER QUALITY UPDATE

### Mission River Tidal – 2001\_01

Assessed Value	
2014 Report (12/2005-11/2012)	71.06
2016 Draft Report (12/2007-11/2014)	68.51

### Aransas River Tidal – 2003\_01

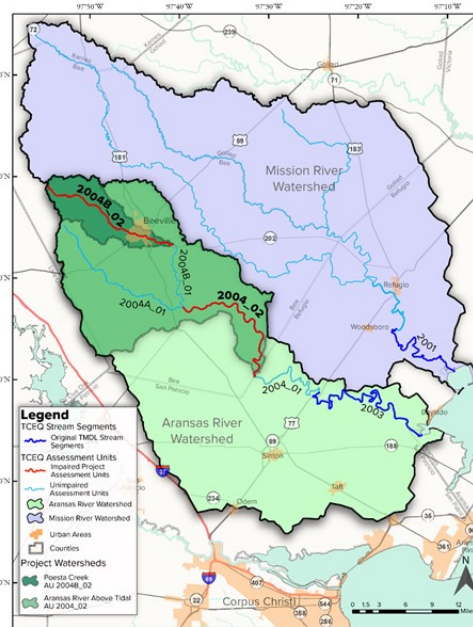
Assessed Value	
2014 Report (12/2005-11/2012)	64.29
2016 Draft Report (12/2007-11/2014)	90.61

### Aransas River Above Tidal – 2004\_02

Assessed Value	
2014 Report (12/2005-11/2012)	166.41
2016 Draft Report (12/2007-11/2014)	181.13

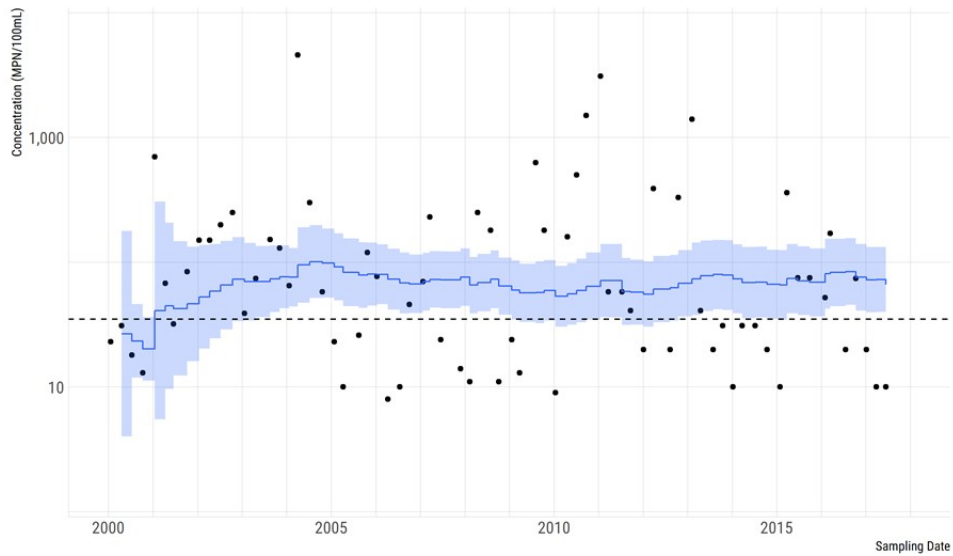
### Poesta Creek – 2004B\_02

Assessed Value	
2014 Report (12/2005-11/2012)	310.76
2016 Draft Report (12/2007-11/2014)	306.54



### Enterococcus Bacteria Concentrations

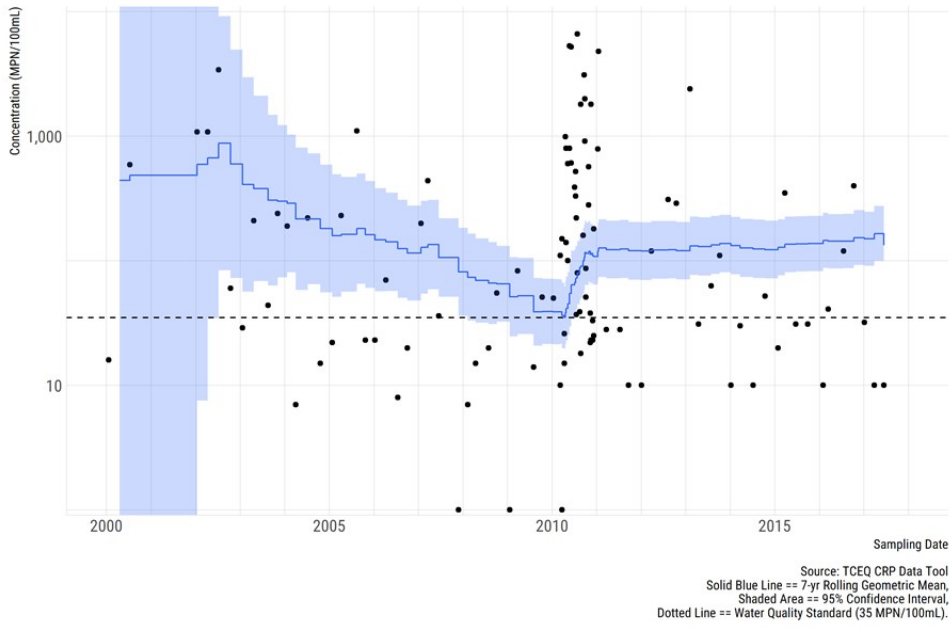
2001\_01 Mission River Tidal (January 2000 - December 2017)



Source: TCEQ CRP Data Tool  
 Solid Blue Line == 7-yr Rolling Geometric Mean,  
 Shaded Area == 95% Confidence Interval,  
 Dotted Line == Water Quality Standard (35 MPN/100mL).

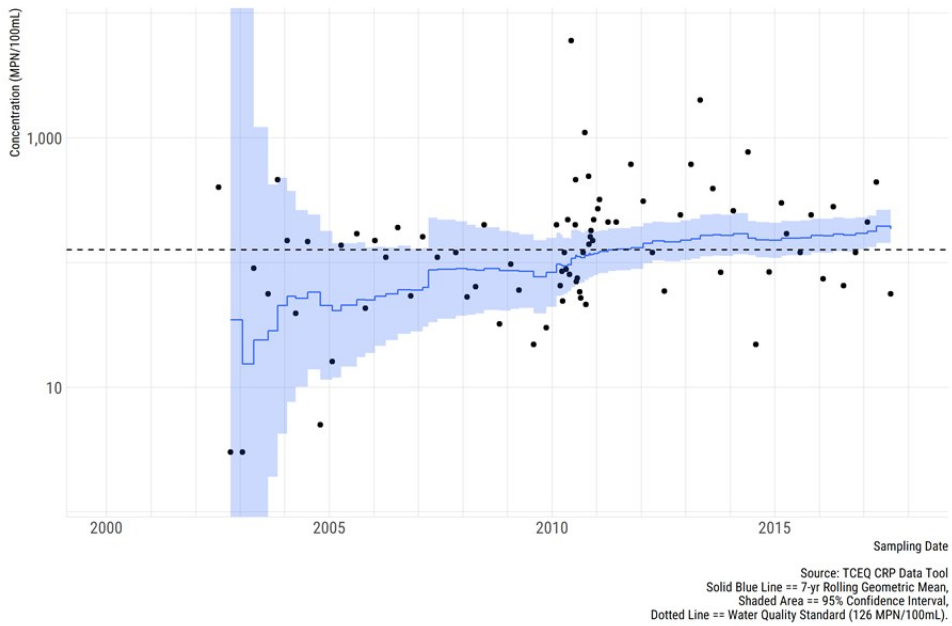
### Enterococcus Bacteria Concentrations

2001\_01 Aransas River Tidal (January 2000 - December 2017)



### E. coli Bacteria Concentrations

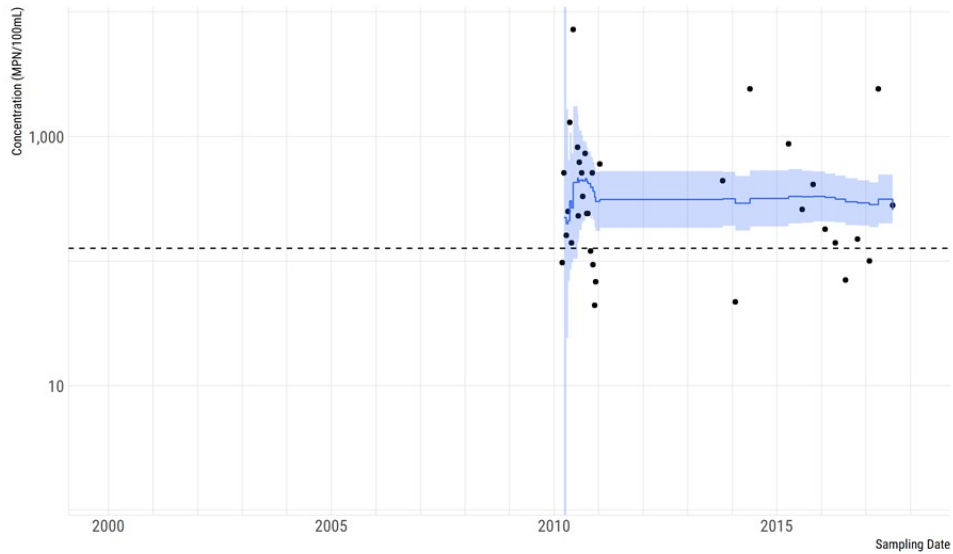
2004\_02 Aransas River Above Tidal (January 2000 - December 2017)





### E. coli Bacteria Concentrations

2004B\_02 Poesta Creek (January 2000 - December 2017)



Source: TCEQ CRP Data Tool  
Solid Blue Line == 7-yr Rolling Geometric Mean,  
Shaded Area == 95% Confidence Interval,  
Dotted Line == Water Quality Standard (126 MPN/100mL).

# NEXT STEPS

Allen Berthold – Texas Water Resources Institute



# Next Steps

## Tres Palacios Watershed Protection Plan Healthy Livestock Practices

These practices not only help improve livestock and crop production, but they also help improve the water quality in ponds, streams, and rivers in your area!

### Cross Fencing



Fences installed inside a perimeter fence to divide a grazing area into separate paddocks

**Benefits**

- Help facilitate a prescribed grazing system through livestock movement
- Eliminate access to unsafe areas
- Allow non-grazed pastures time to recover

### Prescribed Grazing



Managing vegetation harvest with grazing and/or browsing animals

**Benefits**

- Improves or maintains quantity/quality of forage for grazing animal productivity
- Improves or maintains species composition and vigor of plant communities

### Feed, Salt, and Mineral Locations



The placement of feed, salt, or mineral locations off-stream as an attempt to improve grazing distribution and encourage livestock to move away from sensitive riparian areas

**Benefits**

- Decreases herd injuries associated with cattle climbing steep and unstable stream banks
- Increases grazing distribution
- Increases overall herd gain

### Heavy Use Area Protection



The stabilization of areas frequently and intensively used by people, animals, or vehicles by establishing vegetation cover, surfacing with suitable materials, and/or installing needed structures

**Benefits**

- Reduces herd health risks associated with livestock standing in muddy areas, such as foot disease and injuries due to unstable footing
- Reduces accelerated soil erosion and maintains or improves soil conditions

- Develop educational materials
- Develop newsletter and distribute via email
- Continue grant writing
  - Small acreage landowner grant
  - Targeted education to TSSWCB
- Continue tracking implementation
  - Reach out to municipalities
- Host education programs
  - Lone Star Healthy Steams, Septic, Feral Hog
- Next public meeting – Spring 2019

TEXAS A&M  
**AGRI LIFE**  
RESEARCH | EXTENSION

Texas Water  
Resources Institute  
*make every drop count*

# DISCUSSION

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Texas Water  
Resources Institute  
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TEXAS A&M  
**AGRI LIFE**  
RESEARCH | EXTENSION

## Appendix K: Mission and Aransas Rivers TMDL I-Plan Implementation Stakeholder Meeting Presentation- May 28, 2019

**MISSION AND  
ARANSAS RIVERS  
IMPLEMENTATION  
PLAN UPDATE**

Allen Berthold – Texas Water Resources Institute  
Stephanie deVilleneuve – Texas Water Resources Institute  
May 28, 2019

**Texas Water  
Resources Institute**  
*make every drop count*

**TEXAS A&M  
AGRI LIFE  
RESEARCH | EXTENSION**

### **Agenda**

- Total Maximum Daily Load (TMDL) and Total Maximum Daily Load Implementation Plan (I-Plan) Recap
- Overview of WPP
- Implementation Update
- Water Quality Update
- Next Steps
- Discussion

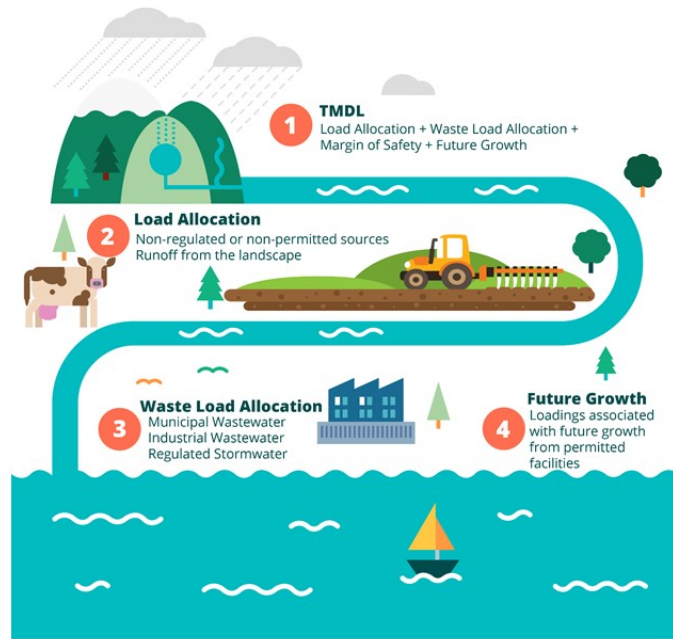
# TMDL Recap

Defines the "pollution" budget for the waterbody.

Identifies pollutant of concern, sources, and allowable load.

Adopted in 2016 by TCEQ.

Updated in 2017 to include Load Allocations for Aransas River Above Tidal and Poesta Creek.



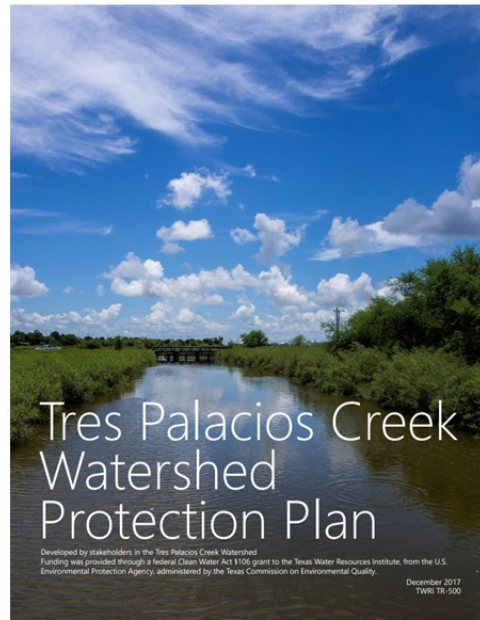
# I-Plan Summary and Recap

	Description	# in Mission River	# in Aransas River
MM #1	Promote Voluntary Conservation Plans	81	122
MM #2	Tax Exemption Evaluation	NA	NA
MM #3	Feral Hog Control	745	598
MM #4	Reduce Illicit Dumping	NA	NA
MM #5	Increase Septic System Compliance	76	486
MM #6	Promote Urban Stormwater BMPs	74	517
MM #7	Reduce Unauthorized Discharges	15%	15%
MM #8	Voluntary Adoption of Half Bacteria Limits by WWTFs	0	4
MM #9	Expand Monitoring	NA	NA
CA #1	Increase WWTF Effluent Monitoring	NA	NA
CA #2	Upgrade WWTFs	0	2



# Overview of Watershed Protection Plan

- Chapter 1: Watershed Management
- Chapter 2: Characterization of the Mission and Aransas Rivers Watersheds
- Chapter 3: Water Quality
- Chapter 4: Pollutant Source Assessment
- Chapter 5: Watershed Protection Plan Management Strategies
- Chapter 6: Plan Implementation
- Chapter 7: Assistance Needs
- Chapter 8: Implementation Support and Success



## IMPLEMENTATION UPDATE

## **General Land Office Implementation Grant**

- Communications
  - Spring/Summer 2019 Newsletter
  - Septic System Maintenance Fact Sheet
  - Identifying a Failing Septic System Fact Sheet
  - Septic System Pocket Guide –In Development
  - Benefits of Rotational Grazing – Thoughts?
- Grant Writing
  - Implementation – funded
  - Stormwater Education – rejected
  - Targeted Education – rejected
  - Small Acreage Landowner – rejected
  - Water Quality Monitoring – funded
  - WPP Development – funded
  - Upcoming - TCEQ, TSSWCB, GLO RFPs

## **General Land Office Implementation Grant**

- Public Meetings
  - August 2018
  - May 2019
- Education and Outreach
  - Riparian Education – Goliad April 20, 2018
  - Texas Watershed Stewards – Beeville July 18, 2018
  - Texas Well Owner Network – Beeville October 18, 2018
  - Texas Well Owner Network – Refugio May 15, 2019
  - Lone Star Healthy Streams – Refugio, July 16, 2109
  - Others?? Septic System Maintenance?

## Implementation Tracking

	Description	# in Mission River	# in Aransas River
MM #1	Promote Voluntary Conservation Plans	54 (81 goal)	53 (122 goal)
MM #2	Tax Exemption Evaluation	NA – Honey Bee?	NA– Honey Bee?
MM #3	Feral Hog Control	?	?
MM #4	Reduce Illicit Dumping	Trash pickup in Blanco Creek	?
MM #5	Increase Septic System Compliance	?	?
MM #6	Promote Urban Stormwater BMPs	?	?
MM #7	Reduce Unauthorized Discharges	2009-2016 = 1.3 average per year 2016-2019 = 1.5 per year average	2009-2016= 2.6 average per year 2016-2019 = 4.5 average per year
MM #8	Voluntary Adoption of Half Bacteria Limits by WWTFs	?	?
MM #9	Expand Monitoring	18 months	18 months
CA #1	Increase WWTF Effluent Monitoring	According to Permit	According to Permit
CA #2	Upgrade WWTFs	1? (goal of 0)	2 (goal of 2)

## Grant Ideas?

- GLO, TCEQ, TSSWCB requests for proposals out soon
- Municipal stormwater education programs
- Continued implementation?
- Need for local technician at SWCDs?
- Septic system repair and replacement?
- Small acreage education?

# WATER QUALITY UPDATE

## Mission River Tidal – 2001\_01 Assessed Value

2014 Report (12/2005-11/2012)	71.06
2016 Draft Report (12/2007-11/2014)	68.51
2018 Estimated Value (12/2009-11/2016)	75.82

## Aransas River Tidal – 2003\_01 Assessed Value

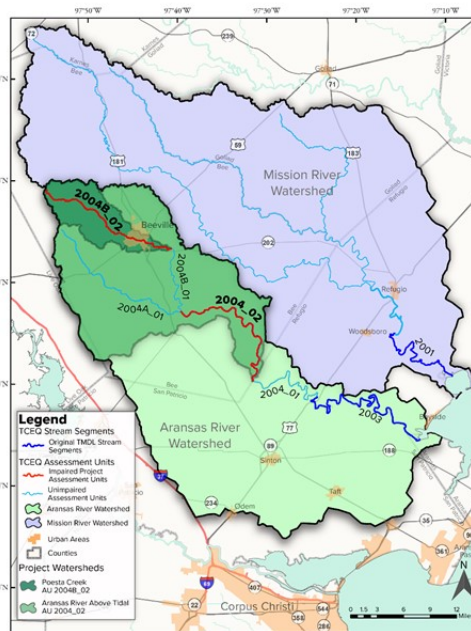
2014 Report (12/2005-11/2012)	64.29
2016 Draft Report (12/2007-11/2014)	90.61
2018 Estimated Value (12/2009-11/2016)	86.36

## Aransas River Above Tidal – 2004\_02 Assessed Value

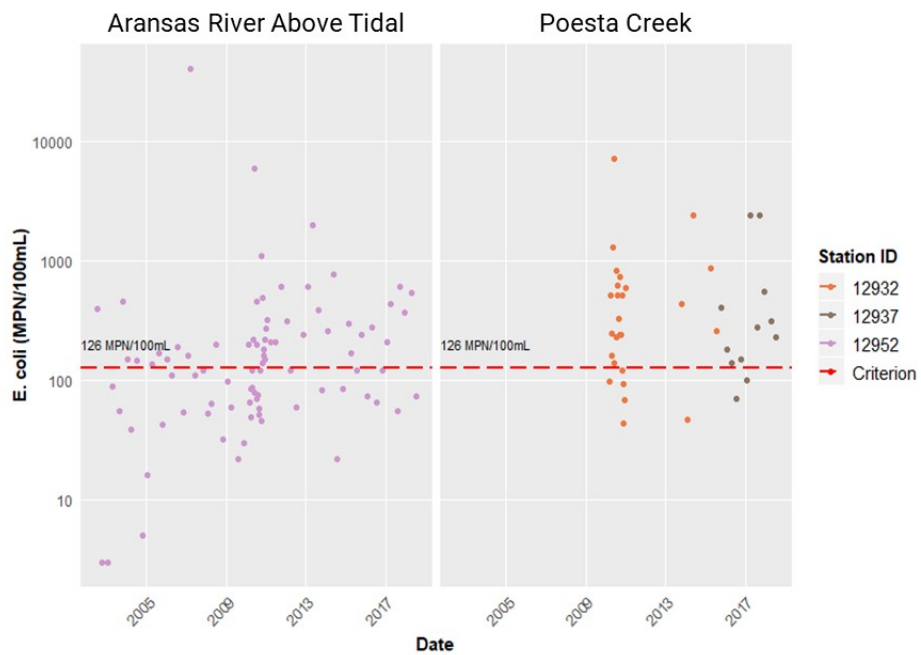
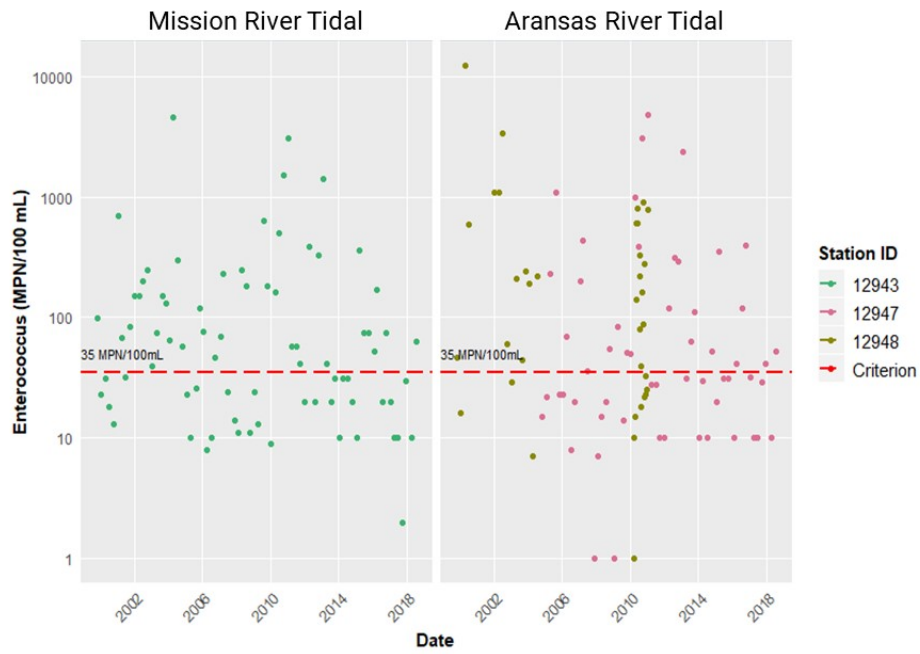
2014 Report (12/2005-11/2012)	166.41
2016 Draft Report (12/2007-11/2014)	181.13
2018 Estimated Value (12/2009-11/2016)	177.16

## Poesta Creek – 2004B\_02 Assessed Value

2014 Report (12/2005-11/2012)	310.76
2016 Draft Report (12/2007-11/2014)	306.54
2018 Estimated Value (12/2009-11/2016)	291.99







# NEXT STEPS



## Next Steps

### Mission and Aransas Rivers Watershed Protection Plan



A document developed by the stakeholders of the Mission and Aransas Rivers watersheds to restore and protect water quality in Mission River (Segment 2001), Aransas River (Segment 2003) and other waterbodies in the watersheds.

- Develop a Fall newsletter and distribute via email
- Complete Watershed Protection Plan
- Continue monitoring
- Upcoming grant opportunities
  - TCEQ RFP
  - TSSWCB RFP
  - GLO RFP
- Continue tracking implementation
- Host education program
  - Lone Star Healthy Streams
- Next public meeting – Fall 2019



# DISCUSSION

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## Appendix L

### Task 3: Stakeholder Education and Outreach

- TWRI coordinated and helped facilitate a Texas Riparian and Stream Ecosystems Workshop in Goliad, Texas during Quarter 3: April 25, 2018
- TWRI coordinated and helped facilitate a Texas Watershed Stewards Workshop in Beeville, Texas during Quarter 4: July 17, 2018. This workshop also counted as the Feral Hog Management Workshop because those topics were covered at the event.
- TWRI coordinated and helped facilitate a TWON Well Educated Workshop in Beeville, Texas during Quarter 5: October 18, 2018. This workshop also counted as the Septic System Education Workshop because those topics were covered at the event.
- TWRI coordinated and helped facilitate a TWON Well Screening event in Refugio, Texas during Quarter 7: May 15, 2019
- Notices, agendas, meetings materials (educational materials developed in above appendices), attendance list and summaries of meetings were provided to the Texas General Land Office project manager upon completion of meetings

# Appendix M: Texas Riparian & Stream Ecosystem Workshop Promotional Flyer



texasriparian.org



## Texas Riparian & Stream Ecosystem Workshop

### Mission, Aransas and Lower San Antonio Rivers

April 25, 2018 | 8:00 a.m. - 4:00 p.m.

The Fire Pit  
 144 N Courthouse Square  
 Goliad, Texas 77963

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](mailto: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 CEUs; Texas Forestry Association - 6 hours; Society of American Foresters - 6 hours; 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 April 20, 2018 at the link above or by contacting Entwistle. The San Antonio River Authority is sponsoring a lunch of a brisket plate, beans and potato salad.

First name: \_\_\_\_\_ Last name: \_\_\_\_\_

Email address: \_\_\_\_\_ Phone: \_\_\_\_\_

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

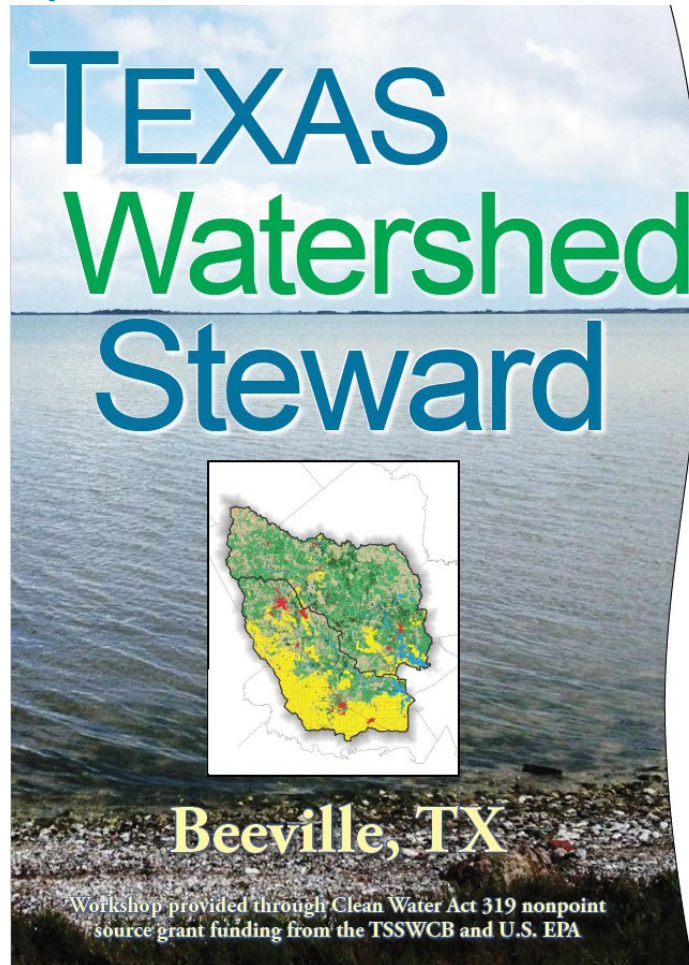


Life's better outside.  
 PROUD PARTNER



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 N: Texas Watershed Stewards Workshop Promotional Flyer



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.

**July 17, 2018:  
8:00 am - 12:00 pm**

Bee County Expo Center  
214 S. FM 351  
Beeville, TX 78102  
(Near intersection of Hwy 59 & FM 351)

The workshop will provide an overview of water quality and watershed management in Texas, including a discussion on the Mission & Aransas Rivers watersheds along with efforts by the Texas Water Resources Institute and area residents to improve and protect it. Free continuing education credits are offered for a wide variety of professional disciplines. For a complete list of CEUs/continuing education 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 call 979.862.4457




## Appendix O: TWON Well Educated Workshop Promotional Flyer

# Water Well Owners Educational Event



**TEXAS  
WELL  
OWNER  
NETWORK**  
RESOURCES HELP LANDOWNERS PROTECT GROUNDWATER



Thursday, October 18, 2018  
1 – 5 p.m.

Bee County Expo Center  
214 S. F.M. 351  
Beeville, TX

**TEXAS WELL OWNER NETWORK PROGRAM**


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), arsenic, and *E. coli* bacteria for \$10. Pick up approved sample containers with instructions at the [Bee County Texas A&M AgriLife Extension](#) office.

Bring your samples and \$10 to the training on October 18.


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




TEXAS A&M  
**AGRI LIFE**  
EXTENSION




TEXAS STATE  
**Soil & Water**  
CONSERVATION BOARD



Texas Water  
**Resources Institute**  
making every drop count



**RCAP**  
www.rcap.org



**TWON**  
TEXAS  
Well Owner  
NETWORK

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 P: TWON Well Screening Press Release

### Well water screening opportunity set for May 14 in Refugio

[today.agrilife.org/2019/04/25/well-water-screening-opportunity-set-for-may-14-in-refugio/](https://today.agrilife.org/2019/04/25/well-water-screening-opportunity-set-for-may-14-in-refugio/)

April 25,  
2019

REFUGIO — The Texas Well Owner Network is hosting a well water screening May 14 in Refugio to give area residents the opportunity to have their well water evaluated.

The screening will be from 8:30-10 a.m. at the Texas A&M AgriLife Extension Service office at 414B N. Alamo St.

A meeting explaining screening results will be at 6 p.m. May 15 at the Refugio County Community Center, 305 Swift St.

The screening is presented by TWON in collaboration with [AgriLife Extension](#), [Healthy Texas](#) and [Texas Water Resources Institute](#), or TWRI. Healthy Texas is an initiative of AgriLife Extension and the Texas A&M University Health Science Center.

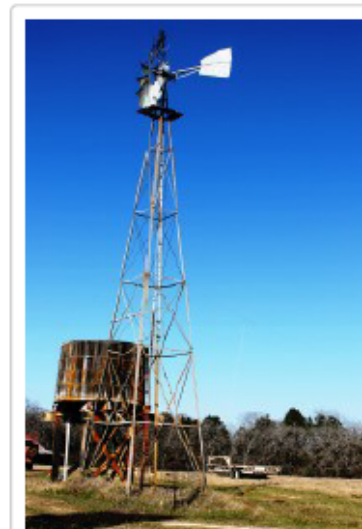
John Smith, AgriLife Extension program specialist, College Station, said area residents wanting to have their well water screened should pick up a sample bag, bottle and instructions from the AgriLife Extension office in Refugio County.

"It is very important that only sampling bags and bottles from the AgriLife Extension office be used and all instructions for proper sampling are followed to ensure accurate results," Smith said.

The samples must be turned in by 10 a.m. on the day of the screening. The cost for each sample is \$10.

Smith said private water wells should be tested annually. Samples will be screened for contaminants, including total coliform bacteria, E. coli, nitrate-nitrogen, arsenic and salinity.

He said long-term consumption of arsenic in water increases the risk of skin cancer and cancer in the liver, bladder and lungs. Chronic exposure to arsenic may lead to gastrointestinal irritation and cardiovascular disease.



The Texas Well Owner Network will present a well water screening opportunity May 14 in Refugio. (Texas Well Owner Network photo)



The presence of E. coli bacteria in water, Smith said, indicates that waste from humans or warm-blooded animals may have contaminated the water. Water contaminated with E. coli is more likely to also have pathogens present that can cause diarrhea, cramps, nausea or other symptoms.

“Water with nitrate-nitrogen at levels of 10 parts per million is considered unsafe for human consumption,” Smith said. “Nitrate levels above 10 parts per million can disrupt the ability of blood to carry oxygen throughout the body, resulting in a condition called methemoglobinemia. Infants less than 6 months of age and young livestock are most susceptible.”

Smith said it is important for those submitting samples to be at the May 15 meeting to receive results, learn corrective measures for identified problems and improve their understanding of private well management.

At the program, Billy Sue Dunnivan, Refugio Groundwater Conservation District general manager, will discuss the district and its purpose.

For more information, contact the AgriLife Extension office at 361-526-2825.

To learn more about the programs offered through the network or to find additional publications and resources, go to <https://twon.tamu.edu>.

Funding for TWON 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. The project is managed by the TWRI, part [Texas A&M AgriLife Research](#), [AgriLife Extension](#) and the [College of Agriculture and Life Sciences](#) at [Texas A&M University](#).

-30-

Contact: John Smith, 979-845-2761, [johnsmith@tamu.edu](mailto:johnsmith@tamu.edu)

## Appendix Q

### Task 4: Project Reporting

- TWRI submitted the first quarterly report on January 10, 2018
- TWRI submitted the second quarterly report on April 10, 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 8, 2019
- TWRI submitted the sixth quarterly report on April 10, 2019
- TWRI submitted the seventh quarterly report on July 10, 2019
- TWRI submitted the eighth quarterly report on October 10, 2019
- TWRI requested a 5 month No Cost Extension in November 2018. This moved the end date of the project to August 31, 2019.
- TWRI requested a 3 month No Cost Extension in June 2019. This moved the end date of the project to November 30, 2019.
- TWRI submitted budget revision requests during Quarters 7 & 8
- AgriLife submitted Invoice #R108010, covering October 1, 2017-March 31, 2018, for a total of \$2,080.55
- AgriLife submitted Invoice #R108365, covering April 1, 2018-May 31, 2018, for a total of \$1,816.65
- AgriLife submitted Invoice #R108971, covering June 1, 2018-August 31, 2018, for a total of \$2,758.08
- AgriLife submitted Invoice #R109827, covering September 1, 2018-December 31, 2018, for a total of \$22,258.22
- AgriLife submitted Invoice #R110385, covering January 1, 2019-March 31, 2019, for a total of \$22,206.34
- AgriLife submitted Invoice #R110949, covering April 1, 2019-June 30, 2019, for a total of \$15,850.38
- AgriLife submitted Invoice #R111541, covering July 1, 2019-September 30, 2019, for a total of \$10,652.67
- TWRI maintains contact with the Texas General Land Office regarding project activities and deliverables.