ANGELINA & NECHES RIVER AUTHORITY

Lake Sam Rayburn On-Site Sewage Facility (OSSF) Program Support and Attoyac Bayou OSSF Remediation

FINAL REPORT

Angelina & Neches River Authority
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ANRA

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FINAL REPORT

August 2016

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Lufkin, TX 75902

Funding support for this project was provided in part through a Clean Water Act §319(h) Nonpoint Source Grant from the Texas Commission on Environmental Quality (TCEQ) and the U.S. Environmental Protection Agency (EPA)

Federal ID# 99614618
Contract # 582-14-40162

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LIST OF ACRONYMS

ANRA	Angelina & Neches River Authority
AU	Assessment Unit
BMP	Best Management Practice
CRP	Clean Rivers Program
CWA	Clean Water Act
CZR	Control Zone Rayburn
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
FM	Farm-to-Market Road
GIS	Geographic Information Systems
gpd	Gallons Per Day
GPS	Global Positioning System
L	liter
mg	milligram
mg/L	milligrams per liter
MHI	Median Household Income
mL	milliliters
MPN	Most Probable Number
MPN/100 mL	Most Probable Number per 100 milliliters
N	Nitrogen
NCR	Noncontact Recreation
NELAP	National Environmental Laboratory Accreditation Program
OSSF	On-Site Sewage Facility
P	Phosphorus
PCR	Primary Contact Recreation
PDF	Portable Document Format
QAPP	Quality Assurance Project Plan
S.U.	Standard Units
SCR1	Secondary Contact Recreation 1
SCR2	Secondary Contact Recreation 2
SH	State Highway
SWQMIS	Surface Water Quality Monitoring Information System
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TSSWCB	Texas State Soil and Water Conservation Board
TSWQS	Texas Surface Water Quality Standards
TWRI	Texas Water Resources Institute
µS/cm	microseimens per centimeter
WPP	Watershed Protection Plan

DISCLAIMER

Reference herein to any specific commercial products, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the Angelina & Neches River Authority, the Texas Commission on Environmental Quality, or the United States Environmental Protection Agency.

EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

Project Background

The purpose of the *Lake Sam Rayburn On-Site Sewage Facility (OSSF) Program Support and Attoyac Bayou OSSF Remediation* project is to identify and address non-point sources of bacteria and nutrients in the Attoyac Bayou watershed. Attoyac Bayou (Segment 0612) is listed as impaired for bacteria for failing to meet its designated use of Primary Contact Recreation. In the *Attoyac Bayou Watershed Protection Plan* (WPP), failed, improperly functioning, or non-existent OSSFs were identified in the WPP as the largest single contributor to bacterial loading in the watershed.

Through the *Lake Sam Rayburn OSSF Program Support and Attoyac Bayou OSSF Remediation* project, the Angelina & Neches River Authority (ANRA) began implementing management recommendations listed in the *Attoyac Bayou WPP*. One of the WPP recommendations is the identification and replacement of failed OSSFs within the watershed. The project also begins the development of an OSSF database for the Sam Rayburn Control Zone, which can be expanded in the future to include the Attoyac Bayou watershed. The development of a watershed-wide OSSF database was also included as a management recommendation in the *Attoyac Bayou WPP*.

Project Goals

In order to address water quality concerns within the Attoyac Bayou watershed, this project was designed to meet several goals. The goals of the *Lake Sam Rayburn OSSF Program Support and Attoyac Bayou OSSF Remediation* were:

- Development of a database for storage and retrieval of OSSF information for permitted systems in counties in the Control Zone Rayburn (CZR), the 2000-ft buffer zone around Sam Rayburn Reservoir, as well as the unincorporated portion of San Augustine County (including the portion within the Attoyac Bayou watershed);
- Electronic capture of all documents related to permitted systems in the CZR and the unincorporated portion of San Augustine County (including the portion within the Attoyac Bayou watershed);
- Field collection of Geographic Information Systems (GIS) data for OSSFs in the CZR and the unincorporated portion of San Augustine County (including the portion within the Attoyac Bayou watershed);
- Mapping of OSSFs in the CZR and the unincorporated portion of San Augustine County (including the portion within the Attoyac Bayou watershed);
- Identification and replacement of failing or non-existent OSSFs in the Attoyac Bayou watershed (located in Rusk, Shelby, San Augustine, and Nacogdoches counties). Provide educational materials to the public;
- Water Quality Monitoring in the Attoyac Bayou watershed to determine effectiveness of Best Management Practices (BMPs) to be implemented in the *Attoyac Bayou Watershed Protection Plan*.

Project Funding

Funding support for this project was provided in part through a Clean Water Act §319(h) Nonpoint Source Grant from the Texas Commission on Environmental Quality (TCEQ) and the U.S. Environmental Protection Agency (EPA).

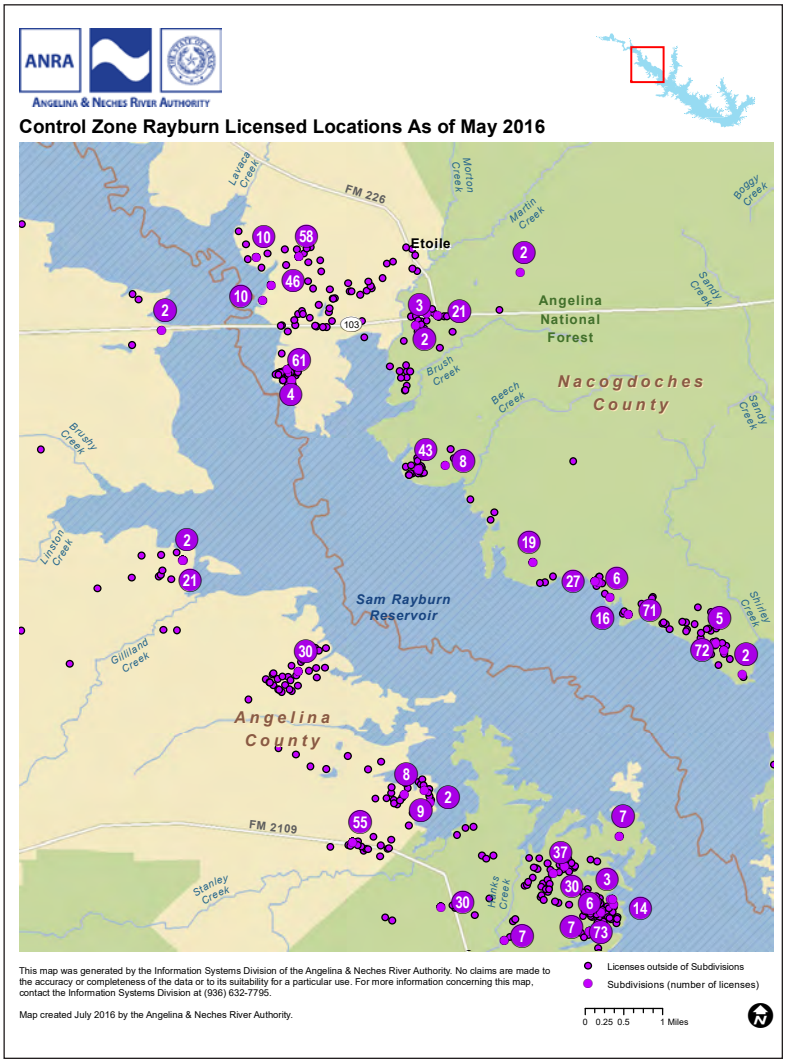
Project Title	*Lake Sam Rayburn On-Site Sewage Facility (OSSF) Program Support and Attoyac Bayou OSSF Remediation*
Contractor	Angelina & Neches River Authority (ANRA)
Federal ID#	99614618
Contract #	582-14-40162
Project Start Date	September 1, 2013
Project End Date	August 31, 2016
Total Budget	$699,425
Federal Funds (60%)	$419,655
Match Funds (40%)	$279,770

Summary of Accomplishments

OSSF Database Development

As a task of this project, ANRA developed a database for storage and retrieval of OSSF information for permitted systems in counties in the Control Zone Rayburn (CZR), the 2000-ft buffer zone around Sam Rayburn Reservoir, as well as the unincorporated portion of San Augustine County (including the portion within the Attoyac Bayou watershed).

The database allows for the storage of all data related to a system, including the property owner, maintenance records, inspections, and complaints/violations. The ability to query this information makes operation of ANRA's OSSF program much more efficient in its day-to-day operations. Additionally, the ability to map complaints/violations may be useful to address water quality issues in the future.

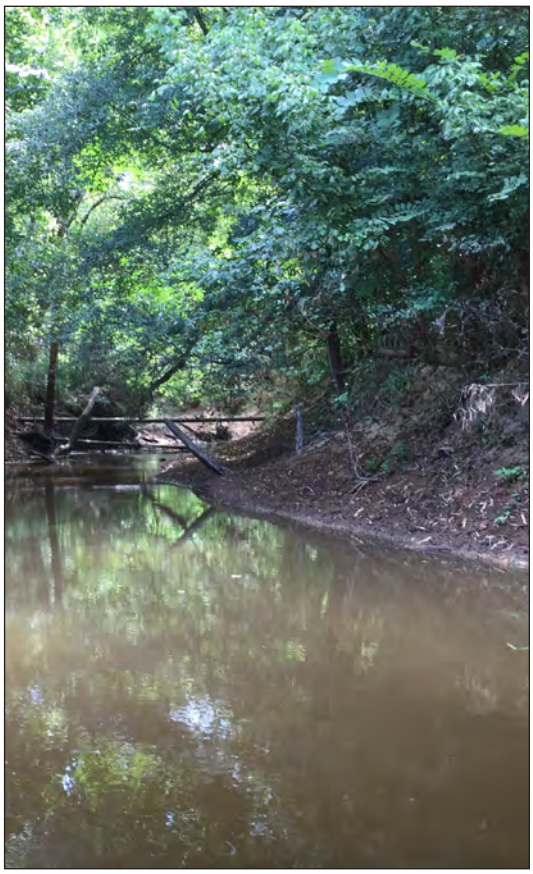


Electronic Document Capture

ANRA has a repository of OSSF records for the Sam Rayburn Reservoir Control Zone dating back to 1972. During the period from December 2013 to February 2015, ANRA converted 4,904 OSSF records from paper to electronic storage as Adobe PDF documents. Those 4,904 records were comprised of a total of 62,184 pages of documents. Data from these records were incorporated into ANRA's OSSF database. Scanned electronic versions of the OSSF documents are linked and accessible from within the ANRA OSSF database.

Collection of GPS Data and Mapping

ANRA conducted a desk review of existing data and the field collection of Geographic Information Systems (GIS) data for OSSFs in the project area. Due to a lack of data on historically licensed OSSFs, ANRA was unable to pinpoint exact locations to all OSSFs within the project area. However, in the cases where we were unable to assign an exact address, we were able to assign the systems on a subdivision level so that we had a general location of the OSSFs in the project area. Mapping of OSSFs in the project area was performed based upon the GPS data that was collected.



Identification and Replacement of Failing or Non-Existent OSSFs

The primary goal of the *Lake Sam Rayburn On-Site Sewage Facility (OSSF) Program Support and Attoyac Bayou OSSF Remediation* project was the identification and replacement of failing or non-existent OSSFs in the Attoyac Bayou watershed (located in Rusk, Shelby, San Augustine, and Nacogdoches counties). Funds were available to install twenty-three (23) aerobic OSSFs. Although ANRA experienced some delays in the project, we were able to successfully install all of the available systems within the watershed.

Taking into consideration the state of some of the systems being replaced (and the fact that several of the properties had no sewage treatment system at all), this project should result in a significant decrease in the amount of bacterial loading entering the Attoyac Bayou.

Data Collection and Analysis - Surface Water Quality Monitoring

Surface water quality monitoring was a component of this project, with the goal of determining the effectiveness of Best Management Practices (BMPs) to be implemented in the *Attoyac Bayou WPP*, such as the identification and replacement of failed OSSFs in the watershed.

Surface water quality monitoring was performed at five monitoring stations on a monthly basis for twenty-one (21) months over the period of October 2014 through May 2016. The monitoring stations chosen represent sites on both the main stem of the Attoyac Bayou as well as tributaries and had been monitored previously as part of the project that developed the *Attoyac Bayou WPP*.

Because of delays related to the timeframe of installing the OSSFs, the majority of the OSSFs were installed after the water quality monitoring component of the project had ended. Although the data could not be used to demonstrate BMP effectiveness, the results did verify data from previous monitoring activities. These stations will continue to be monitored in future projects.

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PROJECT OVERVIEW

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INTRODUCTION

The Angelina & Neches River Authority (ANRA) has the responsibility for monitoring, protecting, and enhancing water resources in the Neches River Basin. As part of ANRA's functions in the basin, it conducts a robust surface water quality monitoring program. ANRA has also been authorized by the Texas Commission on Environmental Quality (TCEQ) to regulate and permit On-Site Sewage Facilities (OSSFs) in portions of the basin. ANRA has permitted OSSFs in the Control Zone Rayburn (CZR), the 2000-ft buffer zone around Sam Rayburn Reservoir, since the early 1970s. In 2009, ANRA became the Authorized Agent for the unincorporated portion of San Augustine County. In October 2015, ANRA's OSSF Order was modified to include Angelina County in its jursidiction.

Based upon water quality data collected by ANRA through the TCEQ's Clean Rivers Program (CRP), a bacterial impairment was identified for the Attoyac Bayou (Segment 0612). The Attoyac Bayou was listed as impaired for elevated bacteria in the *2004 Texas 303(d) List* for not supporting its designated primary contact recreation use.

ANRA participated in a collaboratove assessment and monitoring project, funded through a Clean Water Act §319(h) Nonpoint Source grant from the Texas State Soil and Water Conservation Board (TSSWCB) and the U.S. Environmental Protection Agency (EPA) to the Texas Water Resources Institute (TWRI), that resulted in the development of the *Attoyac Bayou Watershed Protection Plan* (WPP). Failed, improperly functioning, or non-existent OSSFs were identified in the WPP as the largest single contributor to bacterial loading in the watershed.

The *Lake Sam Rayburn OSSF Program Support and Attoyac Bayou OSSF Remediation* project implements Management Recommendation 3 in the *Attoyac Bayou WPP* by identifying and replacing failed OSSFs within the watershed. The project also begins the development of an OSSF database for the Sam Rayburn Control Zone, which can be expanded in the future to include the Attoyac Bayou watershed. The development of a watershed-wide OSSF database was also included in Management Recommendation 3 in the *Attoyac Bayou WPP*.

PROJECT SIGNIFICANCE AND BACKGROUND

Problem/Need Statement

The purpose of this project was to identify and address non-point sources of bacteria and nutrients in specific areas in counties in the Control Zone Rayburn and the unincorporated portion of San Augustine County (including the portion within the Attoyac Bayou watershed). Attoyac Bayou (Segment 0612), a classified water body in 307.10 Appendix A of the Texas Surface Water Quality Standards, was listed as impaired for bacteria in the *2004 Texas 303(d) List.* A concern for ammonia has also been identified for the Attoyac. Attoyac Bayou is a rural stream that flows into Sam Rayburn Reservoir (Segment 0610), a classified reservoir, with the following designated uses: primary contact recreation, public water supply and high aquatic life use. Although a bacterial impairment has not been identified for Sam Rayburn Reservoir, nutrient concerns for ammonia and nitrate have been identified.

Through a Clean Water Act §319(h) Nonpoint Source grant from the Texas State Soil and Water Conservation Board and the U.S. Environmental Protection Agency to the Texas Water Resources Institute, the Attoyac Bayou Watershed Partnership was formed. This stakeholder group was created to address impairments and concerns in the Attoyac Bayou and restore the water quality to the point that it meets applicable water quality standards. Through that assessment and planning project, the *Attoyac Bayou Watershed Protection Plan* was developed. The *Attoyac Bayou WPP* identified numerous potential sources of bacterial loading, including OSSFs, wildlife, cattle, dogs, feral hogs, poultry litter, hunting camps, horses, and wastewater treatment facilities. Failed, improperly functioning or non-existent OSSFs were identified in the WPP as having the highest potential bacterial loading contribution to the watershed of all pollutant sources.

Project Description

ANRA developed the *Lake Sam Rayburn OSSF Program Support and Attoyac Bayou OSSF Remediation* project to implement portions of the *Attoyac Bayou WPP* and attempt to restore water quaility in the basin.

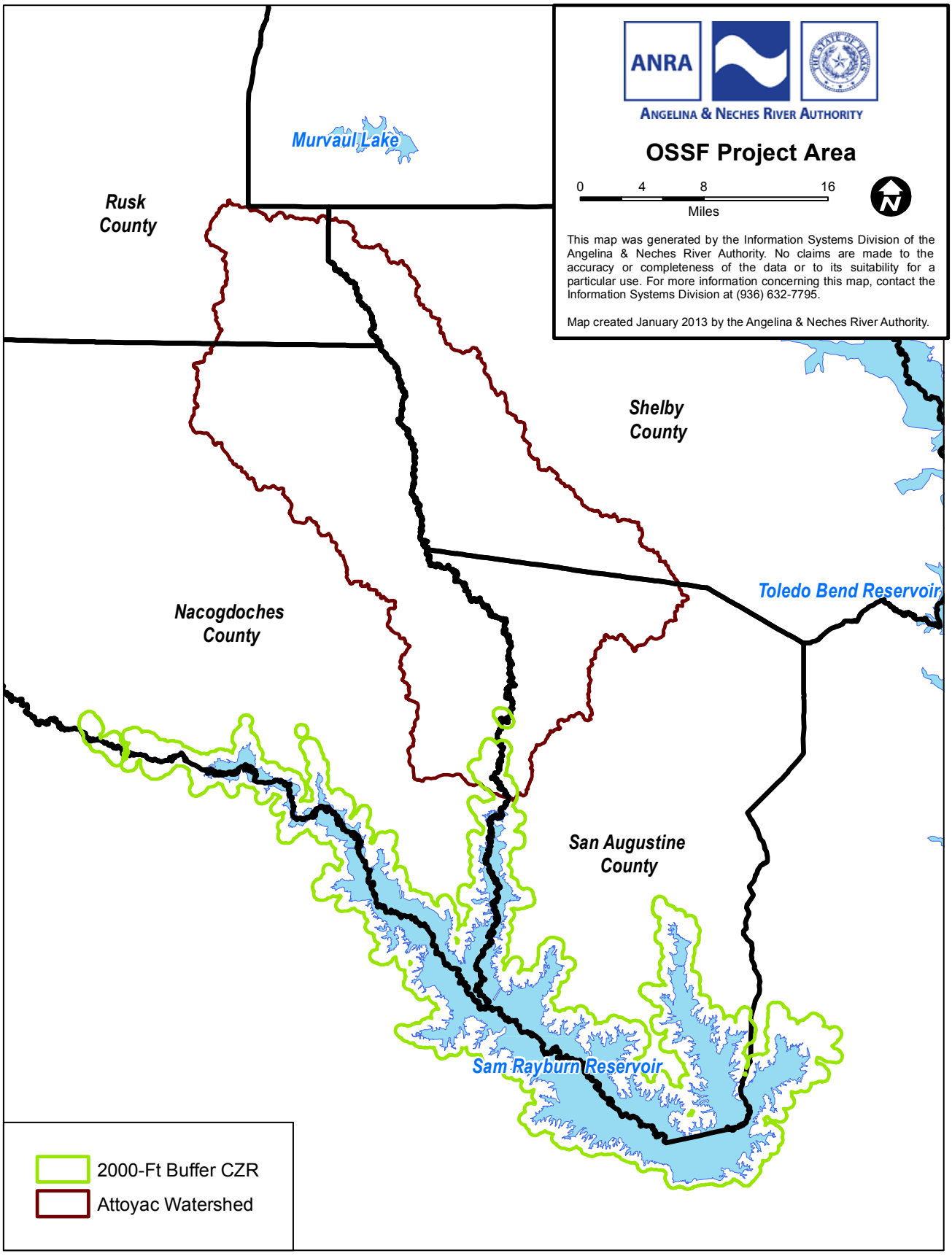
This project developed a database for storage and retrieval of information for OSSFs in the CZR and the unincorporated portion of San Augustine County. The database will be used to track and map all permitted systems in those areas. The database tracking and GIS mapping of permitted OSSFs will provide a framework that ANRA can use in identifying candidates for future OSSF replacement in subsequent projects.

Failing or non-existent OSSFs in the area were identified through a combination of database tracking of complaints and violations, field reconnaissance and inspections, and consultation with local officials. In order to reduce potential souces of pollution that may be contributing to bacterial impairments in the watershed, funds from the project were used to replace failed or improperly functioning OSSFs in the Attoyac Bayou watershed.

This project involved monthly surface water quality monitoring in the Attoyac Bayou watershed for a period of twenty-one months. Water quality monitoring conducted under this project tested not only for bacteria but for nutrients as well, including parameters for which Attoyac Bayou and Sam Rayburn Reservoir have nutrient concerns. The goal of this portion of the project was to identify improvements in water quality following the replacement of failed or non-existent OSSFs, as well as monitoring effectiveness of BMPs established by the *Attoyac Bayou WPP*.

Water quality data acquired during this project was collected under a TCEQ-approved Quality Assurance Project Plan (QAPP), allowing the data to be uploaded to the TCEQ's Surface Water Quality Monitoring Information System (SWQMIS). By uploading the data to SWQMIS, the data is made available to TCEQ for consideration in future water quality assessments.

Attoyac Bayou at SH 7



Map of Project Area

PROJECT GOALS

- Development of a database for storage and retrieval of OSSF information for permitted systems in counties in the Control Zone Rayburn (CZR), the 2000-ft buffer zone around Sam Rayburn Reservoir, as well as the unincorporated portion of San Augustine County (including the portion within the Attoyac Bayou watershed);
- Electronic capture of all documents related to permitted systems in the CZR and the unincorporated portion of San Augustine County (including the portion within the Attoyac Bayou watershed);
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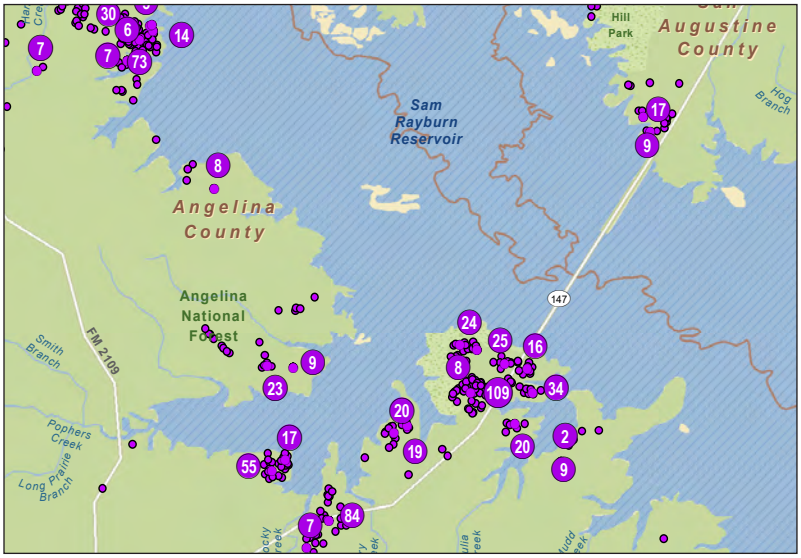

OSSF DATABASE DEVELOPMENT

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TASK DESCRIPTION

This project involved the development of a database for storage and retrieval of OSSF information for permitted systems in counties in the CZR and San Augustine County. In developing the database, ANRA electronically captured all available documents related to permitted systems in the project area. As the Authorized Agent for the Control Zone Rayburn and the unincorporated portion of San Augustine County, ANRA possessed records for over 4,500 permitted systems, some of which date back to the 1970s. New records are being added constantly as new systems are installed.

The database tracking and GIS mapping of permitted OSSFs in the watershed will provide a framework that ANRA can use in identifying failing OSSFs within the watershed.

SCOPE OF WORK

Task 3	OSSF Database Development
Objective:	To develop a database for the storage and retrieval of information related to permitted OSSFs in the Control Zone Rayburn (CZR), the 2000-ft buffer zone around Sam Rayburn Reservoir, as well as the unincorporated portion of San Augustine County.
Subtask 3.1:	**Server Implementation** Deployment of an ArcGIS server and a Structured Query Language (SQL) database server to provide the necessary framework on which the database will be built and hosted.
Subtask 3.2:	**Database Design** Design of a database to store information related to permitted OSSFs in the study area, including (but not limited to) the following information: • Owner information; • Property information; • Permit number; • System type; • Inspections; • Maintenance Contracts; • Complaints and Violations; and • Maps. The design process will include both the creation of new modules as well as building upon and expanding existing database(s) to more fully incorporate information and integrate the information with Geographic Information Systems (GIS) mapping.
Subtask 3.3:	**Incorporation of Historical Data** ANRA possesses hardcopy records for OSSFs in the CZR dating back to the 1970s. However, the majority of the files are not stored in an electronic format. Provisions in the development of the OSSF database will be made for the data from these files to be entered into the database to create a more complete and accurate record of septic systems located within the CZR.
Subtask 3.4:	**Database Administration** On-going administration of the database server, including such activities as security, resource allocation, system maintenance, backup, recovery, and report generation.

METHODS

Server Implementation

Two (2) Dell PowerEdge T620 servers and APC battery backup systems were purchased for this project. Microsoft SQL Server 2012 Standard and SQL Server Client Access Licenses were also purchased. These servers were utilized for the database development, electronic data capture, and mapping portions of the project.

As the project continued and the amount of data being electronically stored increased, and because of the importance of this data (OSSF permit files), ANRA purchased two (2) Dell R510 servers to function as backup file servers. One server is stored within ANRA's Central Office and the other is located off-site at another ANRA facility. This provides both redundancy in the data backups as well as preventing a total data loss in the case of a disaster (fire, flood, etc.) at one of the locations.

OSSF Database Development

The OSSF database was designed by ANRA staff in Microsoft Access format for later conversion to SQL. The database file is stored on ANRA's server, with user accounts and password protection for use in a multi-user environment. The design process included both the creation of new modules as well as building upon and expanding existing databases to more fully incorporate the information with GIS mapping. The database is expandable, so additional modules can be added as future data needs arise.

Information Included in the OSSF Database

Data to be incorporated into the OSSF database come from numerous sources, including permit applications, OSSF informational records (complaint investigations, system designs, data provided by professional OSSF contractors, etc.), historical records, and Global Positioning System (GPS) data.

OSSF Permit Applications

Information entered into ANRA's OSSF Database includes the fields located on ANRA's *Application for Permit to Construct an On-Site Sewage Facility (OSSF)* form, which is completed by all applicants for an OSSF permit. This form is required before a permitted system can be installed, and has been in use since 2011. Permit files from years prior did not necessarily contain the same level of information.

Information obtained from the permit application includes the property owner information (name, address, and contact information), property information (address, county, latitude, longitude), legal description of the property, structure/dwelling information (number of bedrooms, number of bathrooms, water supply, etc.) and OSSF designer/installer contact information. A complete list of fields incorporated into the database is included in the following table.

OSSF Informational Records

Other available data stored in (or linked to) the OSSF database includes the system design, results of inspections and site evaluations, treatment system information, service contract information, and complaint investigations. This information is typically provided by trained and licensed professionals (such as Designated Representatives, Installers, Site Evaluators, and Maintenance Providers). Some of this information is entered directly into the database, and some will be electronically stored in a secondary data store that may be linked to the database. Examples of data stored in a secondary location include, but are not limited to, scanned .pdf versions of applications, designs, etc., as well as site inspection/complaint photographs. This data is stored separately from the OSSF database in order to minimize the database file size as well as to improve database stability. The data is linked to, and accessible from, the database.

Information from OSSF Permit Application	
Form Section	**Fields**
Property Owner Information	Property Owner's First Name Property Owner's Middle Name Property Owner's Last Name Property Owner's mailing address – Street number and name Property Owner's mailing address – City Property Owner's mailing address – State Property Owner's mailing address – Zip Property Owner's phone number – Home Property Owner's phone number – Work Property Owner's phone number – Cell Fax Number Email Address
Property Information	Property Address – Street number and name Property Address – City Property Address – State Property Address – Zip County Latitude Longitude
Legal Description of Property	Subdivision Section Block Lot Document Volume Page Tax # Acres Lot Size Description of Property Location
Structure/Dwelling Information	Facility Type Living Area (square feet) Number of People Number of Bedrooms If Seasonal, months in use Year Structure Built Rental Property Y/N? Water Saving Toilets Y/N? Water Softener Y/N? # Toilets # Urinals # Lavatories # Showers # Bathtubs # Dishwashers # Clothes Washers # In-Sink Grinders # Hot Tubs Capacity of Hot Tubs (gallons) Water Supply Type (Private well or Public Water Supply) Name of Public Water Supply
On-Site Sewage Facility Designer/Installer Contact Information	System Designer Name System Designer Phone Number System Installer Name System Installer Phone Number

Historical Permit Data

Historical permit data was incorporated into the OSSF database. Prior to database development, information regarding permitted OSSFs was stored in hardcopy files as well as in Excel spreadsheets. Information stored in spreadsheet format has been directly imported into the OSSF database. Hardcopy permit files have been scanned to PDF format and linked to the database records.

OSSF GPS Data

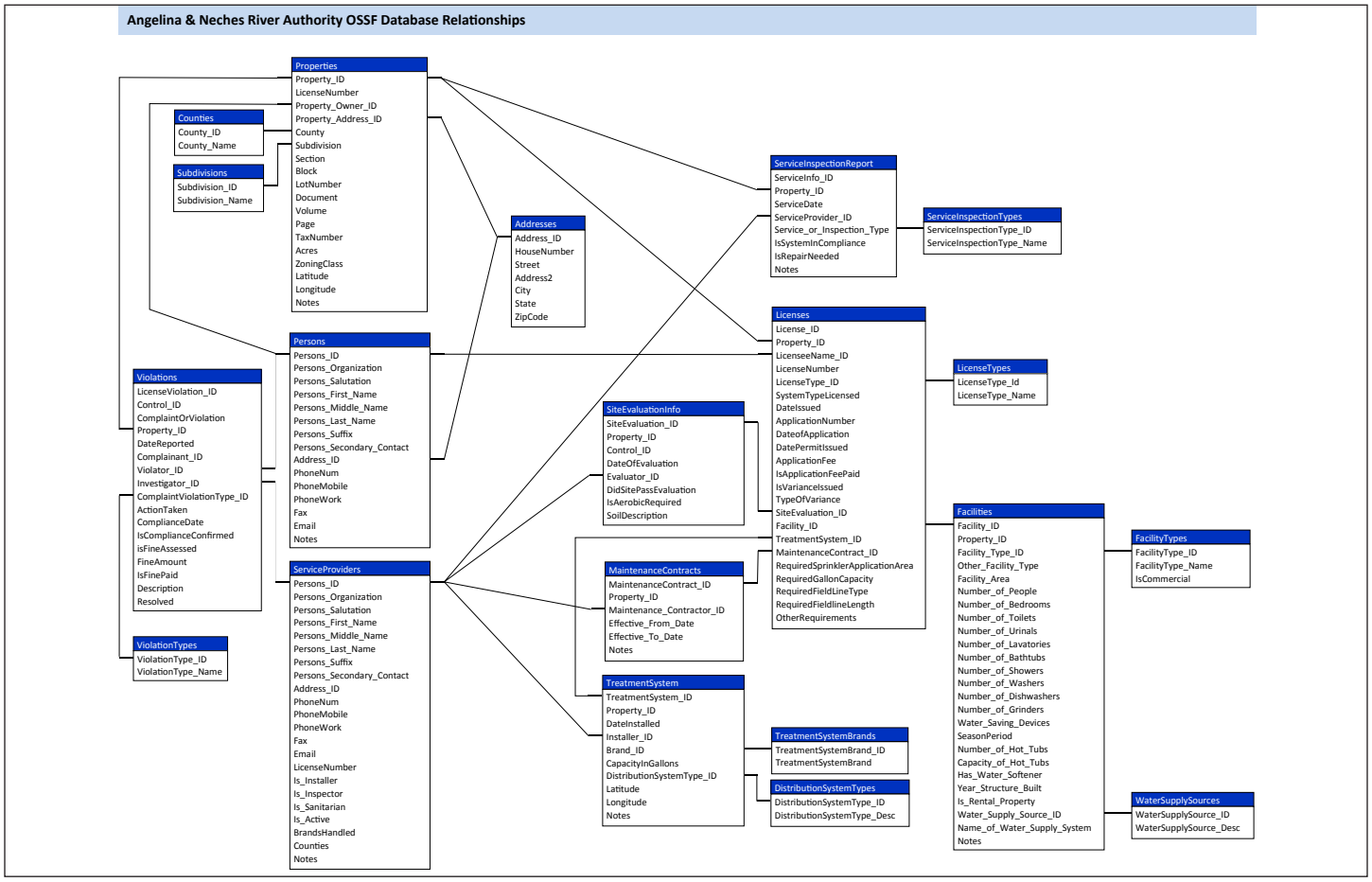
ANRA collected GPS/GIS data for OSSFs in the project area from various sources for incorporation into the database. This data collection was performed in accordance with the *Lake Sam Rayburn OSSF Program Support and Attoyac Bayou OSSF Remediation Quality Assurance Project Plan (QAPP) for Geospatial Data*. Location points were primarily based upon addresses provided in the permit data, as well as geo-tagged photographs from inspections and complaint investigations.

The GPS/GIS data will be used for mapping of OSSFs in the project area. It is anticipated that the data will be useful in linking OSSF information, particularly complaint and violation data, with water quality issues.

GPS data collection and mapping is discussed in more detail later in the report.

OSSF Database Relationships

ANRA's OSSF Database is a relational database. The table relationships are shown below.



RESULTS AND OBSERVATIONS

The ANRA OSSF Database is designed for use in a multi-user environment and is stored on ANRA's server. The database was designed to record information related to property owners, permitted properties, maintenance inspections, complaints, and other OSSF-related data. The database is designed for use by both administrative personnel and OSSF Inspectors.

OSSF Database Features

User Interface

The information stored in the OSSF Database is available to the user through a User Interface Screen.

The User Interface allows access to the following modules:

Applications - enter a new application or continue an application in process.

Maintenance Inspections - allows the user to enter information from maintenance inspections as provided to ANRA by contractors. The maintenance inspections are linked to the OSSFs by the license number.

Complaints - allows for the documentation of information related to complaint investigations. Complaint investigations are linked to individual OSSFs using the license number.

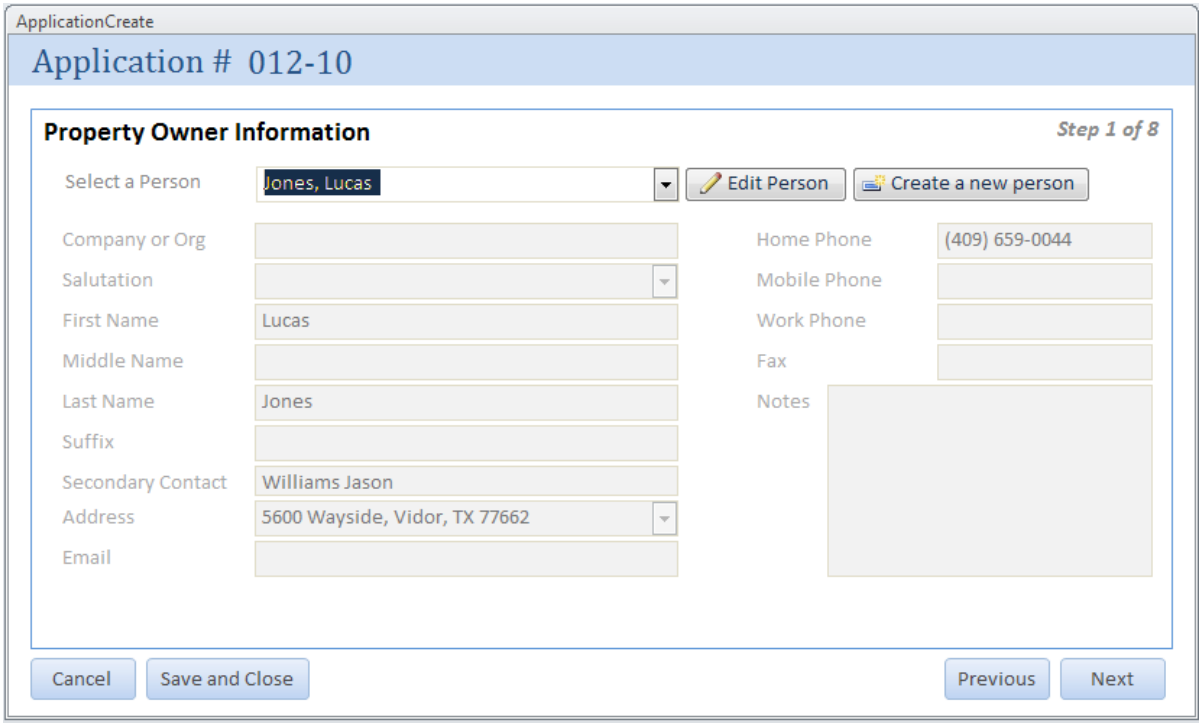
Licensed Properties - allows the user to access information related to licensed OSSF properties, as well as all information linked to those properties (including PDF scans), such as site evaluations, treatment systems, maintenance inspections, complaints/violations, etc.

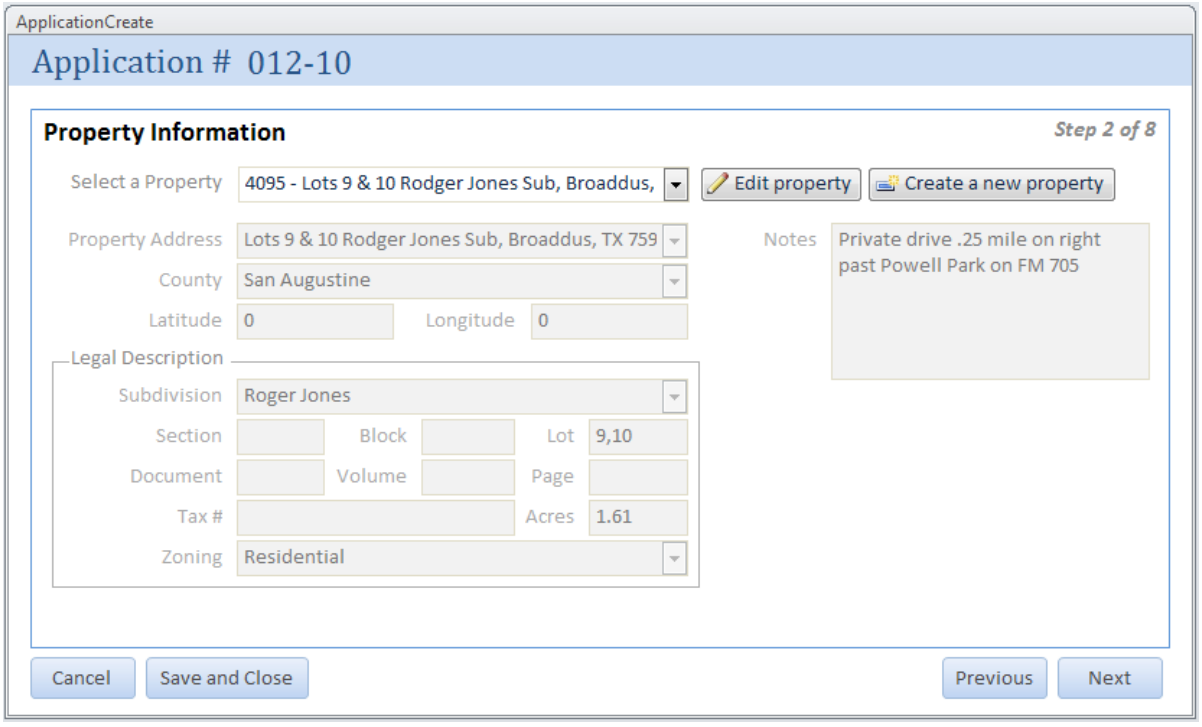
Property Owners - allows the user to see all properties and licenses by individual owners.

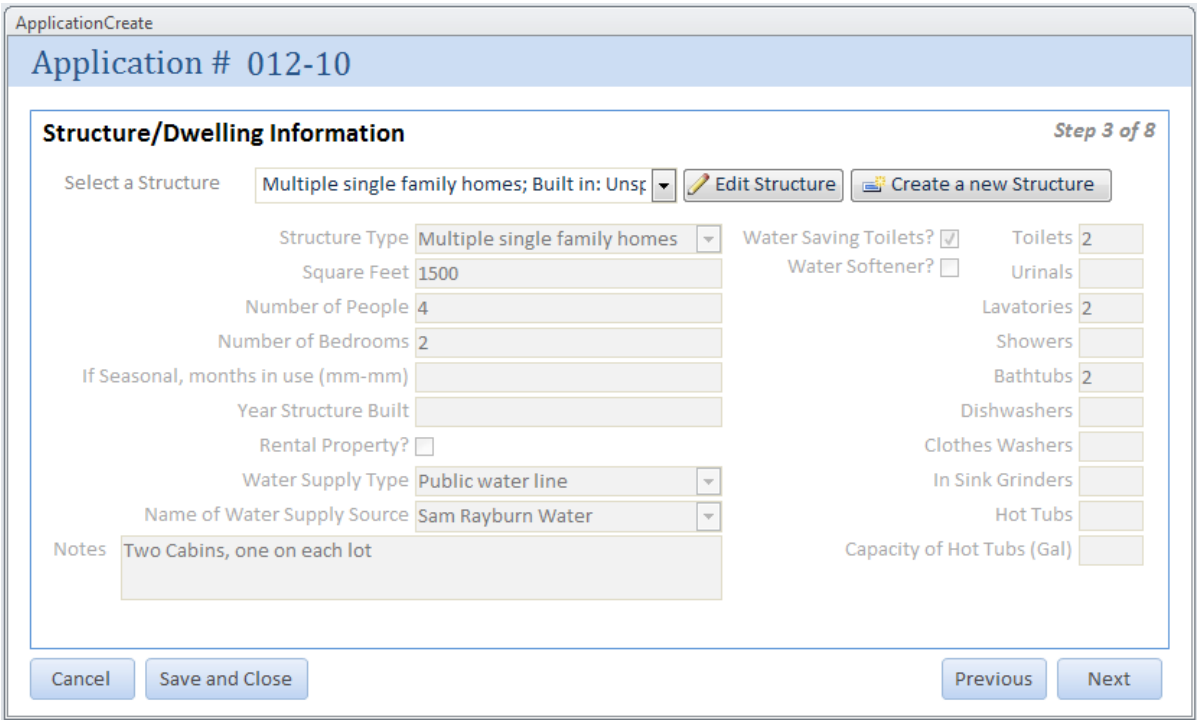
Reports - allows the user to generate reports of properties, licenses, and permits. Additional reporting options will be added as needed.

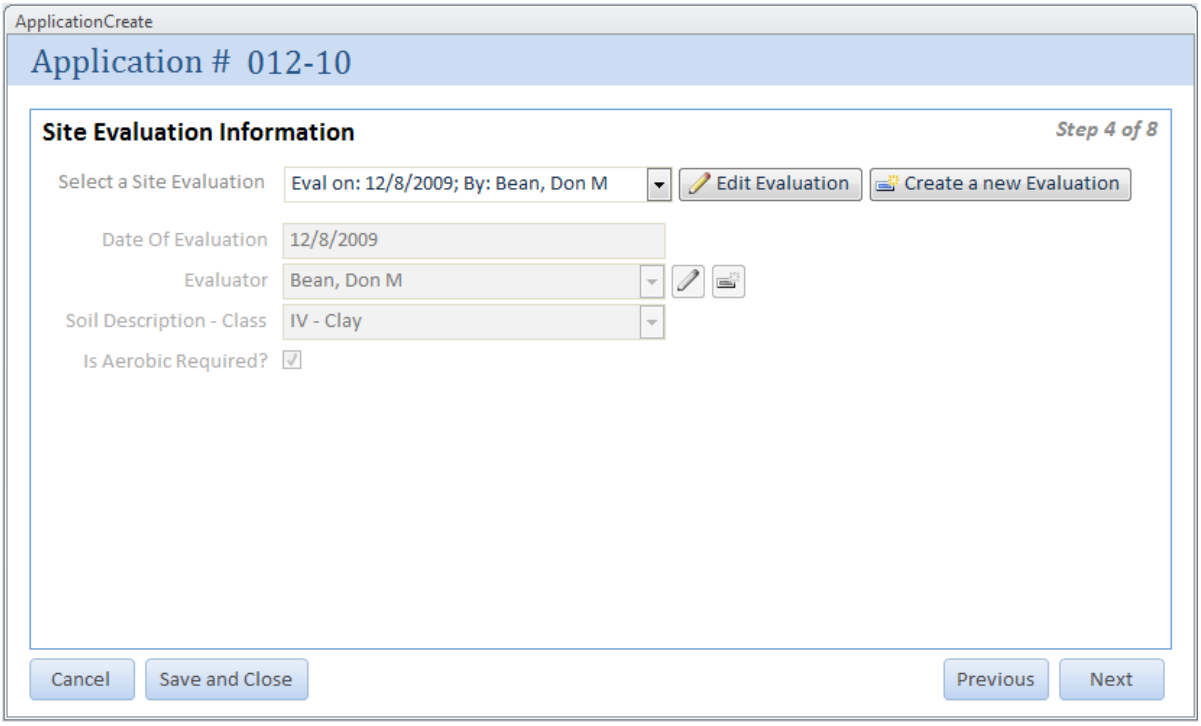
Applications Module

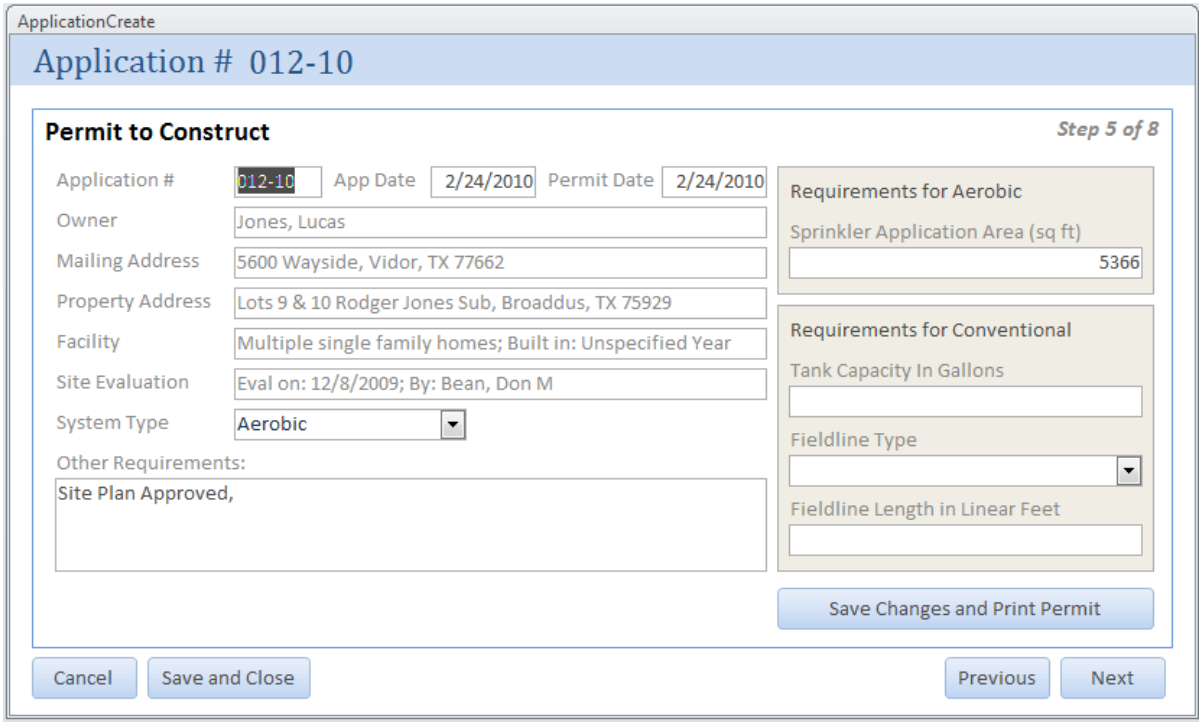
By selecting Applications, the user is able to enter a new application or continue an application in progress. Information from the application is entered through the Applications screens.

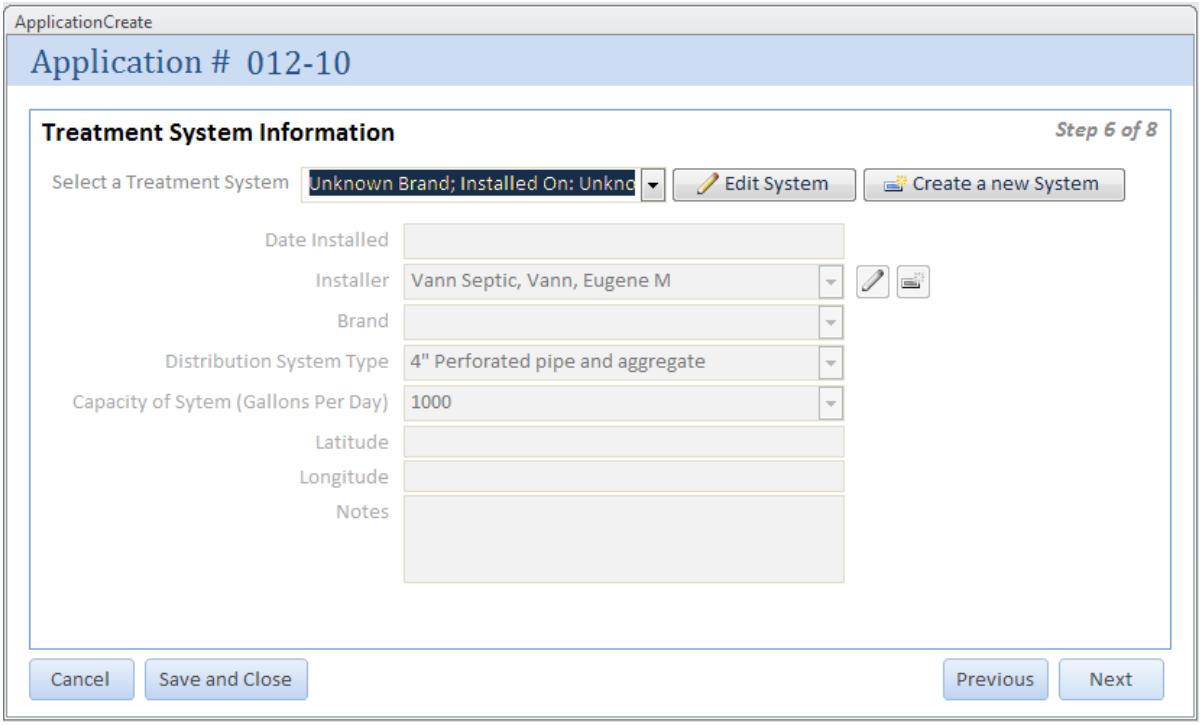


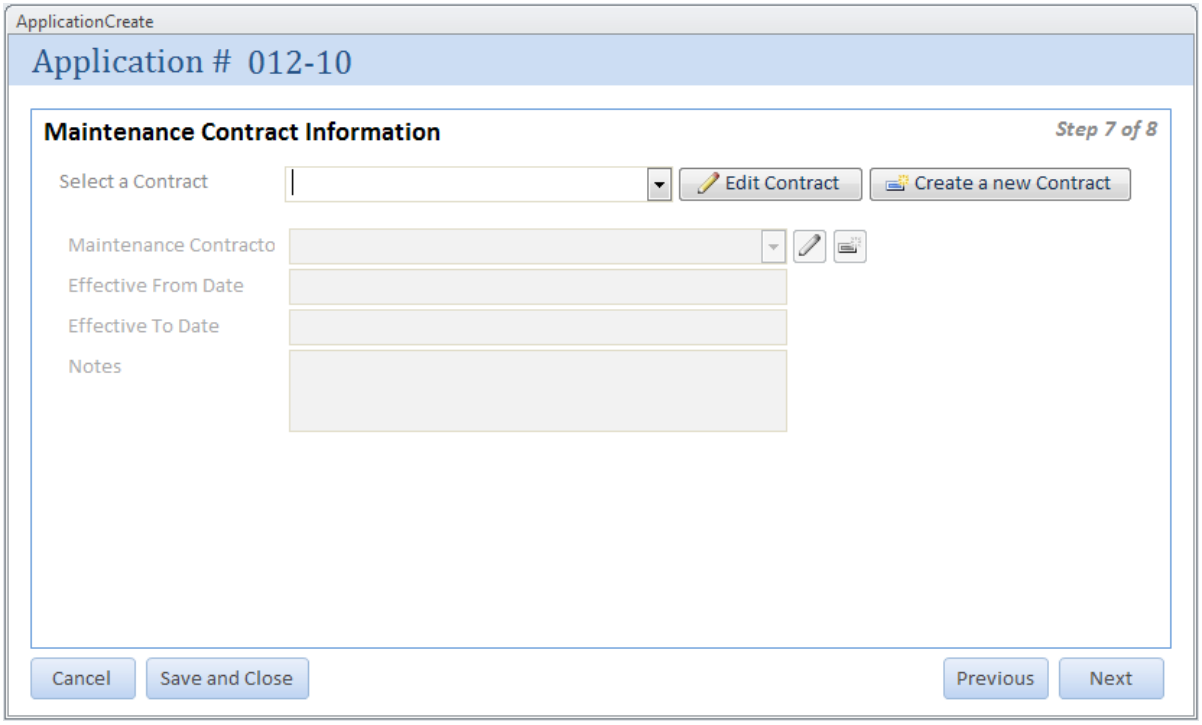


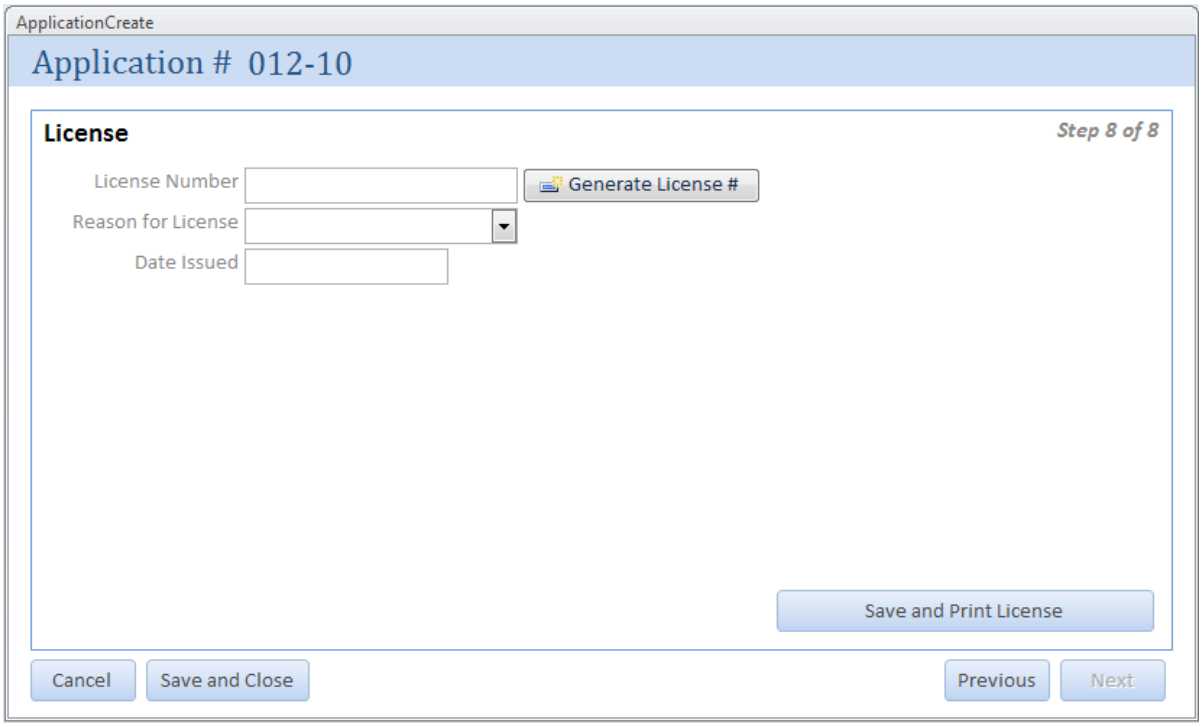

ApplicationCreate
Application # 012-10
Structure/Dwelling Information
Step 3 of 8
Select a Structure
Multiple single family homes; Built in: Unsp
Edit Structure
Create a new Structure
Structure Type
Multiple single family homes
Square Feet
1500
Number of People
4
Number of Bedrooms
2
If Seasonal, months in use (mm-mm)
Year Structure Built
Rental Property?
Water Supply Type
Public water line
Name of Water Supply Source
Sam Rayburn Water
Notes
Two Cabins, one on each lot
Water Saving Toilets?
Water Softener?
Toilets
2
Urinals
Lavatories
2
Showers
Bathtubs
2
Dishwashers
Clothes Washers
In Sink Grinders
Hot Tubs
Capacity of Hot Tubs (Gal)
Cancel
Save and Close
Previous
Next


ApplicationCreate
Application # 012-10
Site Evaluation Information
Step 4 of 8
Select a Site Evaluation
Eval on: 12/8/2009; By: Bean, Don M
Edit Evaluation
Create a new Evaluation
Date Of Evaluation
12/8/2009
Evaluator
Bean, Don M
Soil Description - Class
IV - Clay
Is Aerobic Required?
Cancel
Save and Close
Previous
Next


ApplicationCreate
Application # 012-10
Permit to Construct
Step 5 of 8
Application # 012-10
App Date 2/24/2010
Permit Date 2/24/2010
Owner Jones, Lucas
Mailing Address 5600 Wayside, Vidor, TX 77662
Property Address Lots 9 & 10 Rodger Jones Sub, Broaddus, TX 75929
Facility Multiple single family homes; Built in: Unspecified Year
Site Evaluation Eval on: 12/8/2009; By: Bean, Don M
System Type Aerobic
Other Requirements:
Site Plan Approved,
Requirements for Aerobic
Sprinkler Application Area (sq ft)
5366
Requirements for Conventional
Tank Capacity In Gallons
Fieldline Type
Fieldline Length in Linear Feet
Save Changes and Print Permit
Cancel
Save and Close
Previous
Next

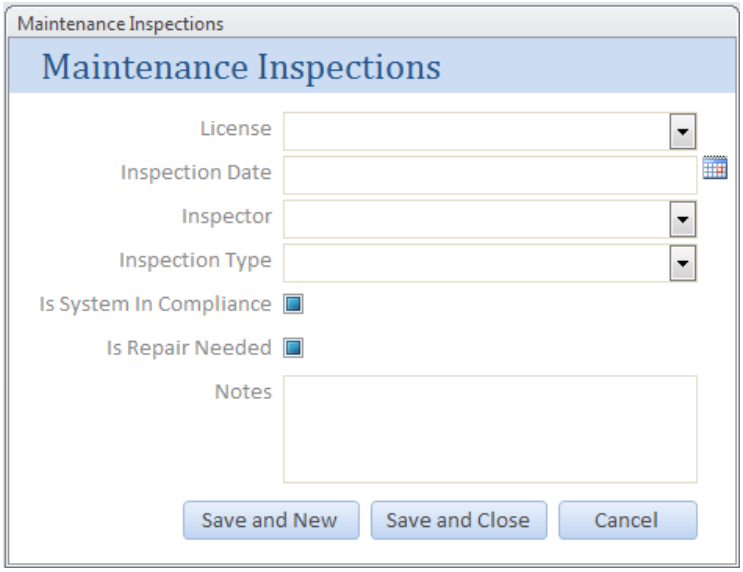

ApplicationCreate
Application # 012-10
Treatment System Information
Step 6 of 8
Select a Treatment System
Unknown Brand; Installed On: Unknc
Edit System
Create a new System
Date Installed
Installer Vann Septic, Vann, Eugene M
Brand
Distribution System Type 4" Perforated pipe and aggregate
Capacity of Sytem (Gallons Per Day) 1000
Latitude
Longitude
Notes
Cancel
Save and Close
Previous
Next


ApplicationCreate
Application # 012-10
Maintenance Contract Information
Step 7 of 8
Select a Contract
Edit Contract
Create a new Contract
Maintenance Contracto
Effective From Date
Effective To Date
Notes
Cancel
Save and Close
Previous
Next


ApplicationCreate
Application # 012-10
License
Step 8 of 8
License Number
Generate License #
Reason for License
Date Issued
Save and Print License
Cancel
Save and Close
Previous
Next

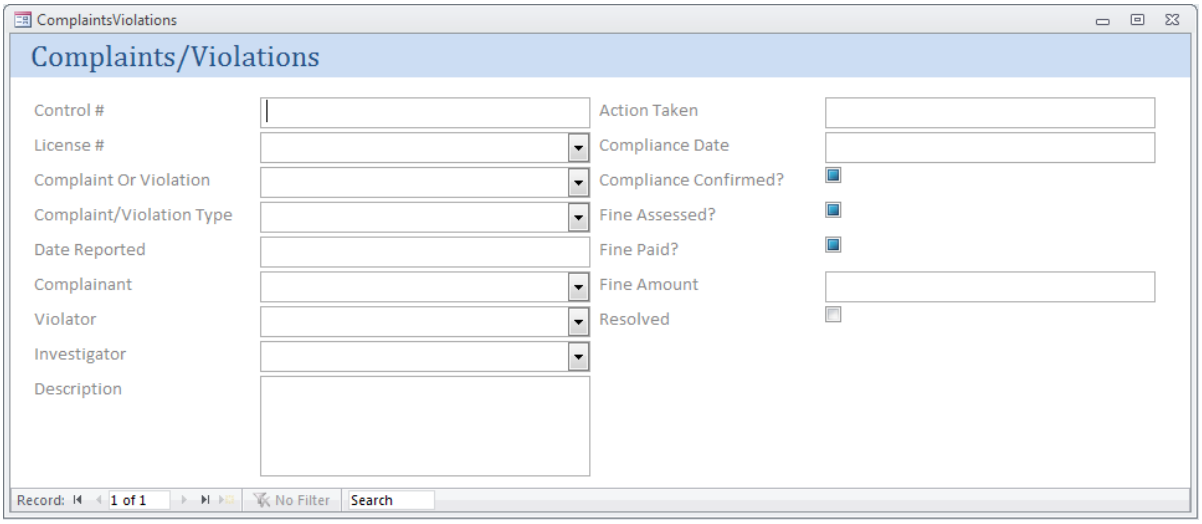
Maintenance Inspections Module

The Maintenance Inspection screen allows the user to enter information from maintenance inspections as provided to ANRA by contractors. The maintenance inspections are linked to the OSSFs by the license number.



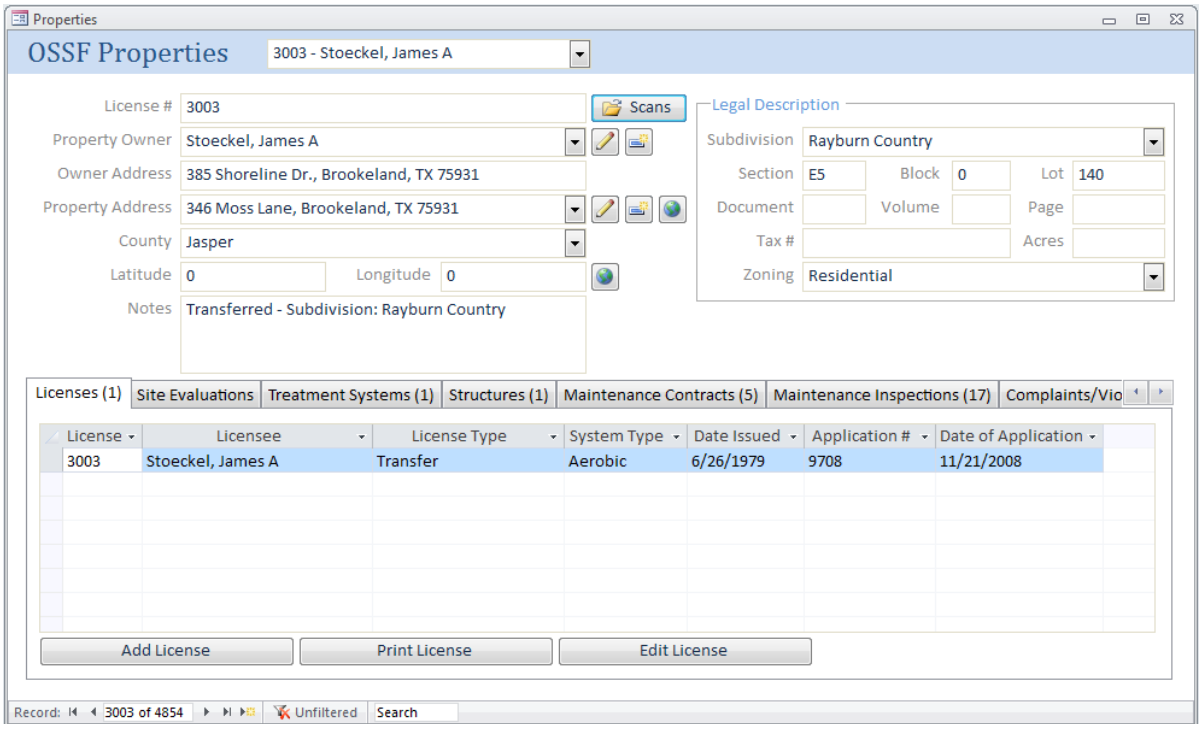
Complaints Module

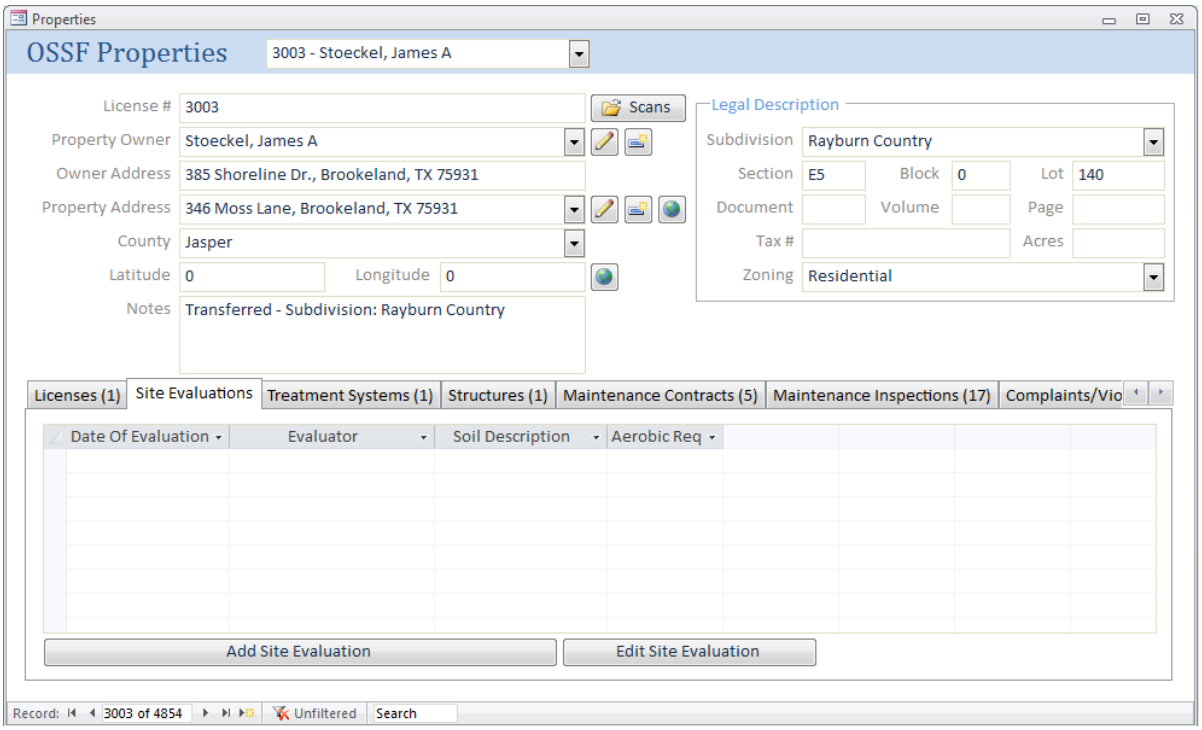
The Complaints screen allows for the documentation of information related to complaint investigations. Complaint investigations can be linked to individual OSSFs using the license number.

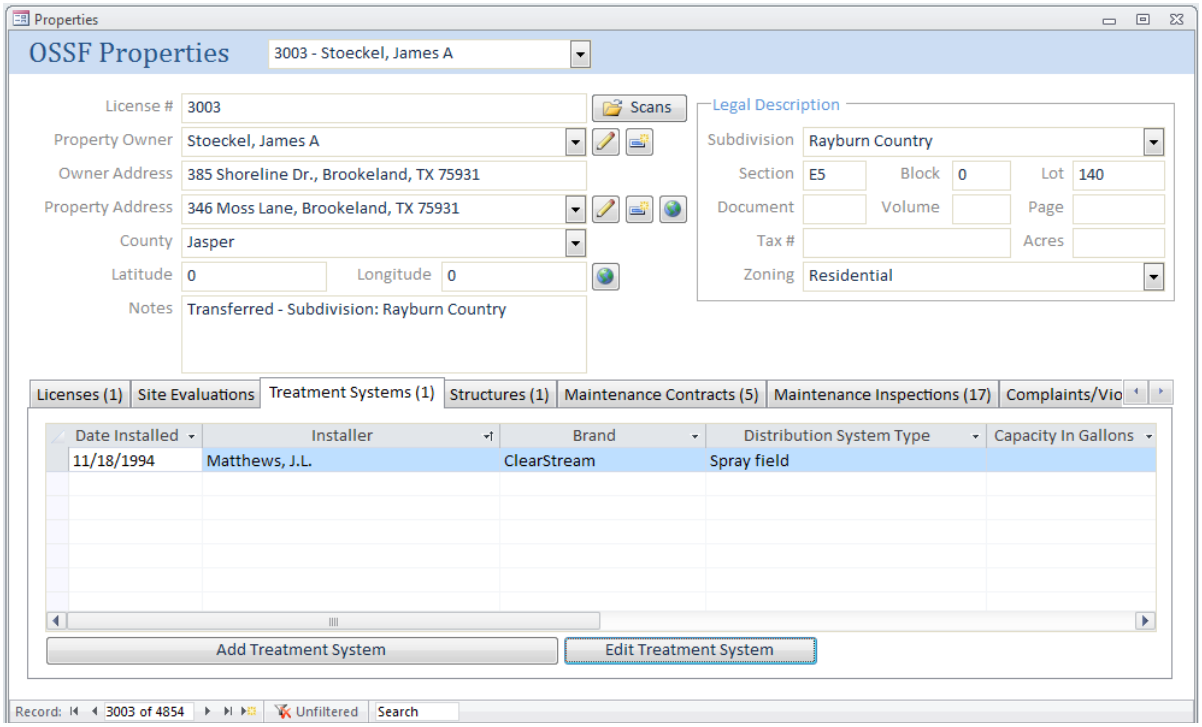


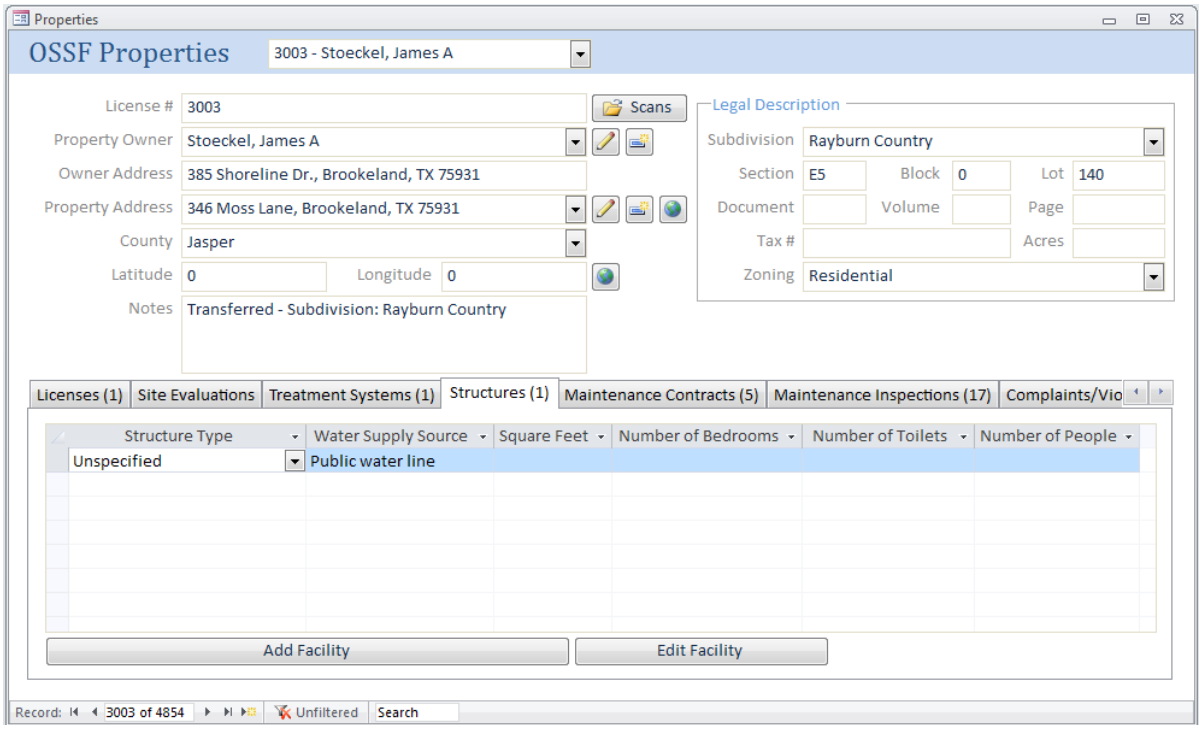
Licensed Properties Module

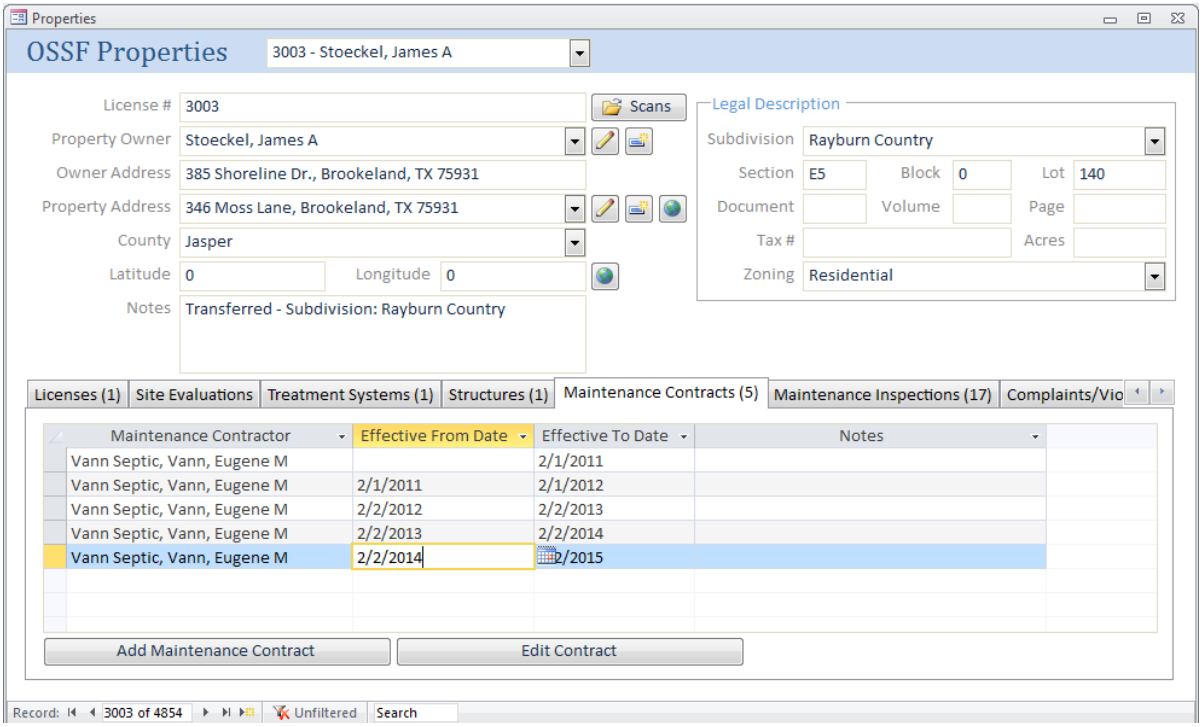
The Licensed Properties screen allows the user to access information related to licensed OSSF properties, as well as all information linked to those properties (including PDF scans), such as site evaluations, treatment systems, maintenance inspections, complaints/violations, etc.

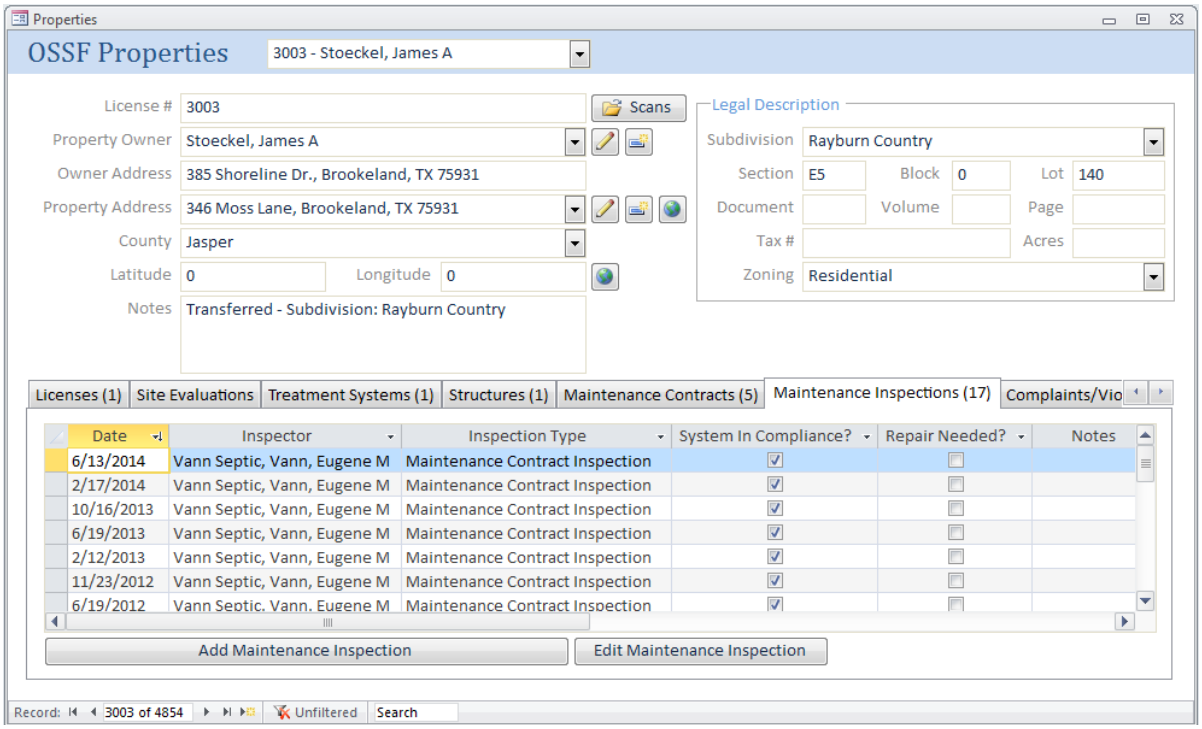


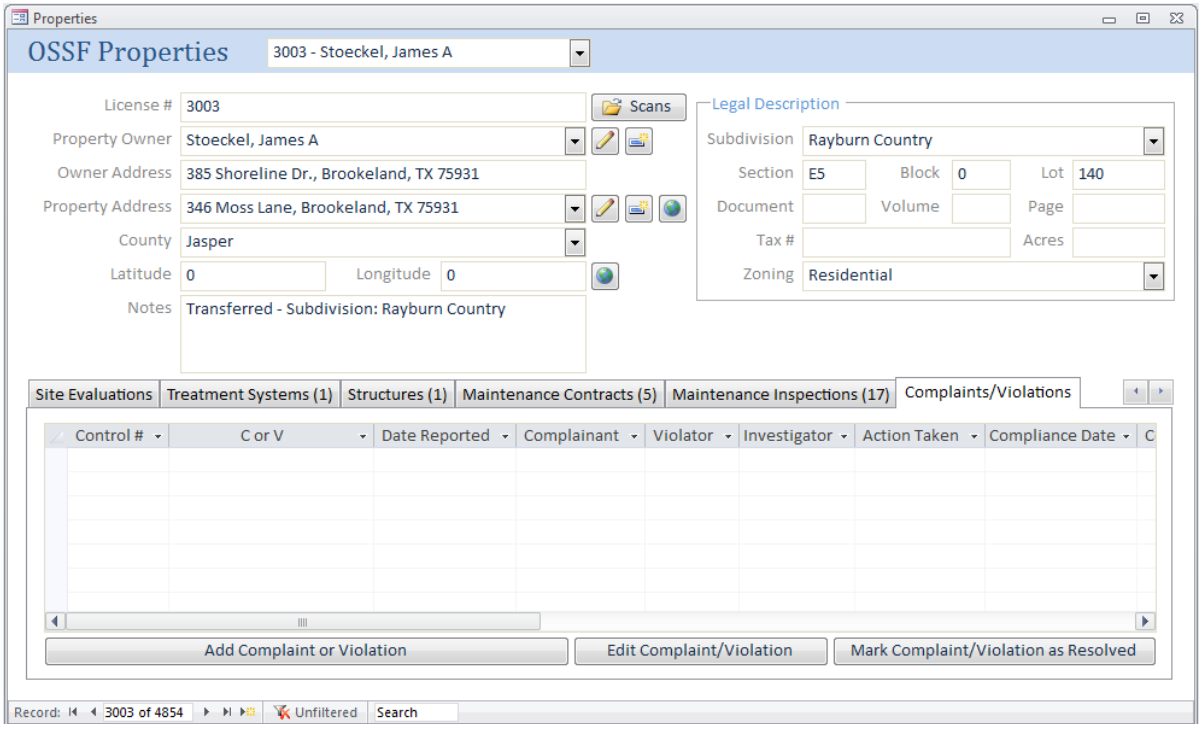



Properties
OSSF Properties
3003 - Stoeckel, James A
License # 3003
Scans
Property Owner Stoeckel, James A
Owner Address 385 Shoreline Dr., Brookeland, TX 75931
Property Address 346 Moss Lane, Brookeland, TX 75931
County Jasper
Latitude 0
Longitude 0
Notes Transferred - Subdivision: Rayburn Country
Legal Description
Subdivision Rayburn Country
Section E5
Block 0
Lot 140
Document
Volume
Page
Tax #
Acres
Zoning Residential
Licenses (1)
Site Evaluations
Treatment Systems (1)
Structures (1)
Maintenance Contracts (5)
Maintenance Inspections (17)
Complaints/Vio
Date Installed
Installer
Brand
Distribution System Type
Capacity In Gallons
11/18/1994
Matthews, J.L.
ClearStream
Spray field
Add Treatment System
Edit Treatment System
Record: 3003 of 4854
Unfiltered
Search


Properties
OSSF Properties
3003 - Stoeckel, James A
License # 3003
Scans
Property Owner Stoeckel, James A
Owner Address 385 Shoreline Dr., Brookeland, TX 75931
Property Address 346 Moss Lane, Brookeland, TX 75931
County Jasper
Latitude 0
Longitude 0
Notes Transferred - Subdivision: Rayburn Country
Legal Description
Subdivision Rayburn Country
Section E5
Block 0
Lot 140
Document
Volume
Page
Tax #
Acres
Zoning Residential
Licenses (1)
Site Evaluations
Treatment Systems (1)
Structures (1)
Maintenance Contracts (5)
Maintenance Inspections (17)
Complaints/Vio
Structure Type
Water Supply Source
Square Feet
Number of Bedrooms
Number of Toilets
Number of People
Unspecified
Public water line
Add Facility
Edit Facility
Record: 3003 of 4854
Unfiltered
Search

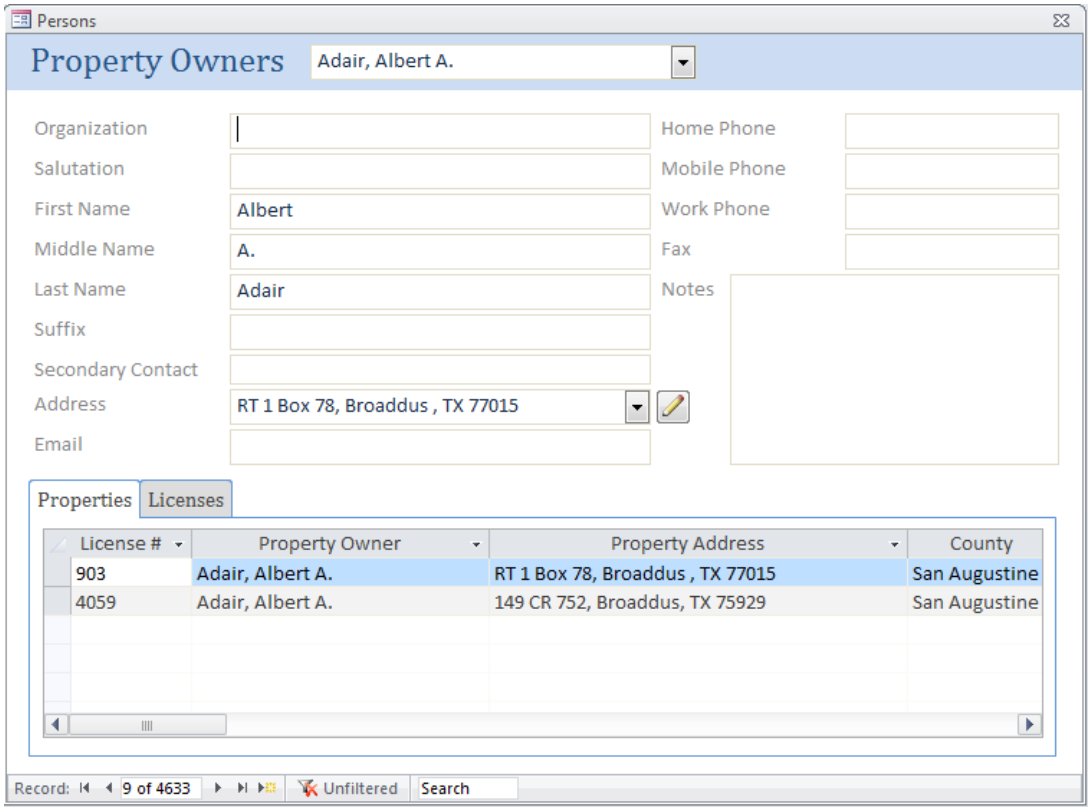

Properties
OSSF Properties
3003 - Stoeckel, James A
License # 3003
Scans
Property Owner Stoeckel, James A
Owner Address 385 Shoreline Dr., Brookeland, TX 75931
Property Address 346 Moss Lane, Brookeland, TX 75931
County Jasper
Latitude 0
Longitude 0
Notes Transferred - Subdivision: Rayburn Country
Legal Description
Subdivision Rayburn Country
Section E5
Block 0
Lot 140
Document
Volume
Page
Tax #
Acres
Zoning Residential
Licenses (1)
Site Evaluations
Treatment Systems (1)
Structures (1)
Maintenance Contracts (5)
Maintenance Inspections (17)
Complaints/Vio
Maintenance Contractor
Effective From Date
Effective To Date
Notes
Vann Septic, Vann, Eugene M 2/1/2011
Vann Septic, Vann, Eugene M 2/1/2011 2/1/2012
Vann Septic, Vann, Eugene M 2/2/2012 2/2/2013
Vann Septic, Vann, Eugene M 2/2/2013 2/2/2014
Vann Septic, Vann, Eugene M 2/2/2014 2/2/2015
Add Maintenance Contract
Edit Contract
Record: 3003 of 4854
Unfiltered
Search


Properties
OSSF Properties
3003 - Stoeckel, James A
License # 3003
Scans
Property Owner Stoeckel, James A
Owner Address 385 Shoreline Dr., Brookeland, TX 75931
Property Address 346 Moss Lane, Brookeland, TX 75931
County Jasper
Latitude 0
Longitude 0
Notes Transferred - Subdivision: Rayburn Country
Legal Description
Subdivision Rayburn Country
Section E5
Block 0
Lot 140
Document
Volume
Page
Tax #
Acres
Zoning Residential
Licenses (1)
Site Evaluations
Treatment Systems (1)
Structures (1)
Maintenance Contracts (5)
Maintenance Inspections (17)
Complaints/Vio
Date
Inspector
Inspection Type
System In Compliance?
Repair Needed?
Notes
6/13/2014 Vann Septic, Vann, Eugene M Maintenance Contract Inspection
2/17/2014 Vann Septic, Vann, Eugene M Maintenance Contract Inspection
10/16/2013 Vann Septic, Vann, Eugene M Maintenance Contract Inspection
6/19/2013 Vann Septic, Vann, Eugene M Maintenance Contract Inspection
2/12/2013 Vann Septic, Vann, Eugene M Maintenance Contract Inspection
11/23/2012 Vann Septic, Vann, Eugene M Maintenance Contract Inspection
6/19/2012 Vann Septic, Vann, Eugene M Maintenance Contract Inspection
Add Maintenance Inspection
Edit Maintenance Inspection
Record: 3003 of 4854
Unfiltered
Search



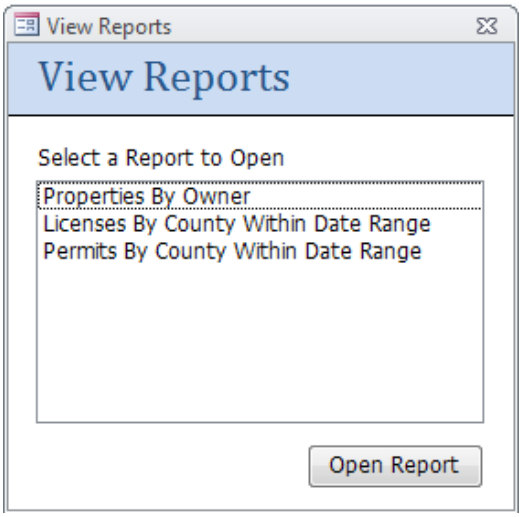
Property Owners Module

The Property Owners screen allows the user to see all properties and licenses by individual owners.



Reports Module

The Reports screen allows the user to generate reports of properties, licenses, and permits. Additional reporting options will be added as needed.



DISCUSSION

The development of an OSSF Database was a crucial step not only for this project, but also for the operation of ANRA's OSSF program. The database allows for the storage of all data related to a system, including the property owner, maintenance records, inspections, and complaints/violations. The ability to query this information makes operation of ANRA's OSSF program much more efficient in its day-to-day operations. Additionally, the ability to map complaints/violations may be useful to address water quality issues in the future.

During the course of this project, ANRA became the Authorized Agent and assumed control of OSSF permitting for Angelina County. At the time of acquisition, over 10,000 permit/license files were transferred from the Angelina County and Cities Health District to ANRA. Overnight, ANRA went from an OSSF program consisting of approximately 4,500 permitted systems to over 15,000 permitted systems. Having this database implemented allowed for this transition to occur relatively smoothly.

Future Activities

The OSSF Database may be modified as needed to accomplish ANRA's goals. This includes the creation of additional modules as required by future data needs, development of additional queries and reports, and incorporation with mapping functions. The database has fields for entering the latitude and longitude of the systems. As new systems are installed in ANRA's jurisdiction, this data is recorded during site inspections and entered into ANRA's database. This field verified data is then used for mapping purposes.

In future projects, ANRA hopes to partner with other Authorized Agents to develop a watershed database for the Attoyac Bayou. ANRA's current database only houses data from the portion of the watershed within San Augustine County, as that is the only portion of the watershed for which ANRA is the Authorized Agent. Data sharing with the other entities (Nacogdoches County, Rusk County, and TCEQ Region 10 - Beaumont) may allow for such a database to be developed.

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ELECTRONIC DATA CAPTURE

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TASK DESCRIPTION

In order to incorporate data into ANRA's OSSF Database, it was necessary to scan, organize, and store digital copies of all permitted OSSF records in the project area. For this project, that included the Control Zone Rayburn, which is the 2000-ft buffer zone around Sam Rayburn Reservoir, as well as the unincorporated portion of San Augustine County. A portion of the Attoyac Bayou watershed lies within San Augustine County.

ANRA has a repository of OSSF records for the area around Sam Rayburn Reservoir dating back to 1972. These files include all documents related to a licensed OSSF, such as the application, system design and drawings, maps, permit to construct, license to operate, affidavits, etc. At the start of this project, ANRA had slightly more than 4,500 hardcopy permit files on hand. As ANRA is still actively permitting OSSFs in the project area, and has since added Angelina County to its OSSF jurisdiction, the number of permits maintained by ANRA is continually growing.

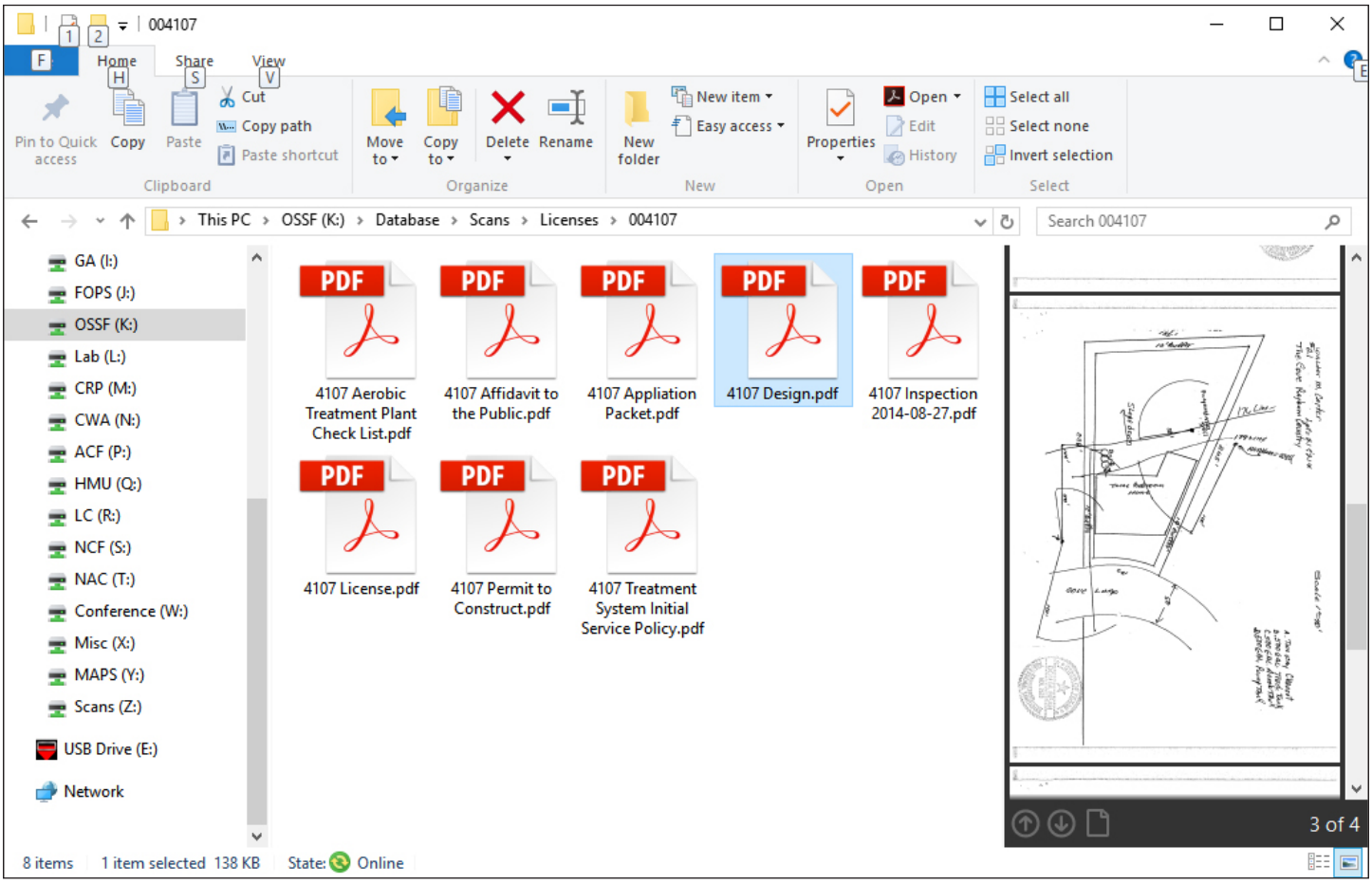
SCOPE OF WORK

Task 4	Electronic Document Capture
Objective:	To scan, organize, and store digital copies of all permitted OSSF records (approximately 4000 systems) in the CZR and unincorporated portion of San Augustine County, including the portion in the Attoyac Bayou watershed.
Subtask 4.1:	**Creation of Electronic Records** Files related to permitted OSSFs will be digitally scanned and archived on a network server.
Subtask 4.2:	**Database Integration** Electronic records will be linked with the OSSF database for the purpose of easy retrieval.

METHODS

Scanning of OSSF Records

In order to scan and digitally store all OSSF records, ANRA leased a Xerox color copier/scanner/printer for the duration of this project. The scanner was configured to scan directly to a networked computer. As files were scanned, they were moved to the appropriate permit file folder on the server. Each permit is stored in a separate folder, which are sorted numerically, with the first permit beginning with file folder 000001. After files are relocated to the correct permit folder, the individual files are renamed so that they are searchable. The folder containing scanned documents is linked and accessable from each permit record in ANRA's OSSF Database.



Example of scanned records stored for each licensed OSSF

Neches River Conservation District
Post Office Box 387 210 Lufkin Avenue
LUFKIN, TEXAS 75901

FILE COPY

LICENSE FOR PRIVATE SEWAGE FACILITY

License No. 001 Date Issued September 5, 1972

This License is authorization for the below-named Licensee to construct and operate a sewage disposal system in the location specified and as described in Application No. 009, for ten (10) years from the date of issuance as long as Licensee complies with all the requirements of Order No. 72-0315-5 of the Texas Water Quality Board; and provided that sewage facility meets inspection requirements five years from date of issuance. (Licensee shall be required to pay a $10.00 inspection fee five years from date of issuance to maintain this License in effect.)

NECHES RIVER CONSERVATION DISTRICT

By: Don A. Fries

First OSSF License issued by ANRA (then known as the Neches River Conservation District), September 5, 1972

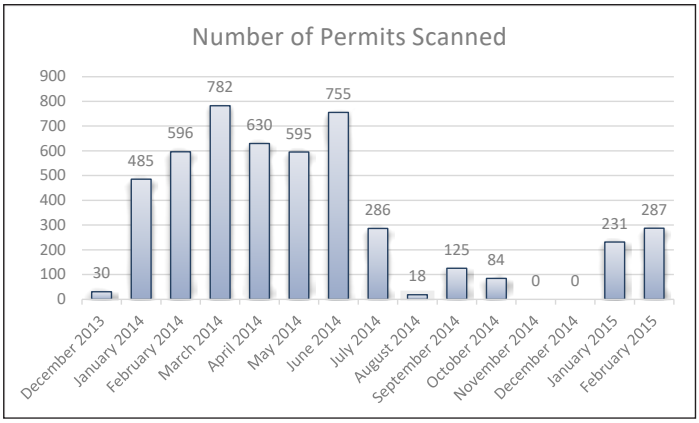
RESULTS AND OBSERVATIONS

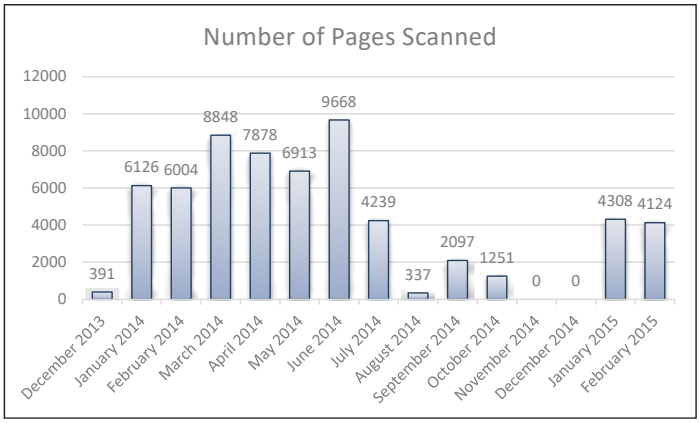
Project Timeframe

A part-time employee was tasked with electronically capturing and renaming of files for this portion of the project. Scanning of the historical OSSF records began in December 2013. Although the scanning of documents is still ongoing, and will continue in the future, the electronic capture of the historical records was completed in February 2015.

Scanning of Historical OSSF Permit Records

During the period from December 2013 to February 2015, there were 4,904 OSSF records converted from paper to electronic storage as Adobe PDF documents. Those 4,904 records were comprised of a total of 62,184 pages of documents.

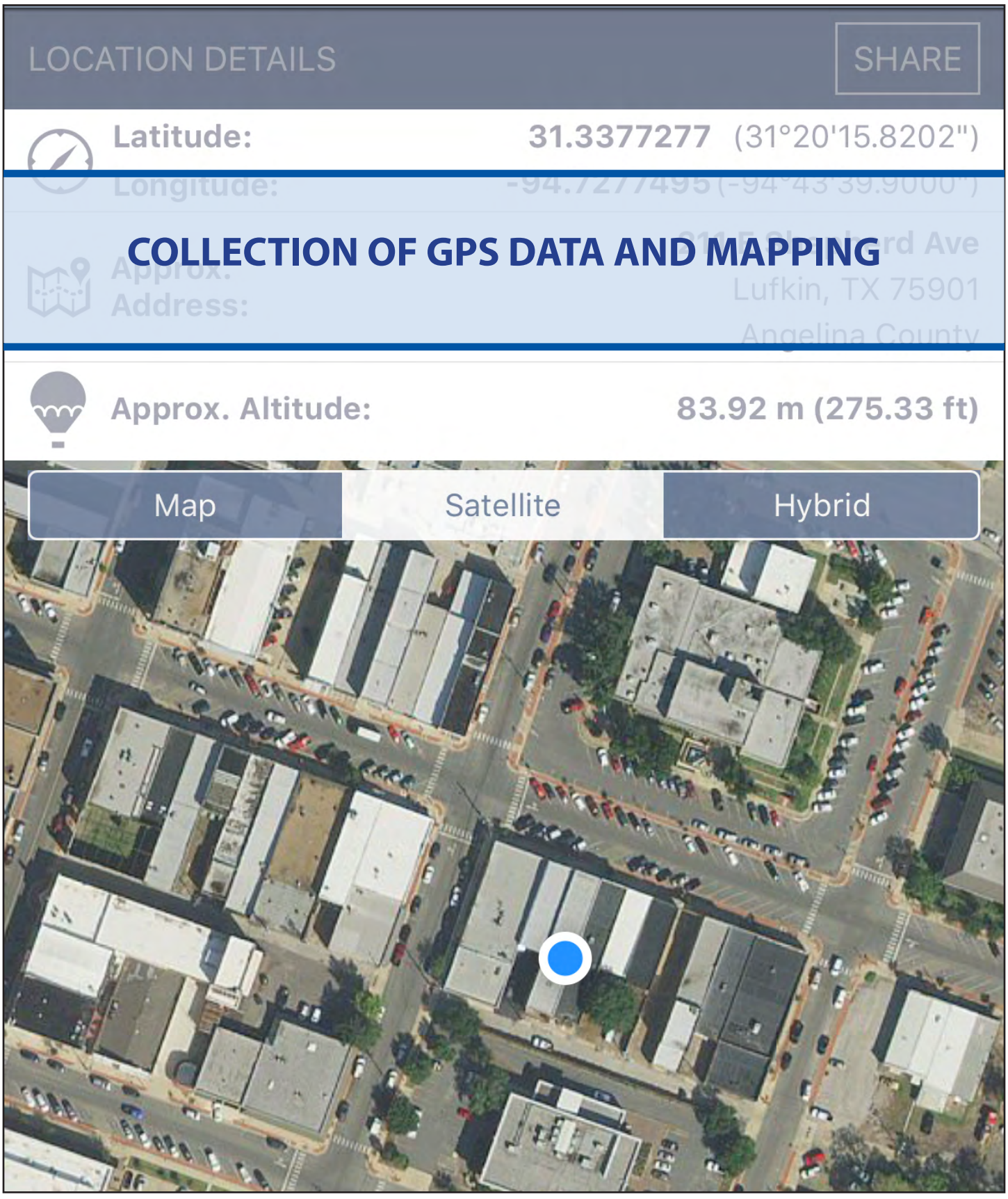




DISCUSSION

Historically, permit files had been stored in a combination of spreadsheets and hardcopy records (file folders, bound journals, index cards, etc.). Hardcopy storage of these records provide no safeguard or backup in the case of disaster (flood, fire, etc.). Spreadsheets were useful in finding data in the hardcopy records, but having the scanned data available in the database makes the program function much more smoothly.

During the course of this project, ANRA became the Authorized Agent and assumed control of OSSF permitting for Angelina County. At the time of acquisition, over 10,000 permit/license files were transferred from the Angelina County and Cities Health District to ANRA. Overnight, ANRA went from an OSSF program consisting of approximately 4,500 permitted systems to over 15,000 permitted systems. Having this database implemented allowed for this transition to occur relatively smoothly.


LOCATION DETAILS
SHARE
Latitude:
31.3377277 (31°20'15.8202")
Longitude:
-94.7277495 (-94°43'39.9000")
COLLECTION OF GPS DATA AND MAPPING
Approx. Address:
Lufkin, TX 75901
Angelina County
Approx. Altitude:
83.92 m (275.33 ft)
Map
Satellite
Hybrid

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TASK DESCRIPTION

For this portion of the project, ANRA personnel collected Global Positioning System (GPS) and Geographic Information Systems (GIS) data for permitted OSSFs within the project area from various sources.

GPS and GIS data acquired for this project were collected in accordance with the *Lake Sam Rayburn OSSF Program Support and Attoyac Bayou OSSF Remediation Quality Assurance Project Plan (QAPP) for Geospatial Data*.

SCOPE OF WORK

Task 5	**Collection of GPS Data and Mapping**
Objective:	To collect GIS data associated with permitted OSSFs in the CZR and the unincorporated portion of San Augustine County.
Subtask 5.1:	**Desk Review** A systematic review of permitted OSSFs in the study area to determine which systems do not have GPS data associated with them.
Subtask 5.2:	**Field Collection** Reconnaissance of permitted OSSFs in the study area, with acquisition of GPS data for systems that do not have this information available.
Subtask 5.3:	**Mapping** Mapping of permitted OSSFs in the study area using ArcGIS.

METHODS

Collection of GPS Data

ANRA collected GPS data for OSSFs in the project area from various sources for incorporation into the OSSF Database.

Integrating Historic GPS Data

Where available, street address data from previously permitted systems was used for geocoding OSSFs to the owner's street address. There are distinct limitations to using street address data, as this data cannot directly pinpoint the OSSF location. However, street address data can identify land parcels or street address locations in which a permitted OSSF has been installed. The minimum required fields for geocoding a street address are street address number, street name, town/city, and/or zip code. In many cases, GPS data from historically licensed systems was not readily available. Data from already licensed systems was extracted from the following sources:

- The address on record for the owner/property was geocoded using Esri's geocoding service.
- For physical addresses that are not geocodeable, such as rural routes, an effort was made to match the address to current 911 address databases.
- For Post Office Boxes, an attempt was made to locate the property using the property description.
- Photo interpolation using Google Earth or Google Maps was also used.

The addresses on record for each licensed property were run through an address verification/update service to attempt to update any rural route addresses to current 911 geocodable addresses. The resulting addresses were geocoded using a geocoding service such as those available from Esri and Google. The resulting locations were then verified to see if they were within the jurisdictional area covered by the OSSF permitting program. For locations/addresses that do not geolocate within the jurisdictional area, if the licensed OSSF was assigned to a specific subdivision, the location was assigned to an arbitrary point near the center of the assigned subdivision. For all remaining licenses, an attempt was made to locate the property using the property description provided with the license. If at all possible, a location was assigned in the general area described in the license documentation.

Photo interpolation using Google Earth or Google Maps was used to identify some properties. The resulting location data was assigned to the appropriate licensees in the database, and tagged to indicate how it was derived, thus indicating expected accuracy (e.g. "cam/google", "handheld GPS", "geocoded address", "georeferenced plat", "subdivision center", "general location only, unable to locate precisely", "Unable to Locate").

ANRA may revisit the data for less precisely located systems and attempt to improve the location accuracy using all available data saved with the license, including, but not limited to: specific driving directions, section/block/lot info for subdivisions, property owner information available from the County Appraisal districts, etc.

Newly Licensed OSSFs

For newly permitted and installed systems, as well as systems with complaint investigations, GPS data was recorded using one of the following methods:

- A digital camera that geotags the photos
- Smartphones (e.g., Apple iPhone) running a GPS collection application (e.g., Motion-X GPS)
- A dedicated mapping-grade GPS unit (sub-meter accuracy after post-processing)

Mapping of OSSFs

Mapping for this project was done using Esri's ArcGIS software. ANRA maintains licenses for ArcGIS Server, ArcGIS Desktop Basic, ArcGIS Desktop Standard, and ArcGIS Spatial Analyst.

RESULTS AND OBSERVATIONS

Collection of GPS Data

Going into the project, the expectation was that ANRA would be able to use property addresses to geolocate the bulk of the historically licensed systems. ANRA possessed some historically collected GPS data, and we anticipated that more of that data would be able to be utilized in this project. Unfortunately, most of that data was not as useful as expected.

Integrating Historic GPS Data

ANRA began this project with just under 5,000 licenses with no location data assigned, ANRA had previously collected 606 GPS historic data points into a spreadsheet, but due to missing information, duplicated data, and some points that appeared to have been collected for purposes other than locating OSSFs, we were only able to match 291 of them to licenses. However, we did find handwritten latitude/longitude pairs collected using the same handheld GPS devices on the system install checklists of approximately 49 more systems. This brought the historically collected total up to 340 systems. As we continue to reference scanned license documentation and attempt to increase the precision of location data, we expect to find more handwritten GPS data.

Geocoding Address Data

During the course of this project, ANRA discovered a lack of property addresses for a large percentage of the historically licensed systems. As ANRA began processing the data, we found that the "property addresses" recorded in files for more than two thirds of our licenses were actually mailing addresses for the property owners, and in a lot of cases, there was no property address at all. This turned out to be mostly due to the fact that the bulk of our OSSF licenses had been issued for new construction properties before a street address was assigned to the property. This coupled with the fact that a lot of these lake properties are vacation homes, resulted in a large portion of the licenses geocoding in Houston or Dallas. Some property owner addresses geocoded as far away as California and Colorado. The end result was that ANRA only had 600 usable locations from the geocoded data.

Alternatives to GPS and Geocoding

As ANRA attempted to find a solution for locating the remaining licenses that would be usable from a labor and cost standpoint, it became apparent that we would have to accept a lower accuracy on the locations than we had initially planned.

ANRA was able to locate 37 OSSFs using driving directions, but a large number of the older licenses only had vague driving directions using landmarks that no longer exist. By taking descriptions from multiple properties that referenced the same landmark (i.e. "Old Blu's Store") we were able to reasonably estimate the location of some of the more frequently cited landmarks and assign "general area" locations to 63 more licenses. ANRA also attempted to locate properties using subdivision plats and county appraisal district data, and were able to locate 350 more using that method.

The process of trying to identify specific system locations using these methods was very labor intensive, taking as much as 30 minutes to derive a location for a given property. Because ANRA still had over 3,000 licenses to locate, and did not have the time, funds, or staff to dedicate approximately 1,500 hours to locating all of the licenses individually, it was decided that we would assign the systems without specific information to the center of the subdivisions where the systems were installed. There were 156 subdivisions located, and 3,387 licenses assigned locations at subdivision centers.

OSSF Licenses by GPS Location Source

Using the described methods, ANRA was able to assign GPS locations to 5,234 OSSFs within the Control Zone Rayburn and the unincorporated portion of San Augustine County.

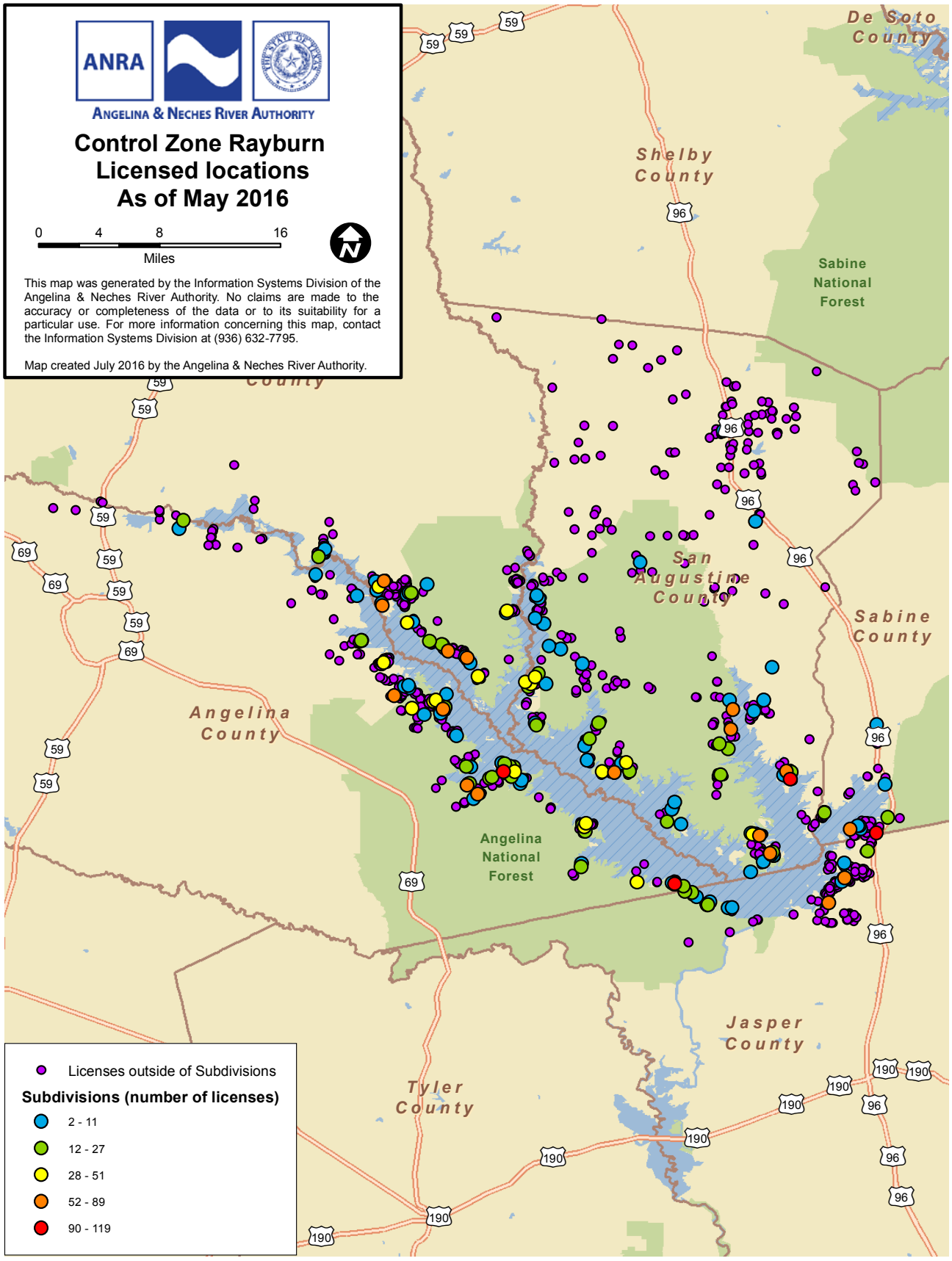
OSSF GPS Locations by Source	
GPS Location Source	**Number of Licenses**
OSSF location assigned to the center of the subdivision	3,387
Geocoded Address	600
GPS-Enabled Camera / Photographic Interpolation using Google Earth of Google Maps	454
Georeference plat of county appraisal district data	350
Historical data recorded by handheld GPS	340
Assigned to general area only (Unable to locate property precisely)	63
Driving directions as recorded on permit application	37
Unable to locate OSSF	3
TOTAL as of 07-13-2016	**5,234**

Mapping

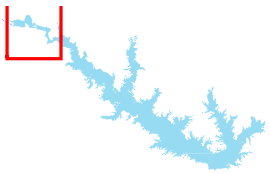
Using the GPS data acquired through this project, ANRA created maps of the OSSFs located in the Control Zone Rayburn and the unincorporate portion of San Augustine County using Esri's ArcGIS program.

For OSSFs that had to be assigned to the subdivision level, those systems are represented as a dot located at the center of the subdivision, with the number of systems assigned to that subdivision being shown. As additional GPS data is collected in the field, it will be possible to relocate systems from the center of the subdivision to the actual physical location.

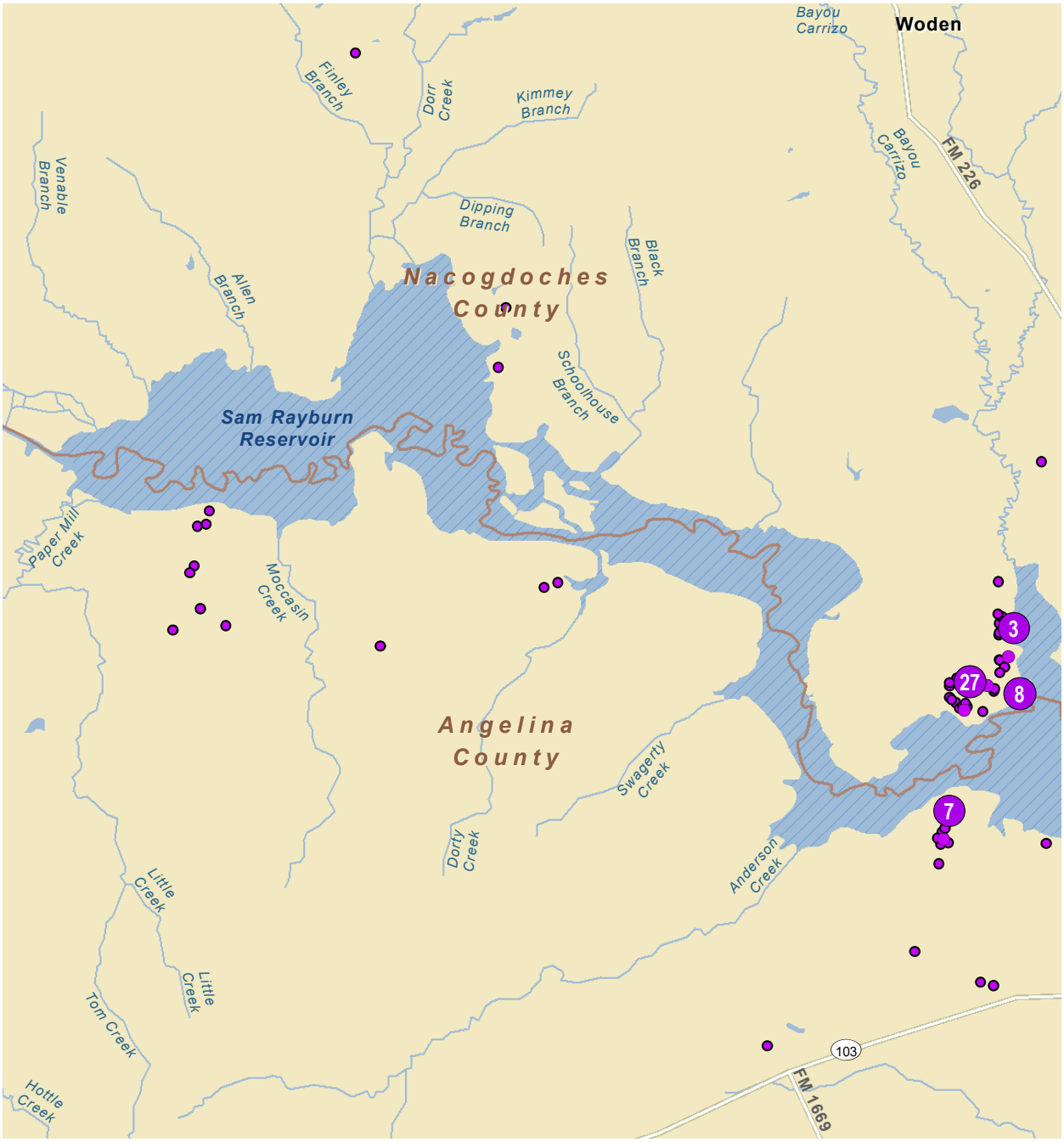
A map of Sam Rayburn Reservoir showing the OSSFs within the Control Zone Rayburn is included on the following page. Additional maps show greater detail by providing close-up views of sections of the reservoir.


ANRA
Angelina & Neches River Authority
Control Zone Rayburn
Licensed locations
As of May 2016
0 4 8 16
Miles
This map was generated by the Information Systems Division of the Angelina & Neches River Authority. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact the Information Systems Division at (936) 632-7795.
Map created July 2016 by the Angelina & Neches River Authority.
De Soto County
Shelby County
Sabine National Forest
San Augustine County
Sabine County
Angelina County
Angelina National Forest
Jasper County
Tyler County
Licenses outside of Subdivisions
Subdivisions (number of licenses)
2 - 11
12 - 27
28 - 51
52 - 89
90 - 119

ANRA
Angelina & Neches River Authority



Control Zone Rayburn Licensed Locations As of May 2016



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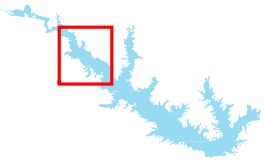
Map created July 2016 by the Angelina & Neches River Authority.

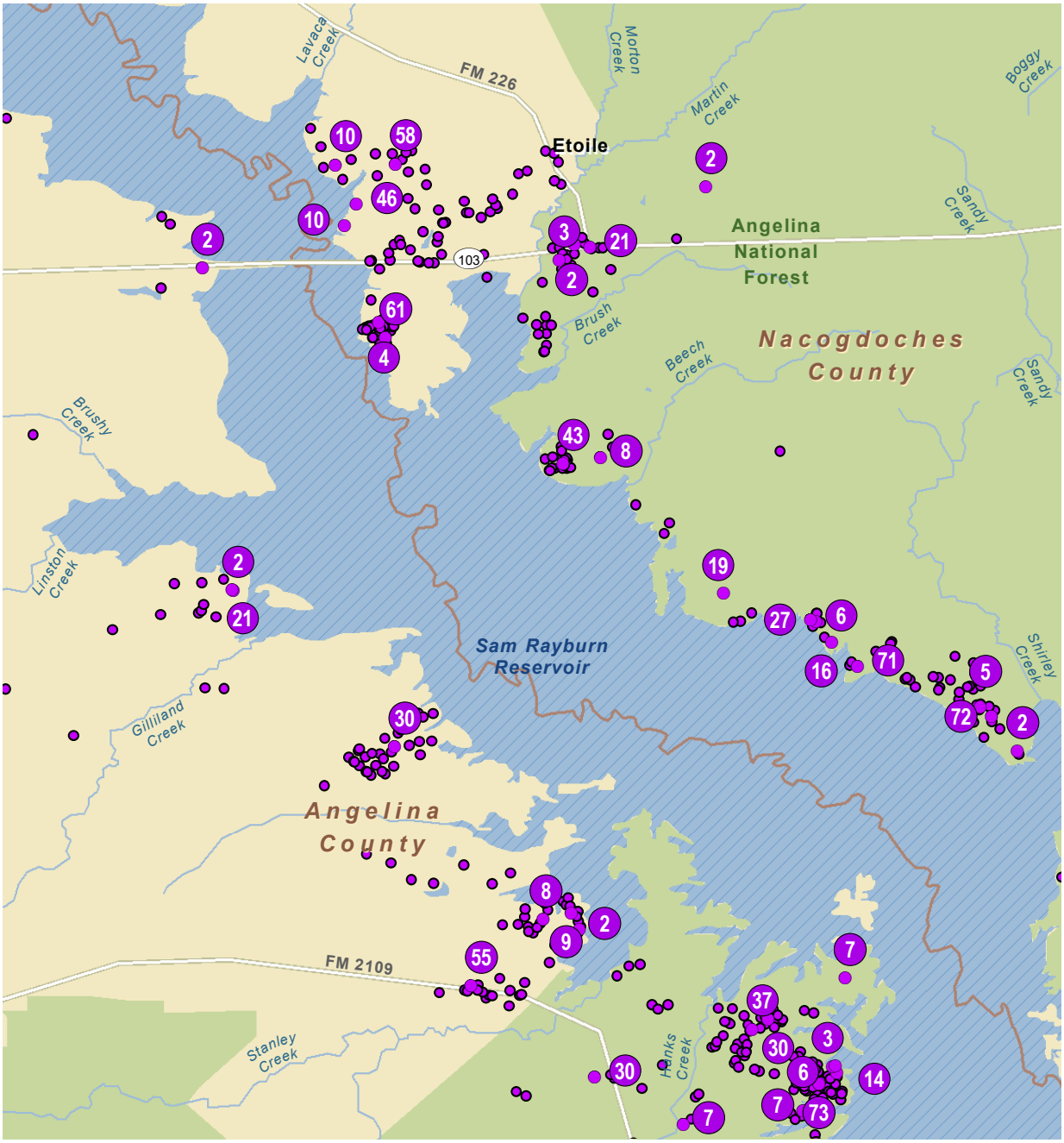
Licenses outside of Subdivisions
Subdivisions (number of licenses)

0 0.25 0.5 1 Miles

ANRA
Angelina & Neches River Authority



Control Zone Rayburn Licensed Locations As of May 2016



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- Licenses outside of Subdivisions
- Subdivisions (number of licenses)

0 0.25 0.5 1 Miles

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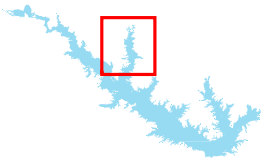
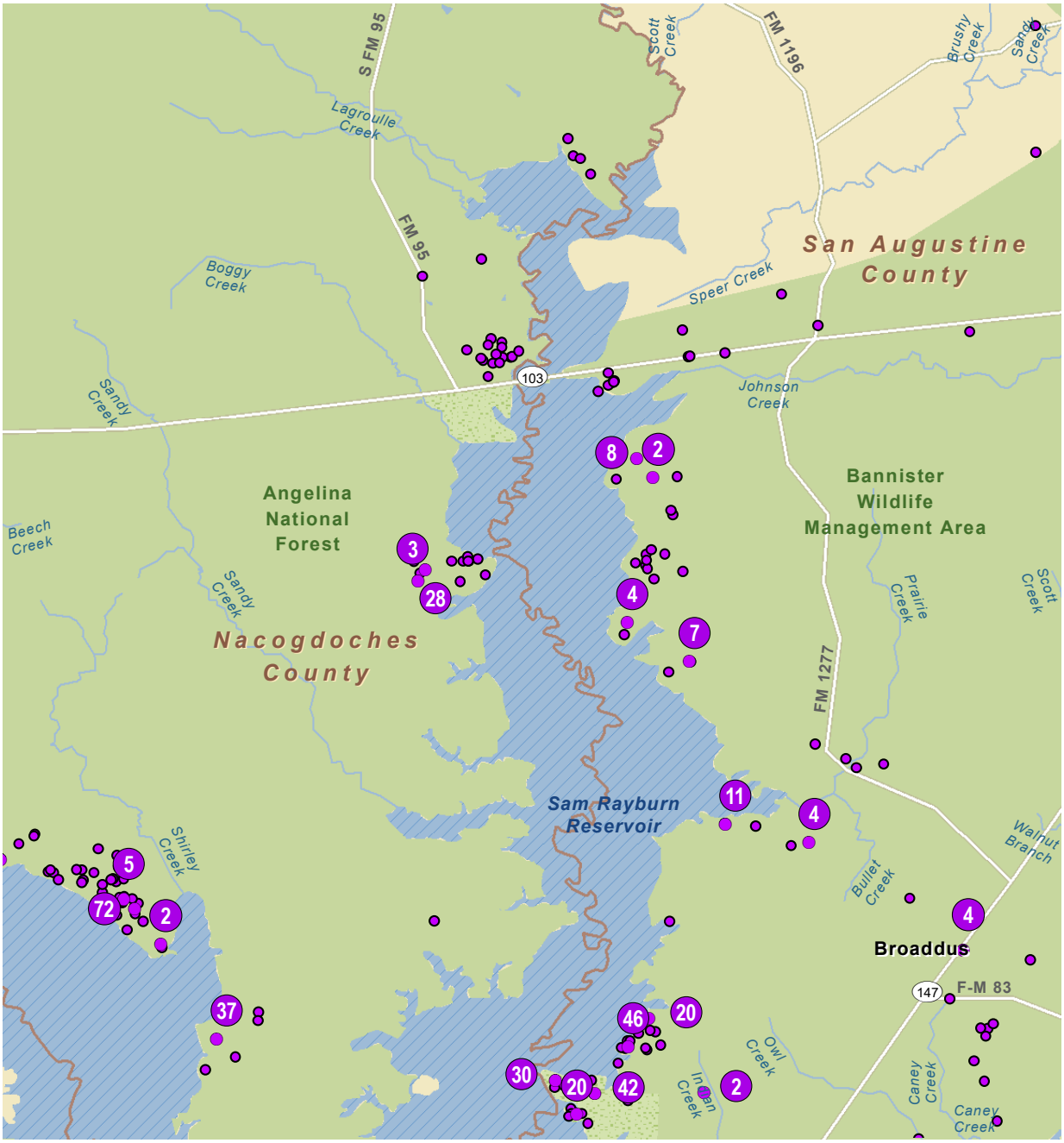


Control Zone Rayburn Licensed Locations As of May 2016



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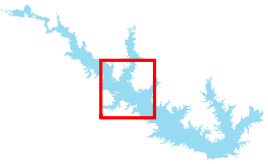
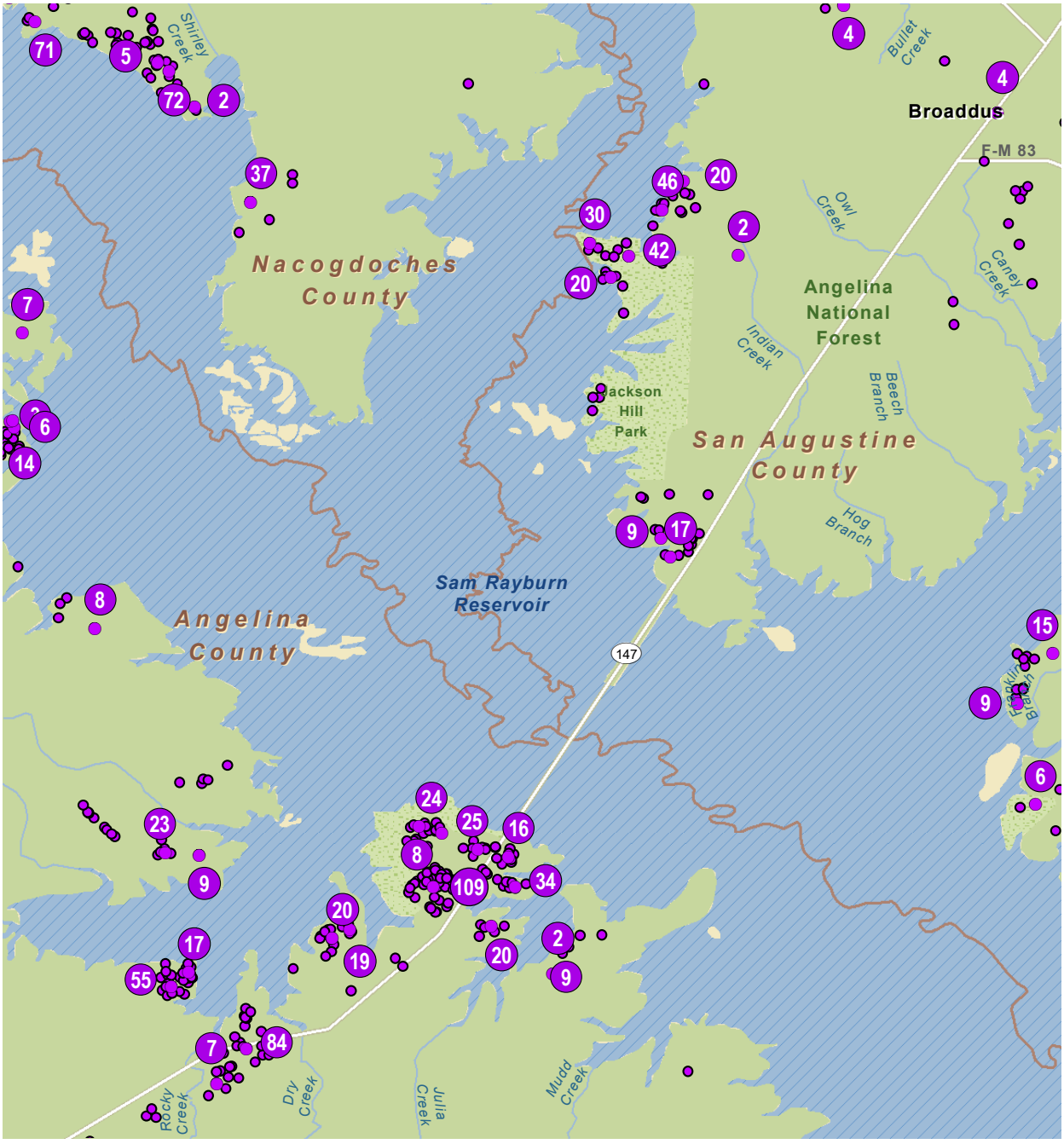


Control Zone Rayburn Licensed Locations As of May 2016



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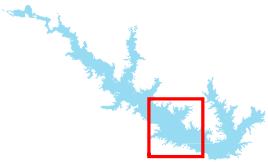

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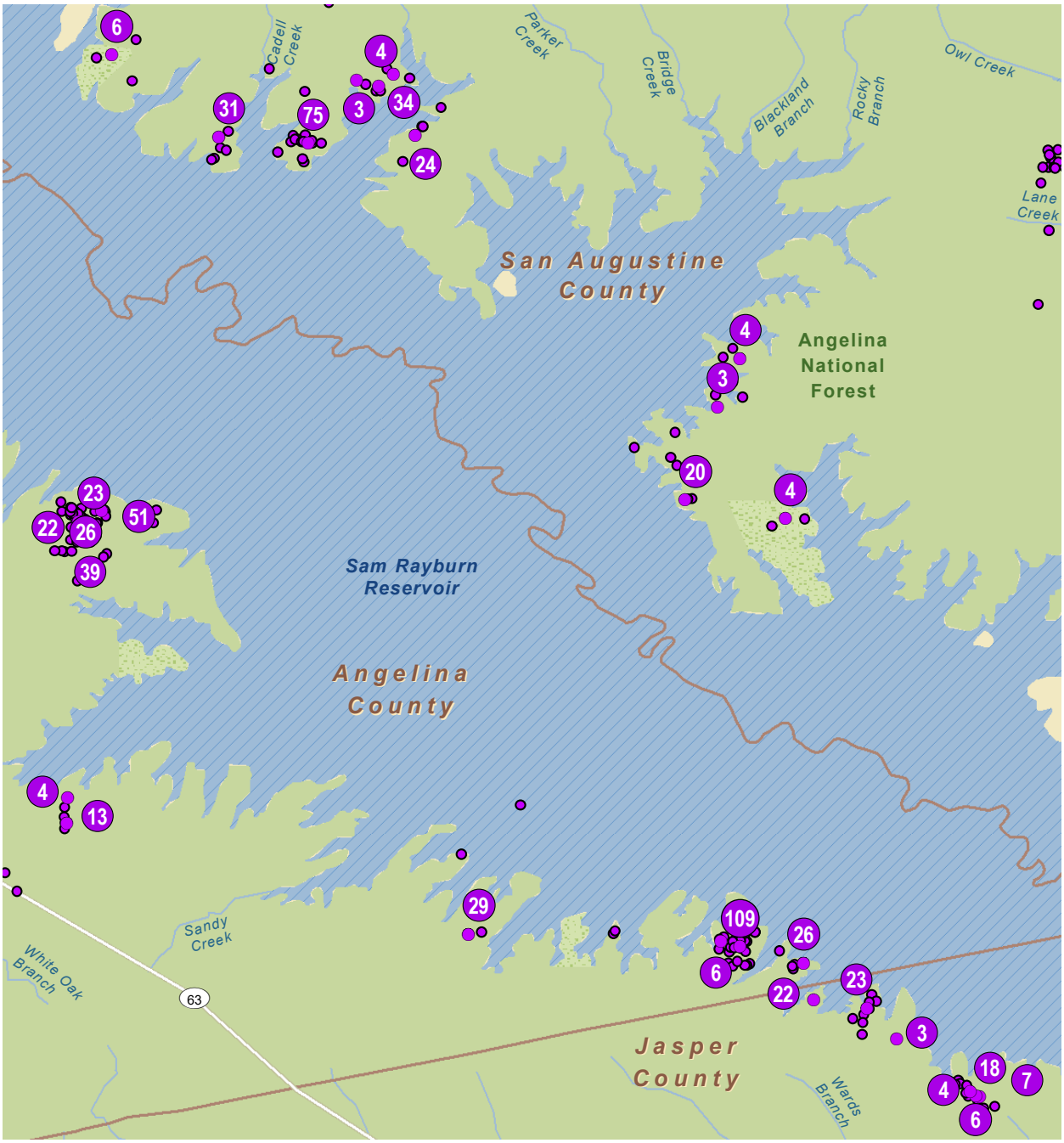

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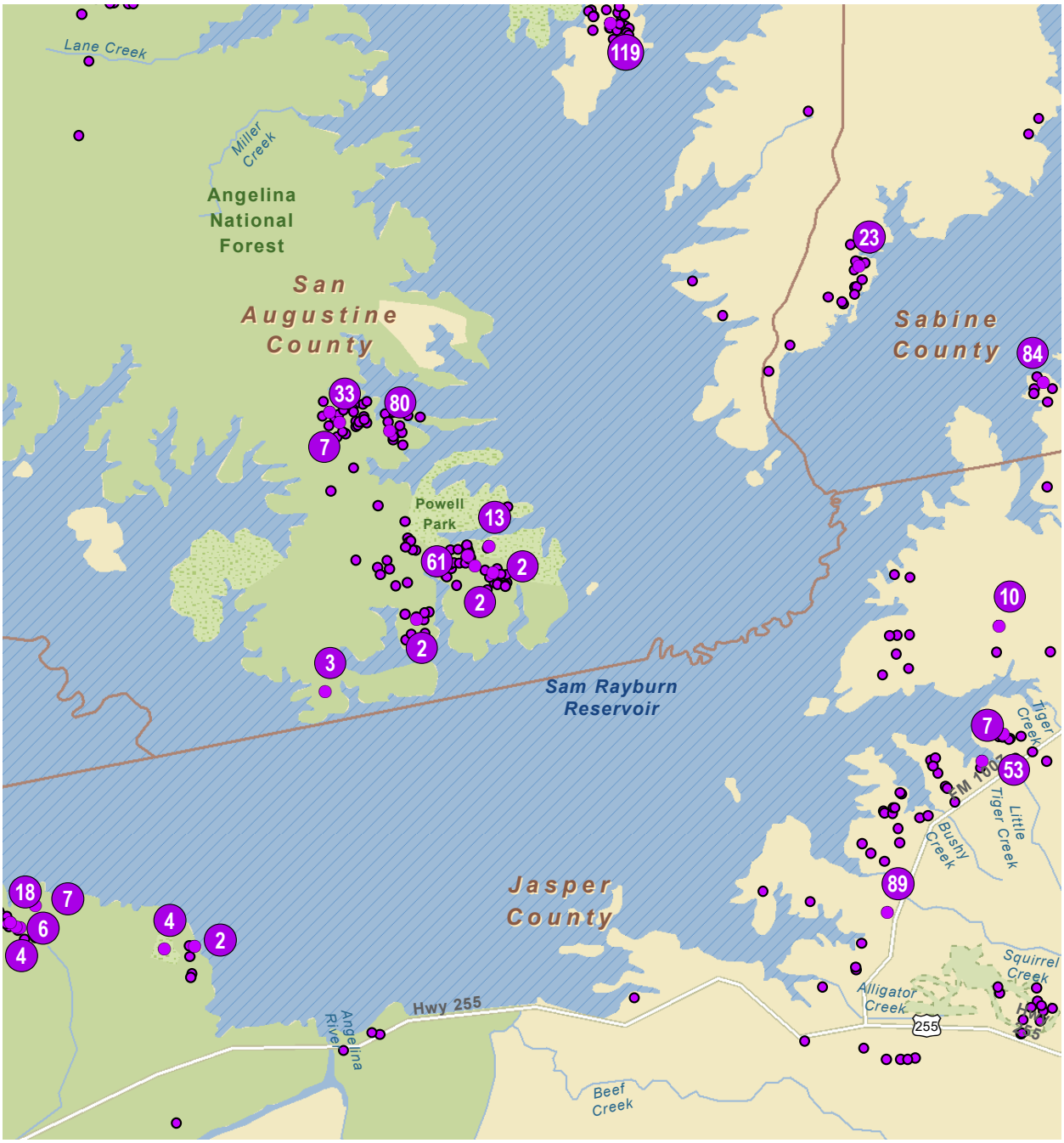
Angelina & Neches River Authority

Control Zone Rayburn Licensed Locations As of May 2016



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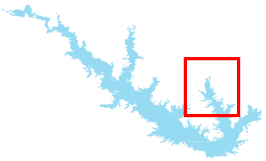
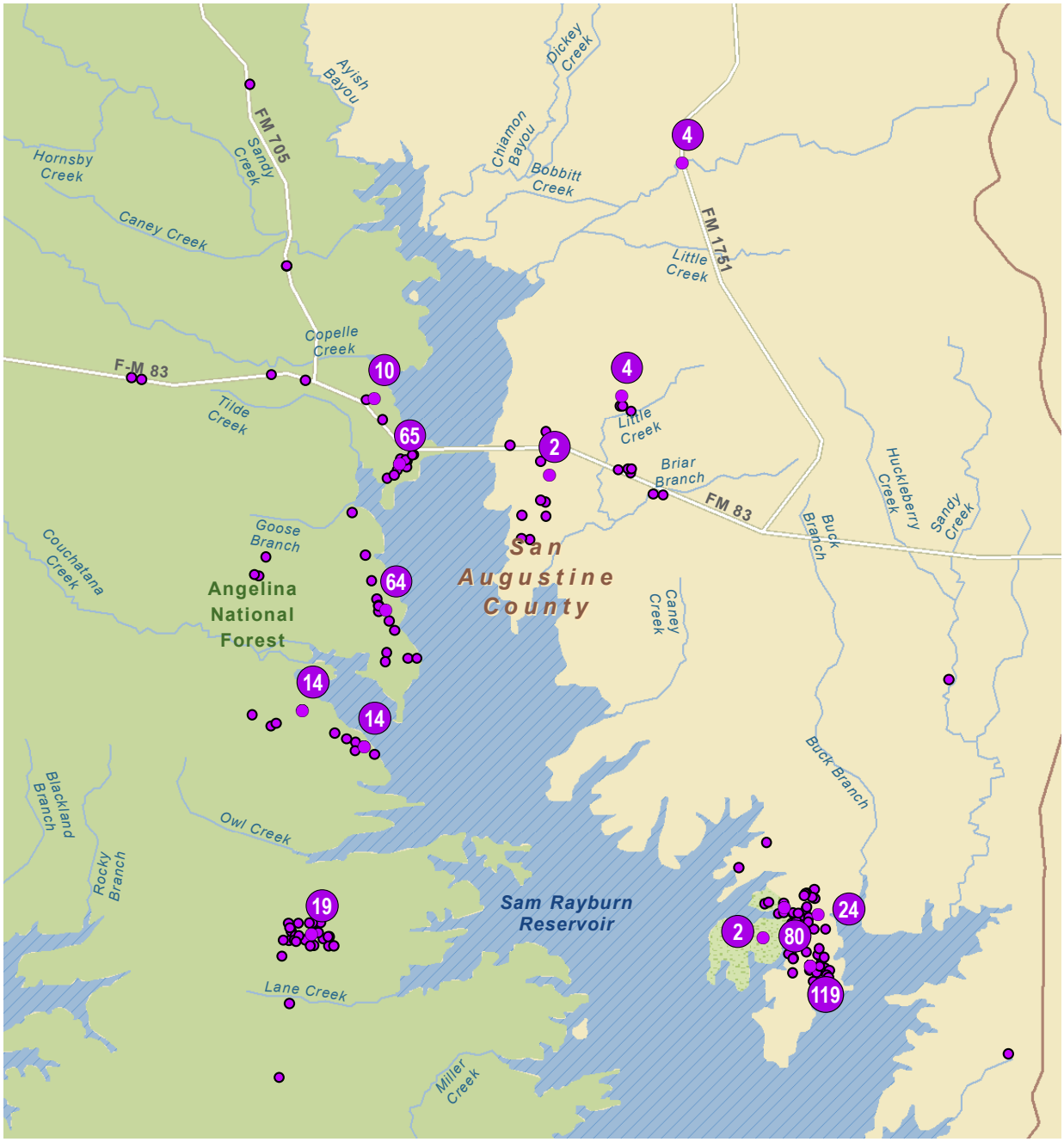


Control Zone Rayburn Licensed Locations As of May 2016



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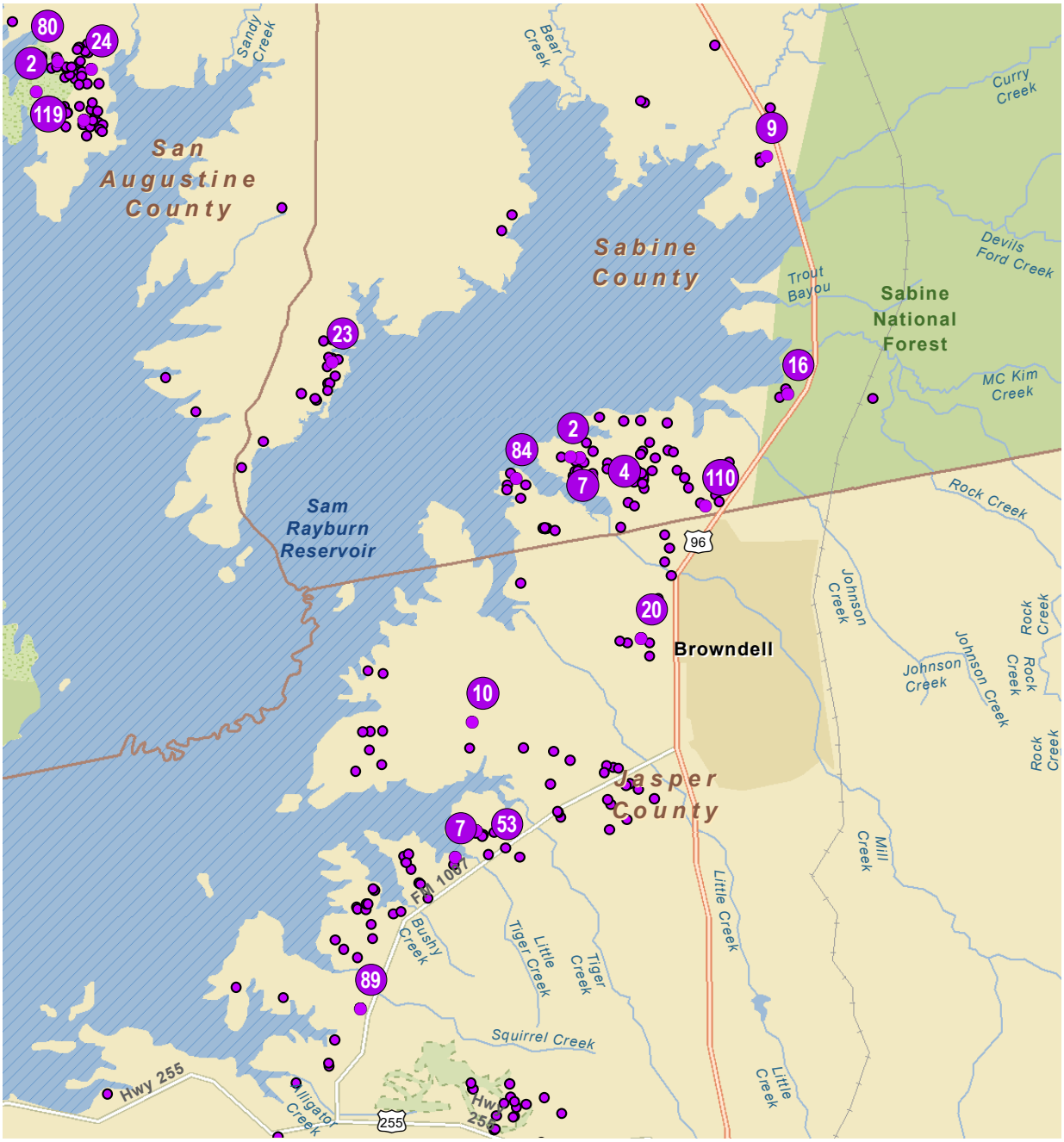

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Licenses outside of Subdivisions
Subdivisions (number of licenses)

0 0.25 0.5 1 Miles

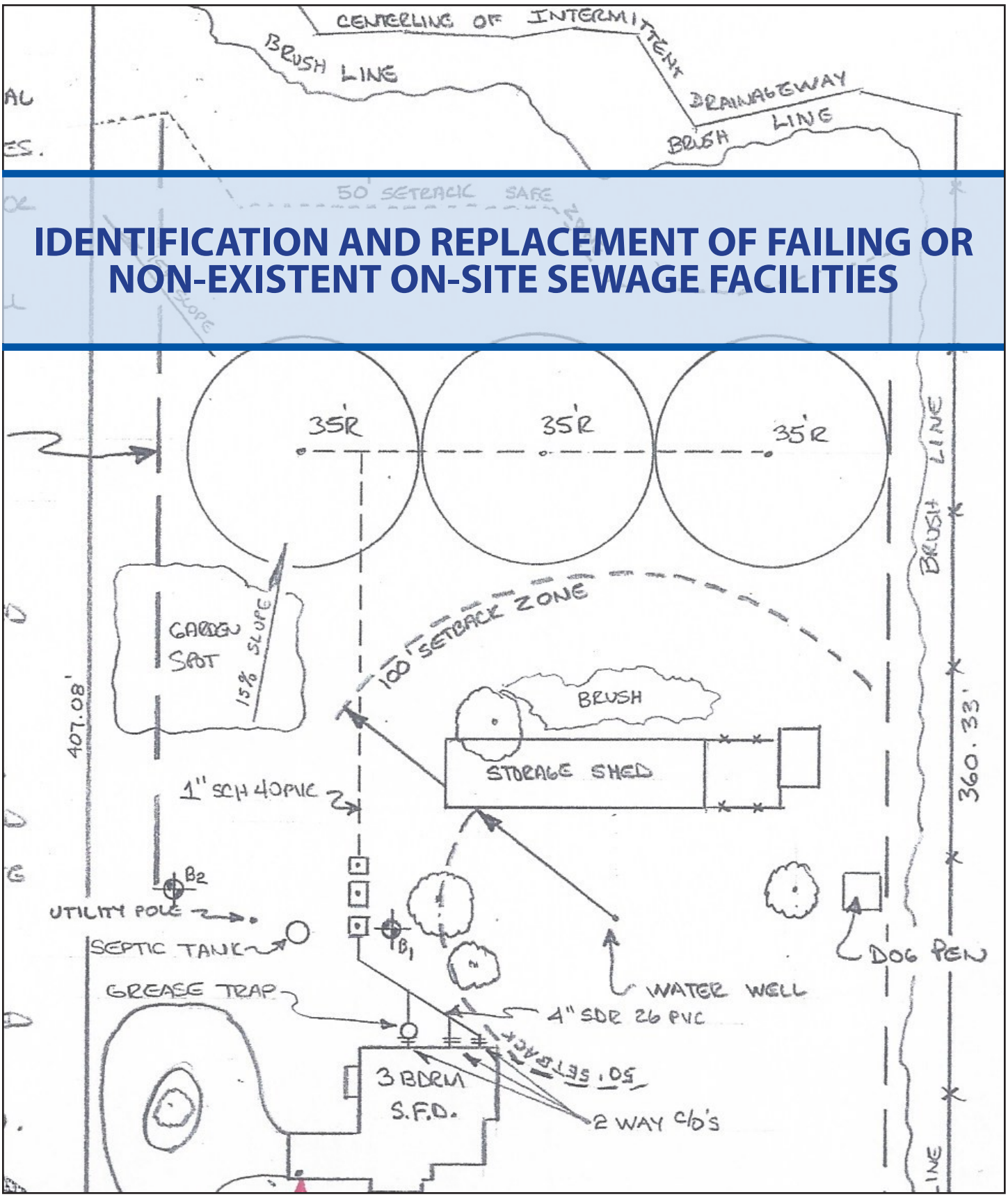
DISCUSSION

Through this project, ANRA was able to collect or assign GPS data for permitted OSSFs within the Control Zone Rayburn and the unincorporated portion of San Augustine County, as well as generate maps depicting the locations of those systems.

Due primarily to a lack of accurate property addresses for historical licenses, we were unable to assign exact locations to the majority of the systems. Because of this, it was necessary to assign over half of the permitted systems at the subdivision level. While this is not ideal due to an inability to pinpoint the exact location of an individual OSSF, having the systems assigned to the subdivision level allows ANRA to easily visualize areas where there are large clusters of OSSFs. With this information, it should be easier to identify areas where monitoring and/or OSSF inspections may be necessary due to the potential for OSSF system failure impacting water quality.

Moving forward, ANRA is collecting GPS data for all permitted systems. This information is requested on the application for a permit to construct an OSSF, and the data is verified by ANRA's OSSF Inspector at the time of final inspection of the installed system.

IDENTIFICATION AND REPLACEMENT OF FAILING OR NON-EXISTENT ON-SITE SEWAGE FACILITIES



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TASK DESCRIPTION

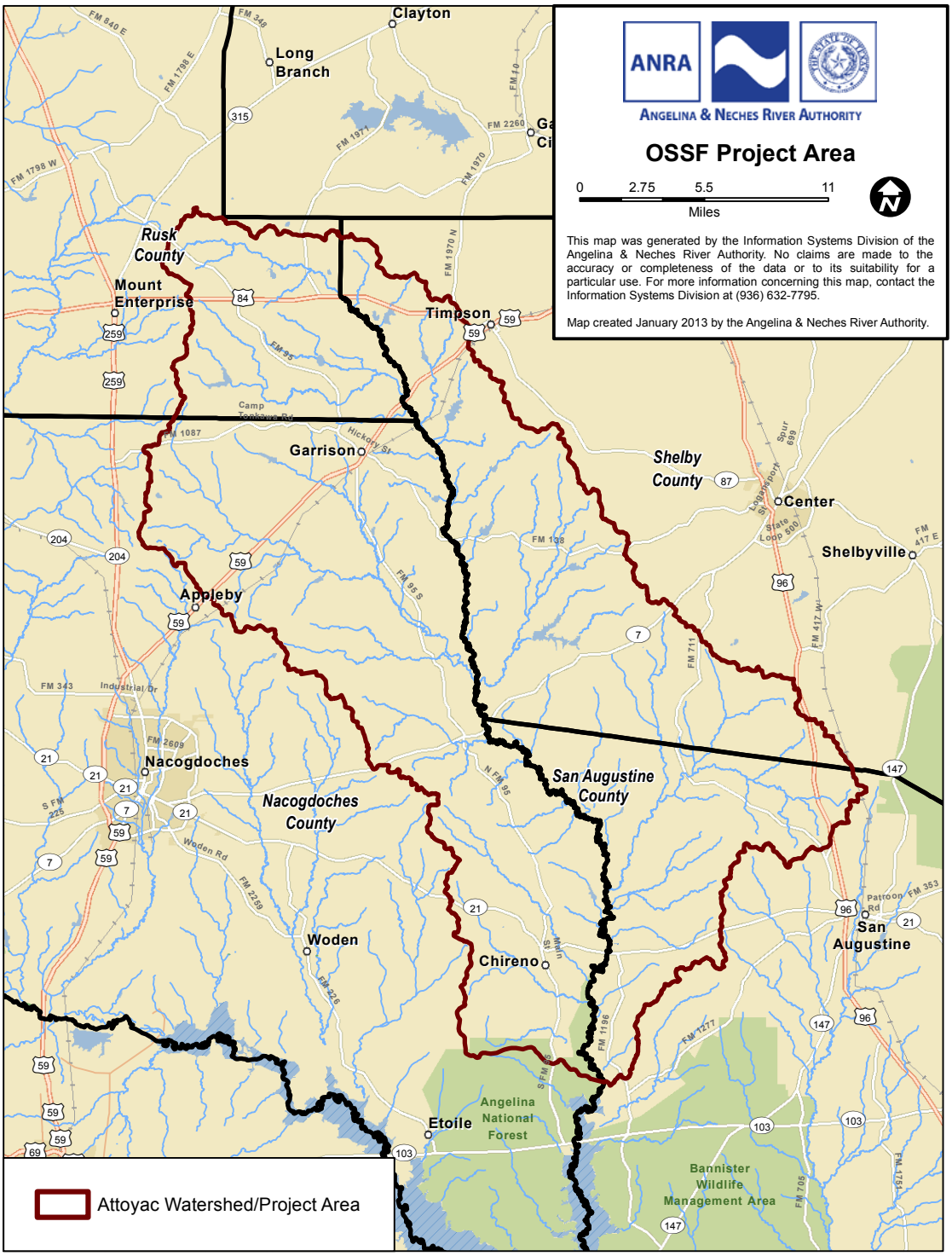
In the *Attoyac Bayou Watershed Protection Plan*, failing On-Site Sewage Facilities (OSSFs) were listed as one of the primary contributors to bacterial impairments within the watershed. The goal of this project task was to identify failing OSSFs within the Attoyac Bayou watershed and replace them with new aerobic OSSFs in order to address improper disposal of sewage. Funds were available to install twenty-three (23) aerobic OSSFs.

SCOPE OF WORK

Task 6	Identification and Replacement/Installation of Failing or Non-Existent OSSFs and Public Education
Objective:	To identify and replace failing OSSFs and install non-existent OSSFs in the portion of the Attoyac Bayou watershed located in Nacogdoches, San Augustine, Rusk, and Shelby Counties. Provide public with educational material on the maintenance of OSSFs.
Subtask 6.1:	**Planning** ANRA will develop a list of targeted properties for replacement of failing OSSFs or installation of OSSFs when non-existent. ANRA will develop a Scope of Work for soliciting bids from registered septic system designers and installers.
Subtask 6.2:	**Identification of Potential Failed OSSFs** ANRA will identify potential failed or non-existent OSSFs in the Attoyac Bayou watershed by one (1) or more of the following methods: • Consultation with local officials (county judges, justices of the peace, etc.); • OSSF complaints and/or violations; • On-site reconnaissance and inspections; and • Public meetings and solicitations (if necessary to reach threshold number of systems).
Subtask 6.3:	**Public Education** Educational materials will be provided to homeowners in order to give them the information necessary to properly maintain their OSSFs. Materials must be first provided to the TCEQ PM for review and approval before distribution.
Subtask 6.4:	**Replacement of Failed OSSFs** Failed or non-existent OSSFs identified by ANRA will be professionally designed and installed by registered designers and installers. Photographic documentation will be used for before/after comparisons to show that sources of NPS pollution have been addressed and remedied.
Subtask 6.5:	**Invoice Processing** ANRA will process invoices and distribute funds to system designers and installers for work conducted in order to design and install failing or non-existent OSSFs.

PROJECT AREA

The project area for the entire grant project (database development, mapping, OSSF replacement, and water quality monitoring) covers the Control Zone Rayburn, the unincorporated portion of San Augustine, and the Attoyac Bayou watershed. Because OSSF installation was being done to implemement activities identified in the *Attoyac Bayou Watershed Protection Plan*, the project task related to OSSF replacement was strictly limited to the Attoyac Bayou watershed. The Attoyac Bayou lies within portions of Rusk, Shelby, Nacogdoches, and San Augustine Counties.



METHODS

Planning

In order to begin replacing failed OSSFs, it was necessary for ANRA to develop a list of targeted properties. ANRA also had to develop a Scope of Work for the design and installation of the systems, as well as contract with a system designer and installer.

Developing a List of Targeted Properties

Failing or non-existent OSSFs in the project area were identified through a combination of consultation with local officials, database tracking of complaints and violations, and field reconnaissance and inspections. These activities are discussed in detail in the section entitled "Identification of Potential Failed OSSFs."

In order to solicit applicants for the project, ANRA developed a set of eligibility criteria to qualify for a grant that would cover 100% of the costs of an aerobic OSSF (including design, permitting, installing, and filing affidavits with the county clerk). Anticipating a competitive awards process, due to expecting to receive more applications than available systems, a scoring methodology was also developed. The grant eligibility requirements and application scoring criteria were approved by ANRA's Board of Directors on February 10, 2015.

OSSF Grant Eligibility Requirements

The following eligibility requirements were approved by ANRA's Board of Directors:

- The residence must be within the portion of Nacogdoches, San Augustine, Shelby, or Rusk Counties that lies within the Attoyac Bayou watershed;
- The residence must be a single family home served by a septic system;
- The applicant must own the property;
- The home must be the applicant's primary residence and be occupied for the majority of the year;
- The property must have a septic system that has failed or have no septic system to treat sewer discharge. Septic systems that are inappropriate for the soil type may also be considered if sufficient funding is available;
- Eligible sites will be limited to those where the household qualifies as *low income* (<80% of the area median income or federal poverty level), *very low income* (<60% of the area median income or federal poverty level), or *extremely low income* (<30% of the area median income or federal poverty level) as defined by TEX. GOV'T CODE § 2306.004;
- Priority will be given to properties within 2000 feet of an impacted waterbody.

From the outset, ANRA had decided to seek the assistance of the County Judges and County Commissioners of the affected counties in order to narrow the focus of the search and shorten the search time. Although there was strong support of the project from county officials, numerous local issues (geographical, demographics, availabillity of resources, etc.) made it difficult for them to identify applicants. With the exception of Nacogdoches County, which has a larger population living within the watershed, as well as a dedicated Environmental Health Director, the process of soliciting applicants through each county government was not very productive. ANRA had great difficulty getting applicants for the project, which delayed the start of the design and installation phase by over a year.

Perhaps the greatest limiting factor in the initial solicitation of applicants was the income eligibility requirements. Because of ANRA's desire to help those most in financial need, the staff recommendation to the Board of Directors was to base income requirements on the federal poverty limit. The eligibility requirements were set so that in order to qualify

for a grant, the income had to fall within either the *low income*, *very low income*, or *extremely low income*.

Initial Grant Income Requirements, Approved 2/10/2015

Annual Maximum Gross Income Categories (Based on Federal Povery Guidelines)				
Persons in Family/ Household	**Poverty Guideline**	**Low Income <80% of Poverty Level**	**Very Low Income <60% of Poverty Level**	**Extremely Low Income <30% of Poverty Level**
1	$11,670	$9,336	$7,002	$3,501
2	$15,730	$12,584	$9,438	$4,719
3	$19,790	$15,832	$11,874	$5,937
4	$23,850	$19,080	$14,310	$7,155
5	$27,910	$22,238	$16,746	$8,373
6	$31,970	$25,576	$19,182	$9,591
7	$36,030	$28,824	$21,618	$10,809
8	$40,090	$32,072	$24,054	$12,027

Based on these guidelines, approved by ANRA's Board of Directors on February 10, 2015, the total household income for a family of four had to be below $23,850 per year in order to qualify for the grant program. Although these limits were set with the intentions of helping those in the most need of financial assistance, the income requirements that were set proved to be too low, and excluded most interested parties. With these guidelines in place, only one applicant was able to meet the income requirements for the grant program.

After reevaluation, it was determined that ANRA needed to increase the income limits in order to allow more people to participate in the grant program. The income requirements, originally based on the federal poverty level, were modified to be based upon the Mean Household Income (MHI) of the watershed. The revised income requirements, shown below, were presented to and approved by ANRA's Board of Directors on September 29, 2015.

Revised Grant Income Requirements, Approved 9/29/2015

Annual Maximum Gross Income Categories (Based on Median Household Income)					
Persons in Family/ Household	**50% of MHI**	**75% of MHI**	**100% of MHI**	**125% of MHI**	**150% of MHI**
1	$14,441	$21,661	$28,882	$36,102	$43,322
2	$16,504	$24,756	$33,008	$41,260	$49,511
3	$18,567	$27,850	$37,134	$46,417	$55,700
4	$20,630	$30,945	$41,260	$51,574	$61,889
5	$22,280	$33,420	$44,560	$55,700	$66,840
6	$23,931	$35,896	$47,861	$59,826	$71,792
7	$25,581	$38,371	$51,162	$63,952	$76,743
8	$27,231	$40,847	$54,463	$68,078	$81,694

The income eligibility requirements were modified to remove this statement:

- Eligible sites will be limited to those where the household qualifies as *low income* (<80% of the area median income or federal poverty level), *very low income* (<60% of the area median income or federal poverty level), or *extremely low income* (<30% of the area median income or federal poverty level) as defined by TEX. GOV'T CODE § 2306.004.

and replace it with this one:

- Eligible sites will be limited to those where the household income is at or below 150% of the Median Household Income (MHI), based on household size. The MHI used for eligibility determination is based on the average MHI for Rusk, Shelby, Nacogdoches, and San Augustine Counties. Priority will be given to individuals and households with lower Median Household Incomes.

Under the revised guidelines, a family of four had to earn less than $61,889 per year to qualify for the grant program, compared to $23,850 per year under the prior guidelines. This expansion of the income eligibility requirements was the crucial step that allowed the project to proceed, as it was now possible to identify enough eligible applicants to successfully complete this task of the project.

OSSF Grant Fact Sheets

Fact sheets about the project were developed and distributed to the public, as well as to county officials. Fact sheets are included in the Appendices.

Appendix A - Notice of Grant Availability
Appendix B - Project Overview Fact Sheet
Appendix C - Grant Selection Criteria Fact Sheet
Appendix D - Grading and Scoring Criteria Fact Sheet
Appendix E - Frequently Asked Questions Fact Sheet
Appendix F - Grant Program Income Categories Fact Sheet

OSSF Grant Application

ANRA developed a grant application packet for homowners to submit for consideration of a grant to replace their failing OSSF. The application asked for the homeowner contact information and physical address of the property, as well as a series of questions pertaining to the property and the septic system at the location. The homeowner was asked to provide information pertaining to household income to determine eligibility. Questions about the age and condition of their current OSSF, including the extent of failure, was used to determine if a site visit was necessary. Homeowners were asked to provide proof of ownership, proof of income, and proof of electric service. Finally, applicants were asked to sign a certifying statement and hold harmless agreement.

A copy of the application form developed for use in this project is located in Appendix G.

OSSF Grant Scoring Criteria

In order to award grants for the replacement or installation of OSSFs in the watershed, ANRA developed criteria for evaluating and scoring the applications. The following general criteria were used:

- Proximity to the water body
- Distance to Sam Rayburn Reservoir
- OSSF system condition
- Household Income

Priority Zones around the Attoyac Bayou and its major tributaries were established, as OSSFs in closest proximity to an impaired waterbody can have the largest impact on water quality. OSSFs in close proximity to the Attoyac Bayou were given the highest priority, followed by systems located in close proximity to one of the major tributaries (Naconiche Creek, Terrapin Creek, Big Iron Ore Creek, Waffelow Creek, and West Creek).

Because the Attoyac Bayou discharges into Sam Rayburn Reservoir and the reservoir is used extensively for both primary contact recreation and public water supply use, it is important to minimize the amount of bacteria loading entering Sam Rayburn Reservoir to protect public health. In the grant scoring criteria, priority was given to residences that were closest in distance to Sam Rayburn Reservoir.

The OSSF system condition was also used to rank applicants. OSSF Inspections can determine if a system has failed or if it simply needs repair or to be pumped. In many instances, a home may not have a system at all. Priority was to be given to these households, as they have the greatest potential for bacterial loading into the watershed. Non-conforming systems, such as those which are not appropriate for the soil type were also considered, but had a lower priority than failed or non-existent systems.

Houeshold income was a primary factor in determing grant eligibility. Grants were awarded to individuals/households that are at, or below, 150% of the MHI for Rusk, Shelby, Nacogdoches, or San Augustine Counties. Income categories were weighted so that housholds with lower MHIs were given priority is scoring and ranking.

A copy of the Scoring Criteria form is located in Appendix H.

Scope of Work for System Design Services

ANRA engaged D&S Environmental Services to provide residential OSSF system designs for this project. Because the amount of this service was below the limit requiring bids, ANRA was able to enter into a contract for professional services for OSSF system design without soliciting bids. A Statement of Qualifications from D&S Environmental Services was received by ANRA on May 4, 2015. A Scope of Work was developed for the design portion of the project. The scope of work specified the total number of systems, requirements for soil analysis and site evaluation, system specifications (such as a requirement for liquid chlorine disinfection), and conditions related to site visits and coordination with ANRA staff.

The agreement between ANRA and D&S Environmental Services was signed and executed on May 12, 2015, following approval by ANRA's Board of Directors. The total fee for the services described in the Scope of Work was $17,250.00, based on 23 systems at $750.00 per system.

Scope of Work for System Installation

In order to select a contractor for the installation of OSSFs for this project, it was necessary for ANRA to issue a public notice to request sealed bids. The public notice was published on three occasions over three consecutive weeks (21 days) per ANRA policy. The public notice was published in the Nacogdoches Daily Sentinel and the Henderson Daily News, two newspapers of general circulation within the Attoyac Bayou Watershed. The following Appendices contain documents related to the request for sealed bids for the installation of OSSFs in the Attoyac Bayou watershed:

Appendix I - Public Notice Inviting Bids
Appendix J - Request for Proposals - OSSF Installation
Appendix K - Request for Proposals Addendum No. 1 - OSSF Installation
Appendix L - Bid Calculation Worksheet

Bid packets were prepared for the Request for Proposals (RFP). System installers were requested to provide bid prices (labor and material) for the following OSSFs:

Aerobic OSSF Base System Components		
SYSTEM COMPONENTS	**500 GPD Aerobic**	**750 GPD Aerobic**
Treatment Plant Manufacturer	TCEQ Approved System	TCEQ Approved System
Pump Tank Capacity	500 gallon (minimum)	750 gallon(minimum)
Trash Tank Capacity	325 gallon (minimum)	500 gallon (minimum)
Effluent Pump	½ HP Submersible	½ HP Submersible
Disinfection	Approved Liquid Chlorinator	Approved Liquid Chlorinator
Alarms	Audible & Visible High Water Alarm	Audible & Visible High Water Alarm
Effluent Pump Timer Requirement	Optional w/20' setback on property lines	Optional w/20' setback on property lines
Final Disposal	Surface Irrigation	Surface Irrigation
Sprinklers	3 Rainbird Maxi-Paw sprinklers with # 10 Low Angle Nozzle (or equivalent)	4 Rainbird Maxi-Paw sprinklers with # 10 Low Angle Nozzle (or equivalent)
Maintenance Contract	2 Year Contract	2 Year Contract
Maintenance Inspections	4X per year for 2 years	4X per year for 2 years

Bids also included costs for permitting, county filing fees, and addtional variable costs such as electrical conduit, PVC pipe, and soil backfill.

The Request for Proposals was issued on January 14, 2016. Two mandatory Pre-Bid Conferences were held, and proposals were due on February 8, 2016. Bids were received from four installers. The Bids were tabluated and a recommendation was presented to ANRA's Board of Directors on February 9, 2016. The Board of Directors accepted the Bid from Socia Septic Systems, Inc., in an amount not to exceed $135,027.00. A Notice of Award and Notice to Proceed were both signed on February 12, 2016.

Identification of Potential Failed OSSFs.

Failing or non-existent OSSFs in the project area were identified through a combination of consultation with local officials, database tracking of complaints and violations, field reconnaissance and inspections, and public meetings and solicitations.

Consultation with Local Officials

The Angelina & Neches River Authority is a political subdivision of the State of Texas, and was created by the state legislature under Article 16, Section 59 of the Texas state constitution. It is recognized as an independent governmental entity authorized to construct, maintain, and operate any and all works necessary for the purpose of controlling, storing, and preserving water resources in its 17 county jurisdiction in the Neches River Basin. The major functions of ANRA are water quality management, water resource development, and conservation of water resources. ANRA administers several water quality related environmental programs including the surface water quality monitoring programs, permit compliance monitoring programs, industrial pre-treatment program, and a water/wastewater sample collection and testing program. ANRA's territorial jurisdiction consists of 8,500 square miles that lie wholly or in part of the following counties: Van Zandt, Smith, Henderson, Newton, Cherokee, Anderson, Rusk, Houston, Nacogdoches, San Augustine, Shelby, Angelina, Trinity, Sabine, Polk, Jasper, and Orange.

ANRA also functions as the Authorized Agent for Angelina County, San Augustine County, and the Control Zone Rayburn. An Authorized Agent is a local government entity that has been delegated the authority by the Texas Commission on Environmental Quality to implement and enforce the rules adopted under Texas Health and Safety Code,

Chapter 366 (*On-Site Sewage Disposal Systems*). Essentially, ANRA is the permitting agency for On-Site Sewage Facilities in Angelina County, San Augustine County, and the Control Zone Rayburn. A portion of the Attoyac Bayou watershed lies within ANRA's Authorized Agent jurisdiction.

Due to ANRA's role as a government entity and its regulatory responsibilities as they relate to OSSFs, the identification of failing septic systems created a unique situation for ANRA. ANRA was attempting to identify homeowners that would qualify for a grant program to replace their failing OSSFs. However, if they did not qualify, ANRA faced finding itself in the situation where someone self-identified a violation of the Texas Health and Safety Code, and as Authorized Agent, we had a duty to initiate enforcement actions, including the potential for civil or criminal penalties resulting from legal action.

In order to reduce the possibility that a voluntary grant program could unintentionally result in enforcement actions having to be initiated against individuals, ANRA decided that the most prudent action would be to open a dialog with the County Judges and County Commissioners in the four counties within the Attoyac Bayou watershed. ANRA felt that, as local elected officials, the County Judges and County Commissioners would be best suited for identifying potential grant applicants, screening applicants to ensure they met the grant qualifications, and forwarding those applicants on to ANRA. This process would also allow ANRA to allocate the grants so that each county would get a portion of the installed systems.

In April 2015, ANRA's General Manager and Environmental Division Manager had a series of meetings with county officials to present the OSSF replacement program and request their involvement. This included making presentations at two Commissioners Court meetings.

Kelly Holcomb and Brian Sims with Angelina and Neches River Authority spoke with the commissioners about grant funding which can now be available to certain parts of Shelby County for on-site septic systems in use within the Attoyac watershed. The grant is identified as Clean Water Act Section 319. They requested the county be the central clearinghouse for the county. The county will collect the applications until May 29 and pass them on to the river authority.

"The Attoyac watershed is southwest of Center and it's a grant program whereby we are the administrators of that grant and will be installing on-site septic systems for entity, citizens or residents who own their property inside the Attoyac watershed," said Miller. "It's a low-income type situation basically it's federal grant monies that have been passed back down to the state of Texas administered to by the TCEQ (Texas Commission on Environmental Quality) in this state in this particular circumstance."

Holcomb explained through an application process the Angelina and Neches River Authority was granted this grant to install 23 systems of these septic systems throughout the entire Attoyac watershed. The proposition is to install these systems in the four effected counties including Shelby, San Augustine, Nacogdoches and Rusk. The grant funds will pay for licensing fees, design fees and installation of the system and the resident will pay almost nothing for a system which could cost $6,000-$7,000.

"Precinct 1 and Precinct 4 are the only precincts that this is going to affect. I just thought it was a great program, I having been somebody whose had to put in two of these systems for a business and then a home that I owned, but it's awfully nice to know that they might get some help from the government to do it," said Judge Harbison. "They're costly and most people that really need them are usually the ones that can't afford them out in the rural areas, so this is a great thing that we might can possibly help our citizens with."

Sims explained the Attoyac Bayou is listed as impaired for bacterial contamination, "It's currently under the development of a watershed protection plan through a partnership that was done through a similar grant from the soil board a few years ago. As part of that watershed protection plan they identified failing septic systems as one of the leading contributors to the bacterial contamination that was in the Attoyac," said Sims. "The purpose of this grant program is to address those sources of pollution and that's why we're able to use those funds to pay for the replacement or installation of septic systems in order to alleviate that source of bacteria entering the watershed."

News article as it appeared on The Shelby County Today website

Meetings with County Officials

- *4/13/2015 - meeting with Shelby County Judge Harbison*
- *4/15/2015 - meeting with Rusk County Judge Hale*
- *4/15/2015 - meeting with Nacogdoches County Judge Perry*
- *4/22/2015 - meeting with San Augustine County Judge Johnson*
- *4/27/2015 - presentation to Shelby County Commissioners Court*
- *4/28/2015 - presentation to San Augustine County Commissioners Court*

Although all parties expressed interest in the grant program and its potential impact on their constituents, ANRA was unable to get the needed number of applicants for the project through local officials. Much of the reason that this method was unsuccessful was geographical in nature. In Rusk and San Augustine Counties, the area encompassing the Attoyac Bayou watershed is minimal and located only in a small portion of the county. Although several potential applicants were identified, the applicants did not qualify due to being outside of the watershed (in some cases, by less than a half mile). For Nacogdoches County however, the Attoyac Bayou makes up the eastern county line, and the watershed encompasses a substantial portion of the county. The Environmental Health Director for Nacogdoches County was able to identify and recommend several applicants to ANRA that were approved for OSSFs. These included multiple systems in Garrison and Chireno, TX.

OSSF Complaints and Violations

As the Authorized Agent for San Augustine County, ANRA has a responsibility to investigate violations of state OSSF regulations. The majority of these investigations are due to complaints submitted to ANRA's office by concerned neighbors stating that a system is malfunctioning. As part of this complaint investigation process in San Augustine County, ANRA's representatives in the field would attempt to determine if the person being investigated would be eligible for the grant. If grant assistance was available to the homeowner, that process could be followed instead of ANRA having to initiate civil or criminal enforcement action.

ANRA's role as a governmental entity/regulator made it difficult to solicit applicants. People were generally hesitant to provide information to us, especially in regards to income levels.

ANRA also contacted TCEQ Region 10 in Beaumont for assistance in identifying potential applicants. TCEQ Region 10 is the permitting authority in Shelby County. TCEQ provided ANRA with several lists of complaints they were investigating, but none of them were located within the watershed. That area of Shelby County has a very low population density, so ANRA was not able to identify any applicants through that route.

Field Reconnaissance and Inspections

ANRA has the authority to investigate OSSF complaints and enforce the rules of the state. However, an issue arose in regards to engaging homeowners to determine if they had a failing system and whether they would be interested in applying for a grant to replace their system. The conundrum ANRA found itself in was how to respond to people that self-identified a problem (*i.e.*, a violation of state OSSF rules) but were unable to qualify for the grant to install a system so they can come into compliance. ANRA is required by Texas Administrative Code Chapter 285 to investigate all complaints related to OSSFs. However, it was not clear what enforcement action was mandatory if ANRA discovered a system failure through self-disclosure instead of through a complaint investigation.

Because ANRA did not want to find itself in a situation where the self-identification of an OSSF issue forced ANRA to enter into enforcement action, several steps were taken to minimize this possibility. All applications received were submitted directly to the Environmental Division Manager for approval, scoring, and ranking. Once applicants were approved, they were provided to the OSSF Inspectors to perform a site visit and engage the OSSF Designer. If the applicant did not qualify, that information was never provided to the OSSF Inspectors, so a complaint was not initiated. Additionally, door-to-door solicitation by ANRA staff was performed to identify potential applicants. Because of ANRA's regulatory role as the Authorized Agent in San Augustine County, our solicitations were performed in Nacogdoches and Shelby Counties, where we are not the Authorized Agent. Because our Authorized Agent status does not extend to those counties, we were able to engage homeowners without a risk of them falling under an enforcement action.

Public Meetings and Solicitations

ANRA did not hold any public meetings soliciting applicants. ANRA did develop flyers with information regarding the program that were posted at post offices and churches within the watershed. Additionally, water supply corporations within the watershed were contacted to determine if they knew of any eligible applicants.

RESULTS AND OBSERVATIONS

OSSF Installation

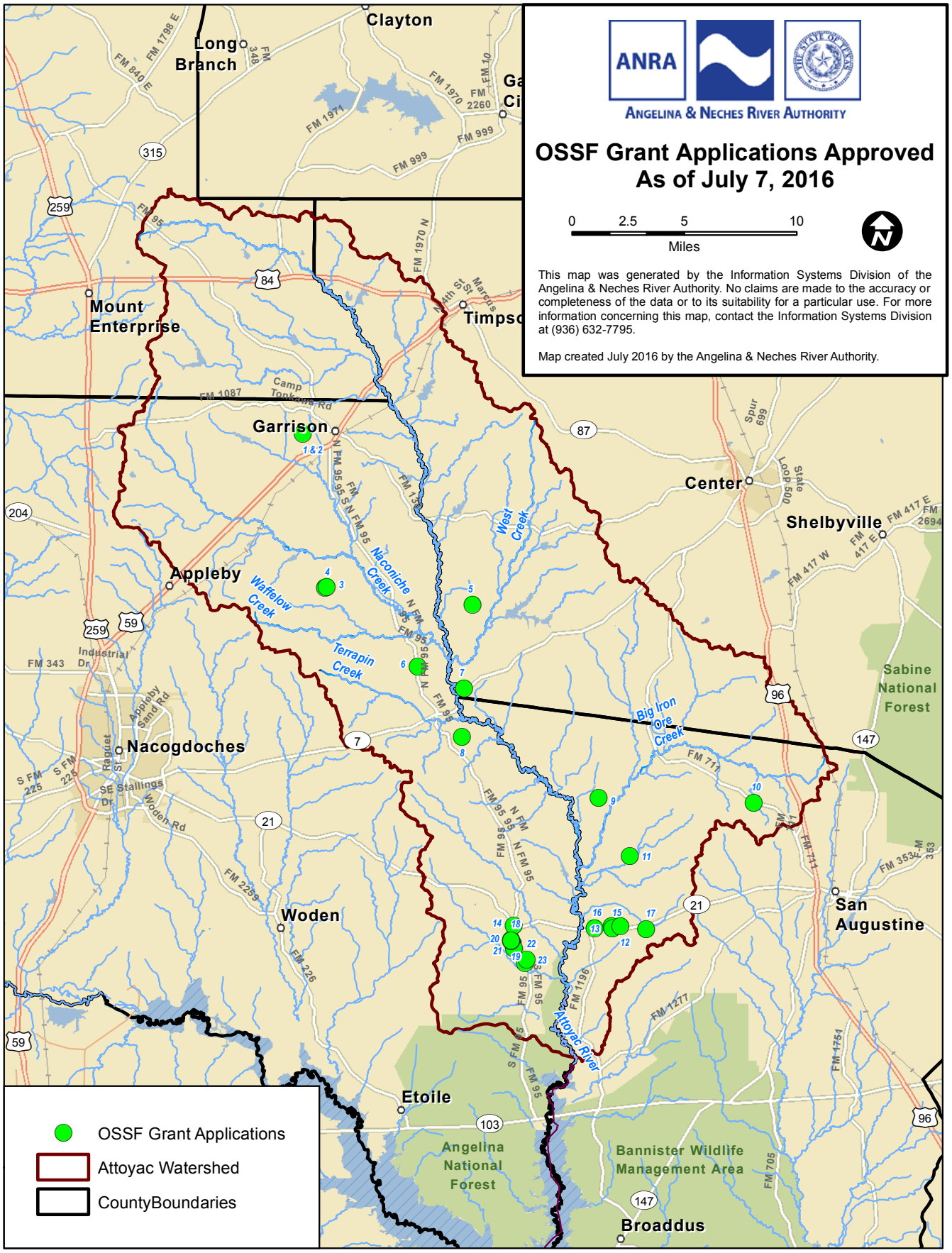
For this project, ANRA was able to identify twenty-three (23) applicants with failing or non-existent OSSFs. ANRA funded the installation of a new OSSF for these properties, covering all related costs (design, installation, permitting, and filing of affidavits).

Approved Applications

Twenty-three applications from homeowners within the Attoyac Bayou watershed were approved for the installation of a new OSSF. The list of names and addresses for the applicants has been anonymized for privacy reasons. Unique identifiers have been assigned to each system. The table below shows a list of approved applications for which systems have been installed. The city and county of each system is listed, along with the invoice amount for the design and installation of each OSSF system. The systems in the list are ordered beginning with the northernmost system and continue in order as you head downstream in the watershed.

LIST OF APPROVED APPLICANTS AND INSTALLED SYSTEMS							
OSSF #	**Identifier**	**City**	**County**	**Date Application Received**	**OSSF Design Cost**	**OSSF Installation Amount**	**Total OSSF Cost**
1	NAC-001 RT	Garrison	Nacogdoches	05/29/15	$750.00	$5,476.00	$6,226.00
2	NAC-002 RT	Garrison	Nacogdoches	05/29/15	$750.00	$6,481.00	$7,231.00
3	NAC-003 TG	Nacogdoches	Nacogdoches	01/20/16	$750.00	$5,356.00	$6,106.00
4	NAC-004 JDV	Nacogdoches	Nacogdoches	01/21/16	$750.00	$5,356.00	$6,106.00
5	SH-001 JC	Center	Shelby	03/07/16	$750.00	$5,432.00	$6,182.00
6	NAC-005 RG	Nacogdoches	Nacogdoches	02/26/16	$750.00	$5,546.00	$6,296.00
7	SH-002 CWC	Center	Shelby	12/23/15	$750.00	$5,086.00	$5,836.00
8	NAC-006 SM	Nacogdoches	Nacogdoches	06/10/16	$750.00	$5,486.00	$6,236.00
9	SA-001 BF	Center	San Augustine	07/01/16	$750.00	$5,610.00	$6,360.00
10	SA-002 KN	San Augustine	San Augustine	12/18/15	$750.00	$5,300.00	$6,050.00
11	SA-003 IPL	San Augustine	San Augustine	07/27/15	$750.00	$5,610.00	$6,360.00
12	SA-004 CC	San Augustine	San Augustine	07/01/16	$750.00	$6,305.00	$7,055.00
13	SA-005 EC	San Augustine	San Augustine	02/05/16	$750.00	$5,610.00	$6,360.00
14	NAC-007 NC	Chireno	Nacogdoches	02/24/16	$750.00	$5,511.00	$6,261.00
15	SA-006 DB	San Augustine	San Augustine	02/05/16	$750.00	$5,865.00	$6,615.00
16	SA-007 KB	San Augustine	San Augustine	02/05/16	$750.00	$5,300.00	$6,050.00
17	SA-008 JC	San Augustine	San Augustine	12/18/15	$750.00	$5,702.50	$6,452.50
18	NAC-008 JP	Chireno	Nacogdoches	12/23/15	$750.00	$6,558.50	$7,308.50
19	NAC-009 RC	Chireno	Nacogdoches	05/24/16	$750.00	$5,516.00	$6,266.00
20	NAC-010 CM	Chireno	Nacogdoches	05/19/16	$750.00	$5,516.00	$6,266.00
21	NAC-011 PR	Chireno	Nacogdoches	04/14/16	$750.00	$5,436.00	$6,186.00
22	NAC -012 RE	Chireno	Nacogdoches	03/09/16	$750.00	$5,516.00	$6,266.00
23	NAC-013 JE	Chireno	Nacogdoches	02/22/16	$750.00	$5,476.00	$6,226.00
				TOTALS	**$17,250.00**	**$129,051.00**	**$146,301.00**

The map of approved OSSF grant applications shows the location of each system within the watershed and the proximity to the Attoyac Bayou and its tributaries.


ANRA
Angelina & Neches River Authority
OSSF Grant Applications Approved
As of July 7, 2016
0 2.5 5 10
Miles
This map was generated by the Information Systems Division of the Angelina & Neches River Authority. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact the Information Systems Division at (936) 632-7795.
Map created July 2016 by the Angelina & Neches River Authority.
Clayton
Long Branch
Mount Enterprise
Garrison
Appleby
Nacogdoches
Woden
Etoile
Broaddus
San Augustine
Center
Shelbyville
Sabine National Forest
Angelina National Forest
Bannister Wildlife Management Area
Naconiche Creek
Waffelow Creek
Terrapin Creek
West Creek
Big Iron Ore Creek
Attoyac River
OSSF Grant Applications
Attoyac Watershed
CountyBoundaries

OSSF #1 and #2: NAC-001 RT and NAC-002 RT

Three households are located on one property in Garrison, TX, in the northern portion of the Attoyac Bayou watershed. A failing conventional septic system was located on this property. The soil type was red clay, for which a conventional system does not provide appropriate treatment. Sewage was surfacing and discharging to the creek. The Nacogdoches County Environmental Health Director provided information about this system to ANRA and assisted the homeowner with preparation and submission of the application.

Due to the fact that multiple homes were being serviced by the same failing conventional system, it was determined that the best course of action would be to install two aerobic OSSFs on the property. A 500-gpd OSSF was installed to treat sewage discharge from the main residence, and a 750-gpd was installed for treatment of sewage from the other two households. The existing system was pumped and closed.

Site photographs of NAC-001 RT and NAC-002 RT property prior to installation

Site photographs of NAC-001 RT and NAC-002 RT property during installation

Site photographs of NAC-001 RT and NAC-002 RT property at inspection

Site photographs of NAC-001 RT and NAC-002 RT property at inspection

OSSF #3: NAC-003 TG

This household is located in Nacogdoches, TX, in Nacogdoches County. This application was provided by the Nacogdoches County Environmental Health Director. The property was serviced by a conventional system that was undersized. Sewage was surfacing from the system and discharging to the creek.

A 500-gpd system was installed at this property based upon the system design. The existing conventional system was pumped and closed.

Site photographs of NAC-003 TG property prior to OSSF installation

Site photographs of NAC-003 TG property during OSSF installation

Site photograph of NAC-003 TG property at inspection

OSSF #4: NAC-004 JDV

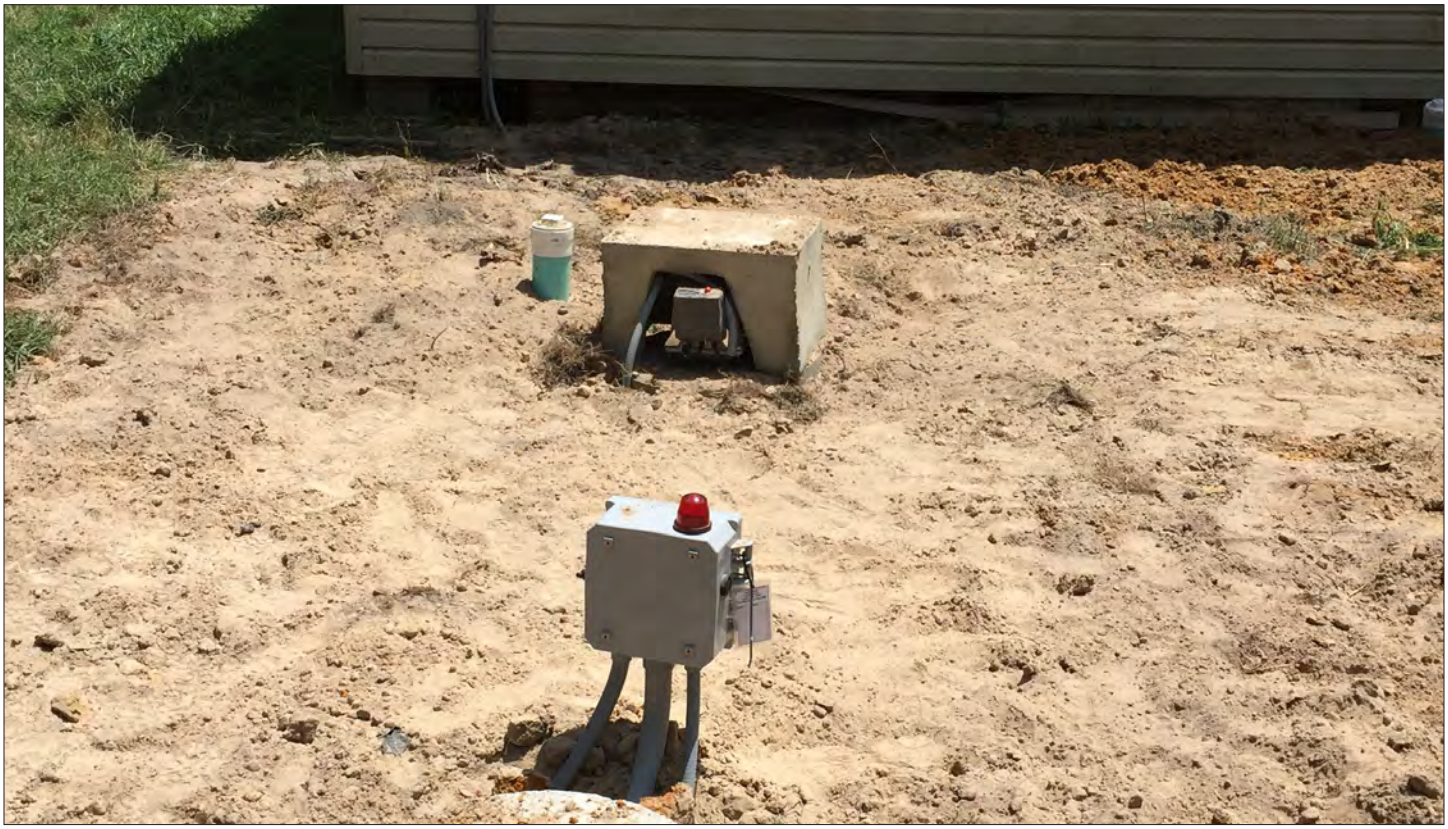
This property is located in Nacogdoches, TX. This application was provided by the Nacogdoches County Environmental Health Director. The conventional septic system located at this property was failing, with sewage pooling at multiple locations.

A 500-gpd system was installed at this property based upon the system design. The existing conventional system was pumped and closed.

Site photographs of NAC-004 JDV property prior to OSSF installation



Site photographs of NAC-004 JDV property during OSSF installation



Site photograph of NAC-004 JDV property at inspection

OSSF #5: SH-001 JC

This property is located in Center, TX, in Shelby County. There was no known septic tank at this location. A field line from the house was present, discharging untreated sewage. This field line would regularly back up and overflow due to a collapse in the line. Untreated sewage that discharges from the pipe would flow onto an adjacent property.

A 500-gpd system was installed at this property based upon the system design.

Site photograph of SH-001 JC property prior to OSSF installation



Site photographs of SH-001 JC property during OSSF installation

Site photograph of SH-001 JC property at inspection

OSSF #6: NAC-005 RG

This property is located in Nacogdoches, TX, in Nacogdoches County. A concrete conventional system, installed in 1981, was located at the property. The conventional system had failed, and wastewater was surfacing. After rainy weather, the homeowners were unable to flush the toilets without plunging them first.

A 500-gpd system was installed at this property based upon the system design. The existing conventional system was pumped and closed.

Site photographs of NAC-005 RG property prior to OSSF installation

Site photograph of NAC-005 RG property during OSSF installation

Site photograph of NAC-005 RG property at inspection

OSSF #7: SH-002 CWC

This property is located in Center, TX, in Shelby County. Upon inspection, sewage discharge was observed on the ground. The property is sloped, creating a natural storm water drainage area. A pond is located approximately 80 feet outside of the property line, beyond a steep slope.

A 500-gpd system was installed at this property based upon the system design.

Site photographs of SH-002 CWC property prior to OSSF installation

Site photograph of SH-002 CWC property during OSSF installation

Site photograph of SH-002 CWC property at inspection

OSSF #8: NAC-006 SM

This property is located in Nacogdoches, TX, in Nacogdoches County. This household is on approximately 3 acres of heavily wooded land, and is part of family land that encompasses approximately 300 acres. The Attoyac River runs through the property. Two large pools of sewage were pooled in the front yard.

A 500-gpd system was installed at this property based upon the system design. The existing system was pumped and closed.

Site photographs of NAC-006 SM property prior to OSSF installation



Site photographs of NAC-006 SM property during OSSF installation


Site photograph of NAC-006 SM property at inspection

OSSF #9: SA-001 BF

The mailing address for this property is in Center, TX (Shelby County), but the actual property location is in San Augustine County. The homeowner reported that the sewer has been leaking and backing up into the house for approximately 3 years.

A 500-gpd system was installed at this property based upon the system design. The existing system was pumped and closed.

Site photographs of SA-001 BF property prior to OSSF installation



Site photographs of SA-001 BF property during OSSF installation

Site photograph of SA-001 BF property at inspection

OSSF #10: SA-002 KN

This property is located in San Augustine, TX, in San Augustine County. A septic system was not present at this location. Untreated sewage was being discharged through a straight pipe from the household.

A 500-gpd system was installed at this property based upon the system design.

Site photographs of SA-002 KN property prior to OSSF installation



Site photographs of SA-002 KN property during OSSF installation

Site photograph of SA-002 KN property at inspection

OSSF #11: SA-003 IPL

This property is located in San Augustine, TX, in San Augustine County. The homeowner reported that the existing septic system was failing, and that it would back up into the home.

A 500-gpd system was installed at this property based upon the system design. The existing system was pumped and closed.

Site photographs of SA-003 IPL property at inspection

Site photograph of SA-003 IPL property during OSSF installation

OSSF #12: SA-004 CC

This property is located in San Augustine, TX, in San Augustine County. The homeowner reported that the existing system was failing. A strong sewer odor was present, and the system would occasionally back up into the home.

Because of the number of occupants (2 adults and 5 children), it was necessary to install a 750-gpd system to meet the estimated daily flow. The existing system was pumped and closed.

Site photographs of SA-004 CC property prior to OSSF installation



Site photographs of SA-004 CC property during OSSF installation

Site photograph of SA-004 CC property at inspection

OSSF #13: SA-005 EC

This property is located in San Augustine, TX, in San Augustine County. A conventional system, installed in the 1960's, was located on the property. The homeowner reported that the system had been failing for approximately 15 years. The OSSF Inspector observed a field line with sewage surfacing on the property.

A 500-gpd system was installed at this property based upon the system design. The existing system was pumped and closed.

Site photographs of SA-005 EC property prior to OSSF installation

Site photograph of SA-005 EC property during OSSF installation

Site photograph of SA-005 EC property at inspection

OSSF #14: NAC-007 NC

This property is located in Chireno, TX, in Nacogdoches County. The homeowner reported that the existing conventional system was failing, with the sinks not draining and toilets unable to flush.

A 500-gpd system was installed at this property based upon the system design. The existing system was pumped and closed.

Site photographs of NAC-007 NC property prior to OSSF installation

Site photographs of NAC-007 NC property during OSSF installation

Site photograph of NAC-007 NC property at inspection

OSSF #15: SA-006 DB

This property is located in San Augustine, TX, in San Augustine County. The existing conventional septic system was installed in 1978 and had clay tile field lines. The OSSF Inspector observed sewage surfacing in the yard.

A 500-gpd system was installed at this property based upon the system design. The existing system was pumped and closed.

Site photographs of SA-006 DB property prior to OSSF installation

Site photographs of SA-006 DB property during OSSF installation

Site photograph of SA-006 DB property at inspection

OSSF #16: SA-007 KB

This property is located in San Augustine, TX, in San Augustine County. There was no existing septic system tanks located on the property. Untreated sewage was being discharged through a pipe onto the surface of the ground.

A 500-gpd system was installed at this property based upon the system design.

Site photograph of SA-007 KB property prior to OSSF installation

Site photographs of SA-007 KB property during OSSF installation

Site photograph of SA-007 KB property at inspection

OSSF #17: SA-008 JC

This property is located in San Augustine, TX, in San Augustine County. There was no existing septic system located on the property. Untreated sewage was being discharged by open pipe to the surface of the ground.

A 500-gpd system was installed at this property based upon the system design.

Site photographs of SA-008 JC property prior to OSSF installation

Site photograph of SA-008 JC property during OSSF installation

Site photograph of SA-008 JC property at inspection

OSSF #18: NAC-008 JP

This property is located in Chireno, TX, in Nacogdoches County. A failing conventional septic system was located on the property. The property owner operates a small daycare out of the residence during the week, with an average of 6 children per day.

Based upon the usage as a single family residence and daycare facility, a 750-gpd system was installed. The existing system was pumped and closed.

Site photographs of NAC-008 JP property during OSSF installation

Site photograph of NAC-008 JP property during OSSF installation

Site photograph of NAC-008 JP property at inspection

OSSF #19: NAC-009 RC

This property is located in Chireno, TX, in Nacogdoches County. The existing system was a conventional system, with a grey water open pipe discharging to a pasture. Discharge from the septic system was pooling in the back yard.

A 500-gpd system was installed at this property based upon the system design. The existing system was pumped and closed.

Site photographs of NAC-009 RC property prior to OSSF installation



Site photographs of NAC-009 RC property during OSSF installation

Site photograph of NAC-009 RC property at inspection

OSSF #20: NAC-010 CM

This property is located in Chireno, TX, in Nacogdoches County. At the initial site visit, the OSSF Inspector observed exposed pipe and sewage surfacing in the back yard. A creek runs through the back section of the property.

A 500-gpd system was installed at this property based upon the system design. The existing system was pumped and closed.

Site photographs of NAC-010 CM property prior to OSSF installation



Site photographs of NAC-010 CM property during OSSF installation

Site photograph of NAC-010 CM property at inspection

OSSF #21: NAC-011 PR

This property is located in Chireno, TX, in Nacogdoches County. The existing system on the property was a conventional septic system installed in 1982. The system was failing, with sewage surfacing, and the grease trap was plugged and bypassed.

A 500-gpd system was installed at this property based upon the system design. The existing system was pumped and closed.

Site photographs of NAC-011 PR property prior to OSSF installation



Site photographs of NAC-011 PR property during OSSF installation

Site photograph of NAC-011 PR property at inspection

OSSF #22: NAC-012 RE

This property is located in Chireno, TX, in Nacogdoches County. This application was provided by the Nacogdoches County Environmental Health Director. The homeowner indicated that the system had been failing since the property was purchased in January 2001, with sewage backing up into the home and surfacing on the ground.

A 500-gpd system was installed at this property based upon the system design. The existing system was pumped and closed.

Site photographs of NAC-012 RE property prior to OSSF installation



Site photographs of NAC-012 RE property during OSSF installation

Site photograph of NAC-012 RE property at inspection

OSSF #23: NAC-013 JE

This property is located in Chireno, TX, in Nacogdoches County. This application was provided by the Nacogdoches County Environmental Health Director. The homeowner indicated that the existing system, installed in 1978, has failed since the property was purchased (approximately 8 years).

A 500-gpd system was installed at this property based upon the system design. The existing system was pumped and closed.

Site photographs of NAC-013 JE property prior to OSSF installation

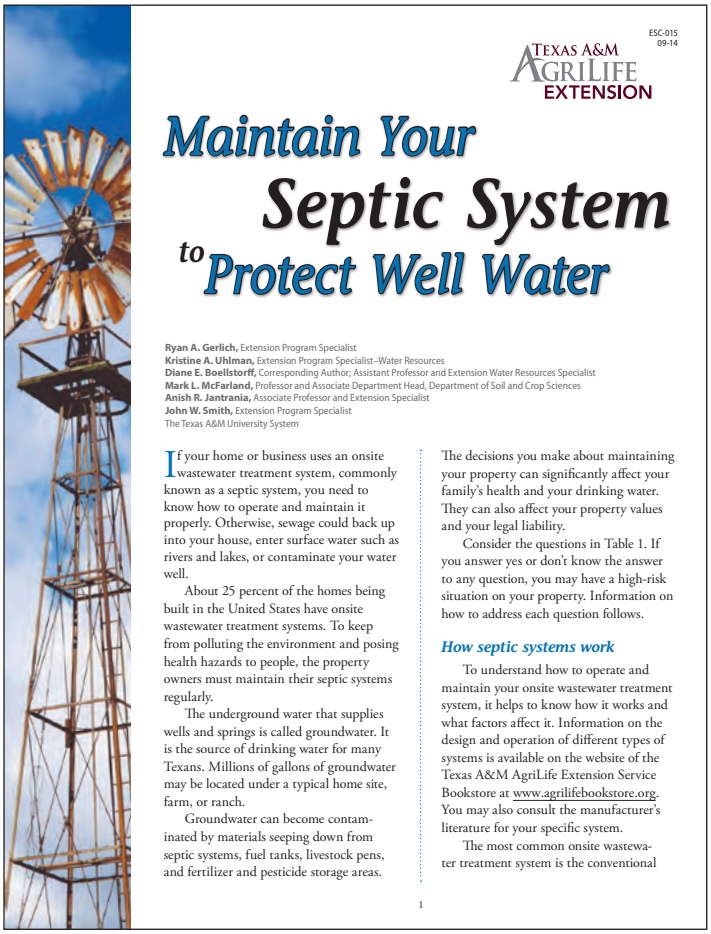
Site photograph of NAC-013 JE property during OSSF installation

Site photograph of NAC-013 JE property at inspection

PUBLIC EDUCATION

For the public education portion of this project, ANRA purchased publications from the Texas A&M AgriLife bookstore for distribution. Educational materials were provided directly to the recipients of OSSFs installed as part of this grant program. Additional materials have been made available at ANRA's Central Office for distribution to the general public and inclusion with OSSF Permit Application packets.

OSSF Publications and Educational Materials from Texas A&M AgriLife	
Code	**Title**
L-5415	OWTS: Owner's Record
L-5491	OWTS: Understanding and Maintaining your Septic System
L-5347	OWTS: Operation and Maintenance
L-5460	OWTS: Liquid Chlorination
B-6234	Living with an Aerobic Treatment Unit and Spray Field
B-6171	OWTS: Homeowner's Guide to Evaluating Service Contracts
L-5303	OWTS: Spray Distribution System
L-5302	OWTS: Aerobic Treatment Unit
B-6077	OWTS: Selecting and Permitting
ESC-015	TWON: Maintain Your Septic System to Protect Well Water



ESC-015
09-14

TEXAS A&M AGRILIFE EXTENSION

Maintain Your Septic System to Protect Well Water

Ryan A. Gerlich, Extension Program Specialist
Kristine A. Uhlman, Extension Program Specialist–Water Resources
Diane E. Boellstorff, Corresponding Author; Assistant Professor and Extension Water Resources Specialist
Mark L. McFarland, Professor and Associate Department Head, Department of Soil and Crop Sciences
Anish R. Jantrania, Associate Professor and Extension Specialist
John W. Smith, Extension Program Specialist
The Texas A&M University System

If your home or business uses an onsite wastewater treatment system, commonly known as a septic system, you need to know how to operate and maintain it properly. Otherwise, sewage could back up into your house, enter surface water such as rivers and lakes, or contaminate your water well.

About 25 percent of the homes being built in the United States have onsite wastewater treatment systems. To keep from polluting the environment and posing health hazards to people, the property owners must maintain their septic systems regularly.

The underground water that supplies wells and springs is called groundwater. It is the source of drinking water for many Texans. Millions of gallons of groundwater may be located under a typical home site, farm, or ranch.

Groundwater can become contaminated by materials seeping down from septic systems, fuel tanks, livestock pens, and fertilizer and pesticide storage areas.

The decisions you make about maintaining your property can significantly affect your family's health and your drinking water. They can also affect your property values and your legal liability.

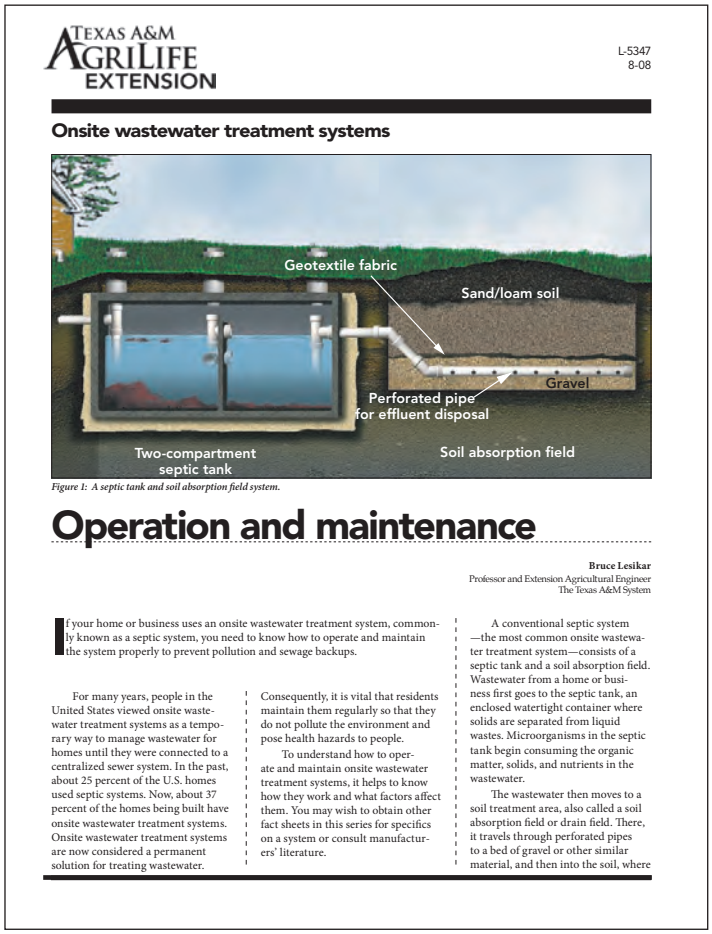
Consider the questions in Table 1. If you answer yes or don't know the answer to any question, you may have a high-risk situation on your property. Information on how to address each question follows.

How septic systems work

To understand how to operate and maintain your onsite wastewater treatment system, it helps to know how it works and what factors affect it. Information on the design and operation of different types of systems is available on the website of the Texas A&M AgriLife Extension Service Bookstore at www.agrilifebookstore.org. You may also consult the manufacturer's literature for your specific system.

The most common onsite wastewater treatment system is the conventional

1



TEXAS A&M AGRILIFE EXTENSION

L-5347
8-08

Onsite wastewater treatment systems

Figure 1: A septic tank and soil absorption field system.

Operation and maintenance

Bruce Lesikar
Professor and Extension Agricultural Engineer
The Texas A&M System

If your home or business uses an onsite wastewater treatment system, commonly known as a septic system, you need to know how to operate and maintain the system properly to prevent pollution and sewage backups.

For many years, people in the United States viewed onsite wastewater treatment systems as a temporary way to manage wastewater for homes until they were connected to a centralized sewer system. In the past, about 25 percent of the U.S. homes used septic systems. Now, about 37 percent of the homes being built have onsite wastewater treatment systems. Onsite wastewater treatment systems are now considered a permanent solution for treating wastewater.

Consequently, it is vital that residents maintain them regularly so that they do not pollute the environment and pose health hazards to people.

To understand how to operate and maintain onsite wastewater treatment systems, it helps to know how they work and what factors affect them. You may wish to obtain other fact sheets in this series for specifics on a system or consult manufacturers' literature.

A conventional septic system—the most common onsite wastewater treatment system—consists of a septic tank and a soil absorption field. Wastewater from a home or business first goes to the septic tank, an enclosed watertight container where solids are separated from liquid wastes. Microorganisms in the septic tank begin consuming the organic matter, solids, and nutrients in the wastewater.

The wastewater then moves to a soil treatment area, also called a soil absorption field or drain field. There, it travels through perforated pipes to a bed of gravel or other similar material, and then into the soil, where

Educational materials from Texas A&M AgriLife

DISCUSSION

ANRA's goals for this project were to 1) identify failing or non-existent On-Site Sewage Facilities within the Attoyac Bayou Watershed, and 2) to install up to twenty-three (23) OSSFs to address nonpoint sources of pollution. Failing OSSFs were listed in the *Attoyac Bayou Watershed Protection Plan* as one of the leading potential sources of bacterial contamination in the watershed.

Based upon the initial project goal of installing 23 OSSFs, ANRA was able to meet this goal. The majority of the systems were installed in Nacogdoches County, with 13 of 23 OSSFs (56%) installed in that county. Nacogdoches contains a larger portion of the Attoyac watershed and has more population centers in proximity to the Attoyac Bayou and its tributaries than the other counties. The Director of the Nacogdoches County Health Department played a critical role in identifying potential applicants for this project, and personally solicited applications to address problems in specific areas and neighborhoods in the county.

OSSF Installations by County	
County	**Number of OSSFs**
Nacogdoches County	13
San Augustine County	8
Shelby County	2
Rusk County	0
TOTAL	**23**

Although ANRA was able to meet its project goals and successfully install the desired number of systems, there were numerous setbacks during the project related to the project timeframe. We ran into significant difficulties and delays during the grant solicitation process. ANRA initially approached County Judges and County Commissioners to help identify potential candidates for OSSF replacement. Although this approach was extremely useful in Nacogdoches County, we were not able to identify any qualified applicants in San Augustine, Shelby, or Rusk counties using this method. At the time we were soliciting grants by this method, the qualifying income levels were too low, which contributed to the problem.

In regards to the income levels, ANRA's Board of Directors initially approved staff recommendations to base the income level on the Federal Poverty Level. Based upon these levels, a household of four would need an income level at or below $23,850 per year in order to qualify for the grant program. Although these limits were set with the intentions of helping those in the most need of financial assistance, the income requirements that were set proved to be too low, and excluded most interested parties. With these guidelines in place, only one applicant was able to meet the income requirements for the grant program. Due to the lack of applicants, ANRA staff recommended to the Board of Directors that the income levels be increased. The new levels approved by the Board were based on the Median Household Income level for the watershed. Under the revised guidelines, a family of four now had to earn at or below $61,889 per year to qualify for the grant program. This expansion of the income eligibility requirements was the crucial step that allowed the project to proceed, as it was now possible to identify enough eligible applicants to successfully complete this task of the project.

An additional hurdle that ANRA had to overcome for this project was a general anti-government sentiment and a spirit of self-reliance. As the Authorized Agent in San Augustine County, Angelina County, and the Control Zone around Sam Rayburn Reservoir, ANRA found itself in the position of asking homeowners to voluntarily disclose failing septic systems to the agency tasked with enforcing the rules related to OSSFs. Because enforcement for a failed OSSF can possibly result in civil and/or criminal penalties, it made homeowners very reluctant to discuss issues with their system. For this reason, we found it easiest to solicit applications in Nacogdoches County, as we are not the Authorized Agent for that county. The most effective way we found to solicit applications was to go door-to-door and talk with homeowners.

ANRA's intention going into the project was to allow homeowners to pick their preferred system designers and installers, with ANRA paying the invoices. However, because the total amount of funds to be expended for this portion of the project exceeded $50,000, ANRA was required by its Purchasing Policy to solicit sealed bids for the OSSF installation. With sealed bids having to be approved and contracts awarded by our Board of Directors, this action caused additional delays, especially considering that ANRA's Board only meets quarterly.

ANRA had planned to have all systems installed during the first two years of the project in order to use water quality data collected through the project to demonstrate improvements in *E. coli* levels in the watershed. Unfortunately, because of the numerous delays, OSSFs did not get installed until the final year of the project. By the time the last OSSF had been installed, water quality monitoring activities had ended several months prior. Even though the water quality data is not as useful as we would have hoped in measuring the success of this particular activity, it is still useful in demonstrating the effects of other BMPs implemented as part of the *Attoyac Bayou Watershed Protection Plan*. The same sites monitored through this project will continue to be monitored in subsequent projects, including a project to begin at the start of next fiscal year.

Through all of the setbacks and delays, there were numerous lessons learned during this project, including pitfalls to avoid. With the great relationships we developed with designers, installers, and County officials, we are confident that future projects to replace OSSFs within the watershed could not only be successful, but could be a crucial step in improving the water quality within the Attoyac Bayou watershed.

DATA COLLECTION AND ANALYSIS - SURFACE WATER QUALITY MONITORING

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TASK DESCRIPTION

The goal of the surface water quality monitoring in the Attoyac Bayou watershed was to identify improvements in water quality following the replacement of failed or non-existent On-Site Sewage Facilities (OSSFs), as well as monitoring the effectiveness of Best Management Practices (BMPs) established by the *Attoyac Bayou Watershed Protection Plan* (WPP). Water quality monitoring conducted under this project tested not only for bacteria but for nutrients as well, including parameters for which Attoyac Bayou and Sam Rayburn Reservoir have nutrient concerns. Surface water quality monitoring began in the second year of the project. The specifics of the monitoring plan are addressed in the *Lake Sam Rayburn OSSF Program Support and Attoyac Bayou OSSF Remediation Quality Assurance Project Plan (QAPP) for Monitoring Data* (QTRAK# 14-501).

SCOPE OF WORK

Task 7:	**Data Collection and Analysis – Surface Water Quality Monitoring**
Objective:	To collect and analyze surface water quality monitoring data to identify improvements in water quality following the replacement of failed or non-existent OSSFs and in accordance with the approved QAPP.
Subtask 7.1:	**Data Collection** Surface water quality monitoring data will be collected at five (5) sites on a monthly basis for two (2) years. Samples will be analyzed for Nitrate-N, Nitrite-N, Ammonia-N, Total Phosphorus, Orthophosphorus, Chloride, Sulfate, Total Suspended Solids, Total Dissolved Solids, and *E. coli*. Field Parameters will also be collected including pH, Dissolved Oxygen, Temperature, Conductivity, and Flow. All surface water quality monitoring will be conducted under an approved QAPP. Field, laboratory, and other activities associated with data and information collection will be conducted in accordance with an approved QAPP. All laboratory analyses will be performed by a laboratory that is accredited by TCEQ and whose accreditation at the time the analyses are performed includes the matrices, methods, and parameters of analysis. The ANRA Environmental Laboratory (TCEQ NELAP Certificate # T104704292-13-5) performed the analysis for samples collected under the approved QAPP.
Subtask 7.2:	**Data Submittals** ANRA will review, verify, and validate water quality monitoring data before it is submitted to the TCEQ. ANRA will submit a semi-annual report of water quality data that is consistent with TCEQ formatting requirements for upload into the Surface Water Quality Monitoring Information System (SWQMIS).
Subtask 7.3:	**Data Analysis** ANRA will analyze data and information collected in accordance with the QAPP.
Subtask 7.4:	**Panoramic Photography** ANRA will create interactive 360-degree panoramic photographs of monitoring stations during sample collection. These panoramas will be integrated with Google Maps and made available on the internet for interested parties. These photographs will be created during each sampling event and will provide additional documentation of the monitoring stations and thus facilitate public participation in the project.
Subtask 7.5:	**Data Collection and Analysis Report** ANRA will develop a report detailing activities conducted under this Task.

METHODS

Data Collection

For this project, surface water quality samples were collected at five (5) monitoring stations in the Attoyac Bayou watershed. Monitoring was conducted on a monthly basis for a period of twenty-one months, beginning in Year 2 of the project. Monitoring began in October 2014 and ended in May 2016.

Monitoring Stations and Site Descriptions

The five stations chosen were monitored previously as part of the project that led to the development of the *Attoyac Bayou Watershed Protection Plan* (WPP). Because the monitoring program was designed to assess the effectiveness of Best Management Practices (BMPs) implemented under the *Attoyac Bayou WPP*, monitoring was recorded as Monitoring Type RTBA (Routine Monitoring, BMP Effectiveness). These stations supplement the routine quarterly monitoring that ANRA conducts on the Attoyac Bayou as part of TCEQ's Clean Rivers Program (CRP).

ANRA's monitoring program for this project included monitoring stations along the main stem of the Attoyac Bayou as well as the tributaries. These stations supplement the routine quarterly monitoring that ANRA conducts on the Attoyac Bayou as part of TCEQ's Clean Rivers Program (CRP).

The monitoring stations for this project are listed below. A map is included for reference.

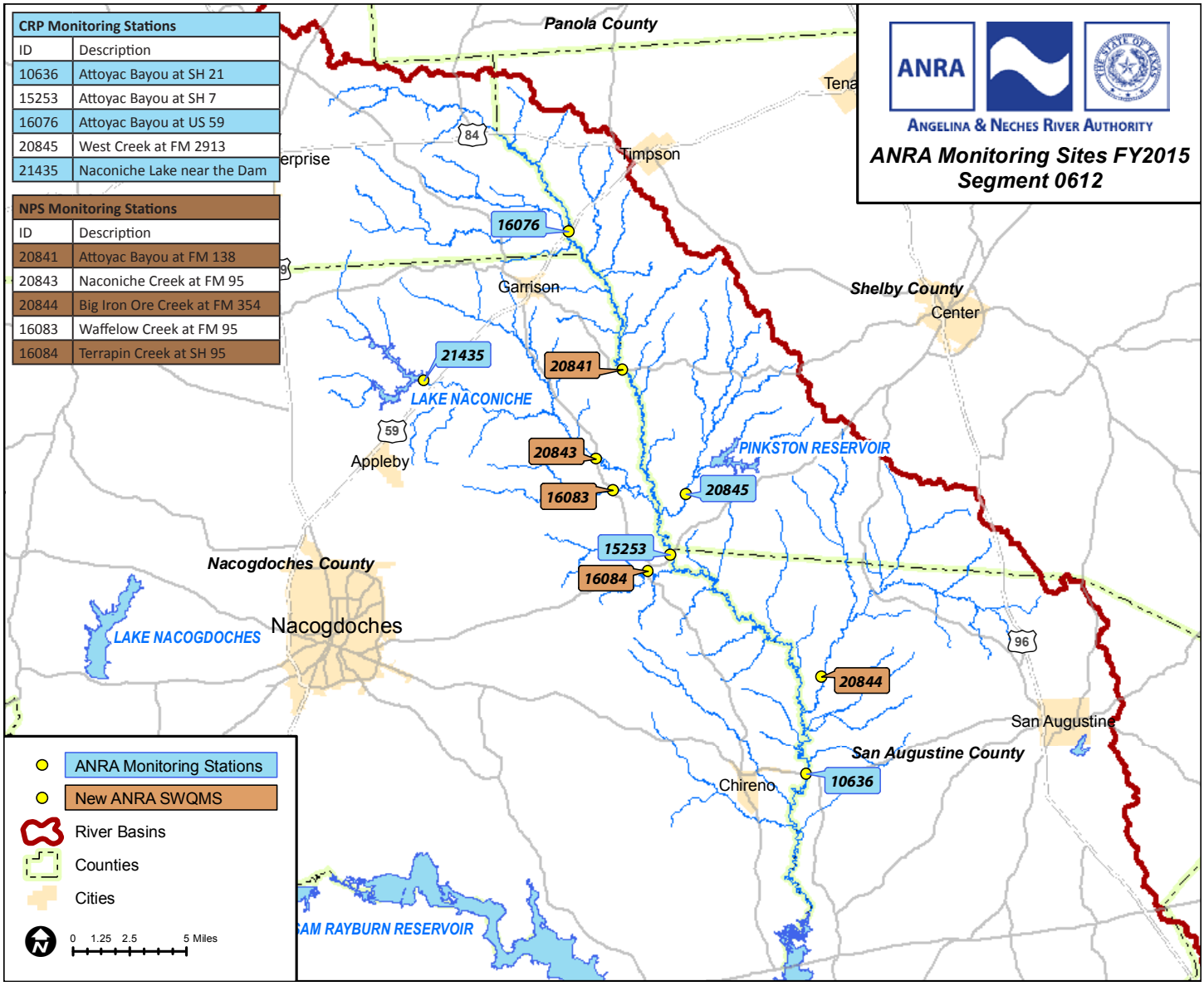
1. Station 20841 (Attoyac Bayou at FM 138) is located 9.65 km southeast of US 59 in Garrison. This monitoring station is located on Segment 0612.

2. Station 20843 (Naconiche Creek at FM 95) is located approximately 9 km north of the intersection with SH 7 in Martinsville. This monitoring station is located on Segment 0612D.

3. Station 20844 (Big Iron Ore Creek at FM 354) is located approximately 9.65 km north of the intersection with SH 21 and northeast of the city of San Augustine. This monitoring station is located on Segment 0612E.

4. Station 16083 (Waffelow Creek at FM 95) is located 3.65 miles northwest of the city of Martinsville. This monitoring station is located on Segment 0612B.

5. Station 16084 (Terrapin Creek at SH 95) is located 1 mile south of Martinsville. This monitoring station is located on Segment 0612A.



Surface Water Quality Monitoring Stations				
TCEQ Station ID	**Station Name**	**Sampling Frequency**	**Latitude**	**Longitude**
20841	Attoyac Bayou at FM 138	Monthly	31.768502	-94.426251
20843	Naconiche Creek at FM 95	Monthly	31.712166	-94.449405
20844	Big Iron Ore Creek at FM 354	Monthly	31.565953	-94.289458
16083	Waffelow Creek at FM 95	Monthly	31.691862	-94.43789
16084	Terrapin Creek at SH 95	Monthly	31.639128	-94.414803

Quality Assurance Project Plan

ANRA's monitoring program for this project was conducted under the *Lake Sam Rayburn OSSF Program Support and Attoyac Bayou OSSF Remediation Quality Assurance Project Plan (QAPP) for Monitoring Data* (QTRAK# 14-501). The QAPP has an effective period of September 16, 2014 - September 16, 2017. The purpose of the QAPP is to clearly delineate ANRA's Quality Assurance (QA) policy, management structure, and procedures used to implement the QA requirements necessary to verify and validate the data collection through this project. The QAPP is reviewed by TCEQ to help assure that data generated for the project are scientifically valid and legally defensible. This process ensures that data developed under the QAPP and submitted to TCEQ have been collected and managed in a way that guarantees its reliability and therefore can be used as deemed appropriate by the TCEQ.

During the course of the project, there were three amendments to the QAPP.

Quality Assurance Project Plan Documents

Document Title	Date Approved	Purpose
Lake Sam Rayburn OSSF Program Support and Attoyac Bayou OSSF Remediation Quality Assurance Project Plan (QAPP) for Monitoring Data	9/14/2014	Delineates the overall QA policy, management structure, and procedures to implement QA requirements for the project to verify and validate data collected through the project.
Expedited Amendment #1	3/3/2015	Changed monitoring type code from RT (Routine) to RTBA (Routine, BMP Effectiveness) to more accurately reflect the intent of the monitoring. Clarification of the timeframe for monitoring conducted for this project.
Expedited Amendment #2	3/16/2015	Added Dissolved Orthophosphate Phosphorus (Parameter 00671) and Present Weather (Parameter 89966) to the lists of sampling parameters.
Expedited Amendment #3	4/8/2015	Modified Section B5 Quality Control to replace matrix spike acceptability criteria language with alternate language that addresses the specific matrix of the samples being collected and allows the use and consideration of additional quality control data in determining the acceptability of the sample result.

Annual reviews were conducted by the ANRA and TCEQ Project Managers to verify that the original QAPP (and any approved amendments) accurately reflect the project requirements. The first Annual Review Certification was approved on June 29, 2015. The second (and final) Annual Review Certification was approved on June 21, 2016. This review extended the QAPP approval to an end date of September 16, 2017.

Surface Water Quality Monitoring Procedures

All monitoring was performed in accordance with the procedures outlined in the *TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods* (RG-415). These are referred to as the SWQM Procedures. These procedures are available on TCEQ's Surface Water Quality Monitoring Procedures website at https://www.tceq.texas.gov/waterquality/publications/rg/rg-415.

Surface Water Quality Monitoring Parameters

For each sampling event, field measurements were recorded and samples were collected for conventional and bacteriological parameters.

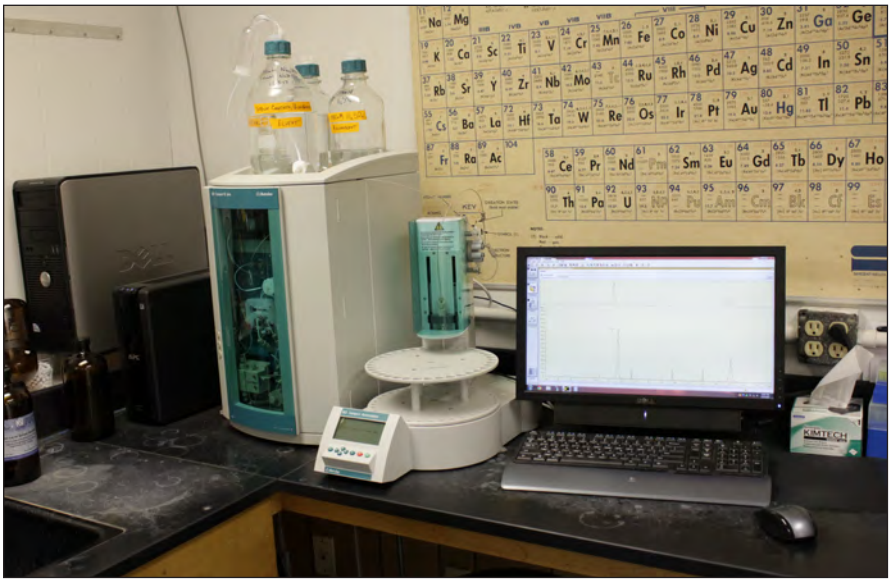
Surface Water Quality Monitoring Parameters		
Field Parameters	**Conventional Parameters**	**Bacteriological Parameters**
Dissolved Oxygen (DO) pH Specific Conductance Water Temperature Secchi Transparency Instantaneous Stream Flow (or flow estimate) Flow Severity Days Since Last Significant Rainfall Present Weather	Ammonia-N Nitrate-N Nitrite-N Chloride Sulfate Dissolved Orthophosphorus (as P) Total Phosphorus Total Suspended Solids (TSS) Total Dissolved Solids (TDS)	E. coli

Field Parameters

For each monitoring event, a multiprobe instrument (either a YSI 600 XLM Sonde with YSI Model 650-03 Display Unit or YSI EXO1 Sonde with Hydrotech NX-10 Display Unit) was used to measure and record field parameters (pH, Dissolved Oxygen, Temperature, Specific Conductance). Flow measurements were recorded using a SonTek ADV Flowtracker Flow Meter and a flow top set wading rod. In instances where it was not possible to take direct instream flow measurements due to site conditions or safety issues, a stream flow estimate was conducted. Secchi-disk transparency was measured using a standard 20-cm Secchi disk attached to a calibrated line (calibrated in metric units).

Laboratory Analysis

Samples for conventional and bacteriological parameters collected under this project were submitted to the ANRA Environmental Laboratory for analysis. Samples to be analyzed for anions (Nitrate-N, Nitrite-N, Sulfate, Chloride, and Dissolved Orthophosphorus) were filtered within 15 minutes of collection using a Geotech brand peristaltic pump with Geotech 0.45 µm filters (Geotech Environmental, Denver, CO). Anions were analyzed by EPA Method 300.0 using a Metrohm 882 Compact IC Plus ion chromatograph (Metrohm USA, Riverview, FL) equipped with a compact autosampler and conductivity detector. The ion chromatograph was purchased specifically for this project.



Metrohm Ion Chromatograph for Anion analysis

Texas Surface Water Quality Standards (TSWQS)

Water quality standards are the basis for assessing the status of a water body. A water quality standard includes an assigned usage and specific criteria required to maintain its use. Texas Surface Water Quality Standards (TSWQS) are state rules adopted by the Texas Commission on Environmental Quality (TCEQ) that are designed to establish numerical and narrative goals for water quality throughout the state. TSWQS also provide a basis on which the TCEQ regulatory programs can establish reasonable methods to implement and attain the state's goals for water quality. The TSWQS are located in Texas Administrative Code, Title 30, Chapter 307.

Site-Specific Uses and Numeric Criteria for the Attoyac Bayou

Segment ID	Segment Name	DESIGNATED USES			CRITERIA*						
		Recreation	Aquatic Life	Domestic Water Supply	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)	Dissolved Oxygen (mg/L	pH Range (S.U.)	*E. coli* Bacteria #/100 mL	Temp (°F)
0612	Attoyac Bayou	PCR	H	PS	75	50	200	5.0	6.0 - 8.5	126	90

PCR = Primary Contact Recreation SCR1 = Secondary Contact Recreation 1 SCR2 = Secondary Contact Recreation 2 NCR = Noncontact Recreation
H = High Aquatic Life Use
PS = Public Supply

* The criteria for Chloride, Sulfate, and TDS are listed as the maximum annual averages for the segment. Dissolved Oxygen criteria are listed as minimum 24-hour means at any site within the segment. The pH criteria are listed as minimum and maximum values expressed in standard units at any site within the segment. The criteria for Temperature are listed as maximum values at any site within the segment.

Nutrient Screening Levels

In addition to numeric criteria, the TSWQS contain narrative criteria that are used to evaluate support of applicable uses. Instream concentrations of nutrient parameters are useful in identifying water quality concerns and in evaluating the causes of nonsupport of the narrative standards. These instream concentrations are used to establish screening levels that can be directly compared to monitoring data. These screening levels are derived from long-term monitoring data or published levels of concern. Recent monitoring data, such as the monitoring conducted as part of this project, can be compared to the screening levels to identify areas of concern based upon elevated nutrient concentrations.

Screening Levels for Nutrient Parameters

Parameter	Screening Level
Ammonia-N	0.33 mg/L as N
Nitrate-N	1.95 mg/L as N
Orthophosphorus (as P)	0.37 mg/L as P
Total Phosphorus	0.69 mg/L as P

Contact Recreation Use

Contact recreational use in freshwater is assessed using criteria for *E. coli* bacteria. Contact recreation use refers to the ability of the water body to support activities that involve physical contact with the water, such as swimming and wading. There are both primary and secondary contact recreation uses. In Texas, waterbodies have a presumed designated use of primary contact recreation unless it is demonstrated than a more appropriate use is warranted.

Contact Recreation Uses

Recreational Use	Description	Geometric Mean Criteria # / 100 mL
Primary Contact Recreation (PCR)	Activities that are presumed to involve a significant risk of ingestion of water.	126
Secondary Contact Recreation 1 (SCR1)	Activities that commonly occur but have limited body contact incidental to shoreline activity. These activities are presumed to pose a less significant risk of water ingestion than primary contact recreation.	630
Secondary Contact Recreation 2 (SCR2)	Activities with limited body contact incidental to shoreline activity. These activities occur less frequently than secondary contact recreation 1 due to physical characteristics of the water body or limited public access.	1,030
Non-Contact Recreation (NCR)	Activities that do not involve a significant risk of water ingestion, such as those with limited body contact incidental to shoreline activity, or where primary and secondary contact recreation activities should not occur because of unsafe conditions, such as ship and barge traffic.	2,060

Data Submittals

Data collected as part of this project was submitted to the TCEQ in the event/result format specified in the *TCEQ Data Management Reference Guide* (DMRG) for upload to the Surface Water Quality Monitoring Information System (SWQMIS). All data obtained from field and laboratory measurements was reviewed and verified for conformance to project requirements, and then validated against the project's data quality objectives. Only those data supported by appropriate quality control data and meeting the measurement performance specification defined for this project were considered acceptable and submitted to the TCEQ for entry into SWQMIS.

Data Analysis

Trend Analysis

In order to review and evaluate water quality trends for this report, data was acquired from SWQMIS. The public interface for SWQMIS can be accessed at http://www80.tceq.texas.gov/SwqmisPublic/public/default.htm.
Once the data from the selected range was exported from SWQMIS, the raw data files (in the form of pipe-delimited text files), were used to create a relational database. Data was loaded into SQL Server to be queried and graphed using the R statistical software package. R, which is Open Source, provides a wide variety of techniques for data manipulation, calculation, and graphing. R is available as Free Software under the terms of the Free Software Foundation's GNU General Public License in source code format.

The R statistical package can be downloaded from http://www.r-project.org.

In R, water quality parameters were graphed with results plotted against time. The count, minimum, maximum, and mean for each parameter were determined. In the case of *E. coli* bacteria, the geometric mean was calculated. The number of values exceeding the water quality standard criteria as defined in the TSWQS were counted.

A linear regression against time was performed for each parameter. Trends were considered to be significant with a *t-stat* = or > |2| and a *p-value* < 0.1. In the case of non-detects (values reported as less than the method reporting limit), those values were left as-is, ignoring the less than sign. For parameters reported as a greater than (>) value, the greater than sign was dropped and the value was used as-is for calculation purposes. For *E. coli* analysis, samples were analyzed undiluted. With an undiluted sample, the maximum reportable value is >2400 MPN/100 mL.

To determine if water bodies met the established criteria for their designated uses, the data was compared to the uses and criteria specified in the TSWQS, as well as the screening levels for nutrient parameters listed in the *2014 Guidance for Assessing and Reporting Surface Water Quality in Texas*.

For each graph, parameter concentrations are represented by unconnected black dots (•). Each parameter's water quality standard or screening level is represented by a dashed red line (-----), with the numeric value listed as well. For some parameters such as dissolved oxygen, pH, and *E. coli*, there may be multiple criteria. The trend line for each parameter versus time is shown as a black line (——). The *t-stat*, *p-value*, and linear regression equation are listed on each graph. The *t-stat* and *p-value* are included in the water quality summary tables presented with each station. Flow values for each station are also presented on the graphs in a separate plot.

For each station, trends were evaluated to determine if they were statistically significant based upon the *t-stat* and *p-value*. Parameters with a statistically significant decreasing trend are identified with a downward arrow (↓). Parameters with a statistically significant increasing trend are identified with an upward arrow (↑).

WATER QUALITY MONITORING RESULTS

Flow measurements being conducted on Terrapin Creek at SH 95

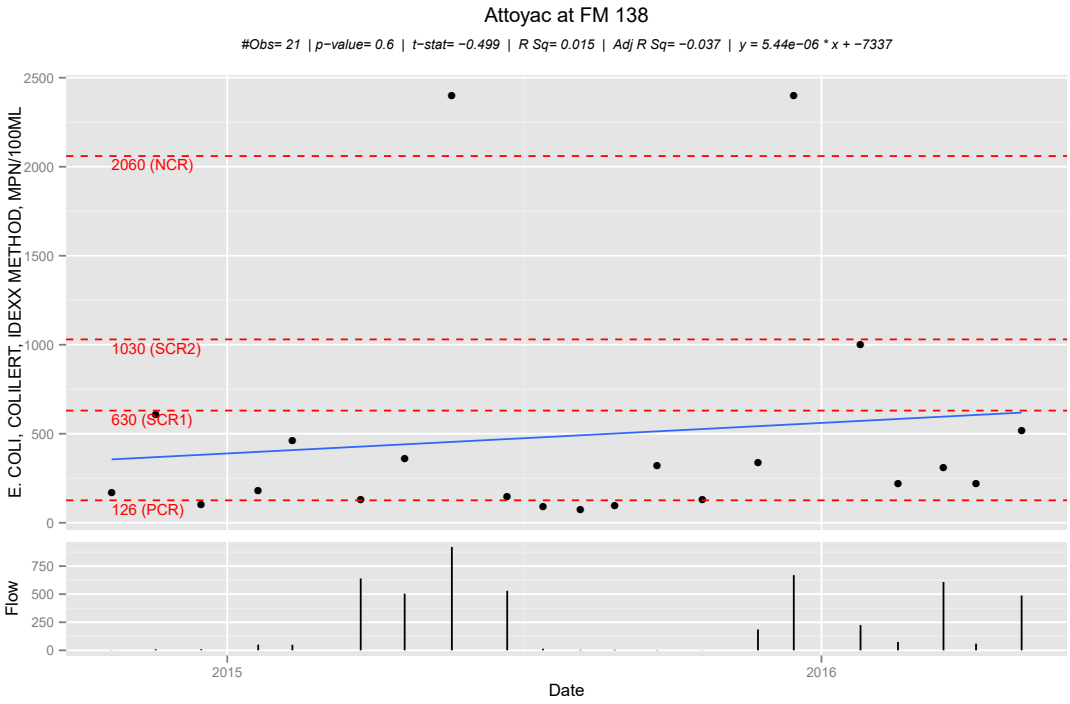
Field parameters being monitored on Attoyac Bayou at FM 138

Monitoring Station 20841 - Attoyac Bayou at FM 138

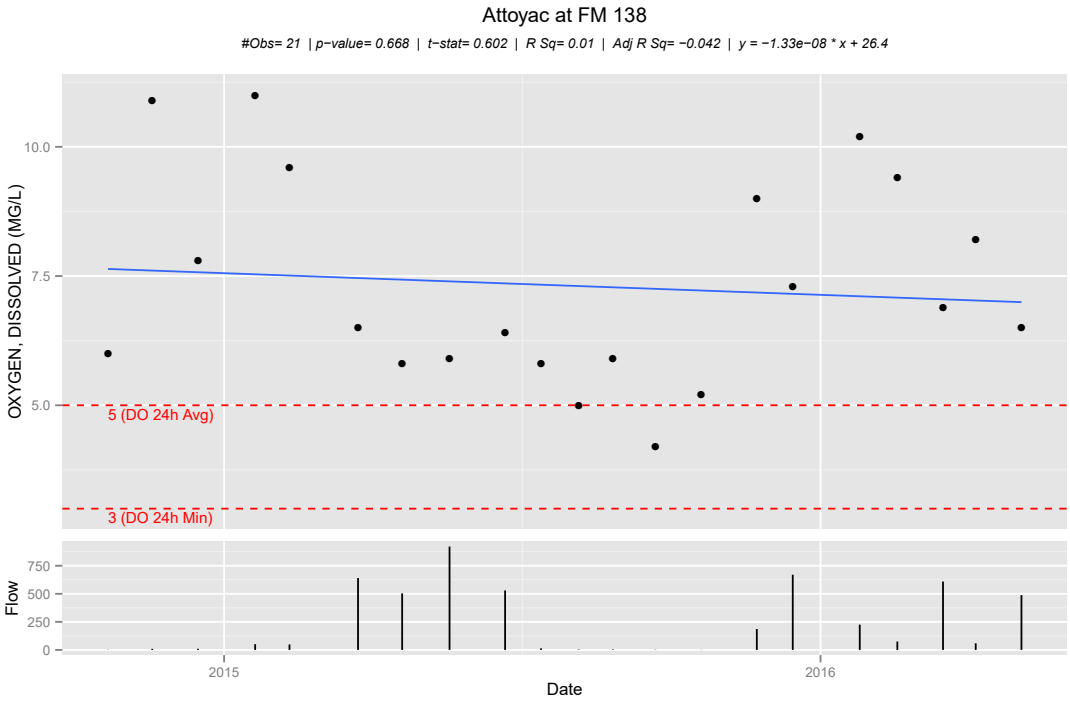
Water Quality Monitoring Results for Station 20841 - Attoyac Bayou at FM 138									
Parameter	**Number of Samples**	**Number of Exceedances**	**MIN**	**MAX**	**MEAN**	**Geometric Mean**	**t-stat**	**p-value**	**Trend**
E. coli (MPN/100 mL)	21	17	77	2400		281.3	-0.4995	0.6003	
Dissolved Oxygen (mg/L)	21	0	4.2	11	7.3		0.6015	0.6683	
pH (S.U.)	21	2	5	7.2	6.6		-2.8228	0.0020	↑
Specific Conductance (µS/cm @ 25C)	21	0	68	196	112.0		1.5106	0.1914	
Total Suspended Solids (mg/L)	21	0	3.7	34	20.0		-1.7891	0.0729	
Total Dissolved Solids (mg/L)	21	0	40	170	111.1		-0.6934	0.3823	
Chloride (mg/L)	21	0	5	18	9.0		0.5806	0.6408	
Sulfate (mg/L)	21	0	5	30	13.1		0.1067	0.9774	
Orthophosphorus (mg/L)	20	0	0.04	0.1	0.0		0.1779	0.9737	
Total Phosphorus (mg/L as P)	21	0	0.03	0.36	0.1		1.1056	0.3146	
Nitrate (mg/L as N)	21	0	0.05	0.43	0.2		-1.0970	0.2553	
Ammonia-Nitrogen (mg/L as N)	21	0	0.1	0.1	0.1		8.82884E+13	0.0923	

Monitoring Station 20841 - Attoyac Bayou at FM 138

E. coli values at this station ranged from 77 to >2400 MPN/100 mL, with a geometric mean of 281.3 MPN/100 mL. Of the 21 samples analyzed, 17 exceeded the standard of 126 MPN/100 mL for Primary Contact Recreation 1. On two occasions, results were reported as >2400 MPN/100 mL. Both of these values were related to elevated flow events.

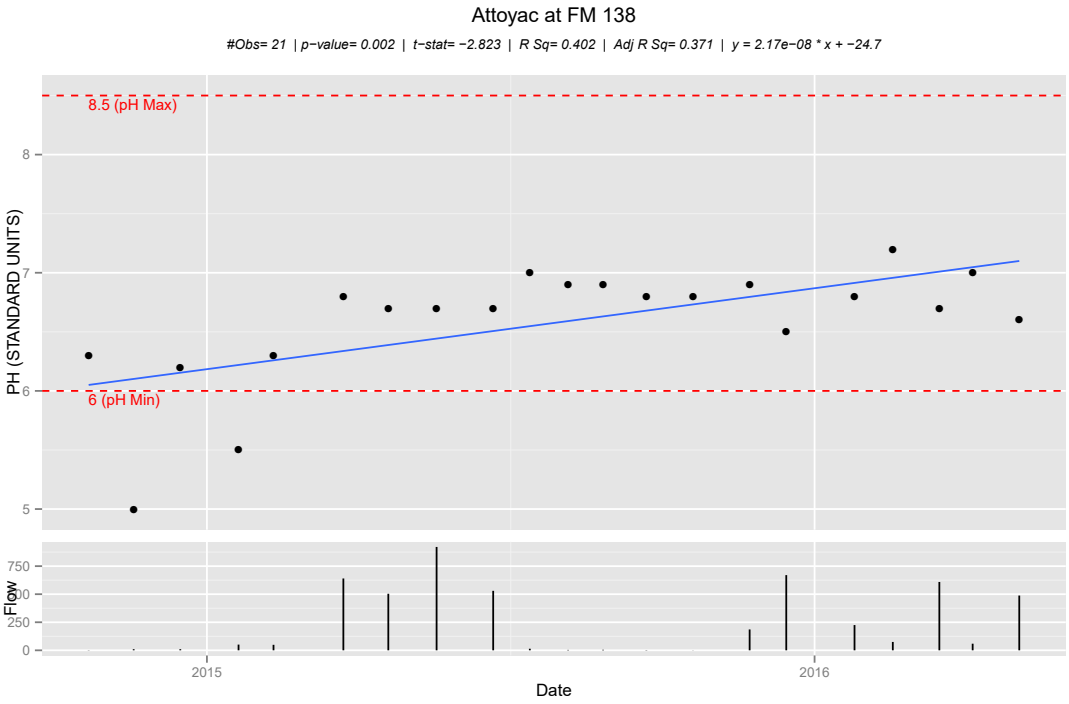


Dissolved Oxygen levels at this station were normal. No values were below the 3.0 mg/L DO criteria for this segment.

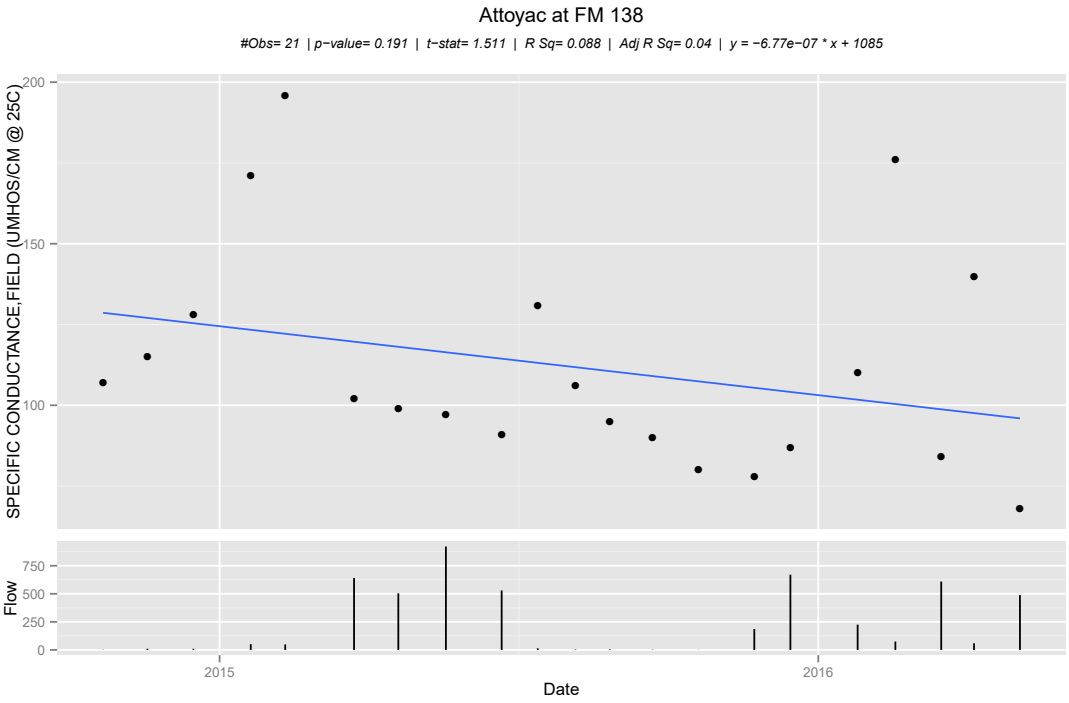


Monitoring Station 20841 - Attoyac Bayou at FM 138

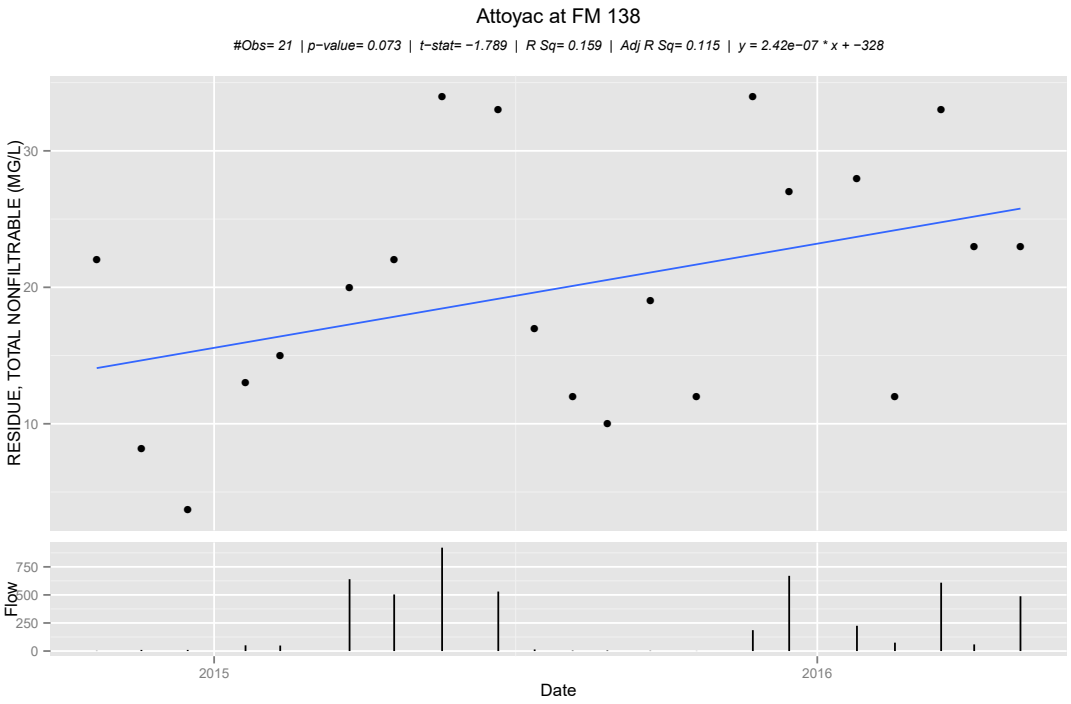
The **pH** values at this station are normal. There is a statistically significant increasing trend for this parameter (*t-stat* = -2.8228, *p-value* = 0.0020). However, this trend is influenced by two low values recorded near the beginning of the monitoring program. This time period coincided with the end of a period of extended drought. As the drought conditions improved, pH levels improved and remained normal.



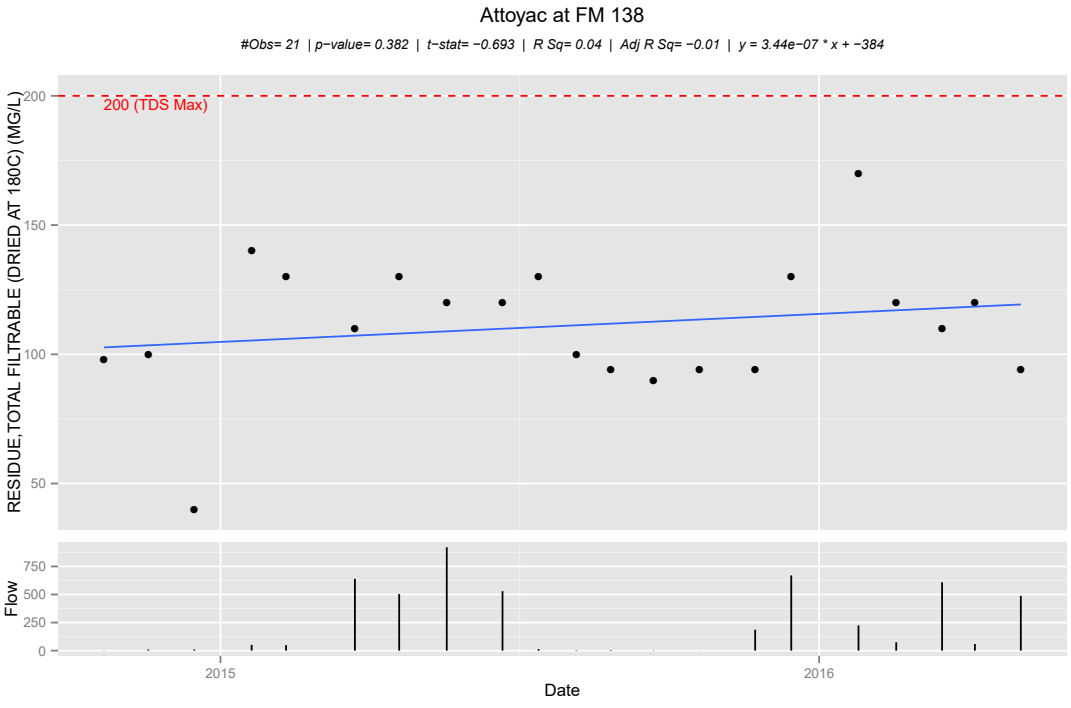
Specific Conductance values showed a decreasing trend, but this trend was not statistically significant. The results were in the range of what is considered normal for this stream segment.



Monitoring Station 20841 - Attoyac Bayou at FM 138



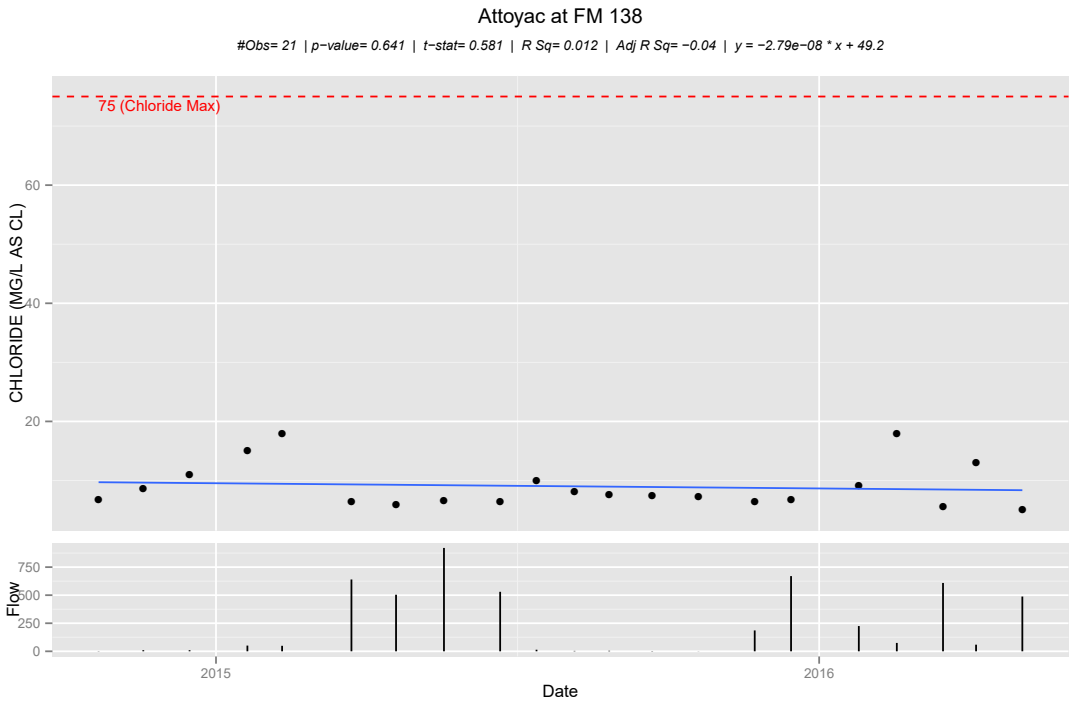
The results for **Total Suspended Solids (TSS)**, also known as Total Non-filterable Residue, ranged from 3.7 to 34 mg/L, with a mean of 20 mg/L. Higher values were observed with elevated flows, but no values were considered to be exceptionally high.



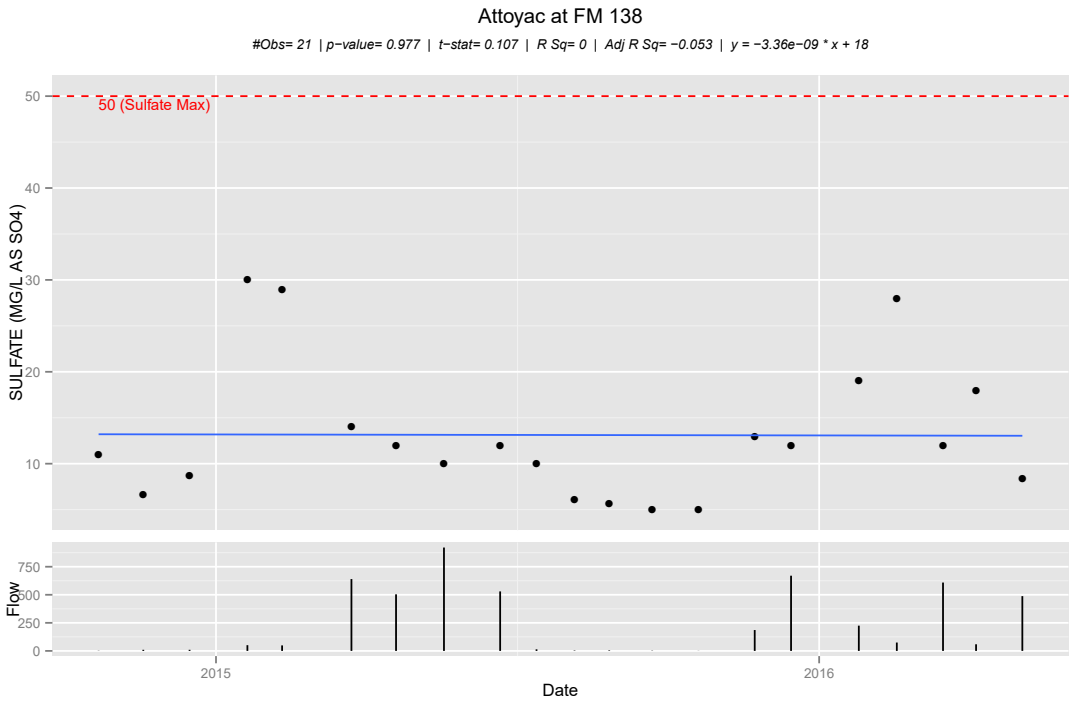
Total Filterable Residue, or **Total Dissolved Solids (TDS)**, results ranged from 40 to 170 mg/L, with a mean of 111.1 mg/L.

Monitoring Station 20841 - Attoyac Bayou at FM 138

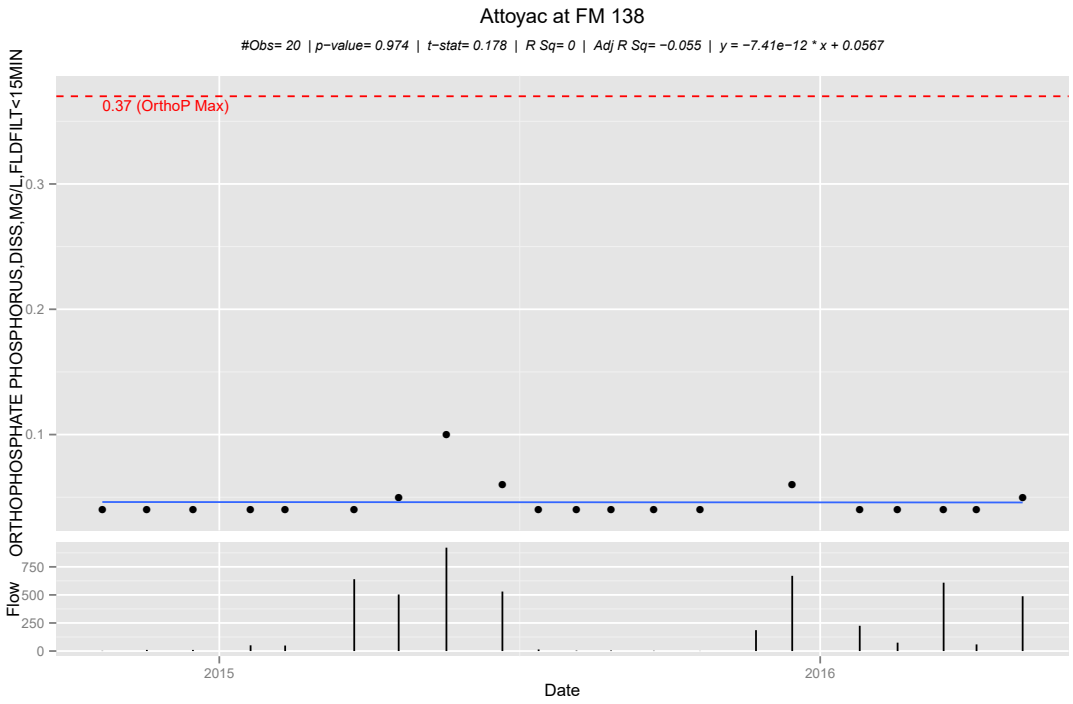
Chloride results at this monitoring station ranged from <5 mg/L to 18 mg/L, with a mean of 9.0 mg/L.



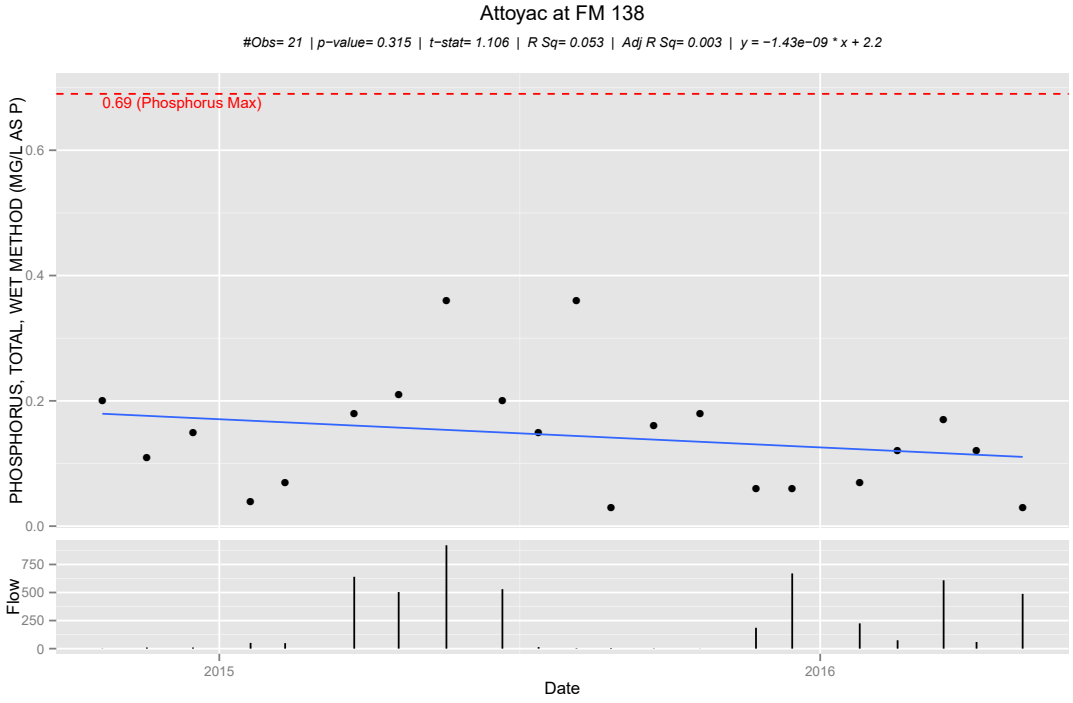
Sulfate results ranged from a minimum value of <5 mg/L to a maximum of 30 mg/L. The mean result was 13.1 mg/L.



Monitoring Station 20841 - Attoyac Bayou at FM 138



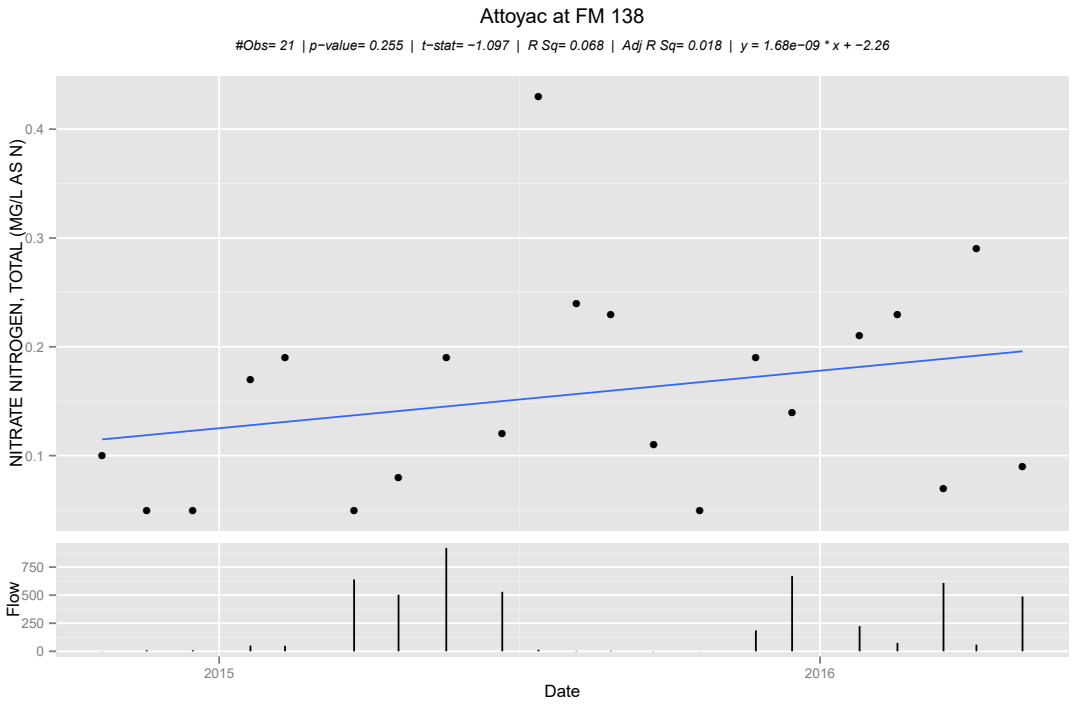
All **Dissolved Orthophosphorus** results were low, with the majority of results reported as less than the limit of quantitation. Results for one sampling event were not reported by the laboratory due to a quality control sample failure.



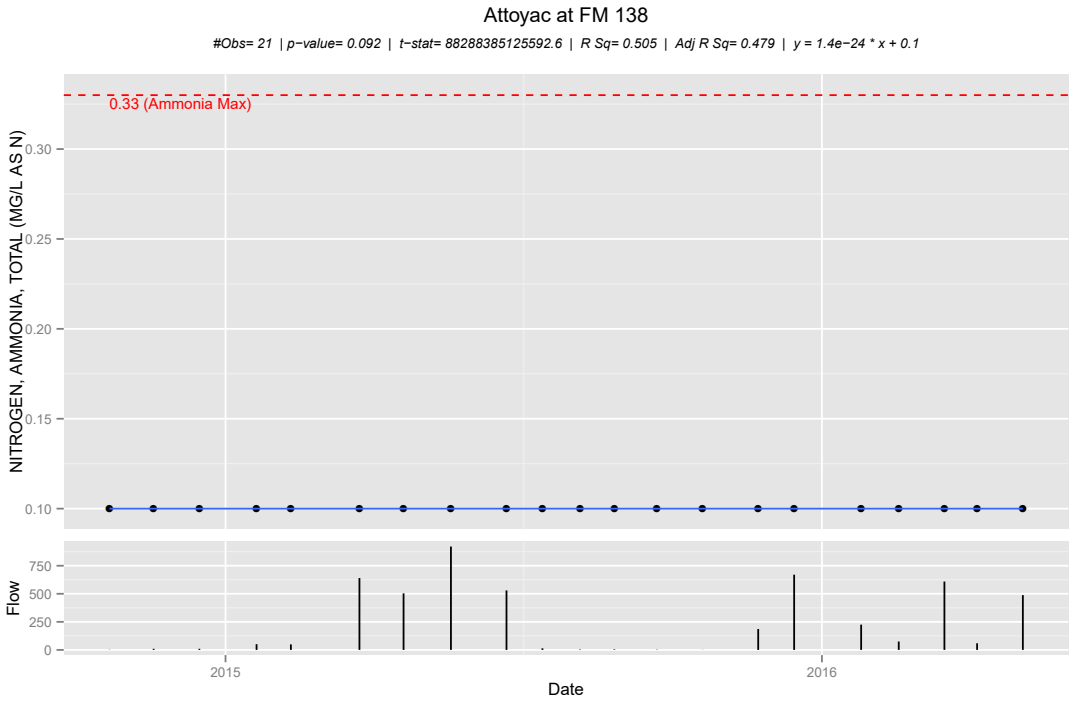
Total Phosphorus results ranged from 0.03 to 0.36 mg/L as P, with a mean value of 0.1 mg/L as P.

Monitoring Station 20841 - Attoyac Bayou at FM 138

Nitrate-Nitrogen results ranged from <0.05 to 0.43 mg/L as N, with a mean value of 0.2 mg/L as N.



For all samples analyzed for **Ammonia-Nitrogen**, the results were reported as less than the limit of quantitation of 0.1 mg/L as N.

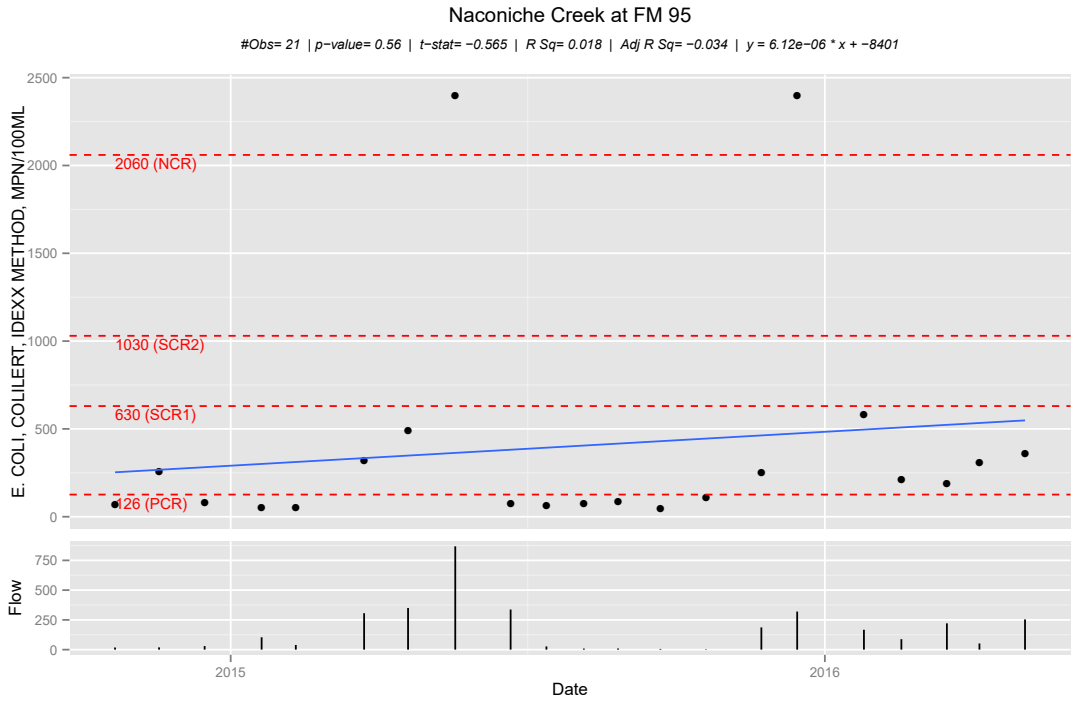


Monitoring Station 20843 - Naconiche Creek at FM 95

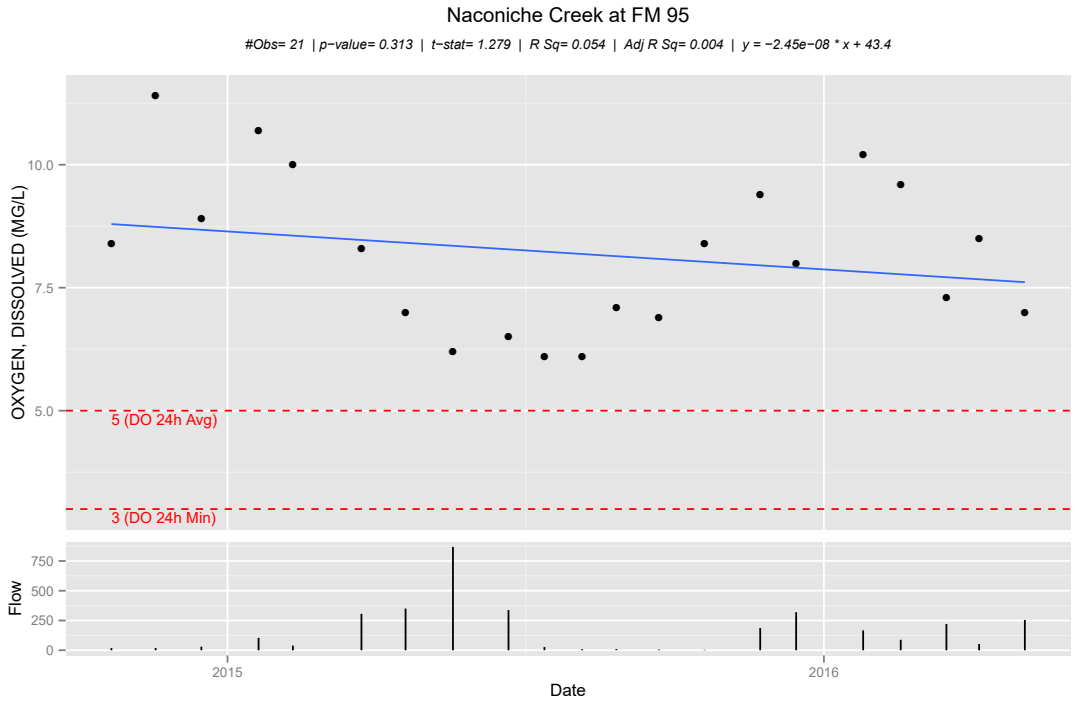
Water Quality Monitoring Results for Station 20843 - Naconiche Creek at FM 95									
Parameter	**Number of Samples**	**Number of Exceedances**	**MIN**	**MAX**	**MEAN**	**Geometric Mean**	**t-stat**	**p-value**	**Trend**
E. coli (MPN/100 mL)	21	11	47	2400		183.4	-0.5655	0.5604	
Dissolved Oxygen (mg/L)	21	0	6.1	11.4	8.2		1.2785	0.3127	
pH (S.U.)	21	1	5.2	7.5	6.8		0.1876	0.6388	
Specific Conductance (µS/cm @ 25C)	21	0	35	154	111.1		2.3630	0.0462	↓
Total Suspended Solids (mg/L)	21	0	3.7	110	28.7		1.1506	0.2830	
Total Dissolved Solids (mg/L)	21	0	68	130	95.5		1.2320	0.3483	
Chloride (mg/L)	21	0	7.4	14	10.0		2.0325	0.0935	↓
Sulfate (mg/L)	21	0	5	39	12.0		-0.5180	0.5638	
Orthophosphorus (mg/L)	20	0	0.04	0.04	0.0		1.39391E+14	0.1043	
Total Phosphorus (mg/L as P)	21	0	0.02	0.23	0.1		1.3120	0.2233	
Nitrate (mg/L as N)	21	0	0.08	0.89	0.4		-0.6517	0.4752	
Ammonia-Nitrogen (mg/L as N)	21	0	0.1	0.22	0.1		1.2776	0.2906	

Monitoring Station 20843 - Naconiche Creek at FM 95

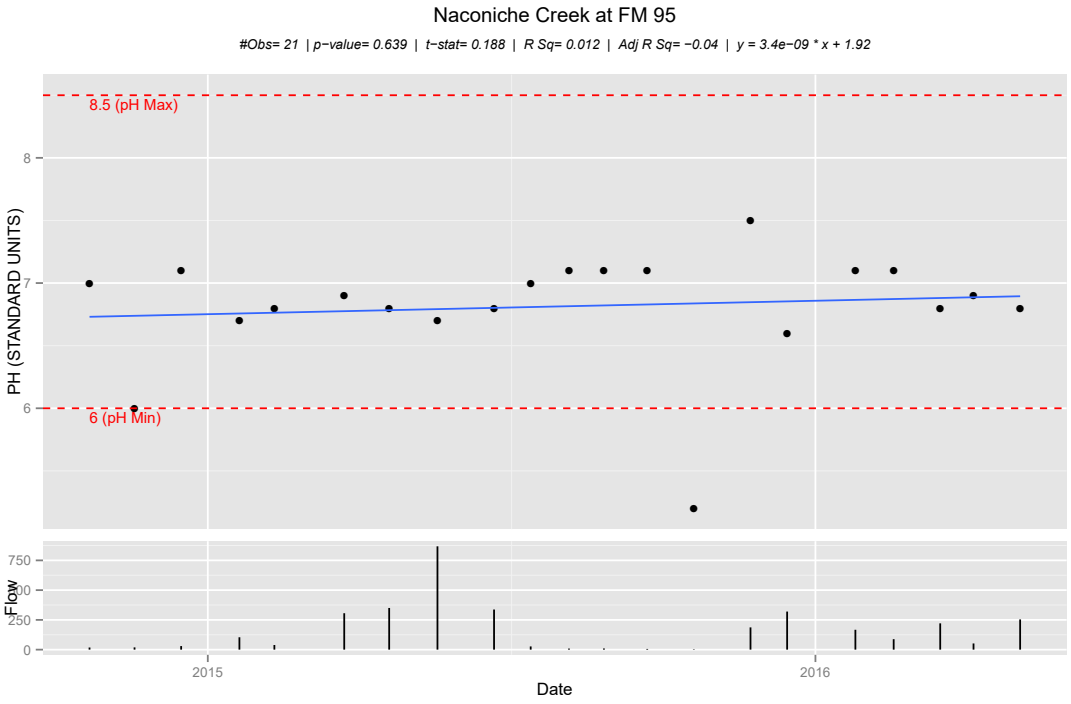
E. coli values at this station ranged from 47 to >2400 MPN/100 mL, with a geometric mean of 183.4 MPN/100 mL. Of the 21 samples analyzed, 11 exceeded the standard of 126 MPN/100 mL for Primary Contact Recreation 1. On two occasions, results were reported as >2400 MPN/100 mL. Both of these values were related to elevated flow events.



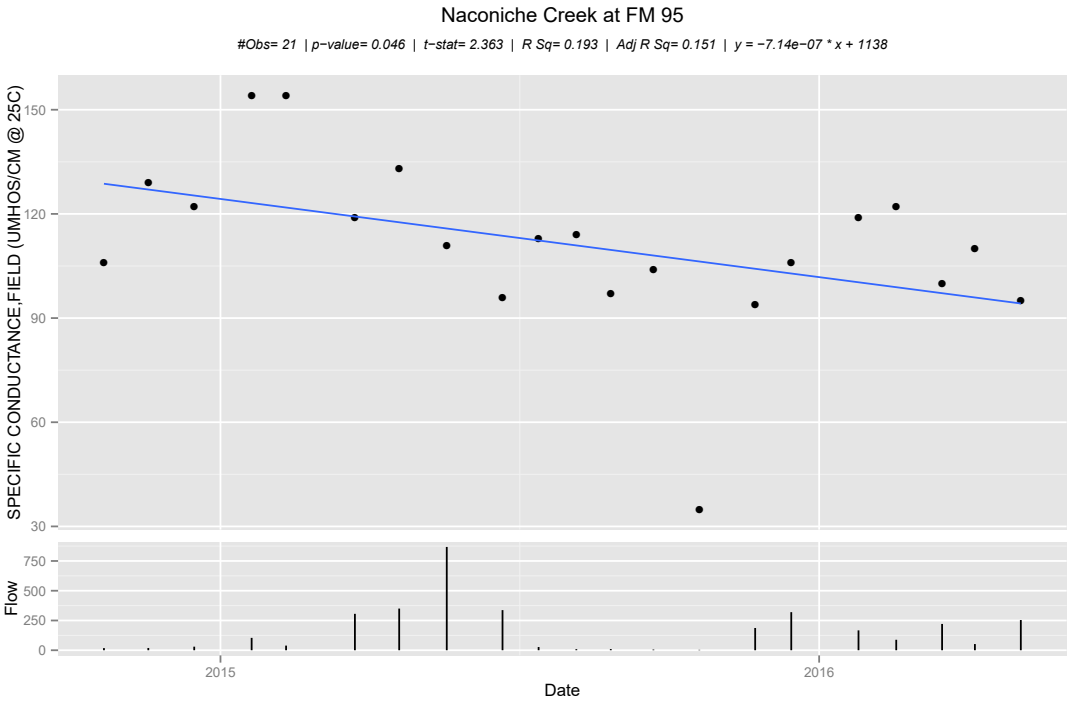
Dissolved Oxygen levels at this station were normal. No values were below the 3.0 mg/L DO criteria for this segment.



Monitoring Station 20843 - Naconiche Creek at FM 95



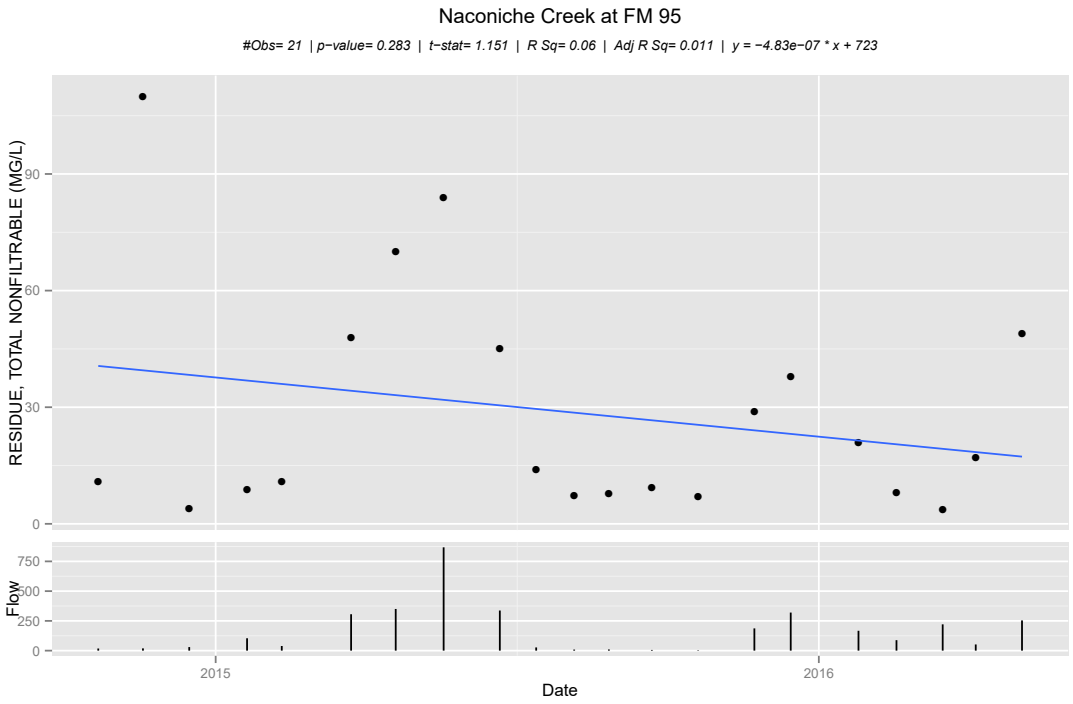
The **pH** values at this station ranged from 5.2 to 7.5 S.U., with a mean of 6.8 S.U. One value was below the water quality standard criteria of 6.0 S.U.



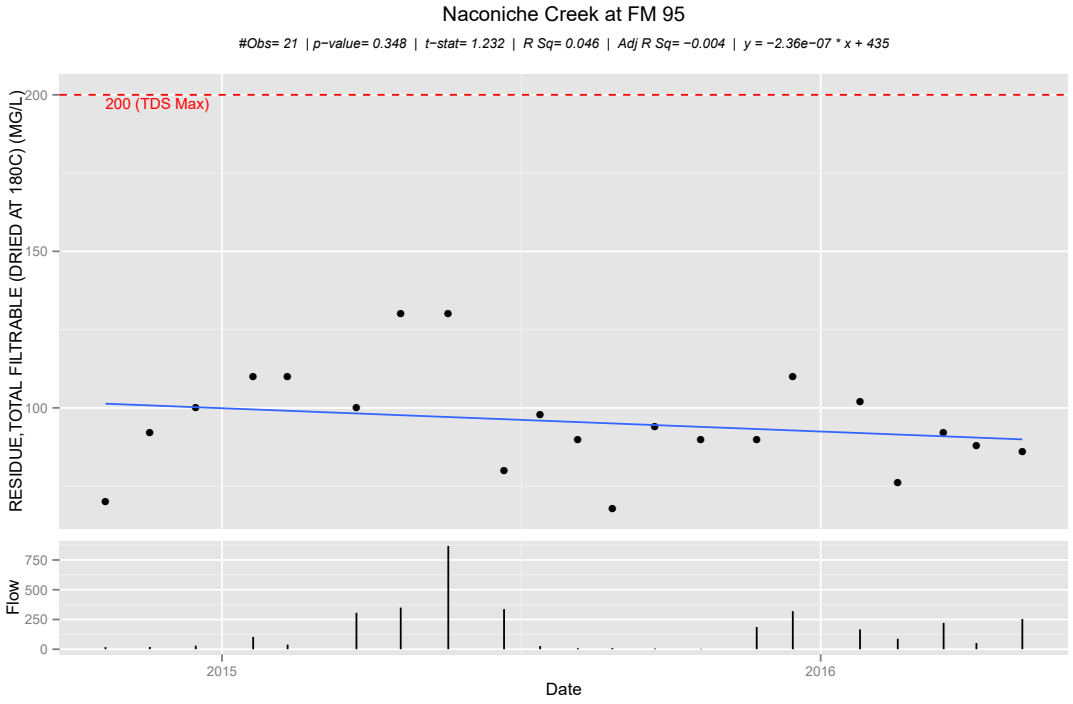
Specific Conductance values showed a decreasing trend. The trend was determined to be stastically significant, but the trend appears to be affected by one particularly low value. Further statistical analysis was not conducted to determine if this value was an outlier. The range of values (35 - 154 µS/cm) is normal for this watershed.

Monitoring Station 20843 - Naconiche Creek at FM 95

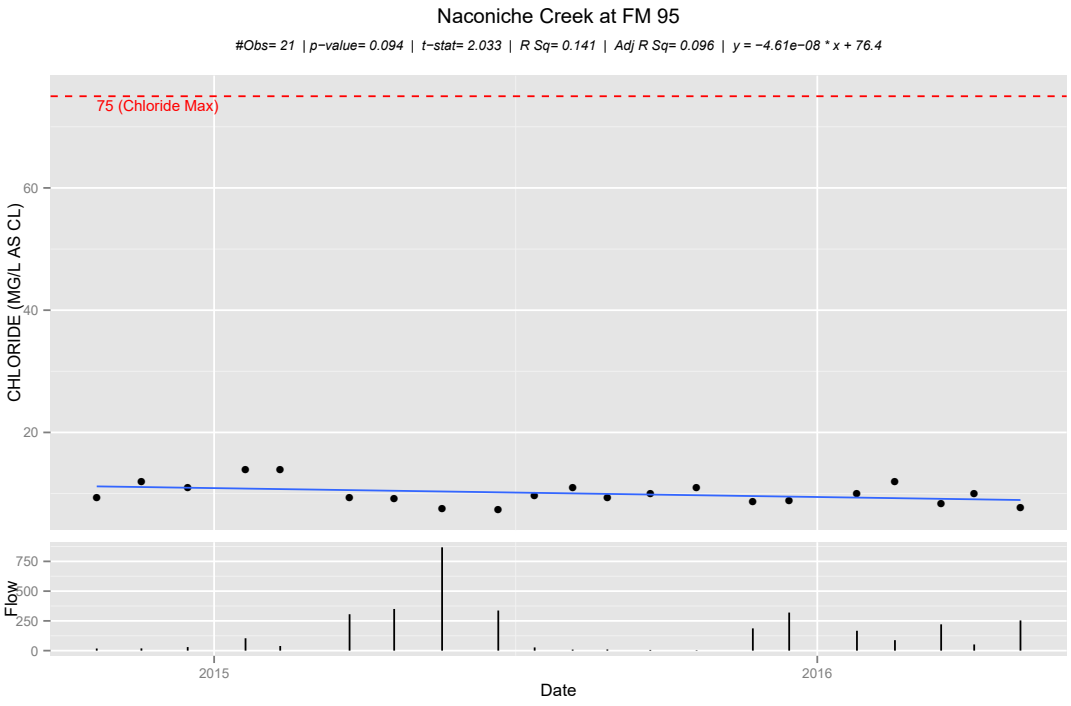
Total Suspended Solids (TSS) results ranged from 3.7 to 110 mg/L, with a mean of 28.7 mg/L.



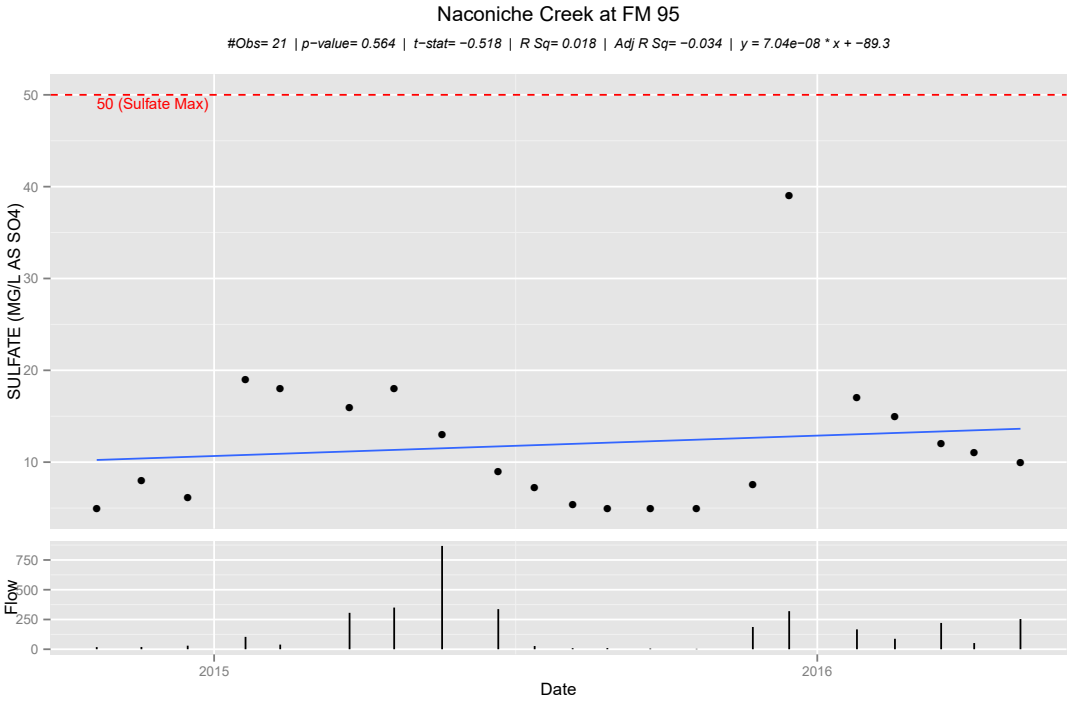
Total Dissolved Solids (TDS) results at this monitoring station ranged from 68 to 130 mg/L, with a mean of 95.5 mg/L.



Monitoring Station 20843 - Naconiche Creek at FM 95



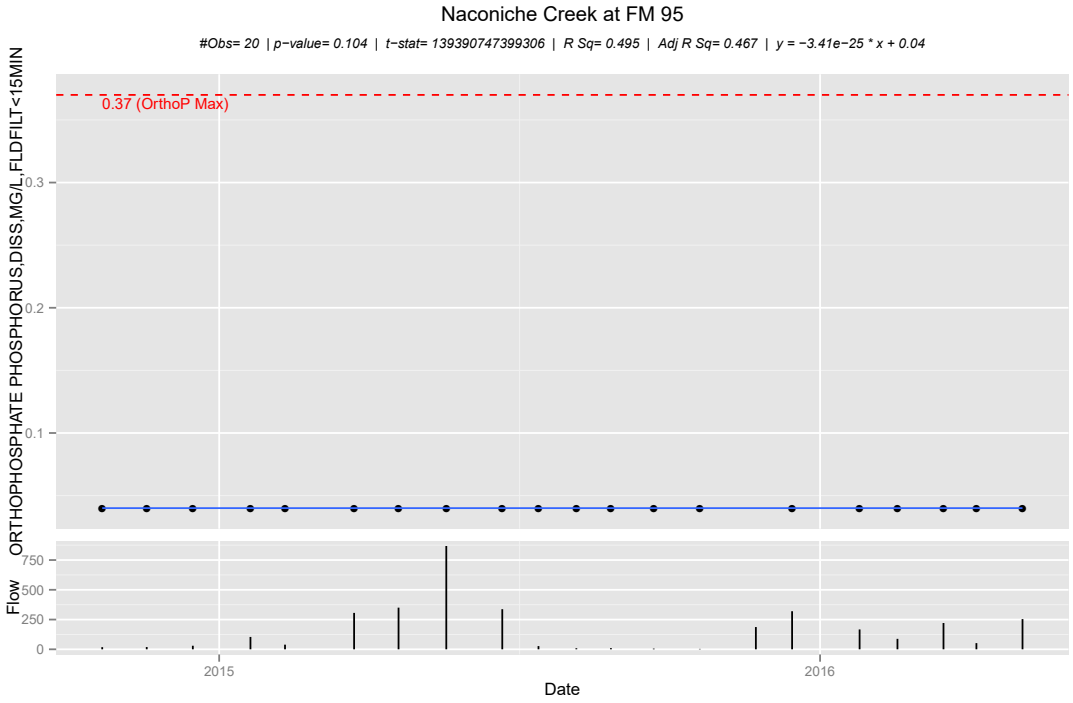
Chloride results at monitoring station 20843 ranged from 7.4 mg/L to 14 mg/L, with a mean of 10.0 mg/L. Statistical analysis showed a statistically significant decreasing trend (*t-stat* = 2.0325, *p-value* = 0.0935) based upon 21 samples.



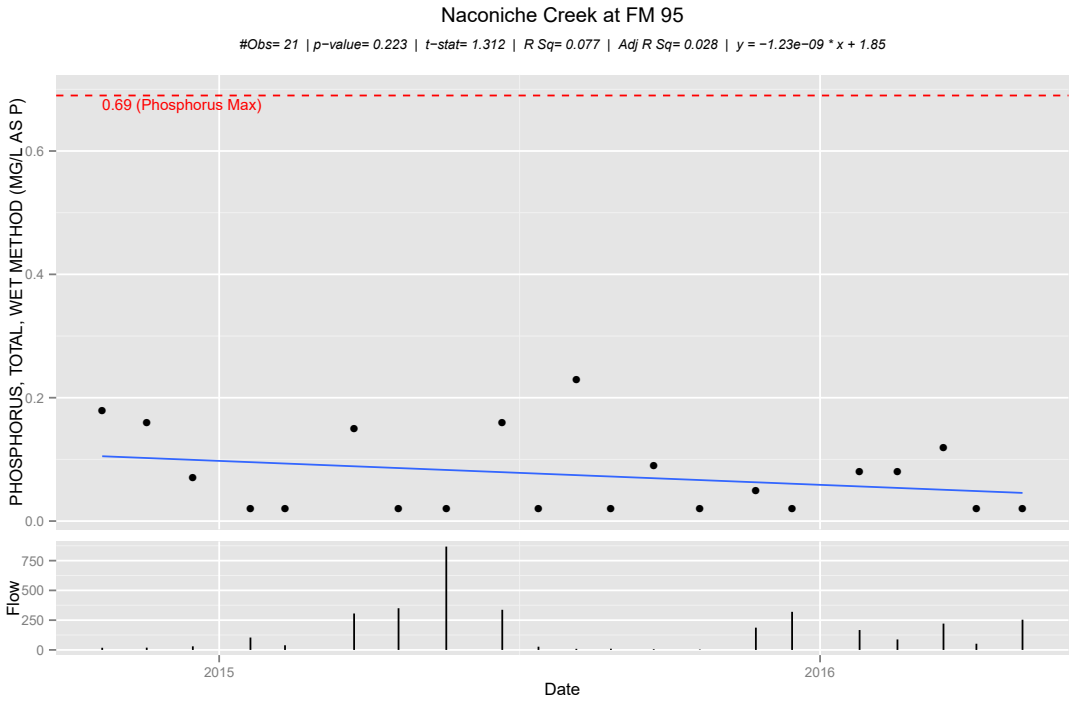
Sulfate results ranged from a minimum value of <5 mg/L to a maximum of 30 mg/L. The mean result was 13.1 mg/L.

Monitoring Station 20843 - Naconiche Creek at FM 95

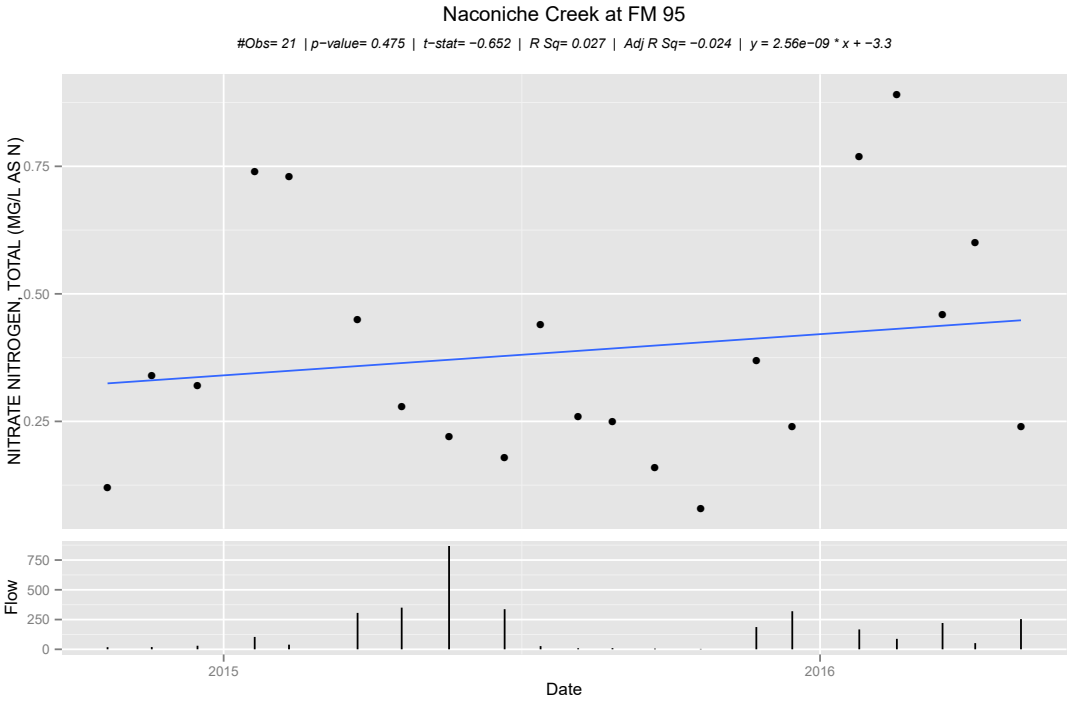
All **Dissolved Orthophosphorus** results were reported as less than the limit of quantitation (<0.04 mg/L as P). Results for one sampling event were not reported by the laboratory due to a quality control sample failure.



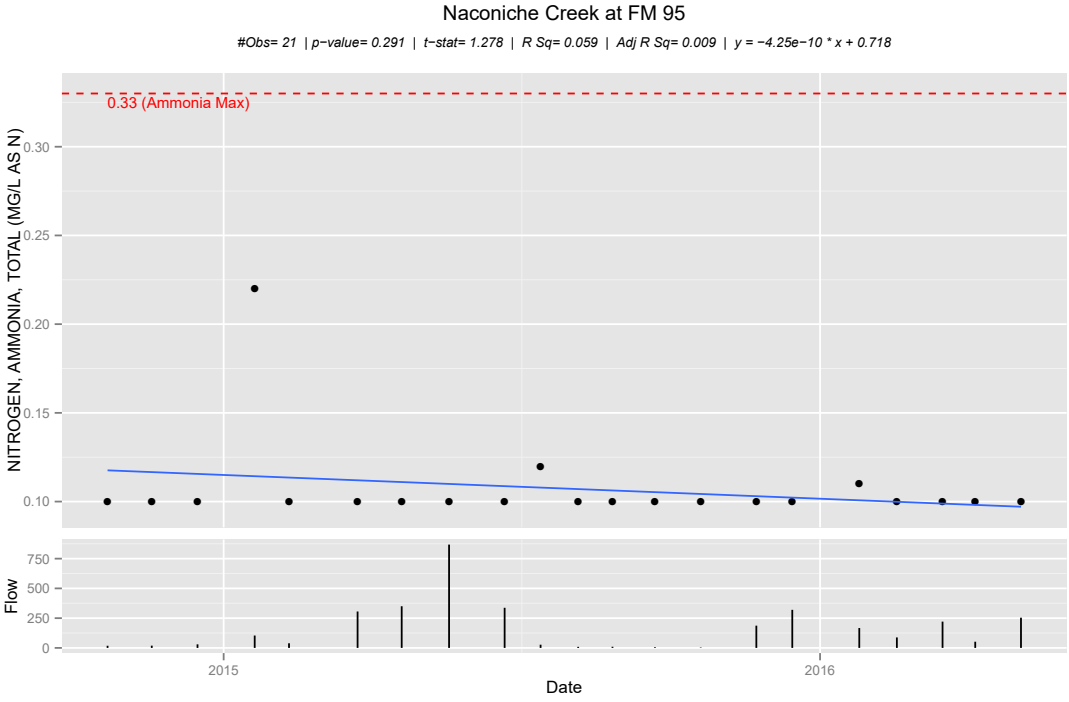
Total Phosphorus results at this monitoring station ranged from 0.02 to 0.23 mg/L as P, with a mean value of 0.1 mg/L as P.



Monitoring Station 20843 - Naconiche Creek at FM 95



Nitrate-Nitrogen results ranged from 0.08 to 0.89 mg/L as N, with a mean value of 0.4 mg/L as N. An increasing trend is observed, but it is not statistically significant.



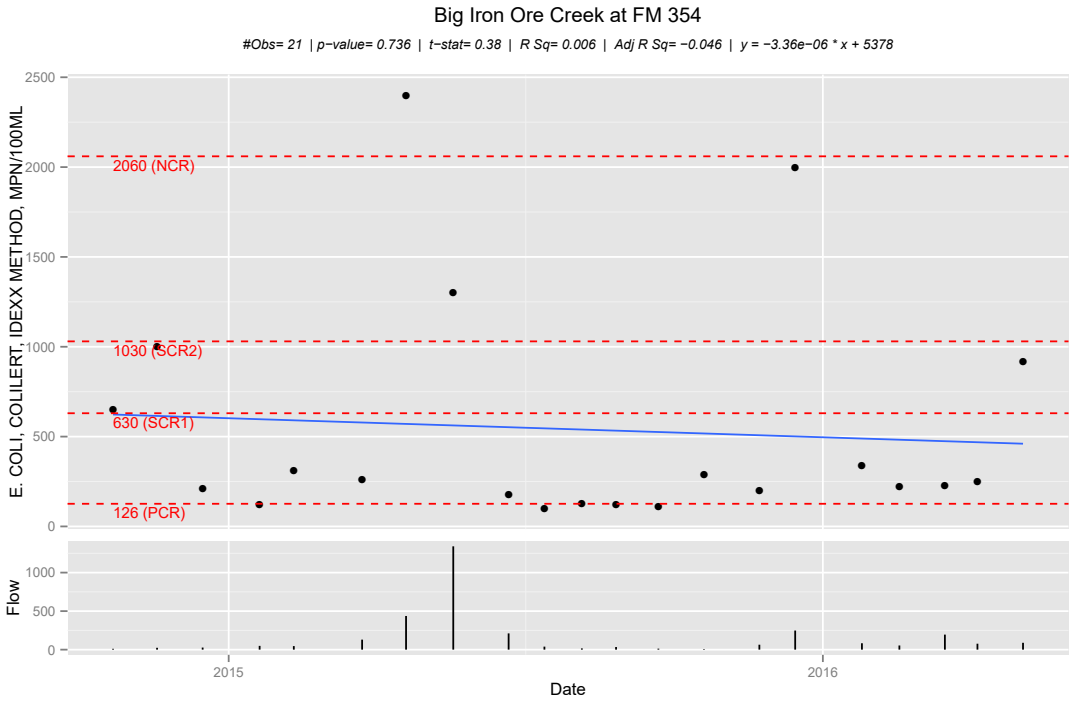
Sample results for **Ammonia-Nitrogen** ranged from <0.1 mg/L as N to 0.22 mg/L as N. The water quality standard criteria is 0.33 mg/L as N.

Monitoring Station 20844 - Big Iron Ore Creek at FM 354

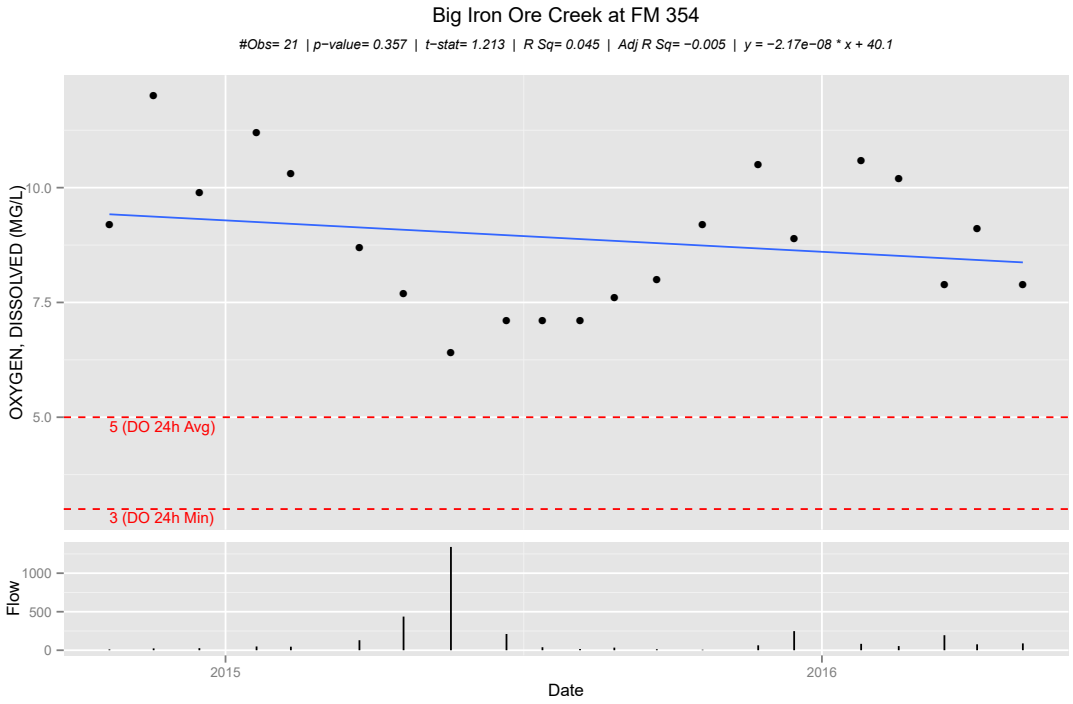
Water Quality Monitoring Results for Station 20844 - Big Iron Ore Creek at FM 354									
Parameter	**Number of Samples**	**Number of Exceedances**	**MIN**	**MAX**	**MEAN**	**Geometric Mean**	**t-stat**	**p-value**	**Trend**
E. coli (MPN/100 mL)	21	17	100	2400		325.6	0.3800	0.7362	
Dissolved Oxygen (mg/L)	21	0	6.4	12	8.9		1.2130	0.3569	
pH (S.U.)	21	0	6.1	7.3	6.8		-1.1946	0.0315	
Specific Conductance (µS/cm @ 25C)	21	0	60	122	101.5		2.0354	0.1099	
Total Suspended Solids (mg/L)	21	0	3.4	270	30.2		0.3688	0.7343	
Total Dissolved Solids (mg/L)	21	0	64	120	89.2		1.4630	0.2620	
Chloride (mg/L)	21	0	5	11	8.4		1.1365	0.3693	
Sulfate (mg/L)	21	0	5	17	10.6		0.6915	0.5812	
Orthophosphorus (mg/L)	20	0	0.04	0.04	0.0		1.39391E+14	0.1043	
Total Phosphorus (mg/L as P)	21	0	0.02	0.5	0.1		0.7033	0.5094	
Nitrate (mg/L as N)	21	0	0.1	1.8	1.1		-0.6555	0.4569	
Ammonia-Nitrogen (mg/L as N)	21	0	0.1	0.13	0.1		0.8198	0.9088	

Monitoring Station 20844 - Big Iron Ore Creek at FM 354

E. coli values at this station ranged from 100 to >2400 MPN/100 mL, with a geometric mean of 325.6 MPN/100 mL. Of the 21 samples analyzed, 17 exceeded the standard of 126 MPN/100 mL for Primary Contact Recreation 1.

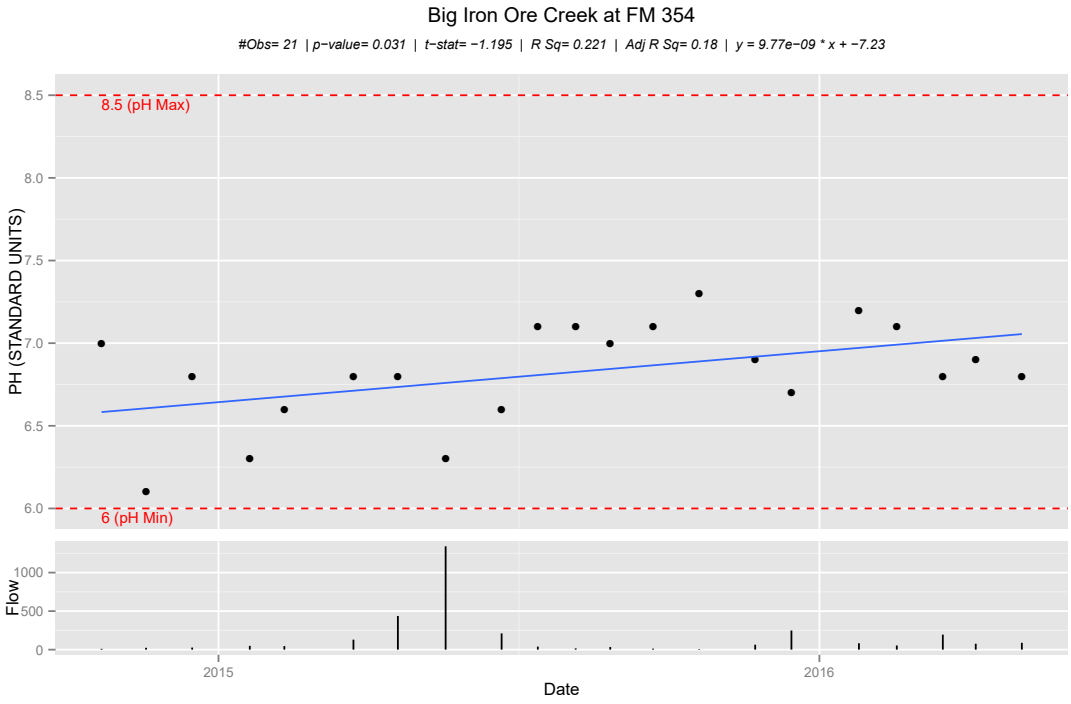


Dissolved Oxygen levels at this station were normal. Results ranged from 6.4 to 12.0 mg/L.

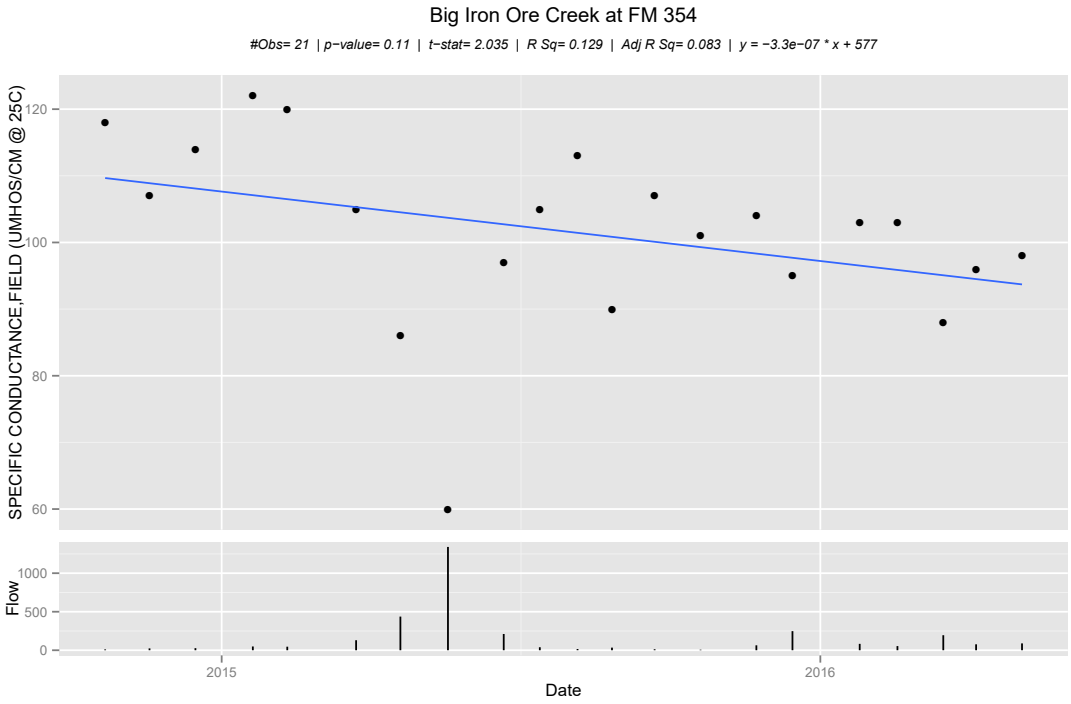


Monitoring Station 20844 - Big Iron Ore Creek at FM 354

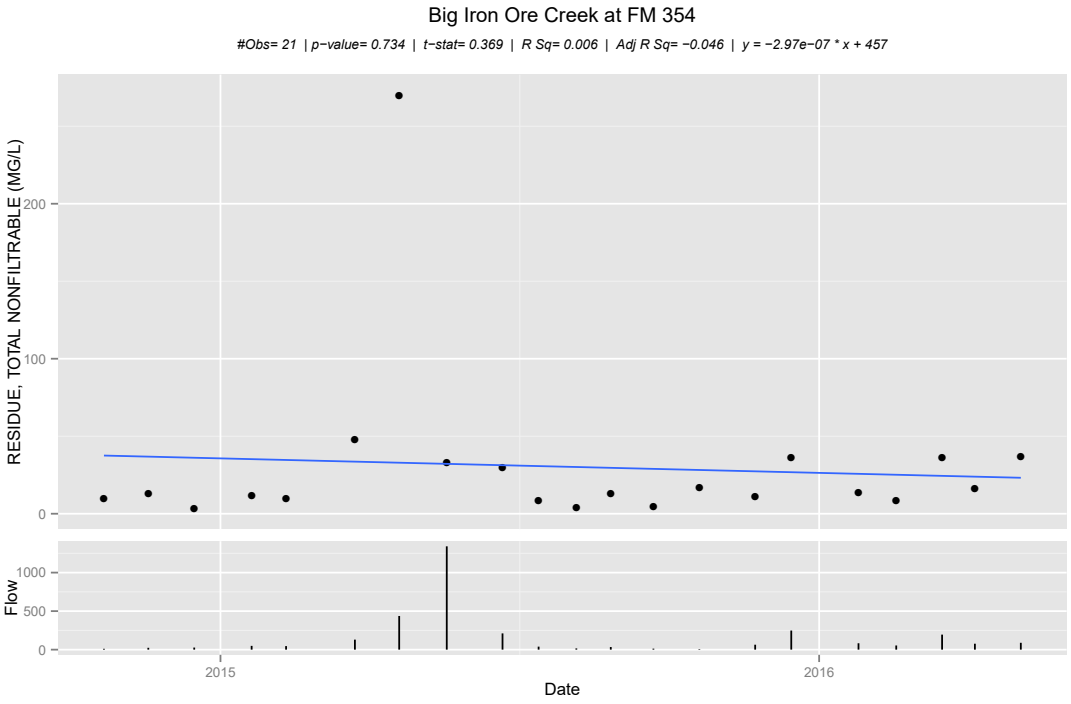
The **pH** values at this station ranged from 6.1 to 7.3 S.U.



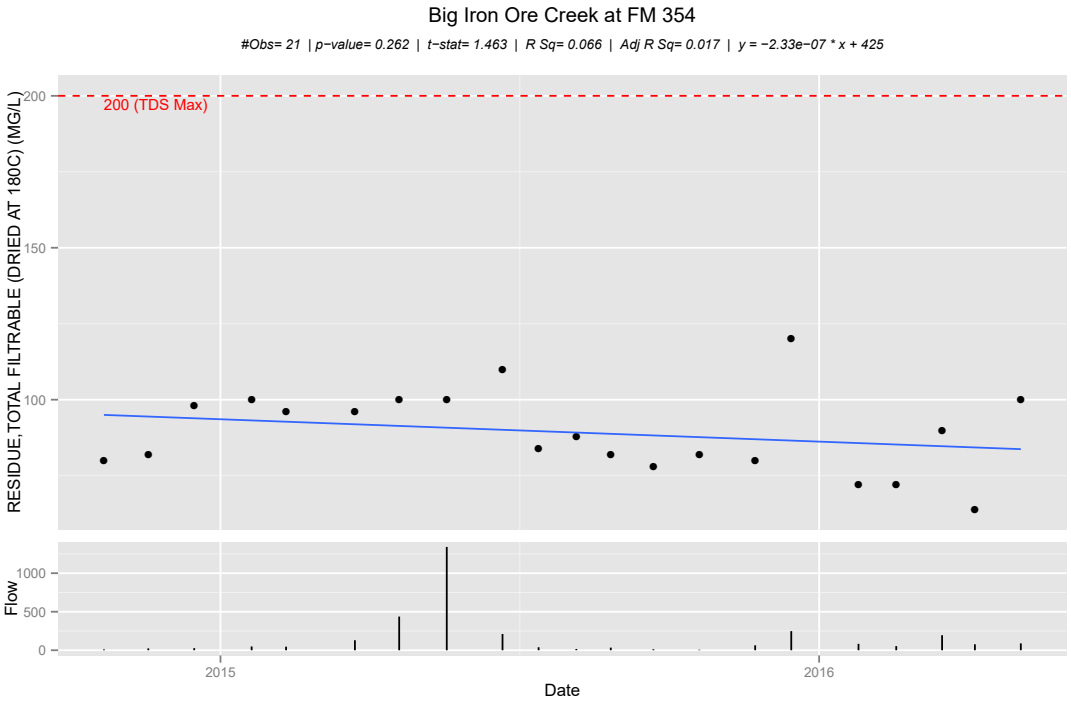
Specific Conductance values showed a decreasing trend, but this trend was not statistically significant. The results were in the range of what is considered normal for this stream segment. Specific Conductance ranged from 60 to 122 µS/cm.



Monitoring Station 20844 - Big Iron Ore Creek at FM 354



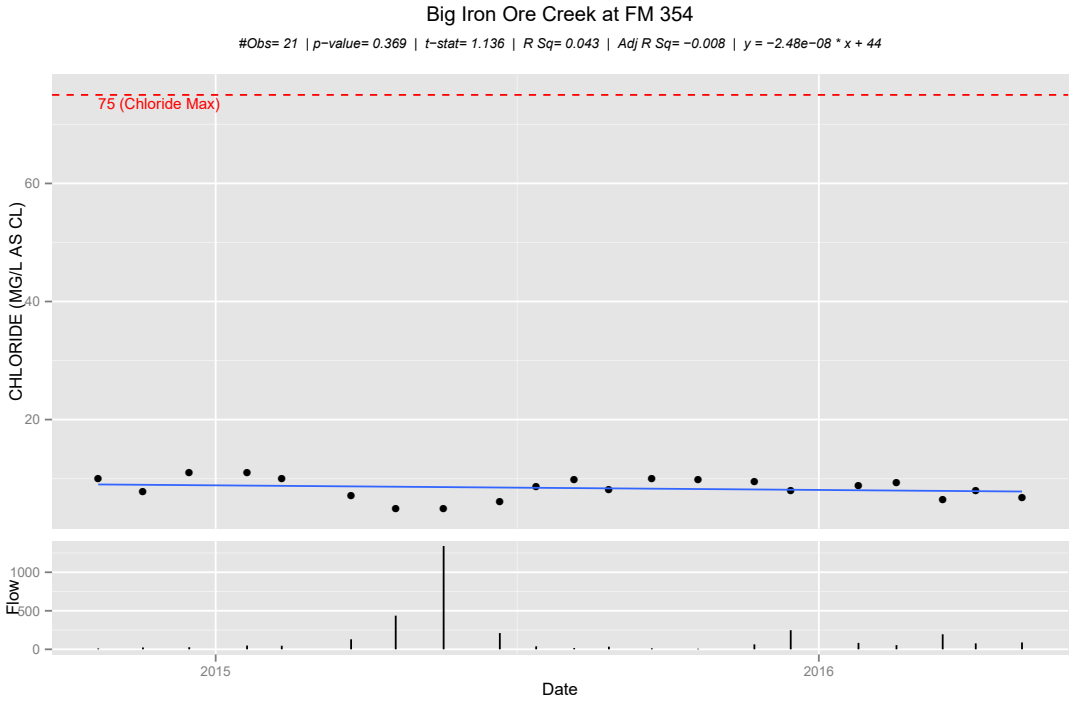
The results for **Total Suspended Solids (TSS)** ranged from 3.4 to 270 mg/L, with a mean of 30.2 mg/L. All but one value was below 50 mg/L.



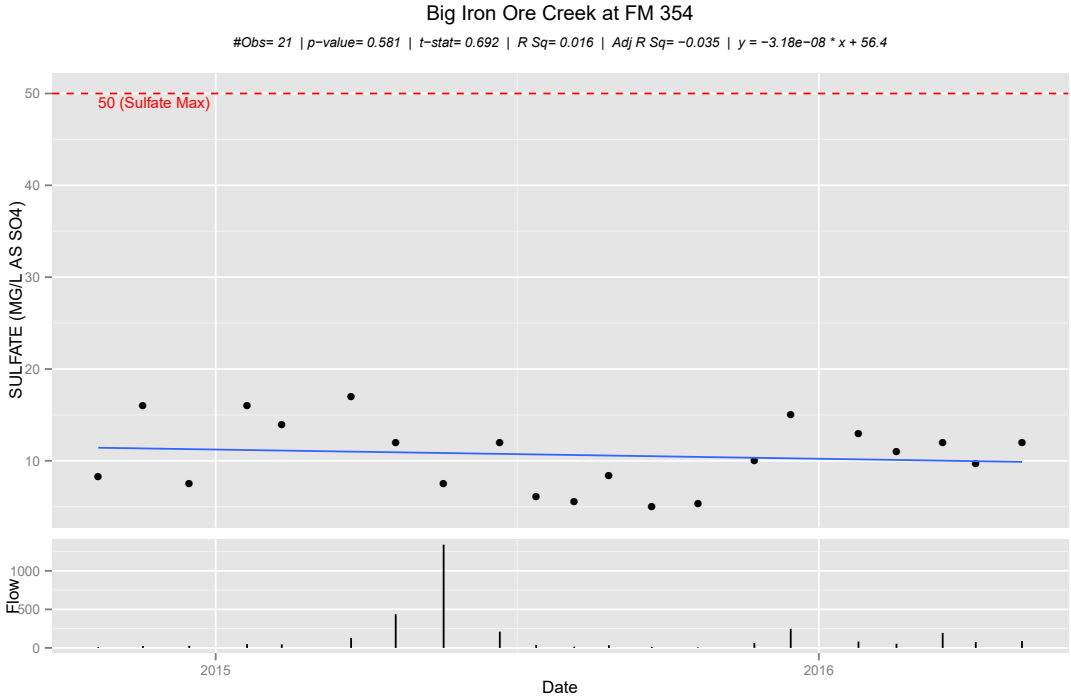
Total Dissolved Solids (TDS) results at this monitoring station ranged from 64 to 120 mg/L, with a mean of 89.2 mg/L.

Monitoring Station 20844 - Big Iron Ore Creek at FM 354

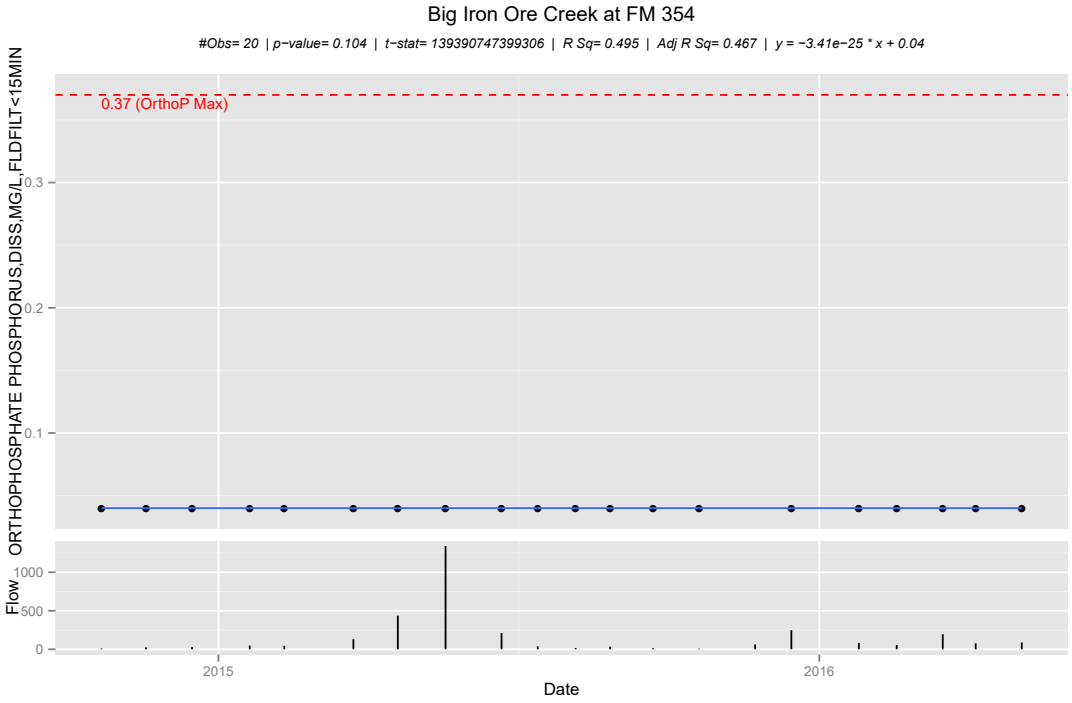
Chloride results at this monitoring station were low, with values ranging-from <5 mg/L to 11 mg/L, with a mean of 8.4 mg/L.



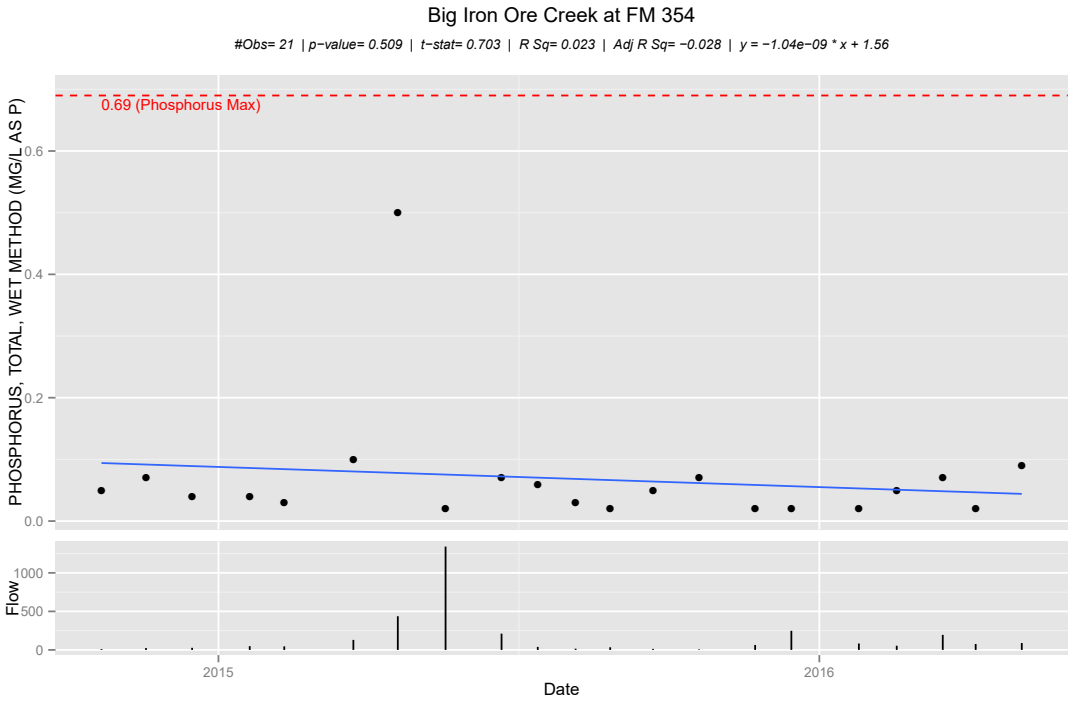
Sulfate results ranged from a minimum value of <5 mg/L to a maximum of 17 mg/L. The mean result was 10.6 mg/L.



Monitoring Station 20844 - Big Iron Ore Creek at FM 354



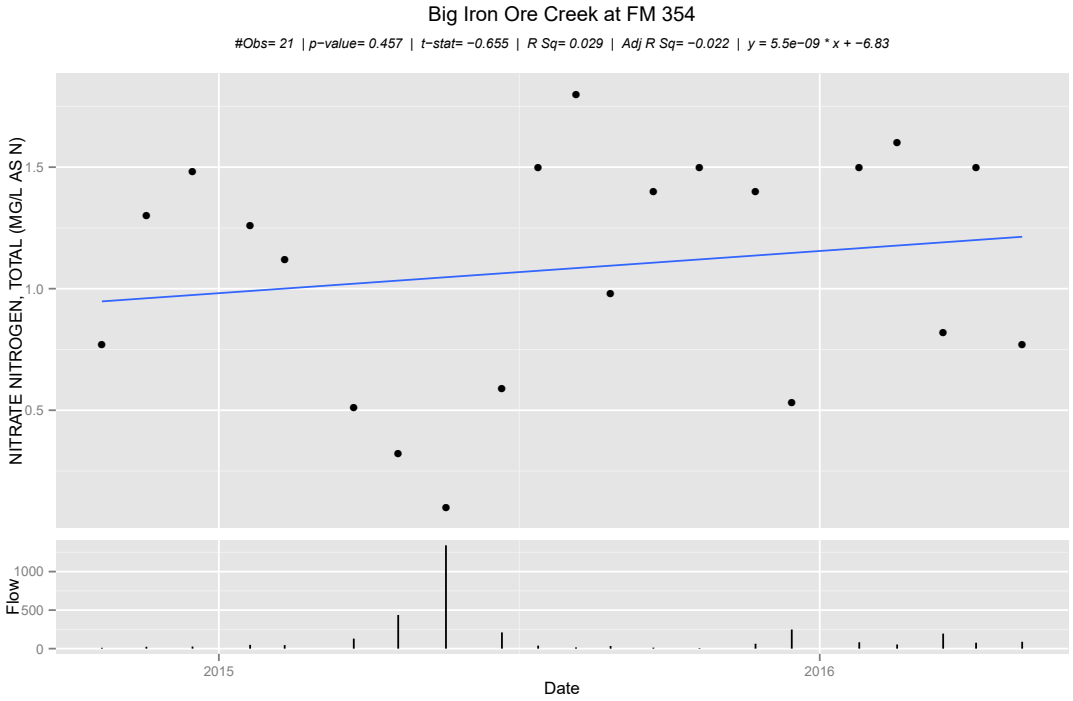
All **Dissolved Orthophosphorus** results at this montoring station were reported as less than the limit of quantitation. Results for one sampling event were not reported by the laboratory due to a quality control sample failure.



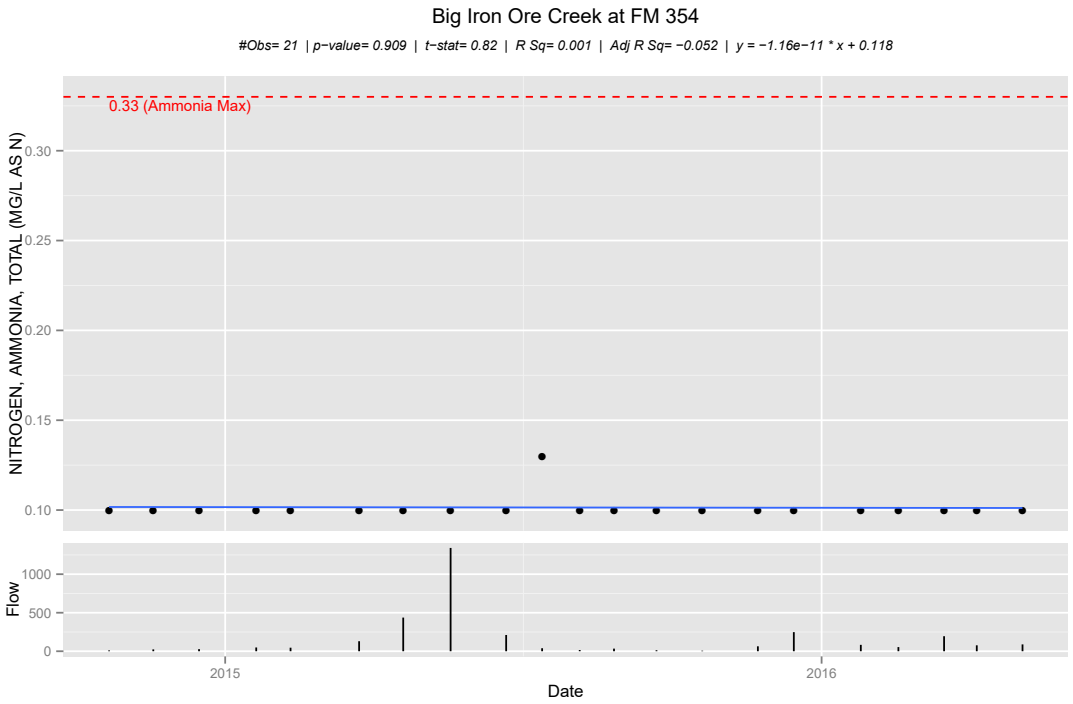
Total Phosphorus results ranged from 0.03 to 0.5 mg/L as P, with a mean value of 0.1 mg/L as P.

Monitoring Station 20844 - Big Iron Ore Creek at FM 354

Nitrate-Nitrogen results were typically elevated. Results at this station ranged from 0.1 to 1.8 mg/L as N, with a mean value of 1.1 mg/L as N.



For all samples analyzed for **Ammonia-Nitrogen**, only 1 of the 21 sample results were reported above the limit of quantitation of 0.1 mg/L as N.

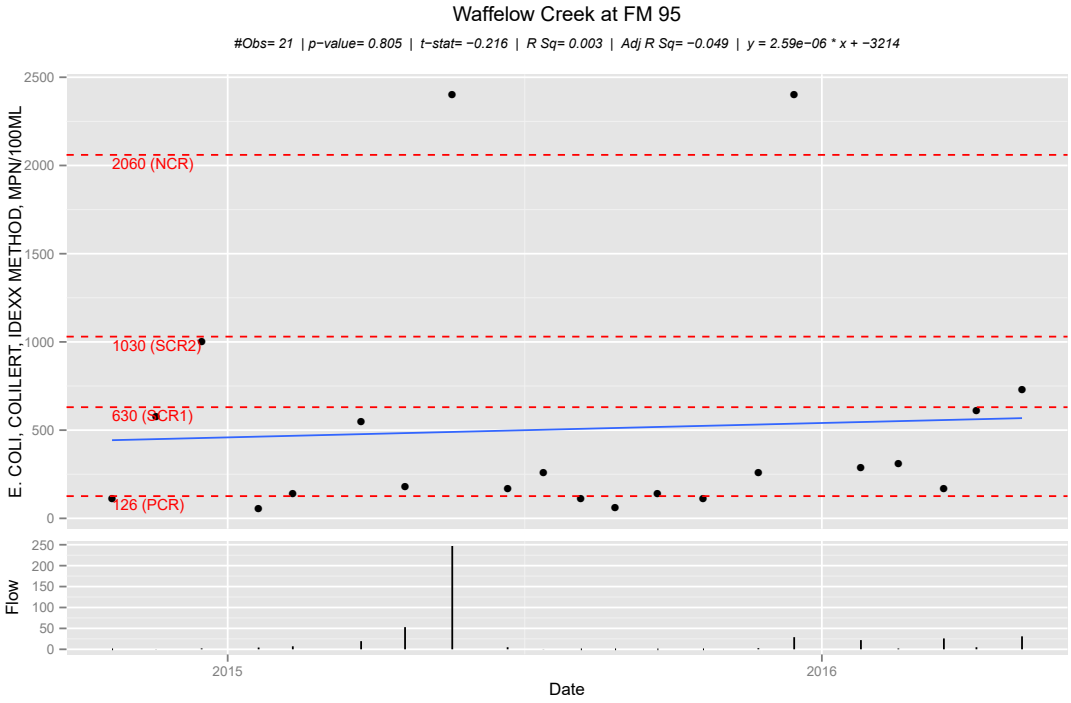


Monitoring Station 16083 - Waffelow Creek at FM 95

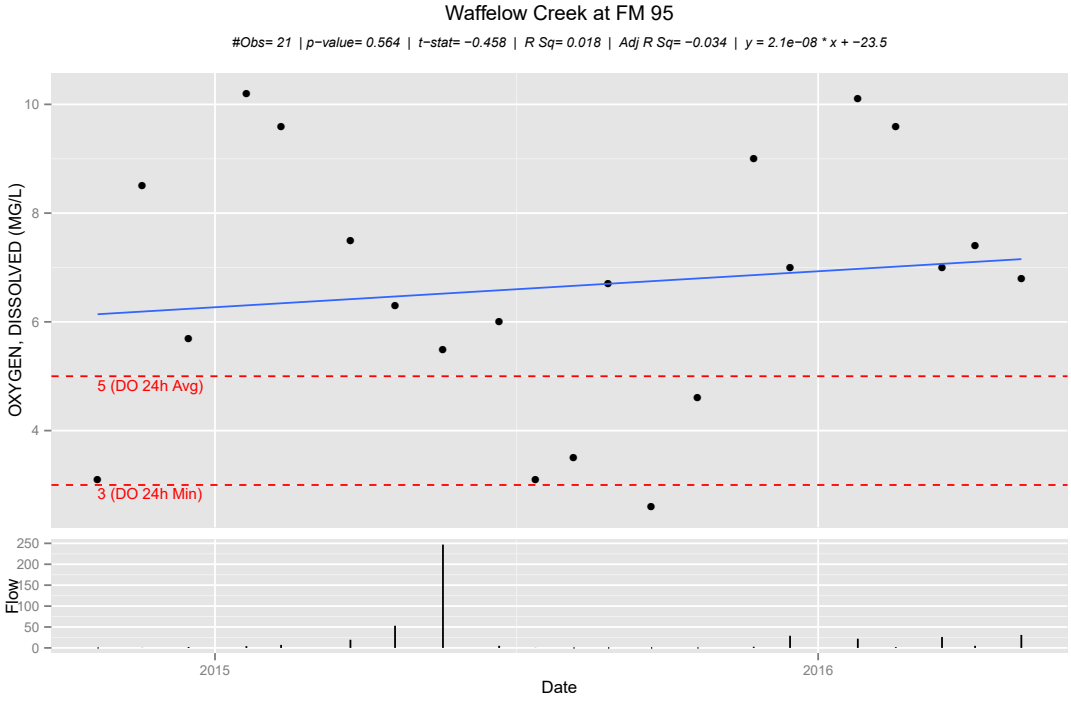
Water Quality Monitoring Results for Station 16083 - Waffelow Creek at FM 95									
Parameter	**Number of Samples**	**Number of Exceedances**	**MIN**	**MAX**	**MEAN**	**Geometric Mean**	**t-stat**	**p-value**	**Trend**
E. coli (MPN/100 mL)	21	16	58	2400		280.3	-0.2160	0.8053	
Dissolved Oxygen (mg/L)	21	1	2.6	10.2	6.7		-0.4576	0.5640	
pH (S.U.)	21	1	5.6	6.9	6.5		-2.2057	0.0031	↑
Specific Conductance (µS/cm @ 25C)	21	0	99	214	134.8		1.4185	0.2455	
Total Suspended Solids (mg/L)	21	0	6.2	28	13.2		-0.2541	0.7351	
Total Dissolved Solids (mg/L)	21	0	78	160	118.8		0.6373	0.7265	
Chloride (mg/L)	21	0	6.2	15	9.3		1.0482	0.3981	
Sulfate (mg/L)	21	1	7	59	25.5		0.3507	0.7939	
Orthophosphorus (mg/L)	20	0	0.04	0.04	0.0		1.39391E+14	0.1043	
Total Phosphorus (mg/L as P)	21	0	0.02	0.19	0.1		1.0807	0.3352	
Nitrate (mg/L as N)	21	0	0.05	0.52	0.2		-1.3277	0.1753	
Ammonia-Nitrogen (mg/L as N)	21	0	0.1	0.22	0.1		1.8940	0.1035	

Monitoring Station 16083 - Waffelow Creek at FM 95

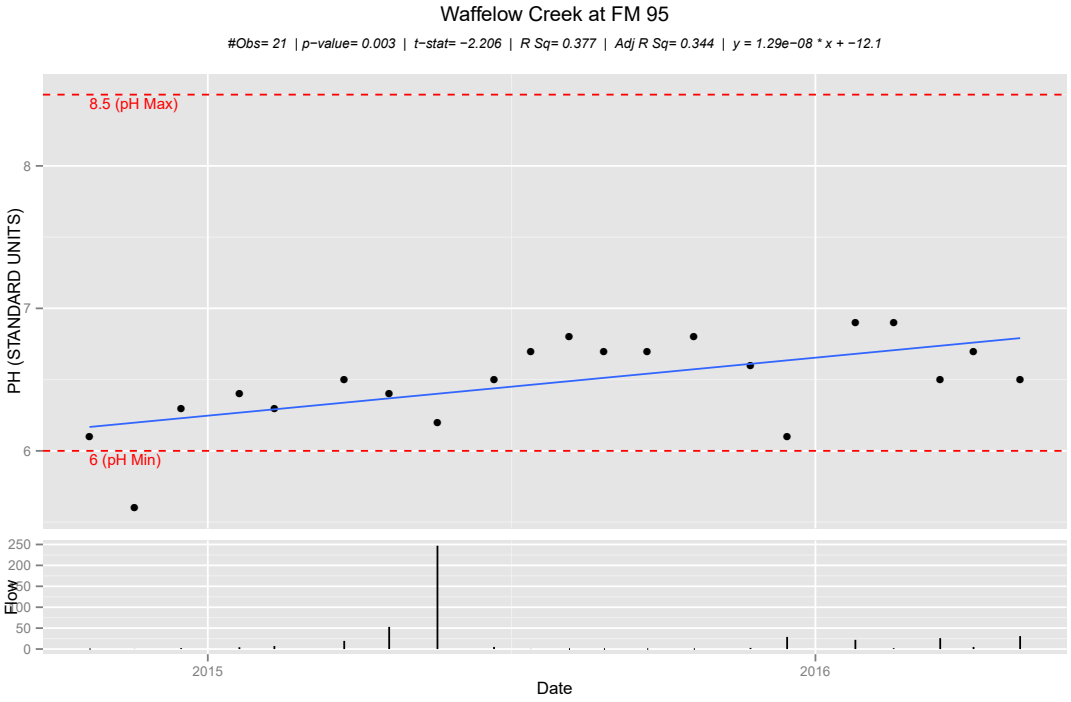
E. coli values at this station ranged from 58 to >2400 MPN/100 mL, with a geometric mean of 280.3 MPN/100 mL. Of the 21 samples analyzed, 16 exceeded the standard for Primary Contact Recreation 1.



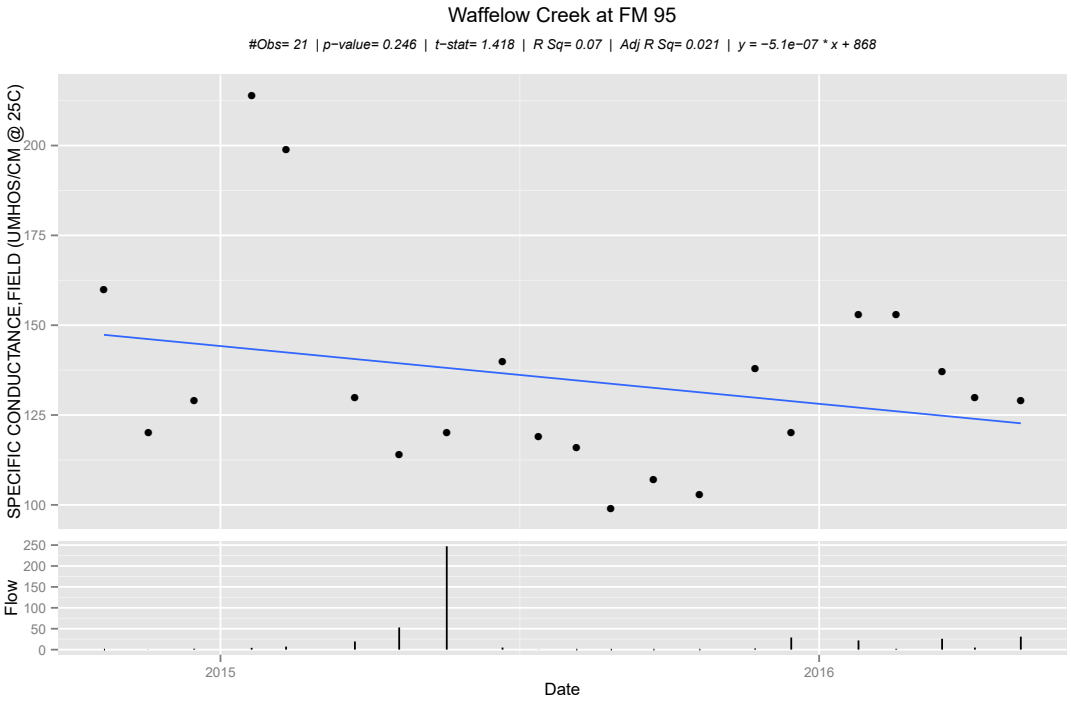
Dissolved Oxygen levels at this station ranged from 2.6 to 10.2 mg/L.



Monitoring Station 16083 - Waffelow Creek at FM 95



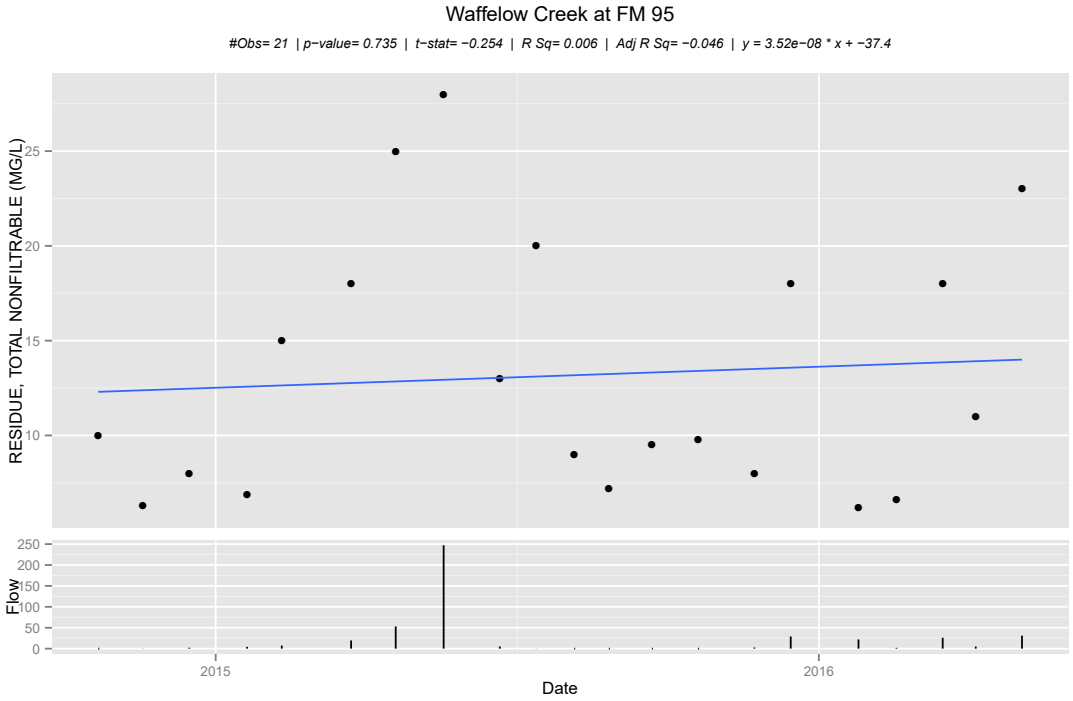
The **pH** values at this station ranged from 5.6 to 6.9 S.U., with a mean of 6.5 S.U. One value was below the water quality standard criteria of 6.0 S.U. There is a statistically significant increasing trend (*t-stat* = -2.2057, *p-value* = 0.0031).



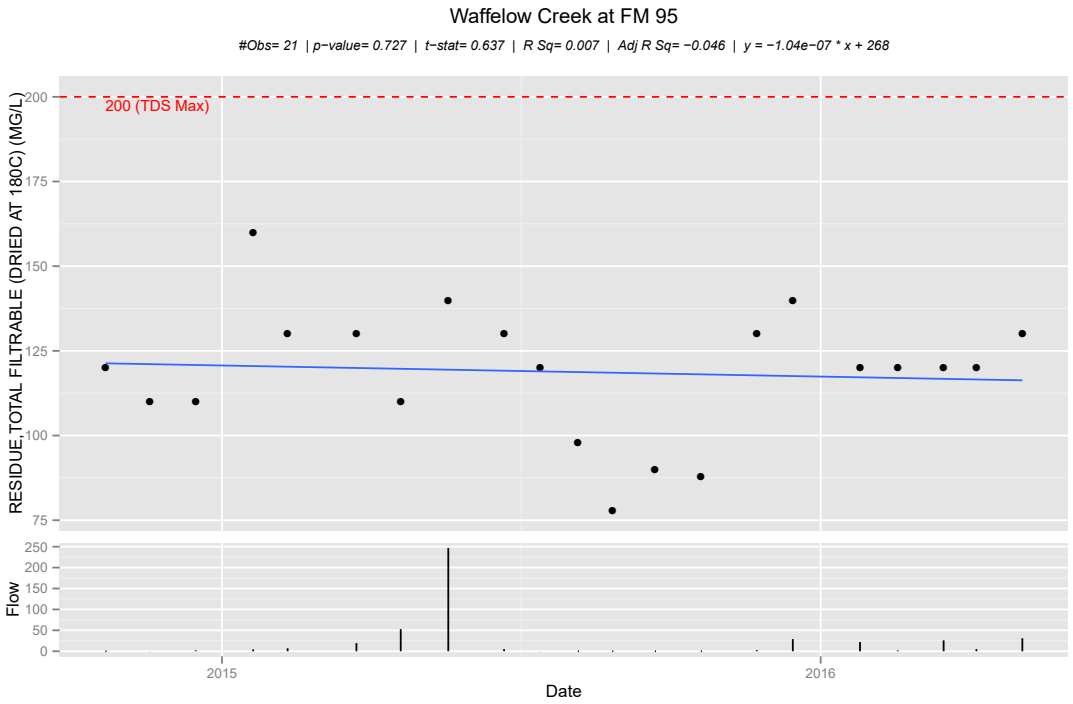
Specific Conductance values showed a decreasing trend. The trend was not determined to be stastically significant, and appears to be affected by two elevated values collected in 2015. The Specific Conductance ranged from 99 to 214 µS/cm.

Monitoring Station 16083 - Waffelow Creek at FM 95

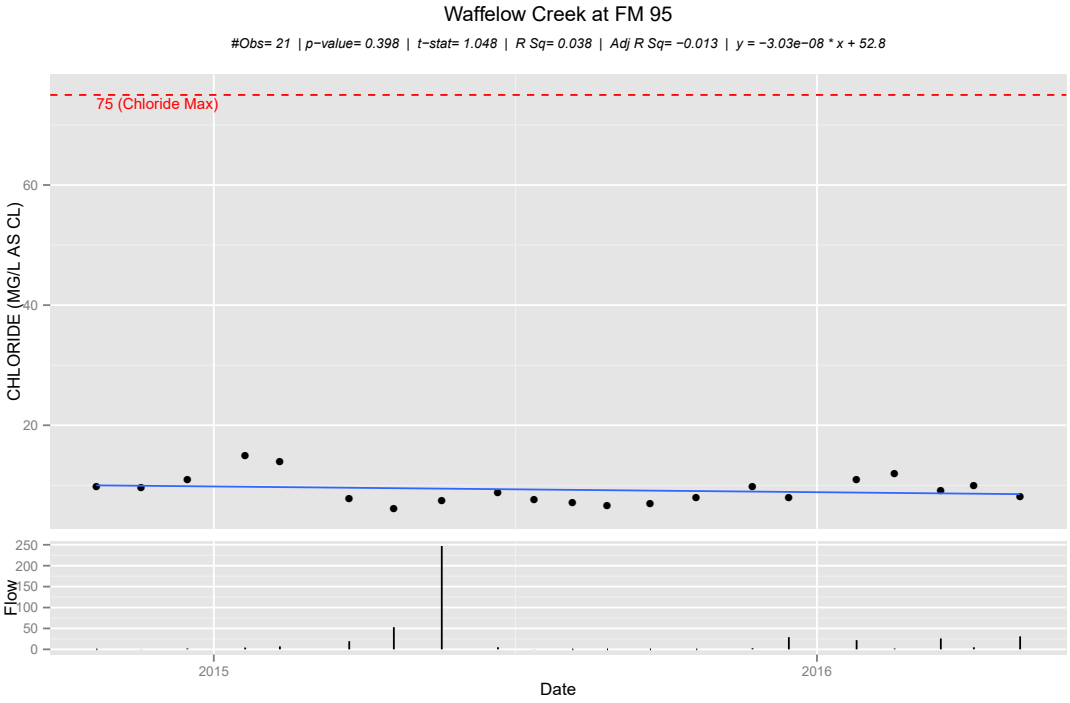
Total Suspended Solids (TSS) results ranged from 6.2 to 28 mg/L, with a mean of 13.2 mg/L.



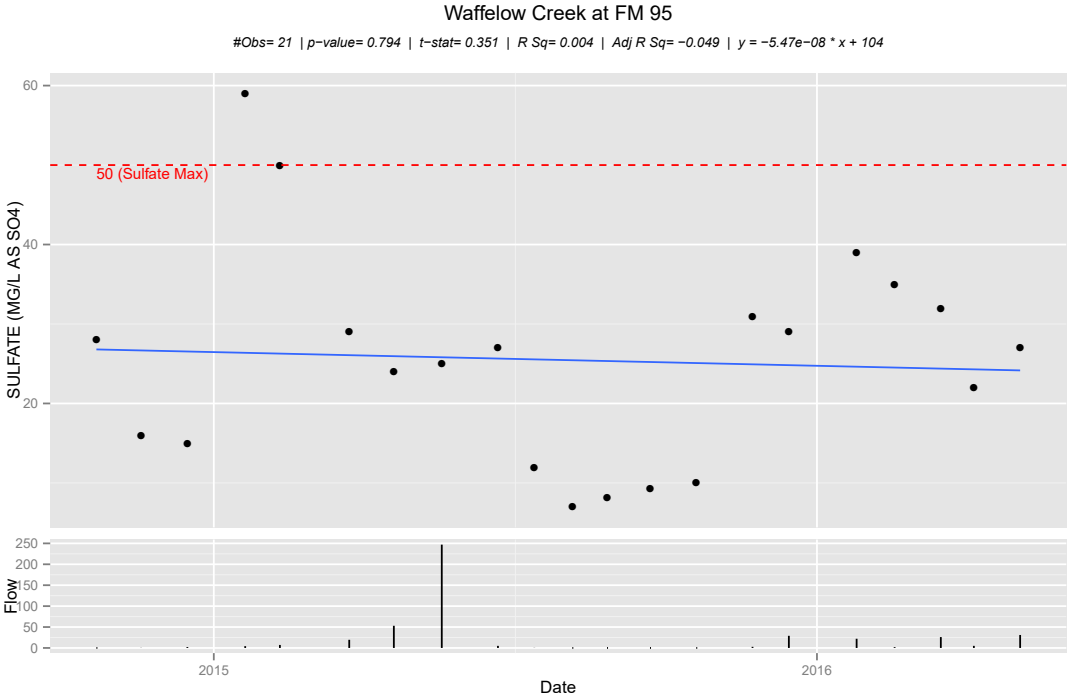
Total Dissolved Solids (TDS) results at this monitoring station ranged from 78 to 160 mg/L, with a mean of 118.8 mg/L.



Monitoring Station 16083 - Waffelow Creek at FM 95



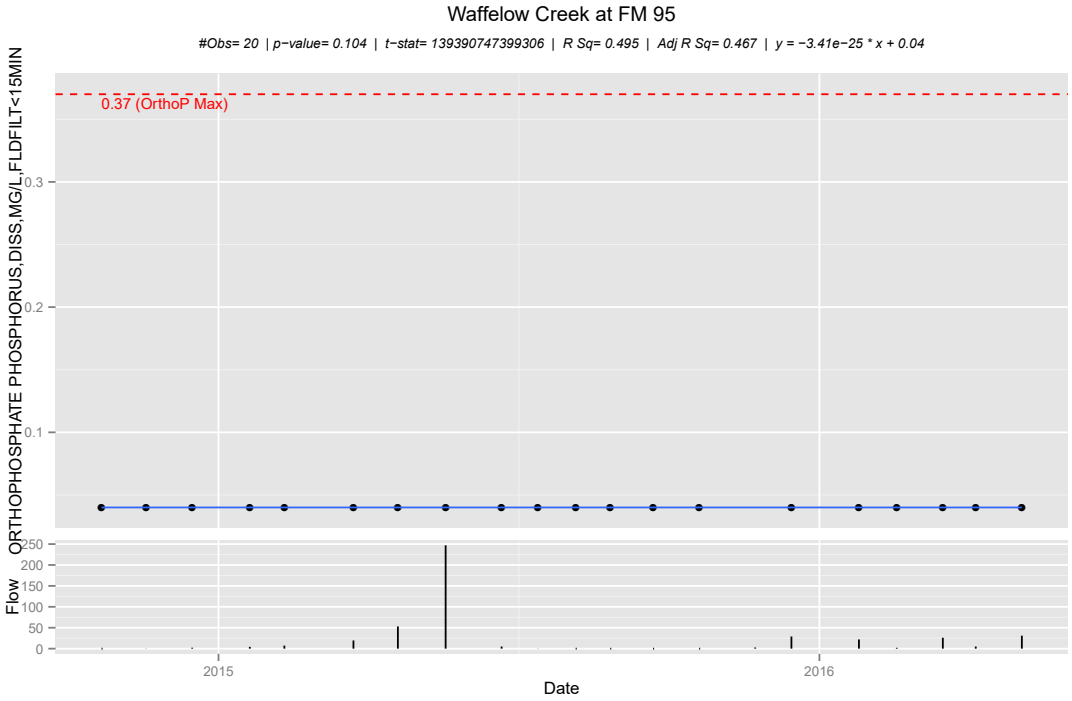
Chloride results ranged from 6.2 mg/L to 15.0 mg/L, with a mean of 9.3 mg/L.



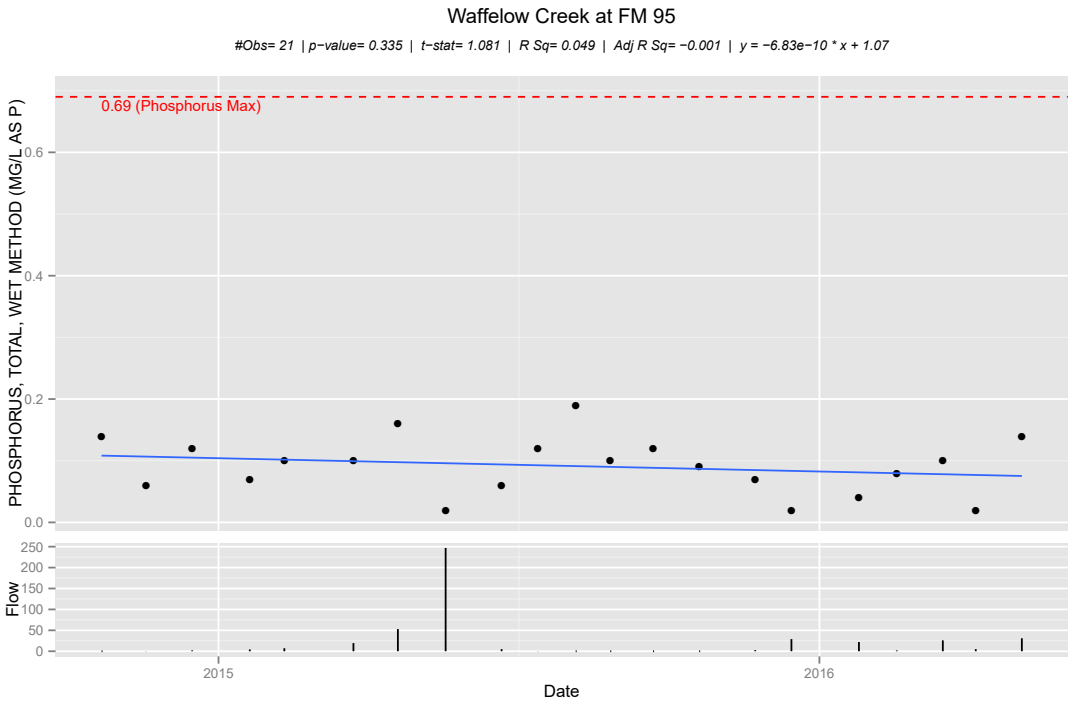
Sulfate results ranged from a minimum value of 7.0 mg/L to a maximum of 59 mg/L. The standard criteria for Sulfate is 50 mg/L.

Monitoring Station 16083 - Waffelow Creek at FM 95

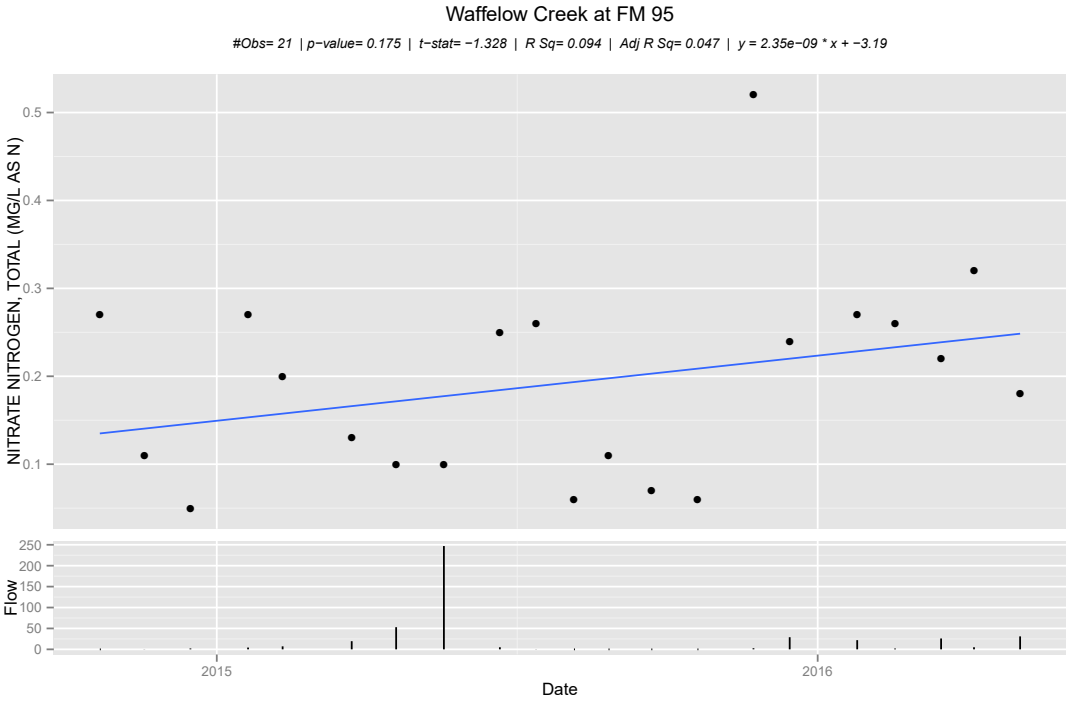
All **Dissolved Orthophosphorus** results were reported as less than the limit of quantitation (<0.04 mg/L as P). Results for one sampling event were not reported by the laboratory due to a quality control sample failure.



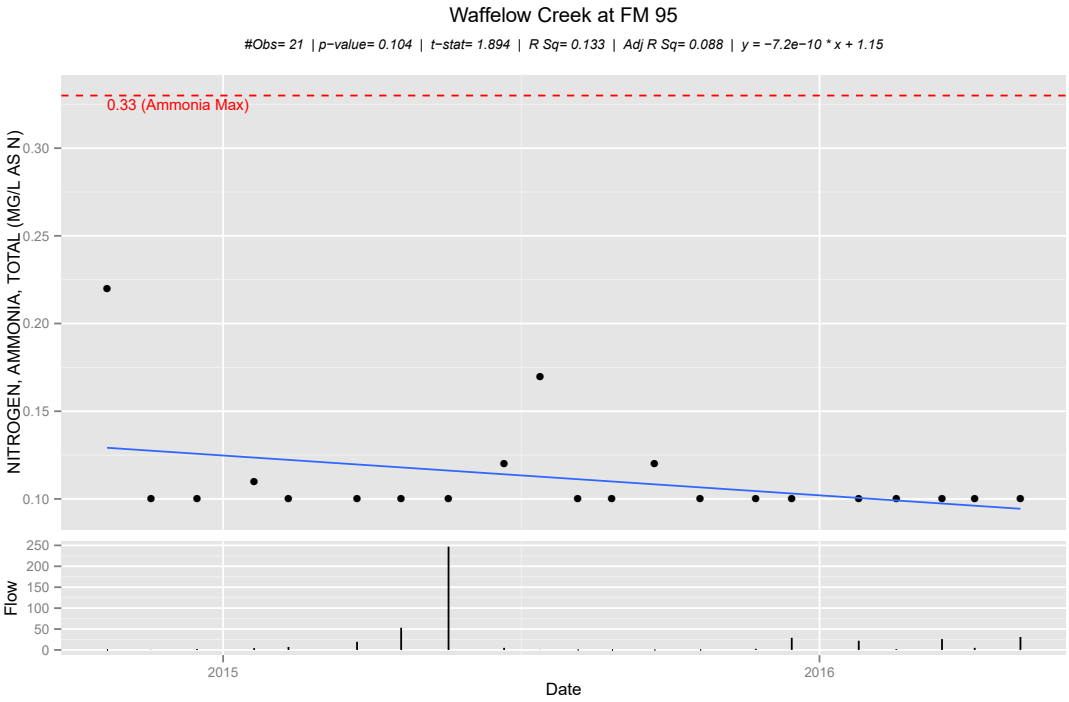
Total Phosphorus results at this monitoring stations ranged from <0.02 to 0.19 mg/L as P, with a mean value of 0.1 mg/L as P.



Monitoring Station 16083 - Waffelow Creek at FM 95



Nitrate-Nitrogen results ranged from 0.05 to 0.52 mg/L as N, with a mean value of 0.2 mg/L as N. An increasing trend is observed, but it is not statistically significant.

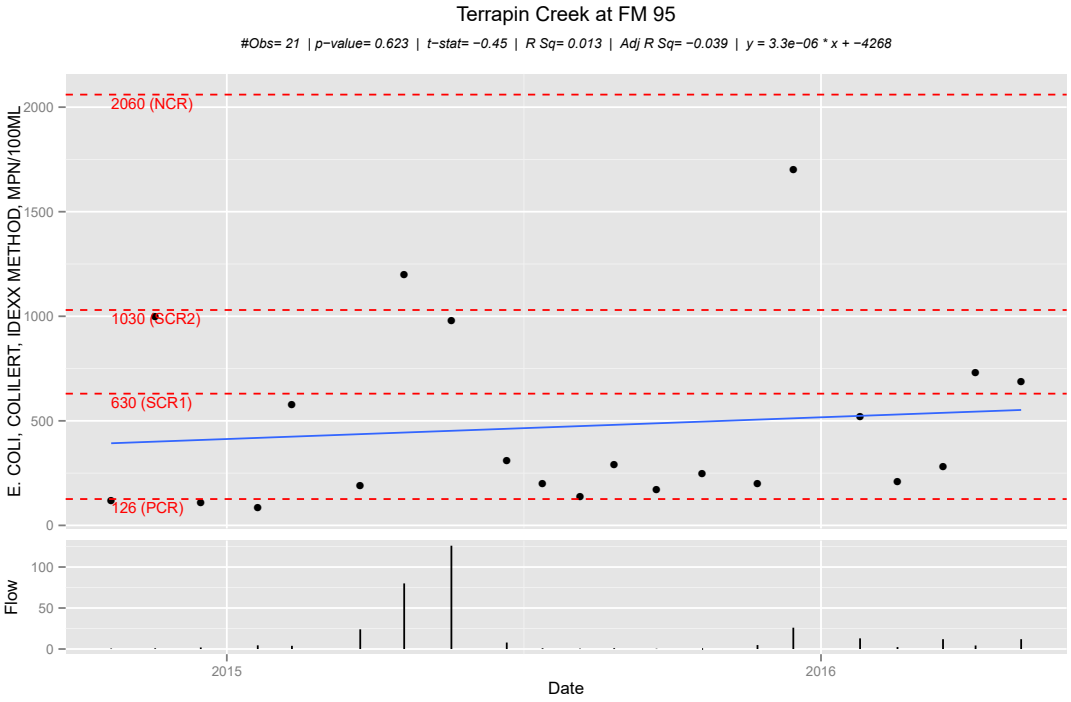


Sample results for **Ammonia-Nitrogen** ranged from <0.1 mg/L as N to 0.22 mg/L as N.

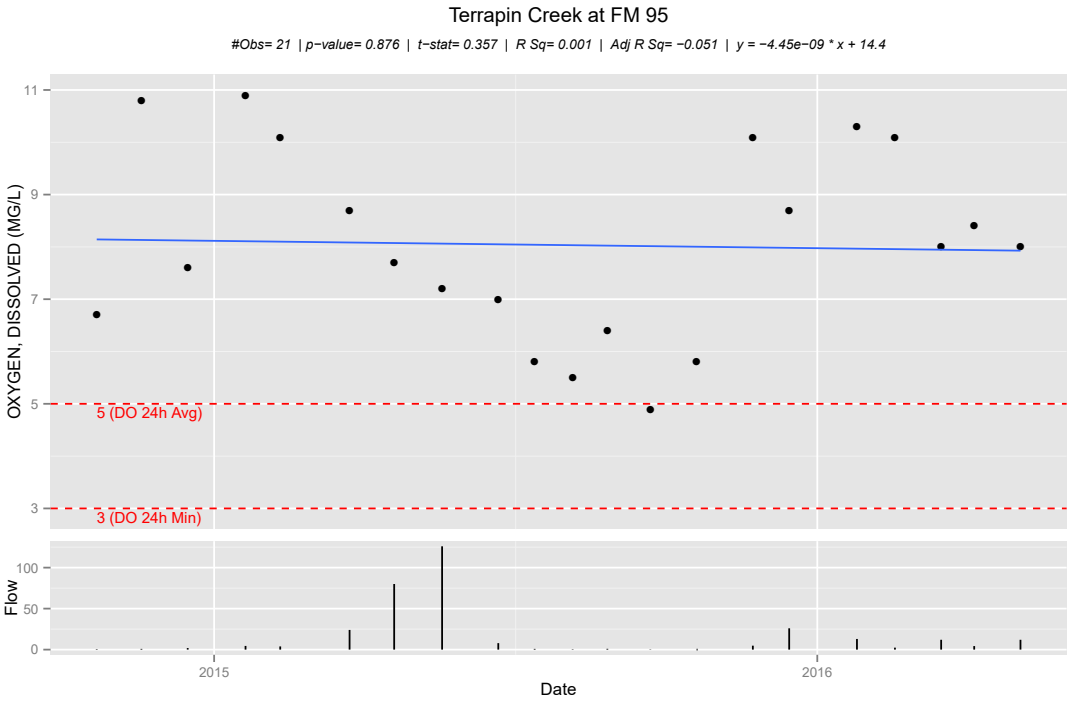
Monitoring Station 16084 - Terrapin Creek at SH 95

Water Quality Monitoring Results for Station 16084 - Terrapin Creek at SH 95									
Parameter	**Number of Samples**	**Number of Exceedances**	**MIN**	**MAX**	**MEAN**	**Geometric Mean**	**t-stat**	**p-value**	**Trend**
E. coli (MPN/100 mL)	21	18	84	1700		330.6	-0.4503	0.6226	
Dissolved Oxygen (mg/L)	21	0	4.9	10.9	8.0		0.3567	0.8760	
pH (S.U.)	21	1	5.7	6.9	6.7		-1.3813	0.0143	
Specific Conductance (µS/cm @ 25C)	21	0	82	194	134.0		-0.2301	0.6894	
Total Suspended Solids (mg/L)	21	0	3.5	75	19.2		-1.5144	0.1348	
Total Dissolved Solids (mg/L)	21	1	70	220	113.1		-1.0226	0.2548	
Chloride (mg/L)	21	0	6.2	12	8.7		-0.2432	0.6296	
Sulfate (mg/L)	21	1	5	51	24.5		0.0218	0.9581	
Orthophosphorus (mg/L)	20	0	0.04	0.04	0.0		1.39391E+14	0.1043	
Total Phosphorus (mg/L as P)	21	0	0.02	0.12	0.1		0.4097	0.7467	
Nitrate (mg/L as N)	20	0	0.12	1.3	0.7		-0.2476	0.7435	
Ammonia-Nitrogen (mg/L as N)	21	0	0.1	0.17	0.1		0.8225	0.5827	

Monitoring Station 16084 - Terrapin Creek at SH 95



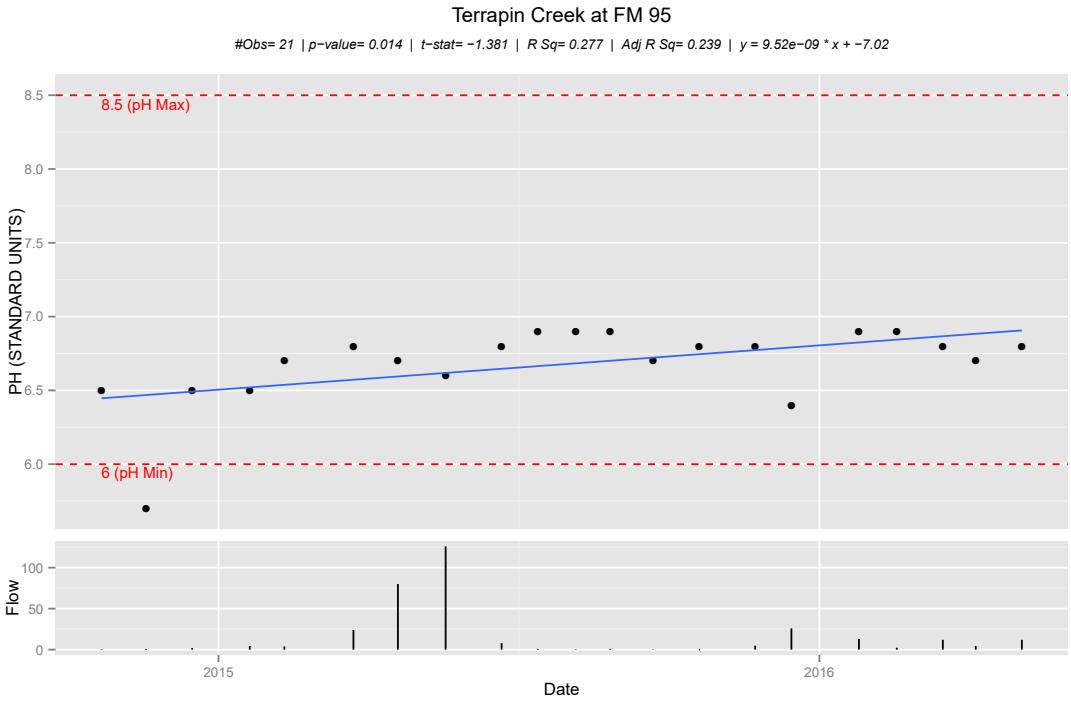
E. coli values at this station ranged from 84 to 1700 MPN/100 mL, with a geometric mean of 330.6 MPN/100 mL. Of the 21 samples analyzed, 18 exceeded the standard of 126 MPN/100 mL for Primary Contact Recreation 1.



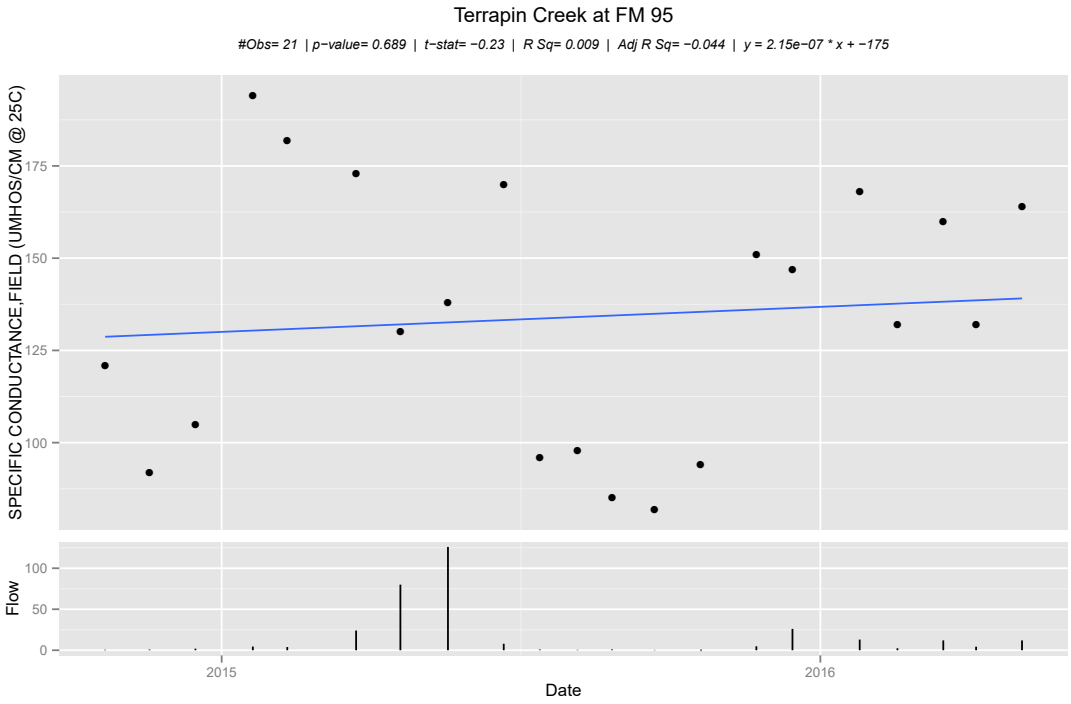
Dissolved Oxygen results at this station ranged from 4.9 to 10.9 mg/L.

Monitoring Station 16084 - Terrapin Creek at SH 95

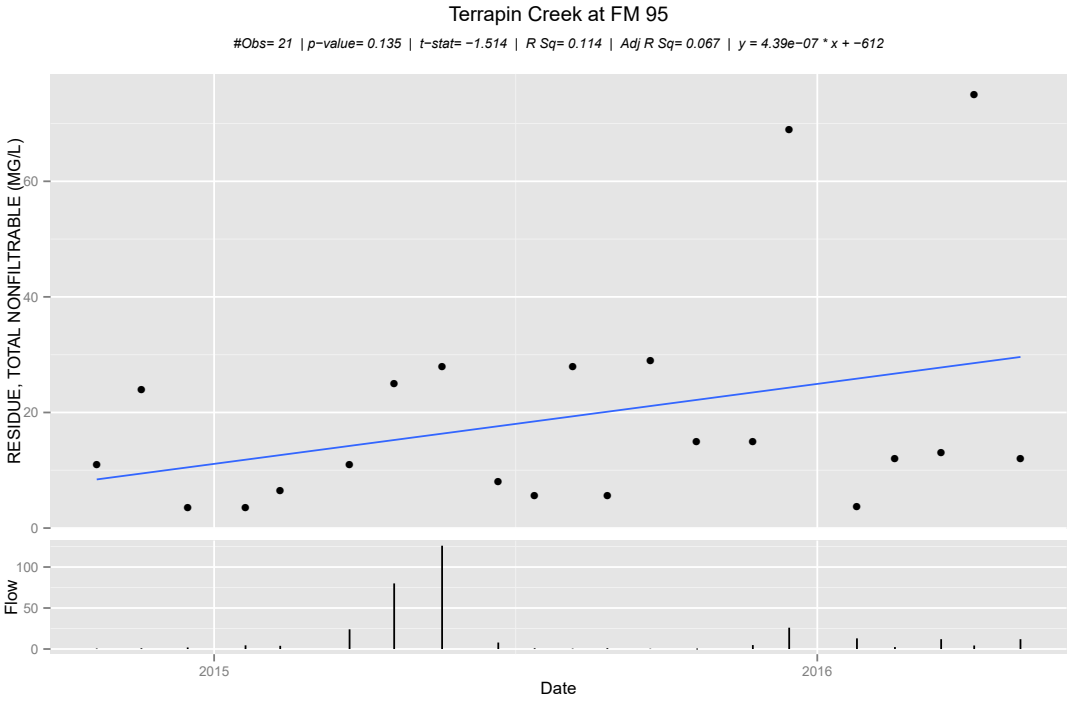
The **pH** values at this station ranged from 5.7 to 6.9 S.U.



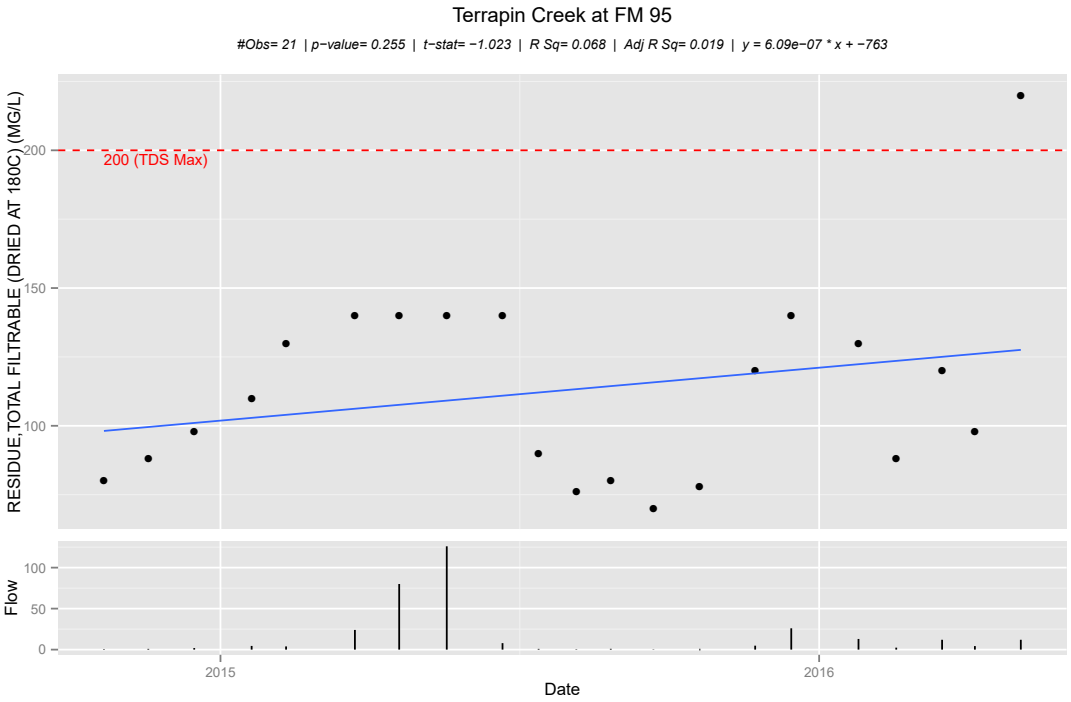
Specific Conductance values ranged from 82 to 194 µS/cm.



Monitoring Station 16084 - Terrapin Creek at SH 95



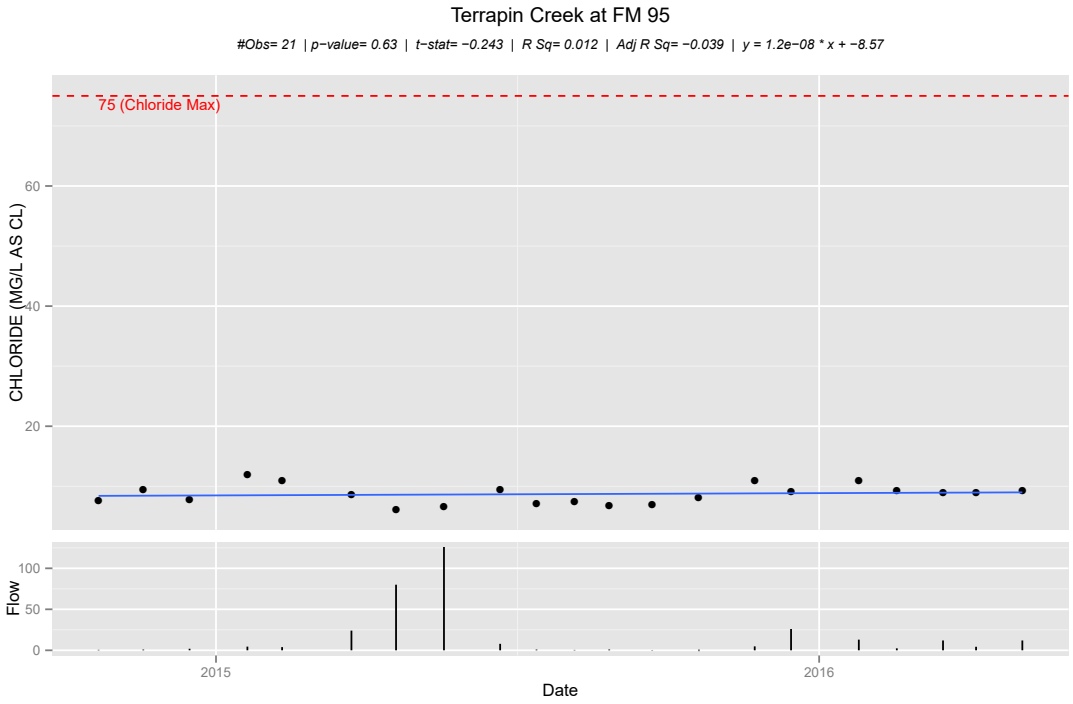
The results for **Total Suspended Solids (TSS)** ranged from 3.5 to 75 mg/L, with a mean of 19.2 mg/L.



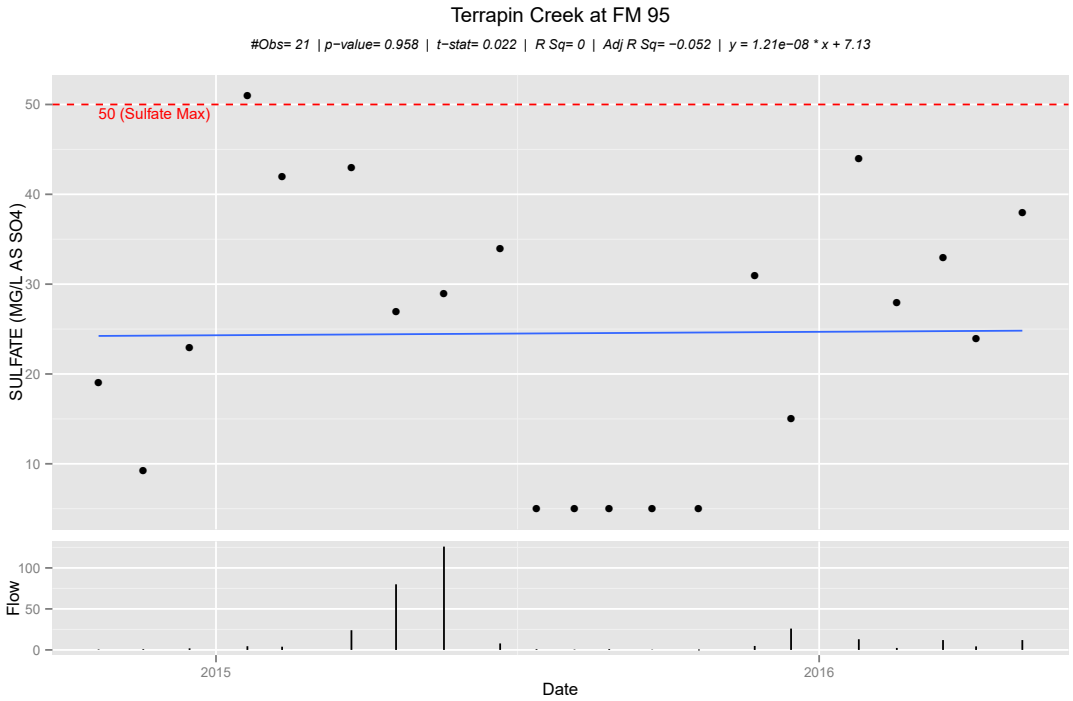
Total Dissolved Solids (TDS) results at this monitoring station ranged from 70 to 220 mg/L, with a mean of 113.1 mg/L.

Monitoring Station 16084 - Terrapin Creek at SH 95

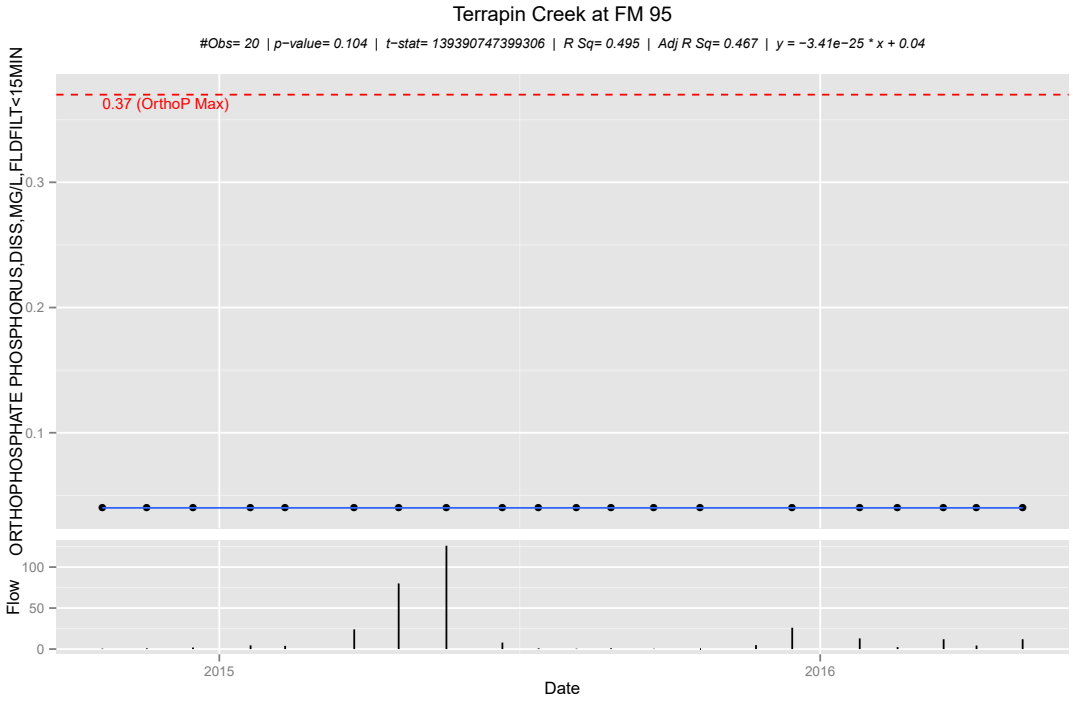
Chloride results at this monitoring station were low, with values ranging-from 6.2 mg/L to 12 mg/L, with a mean of 8.7 mg/L.



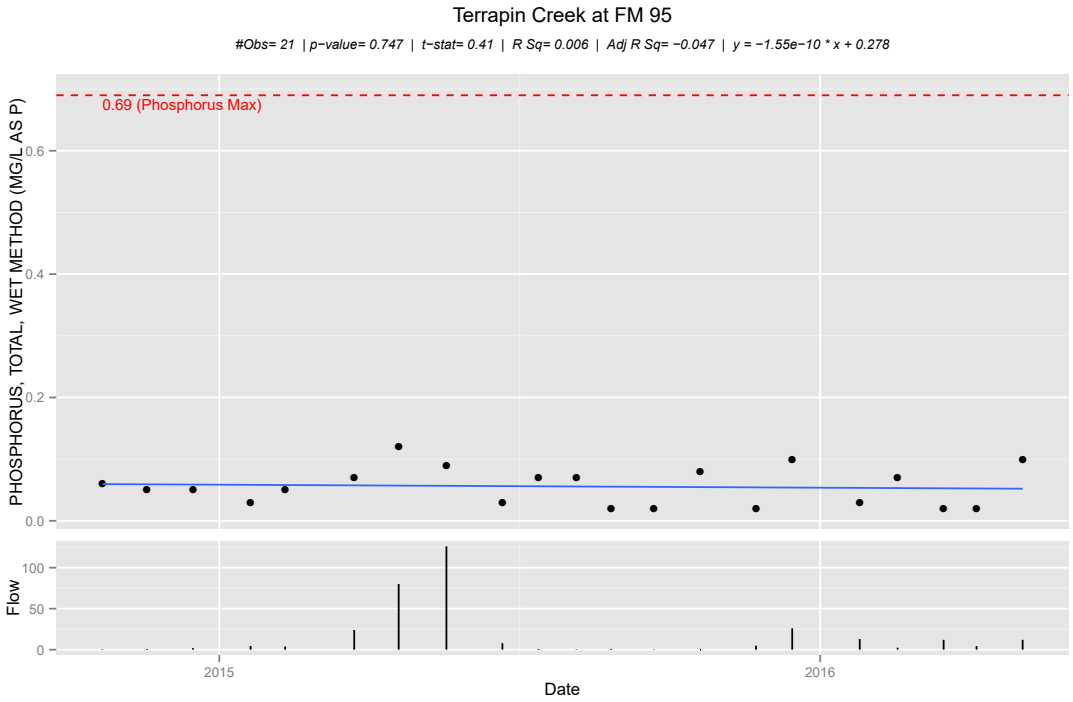
Sulfate results ranged from a minimum value of <5 mg/L to a maximum of 51 mg/L. The mean result was 24.5 mg/L.



Monitoring Station 16084 - Terrapin Creek at SH 95



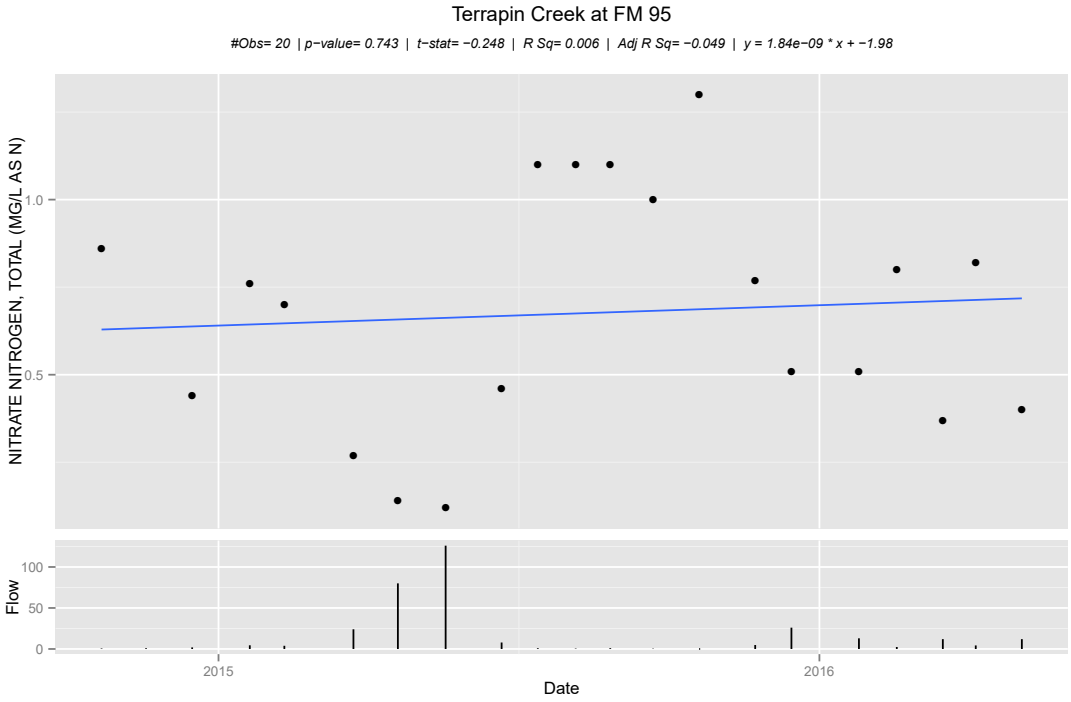
All **Dissolved Orthophosphorus** results at this monitoring station were reported as less than the limit of quantitation. Results for one sampling event were not reported by the laboratory due to a quality control sample failure.



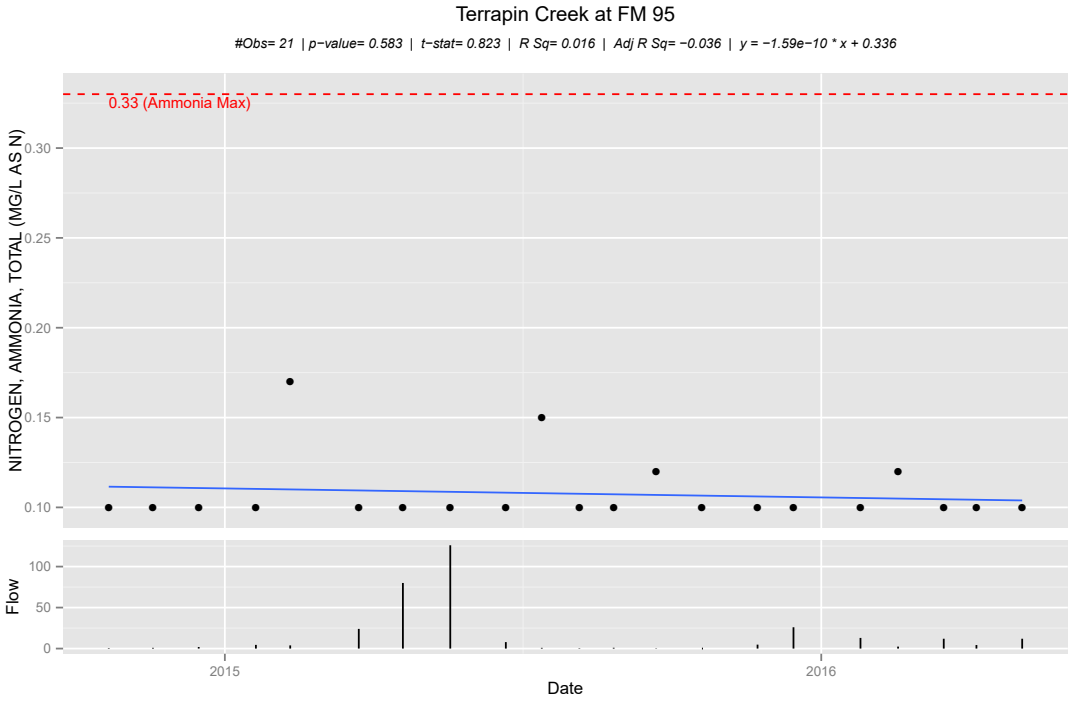
Total Phosphorus results ranged from <0.02 to 0.12 mg/L as P, with a mean value of 0.1 mg/L as P.

Monitoring Station 16084 - Terrapin Creek at SH 95

Nitrate-Nitrogen results at this station ranged from 0.12 to 1.3 mg/L as N, with a mean value of 0.7 mg/L as N.



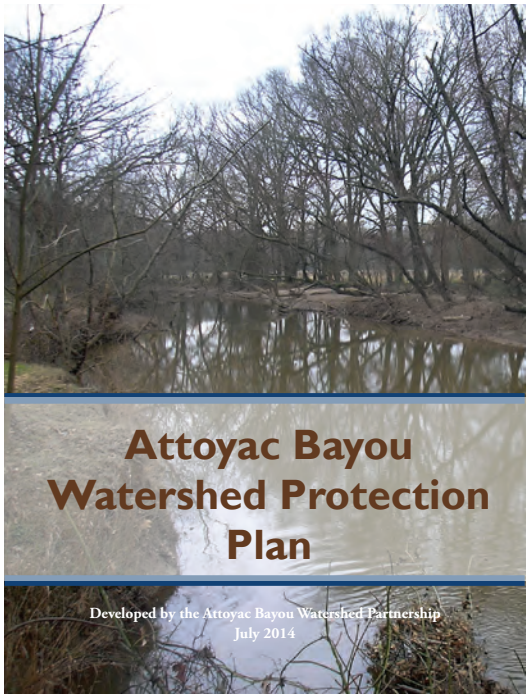
For all samples analyzed for **Ammonia-Nitrogen**, only 4 of the 21 sample results were reported above the limit of quantitation of 0.1 mg/L as N. The highest value reported was 0.17 mg/L.



HISTORICAL WATER QUALITY MONITORING RESULTS

Attoyac Bayou Watershed Protection Plan Development

As part of the development of the *Attoyac Bayou Watershed Protection Plan*, bi-weekly grab samples were collected for bacteria and nutrient samples at 10 stations within the Attoyac Bayou watershed between July 26, 2010 - August 20, 2012. These samples were collected by Stephen F. Austin State University (SFASU) and analyzed by the ANRA Environmental Laboratory. The monitoring stations for the *Lake Sam Rayburn OSSF Program Support and Attoyac Bayou OSSF Remediation* project were stations that were monitored as part of the *Attoyac Bayou Watershed Protection Plan* project. The data for the *Attoyac Bayou Watershed Protection Plan* was collected under an approved Quality Assurance Project Plan and was submitted for inclusion into SWQMIS.



Monitoring data under Attoyac Bayou Watershed Protection Plan project was collected during an extensive period of drought. On multiple occasions, field personnel were unable to collect a sample due to no water being present. Many of the field parameters and nutrient values observed were atypical of the historical monitoring in this stream segment. For water quality assessment purposes, the usefulness of drought monitoring data is still being debated.

As reported in the *Attoyac Bayou Watershed Protection Plan*, the two-year average of monitored water quality parameters are shown in the table below.

Water Quality Monitoring Results for the Attoyac Bayou Watershed Protection Plan (7/26/2010 - 8/20/2012)

TCEQ Station ID	Station Name	# Samples	*E. coli* Geometric Mean (MPN/100 ml)	Dissolved Oxygen (mg/)	pH (SU)	TSS (mg/L)	Dissolved Ortho-P (mg/L)	Total Phosphorus (mg/L)	Nitrate Nitrite Nitrogen (mg/L)	Ammonia Nitrogen (mg/L)
20841	Attoyac Bayou at FM 138	40	376.5	6.6	7.80	30.1	0.09	0.21	0.18	0.12
20843	Naconiche Creek at FM 95	46	189.4	7.2	7.83	11.8	0.07	0.14	0.39	0.12
20844	Big Iron Ore Creek at FM 354	56	454.3	7.9	8.23	27.2	0.04	0.10	0.61	0.12
16083	Waffelow Creek at FM 95	25	201.9	5.8	7.73	29.7	0.05	0.13	0.11	0.24
16084	Terrapin Creek at SH 95	43	194.3	6.0	7.92	34.6	0.04	0.09	0.53	0.17

The *Attoyac Bayou Watershed Protection Plan* and the *Attoyac Bayou Surface Water Quality Monitoring Report* are available on the project website at the following address:

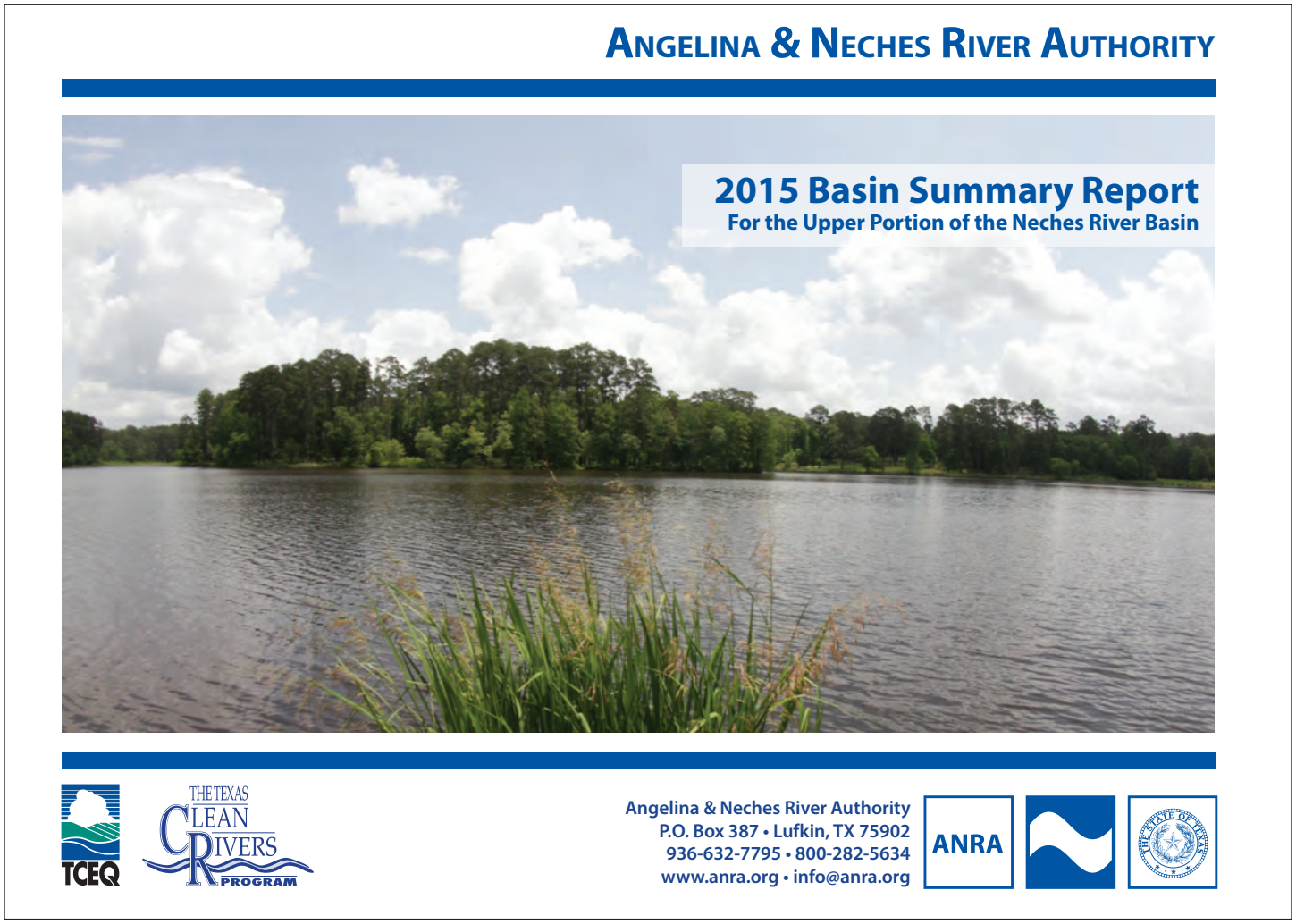
http://attoyac.tamu.edu.

Upper Neches River Basin Summary Report

The Basin Summary Report, assembled by the Angelina & Neches River Authority every five years, provides a comprehensive review of water quality data and water quality related issues for the Upper Neches River Basin. The report serves to develop a greater understanding of water quality within the basin, which can be used to aid regulatory agencies in decision making. The report consists of a comprehensive review including descriptions of water quality conditions and issues, trend analysis of water quality by station and parameter, discussion of watershed characteristics, and potential influences on water quality. Furthermore, recommendations of management strategies for correcting identified water quality impairments are also included in the report. The report details activities performed by the Angelina & Neches River Authority under the Texas Clean Rivers Program.

The 2015 Basin Summary Report can be downloaded at the following location:

http://www.anra.org/divisions/water_quality/crp/pdfs/reports/2015_Summary_Report/ANRA_FY_2015_BHR.pdf

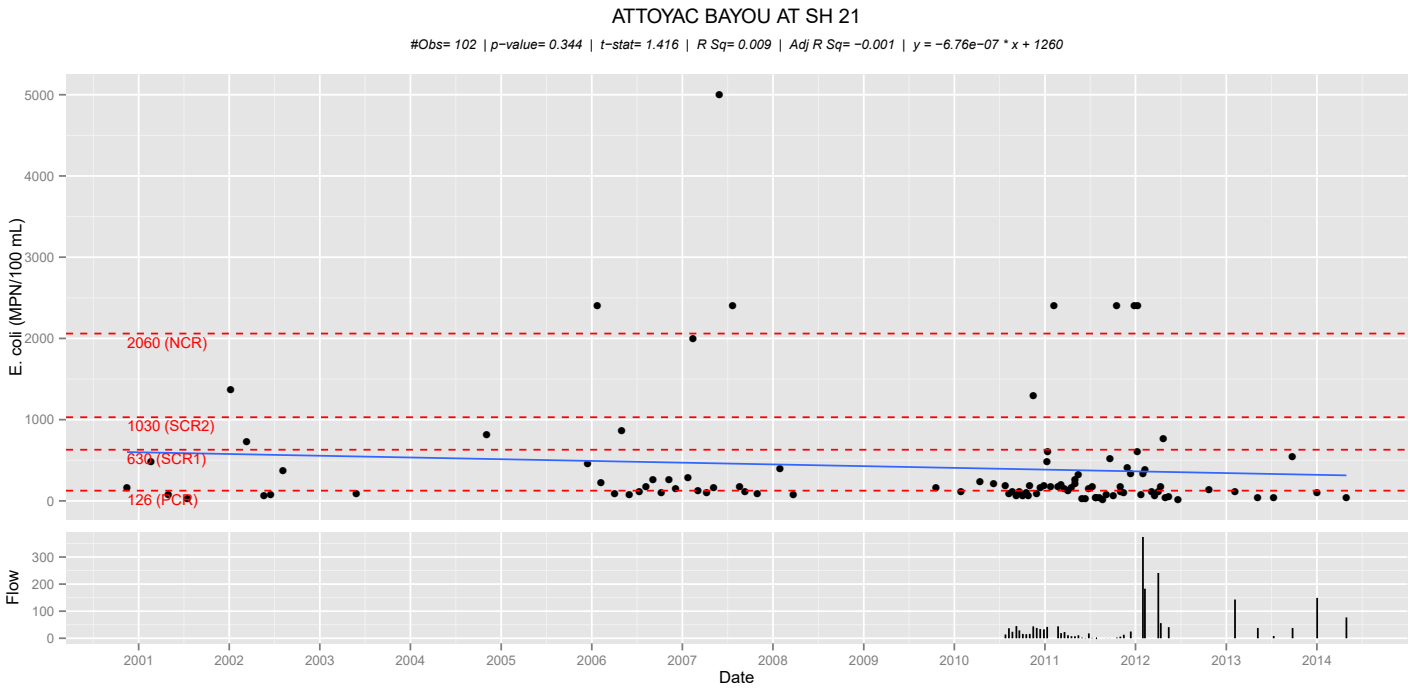


The Attoyac Bayou (Segment 0612) was evaluated as part of ANRA's 2015 Basin Summary Report. For the Summary Report, data from the period of January 1, 2000 to August 31, 2014 was queried and exported from TCEQ's Surface Water Quality Monitoring Information System (SWQMIS) and evaluated.

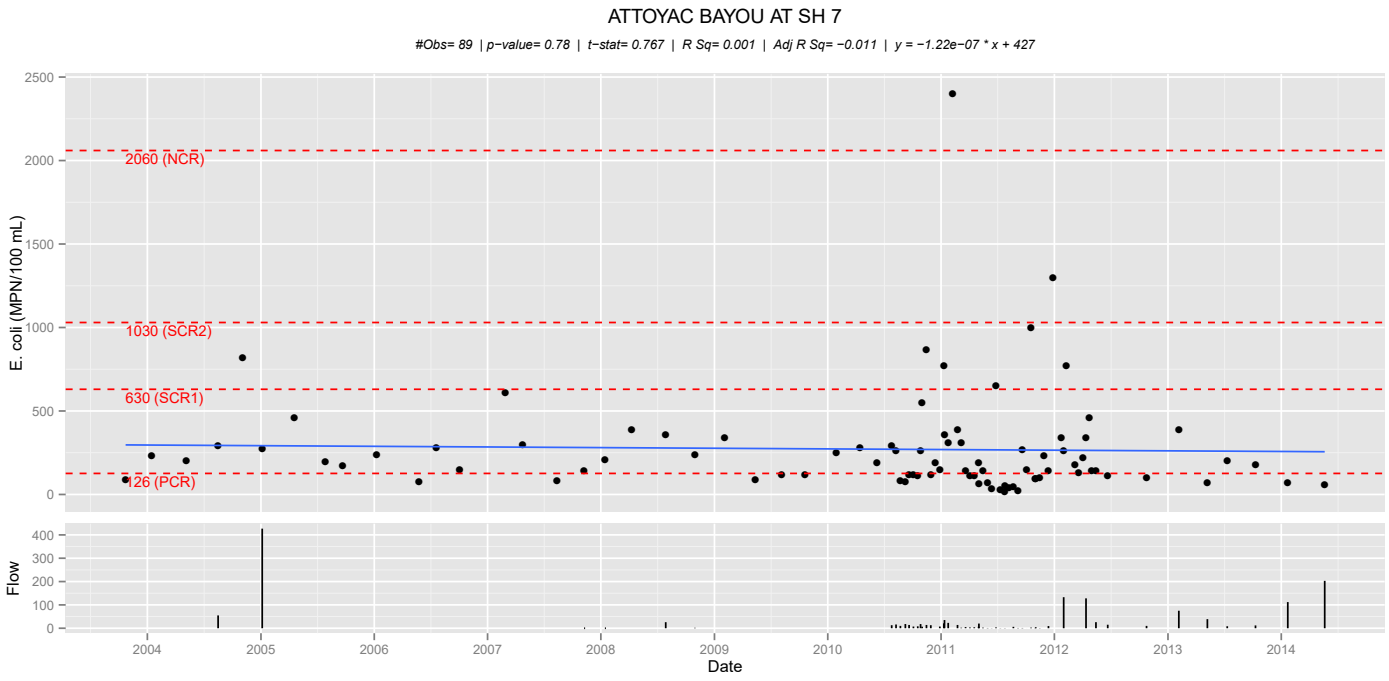
For all three monitoring stations (one in each of the Attoyac Bayou's assessment units), the vast majority of results exceeded the primary contact recreation limit. Attoyac Bayou is listed on the 2014 303(d) List for not supporting primary contact recreation due to bacteria impairments. All three Assessment Units (AU) are listed as category 5b, and were first listed in 2004.

Attoyac Bayou Monitoring Stations in the Basin Summary Report							
Assessment Unit	**Monitoring Station ID**	**Description**	**Annual Frequency**				**Monitoring Entity**
			Field	**Conv**	**Bacteria**	**Flow**	
0612_01	10636	Attoyac Bayou at SH 21	4	4	4	4	ANRA
0612_02	15253	Attoyac Bayou AT SH 7	4	4	4	4	ANRA
0612_03	16076	Attoyac Bayou AT US 59	4	4	4	4	ANRA

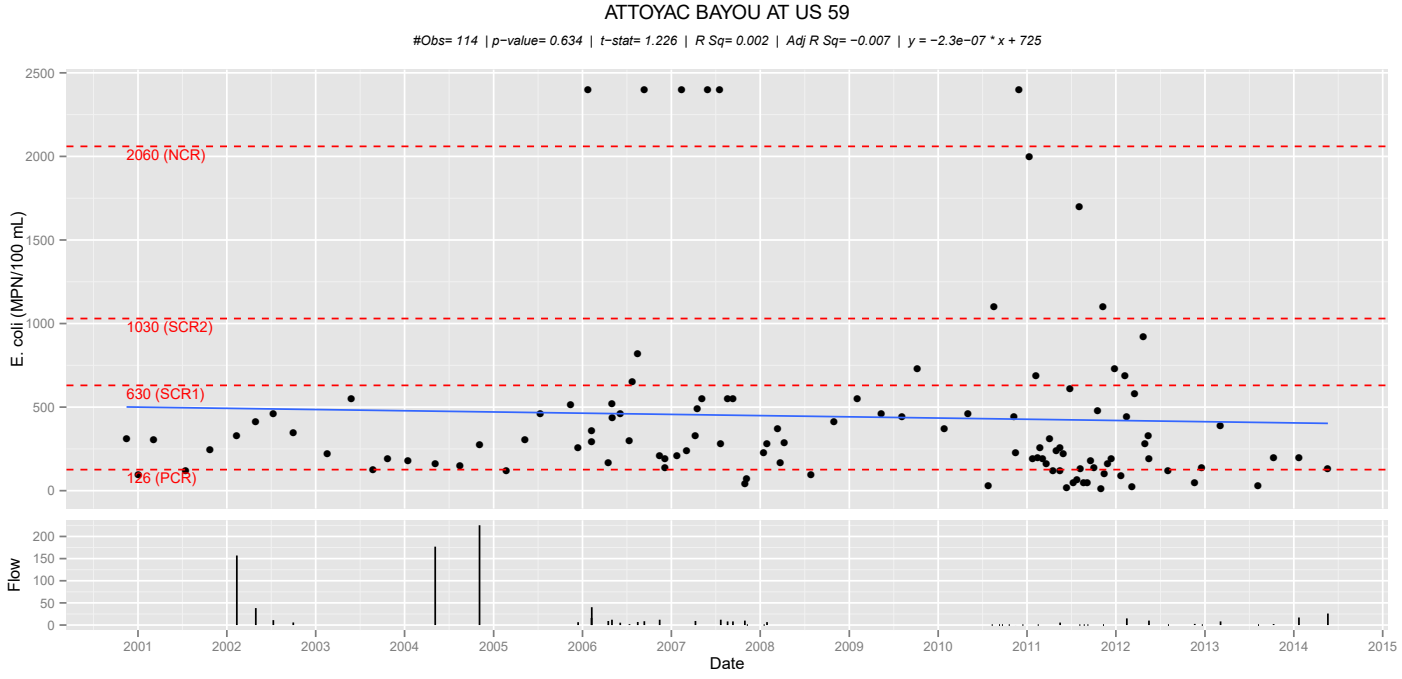
In AU 0612_01, represented by monitoring station 10636 (Attoyac Bayou at SH 21), the geometric mean for *E. coli* exceeded the standard of 126 MPN/100 mL, with a value of 178.54 MPN/100 mL based upon 71 samples assessed from the period of December 1, 2005 to November 20, 2012.



In AU 0612_02, represented by monitoring station 15253 (Attoyac Bayou at SH 7), the geometric mean for *E. coli* exceeded the standard of 126 MPN/100 mL with a value of 195.04 MPN/100 mL based upon an assessment of 115 samples in the 2014 Integrated Report. This AU also had a concern for depressed Dissolved Oxygen, with 17 of 100 values below the screening level of 5.0 mg/L. In the 2012 assessment, this AU had a concern for Ammonia-Nitrogen, with 14 of 48 samples exceeding the criteria of 0.33 mg/L. Based upon the data assessed for the 2014 Integrated Report, this AU is now fully supporting for Ammonia-Nitrogen, with only 14 of 119 values exceeding the criteria.



In AU 0612_03, represented by monitoring station 16076 (Attoyac Bayou at US 59), the geometric mean for *E. coli* exceeded the standard of 126 MPN/100 mL with a value of 147.25 MPN/100 mL based upon 109 samples assessed in the 2014 assessment. This compares to a geomean of 288.18 MPN/100 mL (based upon 60 samples) in the 2012 assessment. This AU also had a concern for depressed Dissolved Oxygen, with 24 of 67 values below the screening level of 5.0 mg/L. A concern for Ammonia-Nitrogen was also identified for this AU, with 29 of 98 samples exceeding the nutrient screening level of 0.33 mg/L.



WATER QUALITY DISCUSSION

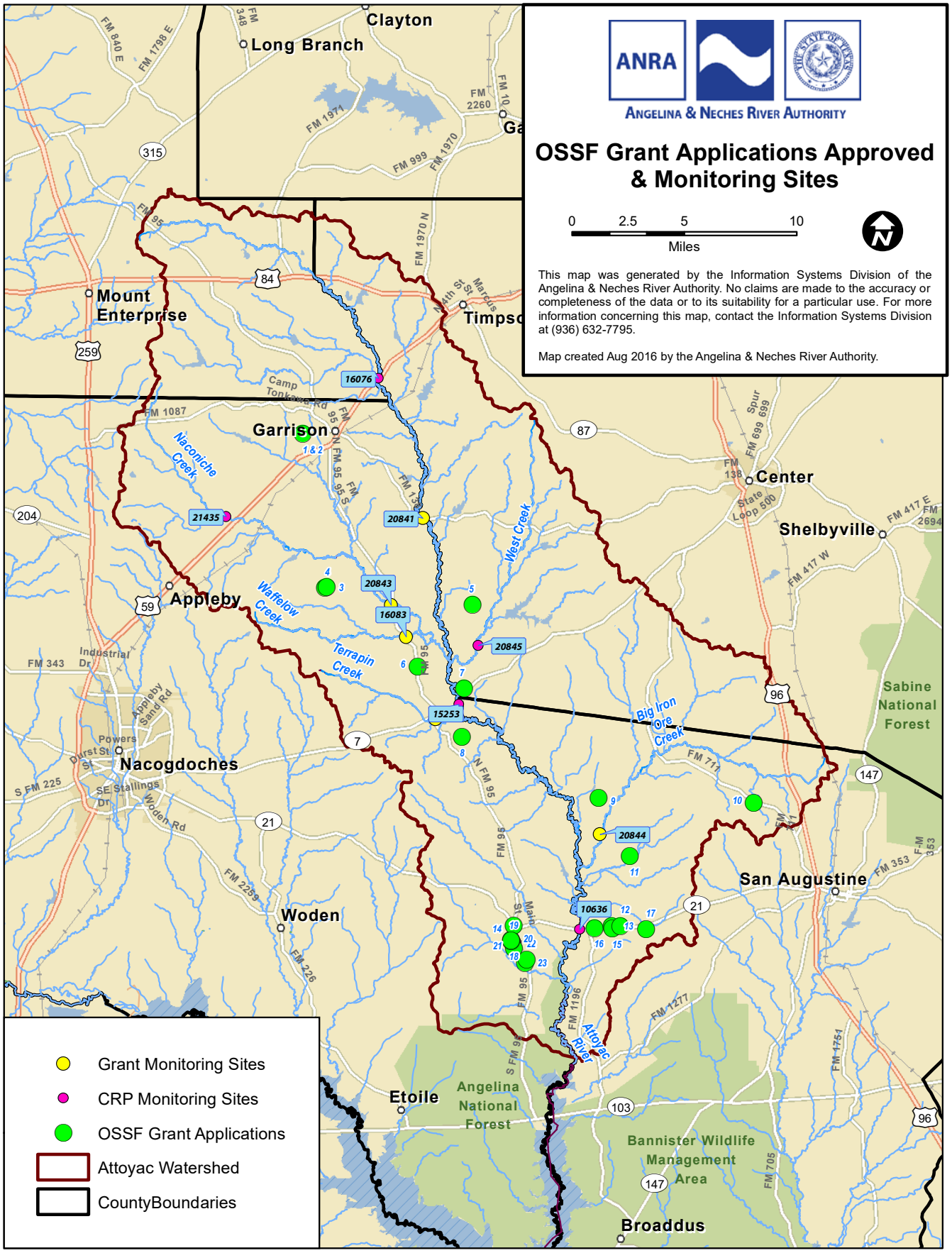
For the *Lake Sam Rayburn OSSF Program Support and Attoyac Bayou OSSF Remediation* project, surface water quality monitoring was performed for twenty-one (21) months over the period of October 2014 through May 2016. Samples were collected monthly, with analysis for field parameters, conventional parameters (nutrients, minerals, and solids), and *E. coli* bacteria. For this project, five sampling stations were chosen. These stations, representing sites on both the main stem of the Attoyac Bayou as well as tributaries, had been monitored previously as part of the project that developed the Watershed Protection Plan for the Attoyac Bayou. These monitoring stations were chosen to examine the effect of replacing OSSFs within the watershed on water quality, particularly *E. coli* concentrations, as well as to evaluate the effectiveness of Best Management Practices implemented as part of the WPP.

ANRA has historically monitored on the Attoyac Bayou for many years, so there is a long record of historical data for comparison. For ANRA's most recent Basin Summary Report, data was analyzed for a period of fifteen years (2000 to 2015).

Based upon historical water quality monitoring data, the Attoyac Bayou is listed as impaired for bacteria, as the water-body fails to meet the water quality standard of 126 MPN/100 ML for its designated Primary Contact Recreation (PCR) use. All three assessment units in the Attoyac Bayou exceed the PCR standard. This standard is also exceeded for the tributaries to the Attoyac Bayou, such as Naconiche Creek, Big Iron Ore Creek, Waffelow Creek, and Terrapin Creek. However, the tributaries are not listed in the Integrated Report as impaired because the monitoring on those stream segments was conducted under biased conditions, such as targeted monitoring based on flow conditions or to monitor BMP effectiveness.

Historically, the *E. coli* levels in the Attoyac Bayou have exceeded the water quality standard for Primary Contact Recreation (126 MPN/100 mL), but have typically been below the standard for Secondary Contact Recreation 1 (630 MPN/100 mL). This pattern was seen in the long-term historical monitoring conducted by ANRA, the special study to develop the *Attoyac Bayou Watershed Protection Plan*, as well as this project. For example, at Attoyac Bayou at FM 138 (Monitoring Station 20841), the geometric mean for the *E. coli* results collected during this project was 281.3 MPN/100 mL. At this station, 17 of 21 grab samples (or 81%) exceeded the Primary Contact Recreation standard of 126 MPN/100 mL. However, only 3 of 21 grab samples (or 14.3%) exceeded the Secondary Contact Recreation 1 standard of 603 MPN/100 mL. This same pattern was observed at other monitoring stations in the watershed. The geometric mean at all stations exceeded the standard for PCR, but for single grab samples, the majority of results were below the SCR1 standard.

ANRA had hoped to use the water quality data generated from this project to demonstrate water quality improvements related to reduced *E. coli* loadings as failing septic systems were replaced in the watershed. As seen in the included map, monitoring stations are spaced throughout the watershed to assess water quality along both the main stem of the Attoyac Bayou as well as several of the major tributaries. The original project scope of work called for OSSF installation within the first two years of the three-year project, with water quality monitoring being performed in the second and third year. However, due to delays in the OSSF installation portion of the project (discussed in detail in that section of the report), the OSSFs were not installed in time to use the monitoring data for that purpose. By the time OSSF installation began, the project was already in its third and final year. When the monitoring component of the project ended in May 2016, only a small percentage of the total number of systems had been installed. The majority of the systems were installed in July and August 2016, after monitoring had ceased. Although the data collected does not meet its intended/planned use, the data is still important as an ongoing record of water quality. The water quality data also providces a good baseline to examine improvements in subsequent projects, including an OSSF repair/replacement project that is beginning in Fiscal Year 2017. Additionally, this data can be incorporated into the next Watershed Protection Plan Update.


ANRA
Angelina & Neches River Authority
OSSF Grant Applications Approved & Monitoring Sites
0 2.5 5 10
Miles
This map was generated by the Information Systems Division of the Angelina & Neches River Authority. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact the Information Systems Division at (936) 632-7795.
Map created Aug 2016 by the Angelina & Neches River Authority.
Clayton
Long Branch
Mount Enterprise
Garrison
Center
Shelbyville
Appleby
Nacogdoches
Woden
Etoile
San Augustine
Broaddus
Naconiche Creek
Waffelow Creek
Terrapin Creek
West Creek
Big Iron Ore Creek
Attoyac River
Sabine National Forest
Angelina National Forest
Bannister Wildlife Management Area
16076
21435
20841
20843
16083
20845
15253
20844
10636
Grant Monitoring Sites
CRP Monitoring Sites
OSSF Grant Applications
Attoyac Watershed
CountyBoundaries

Typically, monitoring through the Clean Rivers Program is conducted on a quarterly basis. Projects such as this one, as well as the previous project that developed the *Attoyac Bayou Watershed Protection Plan*, allow for a much more intensive monitoring regime. In the case of this project, sampling was performed monthly, while the WPP project had bi-weekly monitoring. This type of monitoring regime provides a more accurate depiction of water quality conditions in the stream segment.

In comparing the results from this project with the data collected during 2010 to 2012 as part of the project to develop the *Attoyac Bayou Watershed Protection Plan,* the geometric mean for the datasets in this project are lower than those in the previous project at three of the five locations.

***E. coli* Geometric Mean Values for Recent Attoyac Bayou Monitoring Projects**

TCEQ Station ID	Station Name	Attoyac Bayou WPP Project (July 2010 - August 2012)	Attoyac Bayou OSSF Remediation Project (October 2014 - May 2016)
		***E. coli* Geometric Mean (MPN/100 ml)**	***E. coli* Geometric Mean (MPN/100 ml)**
20841	Attoyac Bayou at FM 138	376.5	281.3
20843	Naconiche Creek at FM 95	189.4	183.4
20844	Big Iron Ore Creek at FM 354	454.3	325.6
16083	Waffelow Creek at FM 95	201.9	280.3
16084	Terrapin Creek at SH 95	194.3	330.6

While this may indicate water quality improvements at those stations, it must be noted that at the time of the Attoyac Bayou WPP project, the basin (as well as the entire State of Texas) was experiencing a severe drought. Because of concerns and uncertainties about how the drought conditions may impact the various water quality parameters, it is difficult to make a direct comparison of the values from the two studies.

These stations will continue to be monitored as part of future projects to assess the effectiveness of BMPs that have been implemented as part of the *Attoyac Bayou Watershed Protection Plan*.

PANORAMIC PHOTOGRAPHS

Beginning in FY 2011, ANRA Clean Rivers Program personnel began taking panoramic photographs of our monitoring stations. These images offer the viewer a full 360° view of the monitoring stations, allowing for an enhanced viewing experience as compared to traditional photographs.

Benefits and Potential Uses

There are numerous reasons for incorporating panoramic photographs into water quality monitoring programs. Some of the reasons are as follows:

- Panoramic photography allows for a 360° interactive presentation of environmental conditions associated with monitoring events.
- The photographs allow for the capture of upstream, downstream, left bank, right bank, canopy, and substrate views in one panoramic image.
- The interactive nature of the panoramas allows for rotating and zooming in order to better observe such things as weather/cloud coverage, pool reach, drought effects, pollution sources or illegal dumping, signs of contact recreation, etc.
- If each panorama is created in conjunction with a monitoring event, the panoramas can be used to demonstrate representativeness of monitoring conditions.
- If panoramas are captured from the same location, monitoring site conditions are easily compared over time. Events from previous dates are available in a pull-down menu within the image viewer.
- Integrated maps that indicate viewing direction and location can provide improved spatial awareness.

Where to View the Panoramas

All panoramas for monitoring activities that were a part of this project are located on ANRA's website at

http://www.anra.org/divisions/water_quality/crp/Attoyac_CWA_Panoramas.html.

An archive of the raw images is available as a 1.8 GB ZIP file that can be downloaded from ANRA's website. The archive is located at the following address:

http://www.anra.org/divisions/water_quality/crp/images/Attoyac_Panoramas_images_only.zip.

A viewer for the raw images is available at http://www.fsoft.it/FSPViewer/.

An archive of the panoramas with map interface as seen on the website is available for download (2.7 GB ZIP file) from ANRA's website at the following address:

http://www.anra.org/divisions/water_quality/crp/images/Attoyac_Panoramas_Inc_maps_for_panotour_viewer.zip.

A viewer for the panoramas with map interface is available for download from the following address:

http://www.kolor.com/panotour-viewer/.

Monitoring Station 20841 - Attoyac Bayou at FM 138

http://www.anra.org/divisions/water_quality/crp/monitoring_sites/attoyac_at_138/Attoyac_at_138.html

Monitoring Station 20843 - Naconiche Creek at FM 95

http://www.anra.org/divisions/water_quality/crp/monitoring_sites/naconiche_at_95/Naconiche_at_95.html

Monitoring Station 20844 - Big Iron Ore Creek at FM 354

http://www.anra.org/divisions/water_quality/crp/monitoring_sites/big_iron_ore_at_354/Big_Iron_Ore_at_354.html

Monitoring Station 16083 - Waffelow Creek at FM 95

http://www.anra.org/divisions/water_quality/crp/monitoring_sites/waffelow_at_95/Waffelow_at_95.html

Monitoring Station 16084 - Terrapin Creek at SH 95

http://www.anra.org/divisions/water_quality/crp/monitoring_sites/terrapin_at_95/Terrapin_at_95.html

SUMMARY

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PROJECT ACTIVITY SUMMARY

OSSF Database Development

Task 3 of this project involved the development of a database for storage and retrieval of OSSF information for permitted systems in counties in the Control Zone Rayburn (CZR), the 2000-ft buffer zone around Sam Rayburn Reservoir, as well as the unincorporated portion of San Augustine County (including the portion within the Attoyac Bayou watershed).

The OSSF database was designed by ANRA staff in Microsoft Access format for later conversion to SQL. The database file is stored on ANRA's server, with user accounts and password protection for use in a multi-user environment. The design process included both the creation of new modules as well as building upon and expanding existing databases to more fully incorporate the information with GIS mapping. The database is expandable, so additional modules can be added as future data needs arise.

Data to be incorporated into the OSSF database comes from numerous sources, including permit applications, OSSF informational records (complaint investigations, system designs, data provided by professional OSSF contractors, etc.), historical records, and Global Positioning System (GPS) data.

The development of an OSSF Database was a crucial step not only for this project, but also for the operation of ANRA's OSSF program. The database allows for the storage of all data related to a system, including the property owner, maintenance records, inspections, and complaints/violations. The ability to query this information makes operation of ANRA's OSSF program much more efficient in its day-to-day operations. Additionally, the ability to map complaints/violations may be useful to address water quality issues in the future.

Having this database implemented allowed ANRA to nearly seamlessly integrate Angelina County's OSSF program into its own when ANRA became the Authorized Agent for Angelina County in October 2015.

Electronic Data Capture

Task 4 of this project was to electronically capture all documents related to permitted systems in the project area. In order to incorporate data into ANRA's OSSF Database, it was necessary to scan, organize, and store digital copies of all permitted OSSF records.

ANRA has a repository of OSSF records for the Sam Rayburn Reservoir Control Zone dating back to 1972. At the start of this project, ANRA had slightly more than 4,500 hardcopy permit files on file. As ANRA is still actively permitting OSSFs in the project area, and has since added Angelina County to its OSSF jurisdiction, the number of permits maintained by ANRA is continually growing.

During the period from December 2013 to February 2015, there were 4,904 OSSF records converted from paper to electronic storage as Adobe PDF documents. Those 4,904 records were comprised of a total of 62,184 pages of documents.

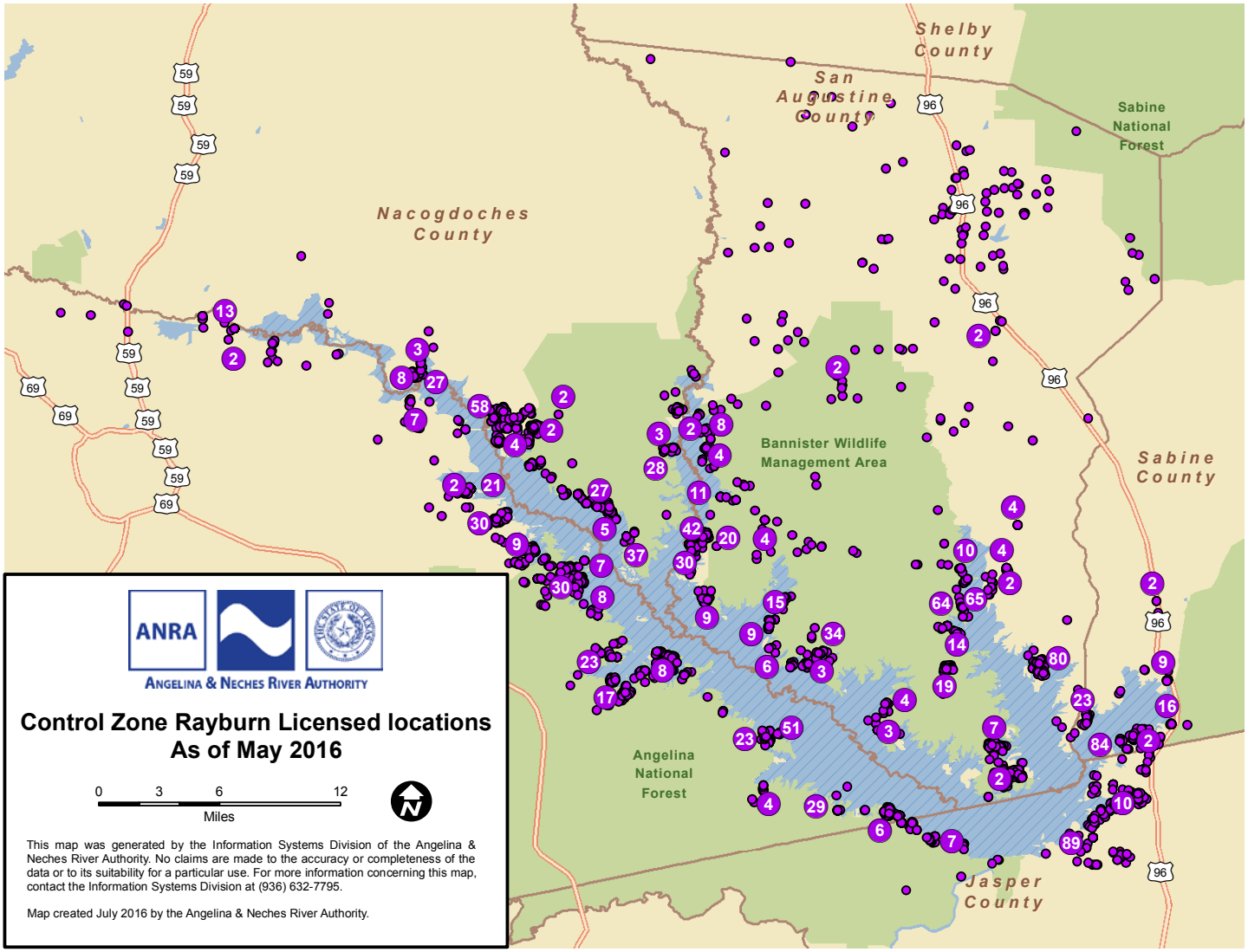
Collection of GPS Data and Mapping

Task 5 of this project involved the desk review of existing data and the field collection of Geographic Information Systems (GIS) data for OSSFs in the project area. Also included in this task was the mapping of OSSFs in the project area. GPS and GIS data acquired for this project were collected in accordance with the *Lake Sam Rayburn OSSF Program Support and Attoyac Bayou OSSF Remediation Quality Assurance Project Plan (QAPP) for Geospatial Data*. Through this project, ANRA was able to collect or assign GPS data for permitted OSSFs within the Control Zone Ray-

burn and the unincorporated portion of San Augustine County, as well as generate maps depicting the locations of those systems.

Due primarily to a lack of accurate property addresses for historical licenses, we were unable to assign exact locations to the majority of the systems. Because of this, it was necessary to assign over half of the permitted systems at the subdivision level. While this is not ideal due to an inability to pinpoint the exact location of an individual OSSF, having the systems assigned to the subdivision level allows ANRA to easily visualize areas where there are large clusters of OSSFs. With this information, it should be easier to identify areas where monitoring and/or OSSF inspections may be necessary due to the potential for OSSF system failure impacting water quality.

Moving forward, ANRA is collecting GPS data for all permitted systems. This information is requested on the application for a permit to construct an OSSF, and the data is verified by ANRA's OSSF Inspector at the time of final inspection of the installed system.



Identification and Replacement of OSSFs and Public Education

Task 6 of this project was the identification and replacement of failing or non-existent OSSFs in the Attoyac Bayou watershed (located in Rusk, Shelby, San Augustine, and Nacogdoches counties). Funds were available to install twenty-three (23) aerobic OSSFs. In order to accomplish this task, ANRA had to develop a list of targeted properties for OSSF installation, select an OSSF designer and installer, and replace the failed OSSFs.

There were numerous setbacks during the project related to the project timeframe. We ran into significant difficulties and delays during the grant solicitation process finding qualified applicants, mainly due to the income levels we set for the program based on the federal poverty level. After approval of increased income levels based on the median household income, we were able to find a sufficient number of applicants. Another prominent issue that caused setbacks is ANRA's role as a regulatory entity made some homeowners reluctant to disclose potential OSSF violations. Additionally, delays occured due to ANRA being required to solicit sealed bids for the installation of the OSSFs. As all actions required Board of Director approval, and with ANRA's Board only meeting quarterly, this added significant time to the project.

ANRA had planned to get all systems installed during the first two years of the project in order to use water quality data collected through the project to demonstrate improvements in *E. coli* levels in the watershed. Unfortunately, because of the numerous delays, OSSFs did not get installed until the final year of the project. By the time the last OSSF had been installed, water quality monitoring activities had ended several months prior. Even though the water quality data is not as useful as we would have hoped in measuring the success of this particular activity, it is still useful in demonstrating the effects of other BMPs implemented as part of the *Attoyac Bayou Watershed Protection Plan*.

Even though we encounted setbacks and slow downs, ANRA was still able to meet its stated goal of installing twenty-three aerobic OSSFs in the Attoyac Bayou watershed. Considering the state of some of the systems being replaced (and the fact that several of the properties had no sewage treatment system at all), this project should result in a significant decrease in the amount of bacterial loading.

Data Collection and Analysis - Surface Water Quality Monitoring

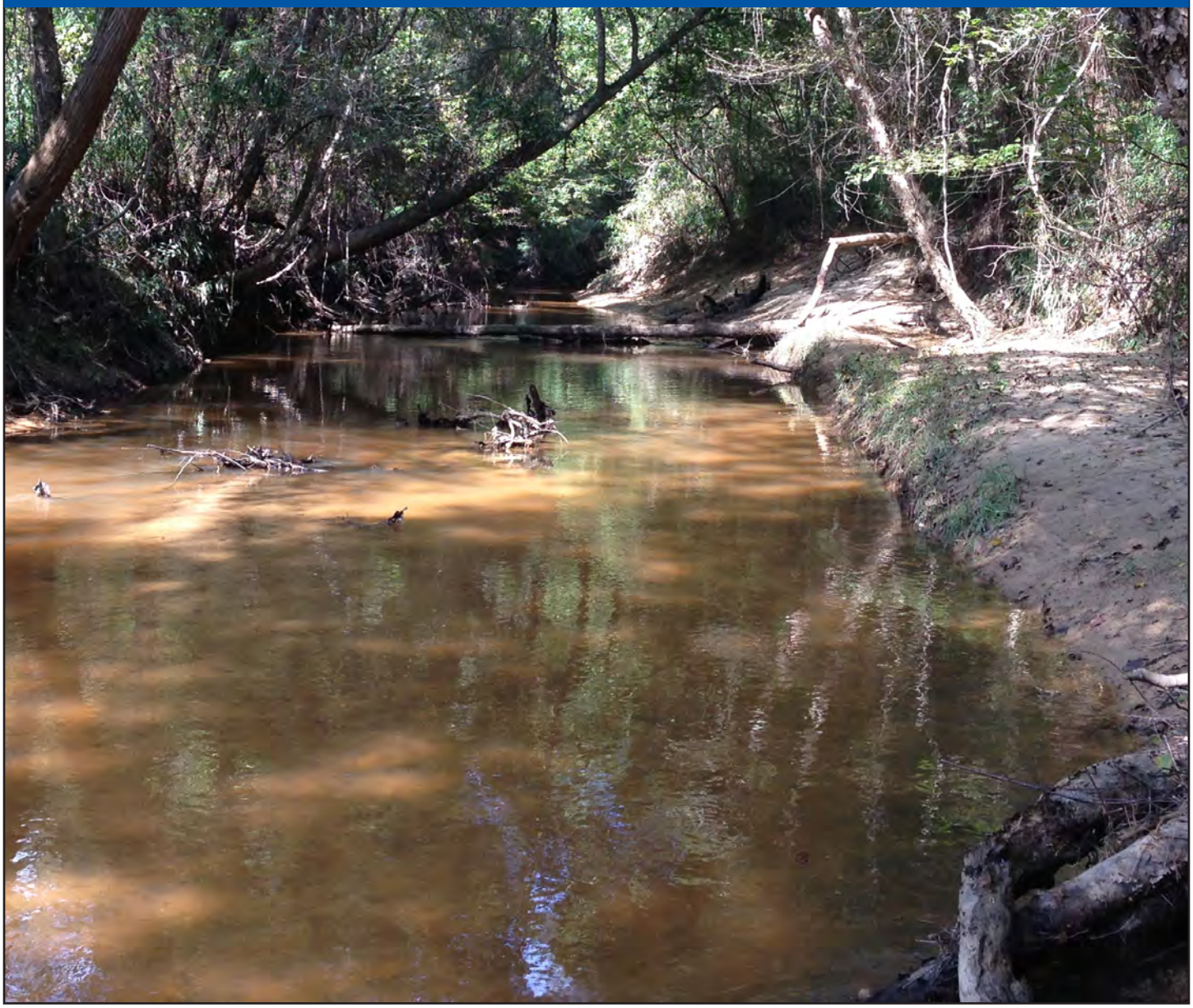
Task 7 of this project was to conduct surface water quality monitoring in the Attoyac Bayou watershed, with the goal of determining the effectiveness of Best Management Practices to be implemented in the *Attoyac Bayou Watershed Protection Plan*. The identification and replacement of failed OSSFs in the watershed is one such BMP.

Surface water quality monitoring was performed at five monitoring stations on a monthly basis for twenty-one (21) months over the period of October 2014 through May 2016. Samples were analyzed for field parameters, conventional parameters, and *E. coli* bacteria. The monitoring stations chosen represent sites on both the main stem of the Attoyac Bayou as well as tributaries and had been monitored previously as part of the project that developed the Watershed Protection Plan for the Attoyac Bayou.

ANRA had hoped to use the water quality data generated from this project to demonstrate water quality improvements related to reduced *E. coli* loadings as failing septic systems were replaced in the watershed. The original project scope of work called for OSSF installation within the first two years of the three-year project, with water quality monitoring being performed in the second and third year. However, due to delays in the OSSF installation portion of the project, the OSSFs were not installed in time to use the monitoring data for that purpose. By the time OSSF installation began, the project was already in its third and final year.

Based on long-term historical monitoring conducted as part of the Clean Rivers Program, the *E. coli* levels in the Attoyac Bayou have exceeded the water quality standard for Primary Contact Recreation (126 MPN/100 mL), causing the waterbody to be listed as impaired for failing to meet its designated use. Although the values exceed the level for Primary Contact Recreation 1, the levels have typically been below the standard for Secondary Contact Recreation 1 (630 MPN/100 mL). This same pattern was observed with the data collected for this project.

REFERENCES



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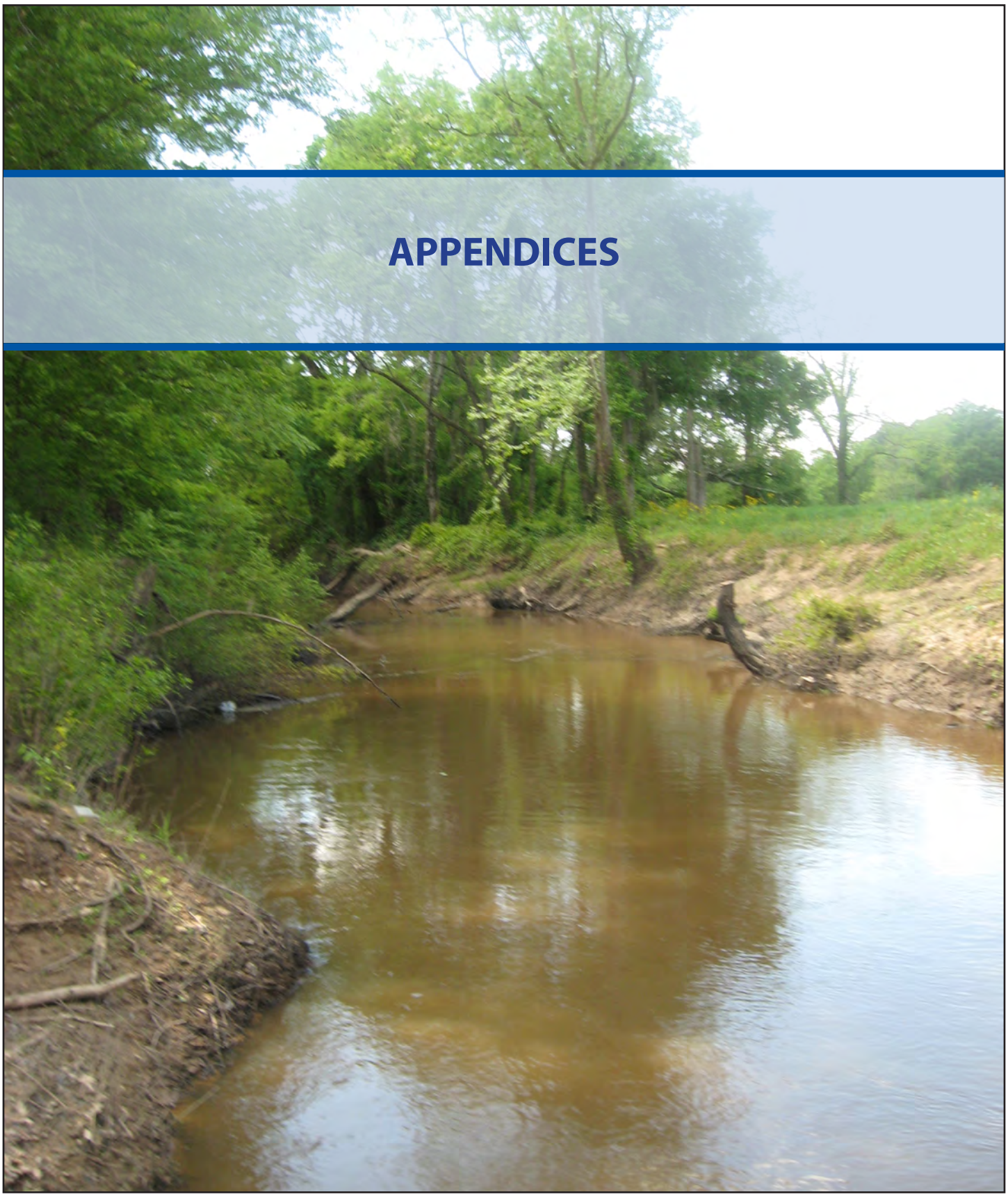

APPENDICES

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APPENDIX A - Notice of Grant Availability

ANRA

ANGELINA & NECHES RIVER AUTHORITY

On-Site Sewage Facility Grants for Homeowners in the Attoyac Bayou Watershed

Do you have a failing conventional or aerobic septic system?

Do you live within close proximity to the Attoyac Bayou?

In an effort to improve water quality and protect public health, the Angelina & Neches River Authority (ANRA) has grant funding available to install or replace OSSFs that may be contributing to bacteria impairments in the Attoyac Bayou.

You may be eligible for a grant to cover 100% of the costs for the design, permitting, and installation of a new On-Site Sewage Facility (OSSF) in the portions of Rusk, Shelby, Nacogdoches, and San Augustine Counties located within the Attoyac Bayou watershed.

Grants will be awarded based upon proximity to the Attoyac Bayou, distance to Sam Rayburn Reservoir, the condition of the current septic system (no system, failing system, or a system that is not appropriate for the soil type), and household income.

Funding for this project has been made available through a federal Clean Water Act Section 319(h) grant from the U.S. Environmental Protection Agency (EPA) through the Texas Commission on Environmental Quality (TCEQ)

To receive an application packet, please contact:

Brian Sims
Environmental Division Manager
Angelina & Neches River Authority
210 E. Lufkin Avenue
Lufkin, TX 75901
Phone: 936-632-7795
Email: bsims@anra.org
Web: www.anra.org

APPENDIX B - Project Overview Fact Sheet

PROJECT OVERVIEW
Attoyac Bayou On-Site Septic System (OSSF) Remediation

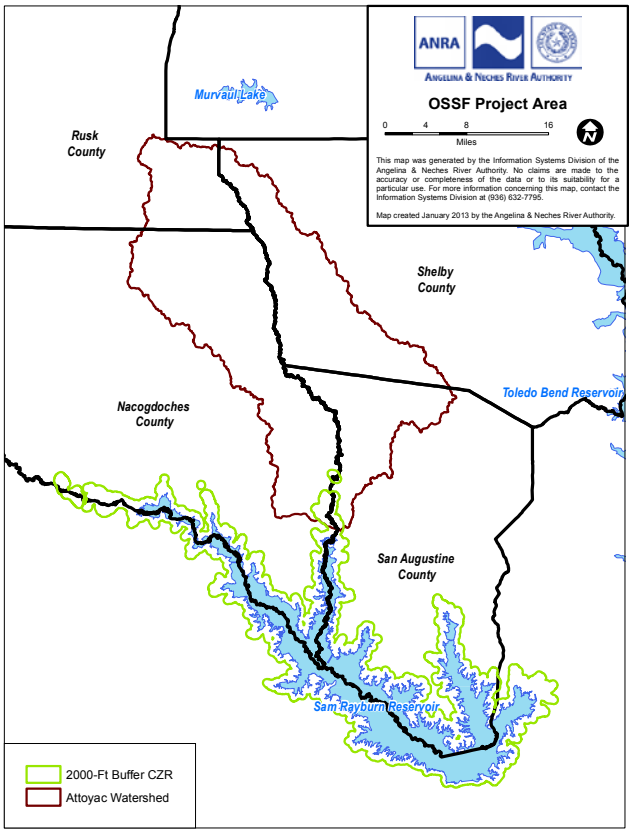
ANRA
Angelina & Neches River Authority

Attoyac Bayou On-Site Septic System (OSSF) Remediation

Water Body	Attoyac Bayou (Segment 0612)
Location	Nacogdoches, San Augustine, Shelby, and Rusk Counties
River Basin	Neches River Basin (6)
Contractor	Angelina & Neches River Authority (ANRA)
Project Period	September 1, 2013 to August 31, 2016
Project Total	$699,425 (Federal 60% and Local Match 40%)

Background

The purpose of this project is to identify and address non-point sources of bacteria and nutrients in the Attoyac Bayou watershed. Attoyac Bayou (Segment 0612), a classified water body in 307.10 Appendix A of the Texas Surface Water Quality Standards, is listed as impaired for bacteria. Attoyac Bayou is a rural stream that flows into Sam Rayburn Reservoir (Segment 0610), a classified reservoir with the following designated uses: primary contact recreation, public water supply and high aquatic life use.



Project Description

Failing or non-existent OSSFs in the Attoyac Bayou watershed will be identified through a combination of tracking of complaints and violations, field reconnaissance and inspections, and consultation with local officials. Funds from the project will be used to replace (in the case of failing systems) or install (in the case of non-existent systems) OSSFs in the Attoyac Bayou watershed located in Nacogdoches, San Augustine, Shelby, and Rusk Counties. Replacement or installation of OSSFs will reduce potential sources of Nonpoint Source (NPS) pollution that may be contributing to the bacteria impairments in the watershed.

Surface water quality monitoring in the Attoyac Bayou watershed will be used to identify improvements in water quality following the replacement of failed or non-existent OSSFs, as well as monitoring effectiveness of Best Management Practices (BMPs) established by the Attoyac Bayou Watershed Protection Plan.

For More Information

Angelina & Neches River Authority
Brian Sims
Environmental Division Manager
210 E. Lufkin Ave
Lufkin, TX 75901
Phone: 936-632-7795
Email: bsims@anra.org

Funding Source

TCEQ Nonpoint Source Program CWA §319(h)

In cooperation with the Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency

APPENDIX C - Grant Selection Criteria Fact Sheet

GRANT SELECTION CRITERIA
Attoyac Bayou On-Site Septic System (OSSF) Remediation

ANRA
Angelina & Neches River Authority

Attoyac Bayou On-Site Septic System (OSSF) Remediation

The **Angelina & Neches River Authority (ANRA)** has received funding through a Clean Water Act (CWA) Section 319 grant to fund the installation of On-Site Septic Facilities (OSSFs) in the Attoyac Bayou watershed in an effort to improve water quality in the Attoyac Bayou, which is listed as impaired for bacterial contamination.

Funding for this project is provided by the **Texas Commission on Environmental Quality (TCEQ)** Nonpoint Source Program and the **Environmental Protection Agency (EPA)** to address nonpoint sources of pollution. Failing OSSFs have been identified as potential sources of pollution in the Attoyac Bayou Watershed Protection Plan. Funding will be available to install approximately 23 OSSFs within the watershed.

General Eligibility

Homeowners within the Attoyac Bayou watershed that meet certain criteria are eligible to apply for one of the available grants to install or replace septic systems within the watershed. In order to qualify, the following criteria must be met:

- Your home must be within the portion of Nacogdoches, San Augustine, Shelby, or Rusk Counties that lies within the Attoyac Bayou watershed.
- Your residence must be a single family home served by a septic system.
- You must own the property.
- The home must be your primary residence and be occupied for the majority of the year.
- The property must have a septic system that has failed or have no septic system to treat sewer discharge. Septic systems that are inappropriate for the soil type may also be considered if sufficient funding is available.
- Eligible sites will be limited to those where the household income is at or below 150% of the Median Household Income (MHI), based on household size. The MHI used for eligibility determination is based on the average MHI for Rusk, Shelby, Nacogdoches, and San Augustine Counties. Priority will be given to individuals and households with lower Median Household Incomes.
- Priority will be given to properties within 2000 feet of an impacted waterbody.

For More Information

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Brian Sims
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Funding Source

TCEQ Nonpoint Source Program CWA §319(h)

In cooperation with the Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency

APPENDIX D - Grading and Scoring Criteria

GRADING AND SCORING CRITERIA
Attoyac Bayou On-Site Septic System (OSSF) Remediation

ANRA
Angelina & Neches River Authority

Attoyac Bayou On-Site Septic System (OSSF) Remediation

The **Angelina & Neches River Authority (ANRA)** has received funding through a Clean Water Act (CWA) Section 319 grant to fund the installation of On-Site Septic Facilities (OSSFs) in the Attoyac Bayou watershed in an effort to improve water quality in the Attoyac Bayou, which is listed as impaired for bacterial contamination.

Funding for this project is provided by the **Texas Commission on Environmental Quality (TCEQ)** Nonpoint Source Program and the **Environmental Protection Agency (EPA)** to address nonpoint sources of pollution. Failing OSSFs have been identified as potential sources of pollution in the Attoyac Bayou Watershed Protection Plan. Funding will be available to install approximately 23 OSSFs within the watershed.

General Criteria

In order to award grants for the replacement of installation of OSSFs in the watershed, ANRA will evaluate and score the applications using the following general criteria:

- Proximity to the water body
- Distance to Sam Rayburn Reservoir
- OSSF system condition
- Household Income

Criteria #1: Proximity to the Waterbody

Priority Zones around the Attoyac Bayou and its major tributaries will be established, as OSSFs in closest proximity to an impaired waterbody can have the largest impact on water quality.

OSSFs in close proximity to the Attoyac Bayou will have the highest priority, followed by systems located in close proximity to one of the major tributaries (Naconiche Creek, Terrapin Creek, Big Iron Ore Creek, Waffelow Creek, and West Creek).

Criteria #2: Distance to Sam Rayburn Reservoir

The Attoyac Bayou discharges into Sam Rayburn Reservoir. Although Sam Rayburn Reservoir is not listed as impaired for bacteria, the reservoir is used extensively for both primary contact recreation and public water supply use. Minimizing the amount of bacteria loading entering Sam Rayburn Reservoir is protective of public health.

Criteria #3: OSSF System Condition

OSSF Inspections can determine if a system has failed or if it simply needs repair or to be pumped.

In many instances, a home may not have a system at all. Priority will be given to these households, as they have the greatest potential for bacterial loading into the watershed.

Criteria #4: Household Income

Grants will be awarded to individuals/households that are at, or below, 150% of the Median Household Income (MHI) for Rusk, Shelby, Nacogdoches, or San Augustine Counties.

For More Information

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Lufkin, TX 75901
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Email: bsims@anra.org

Funding Source
TCEQ Nonpoint Source Program CWA §319(h)

In cooperation with the Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency

APPENDIX E - Frequently Asked Questions (FAQs) Fact Sheet

FREQUENTLY ASKED QUESTIONS
Attoyac Bayou On-Site Septic System (OSSF) Remediation

ANRA

ANGELINA & NECHES RIVER AUTHORITY

Attoyac Bayou On-Site Septic System (OSSF) Remediation

The **Angelina & Neches River Authority (ANRA)** has received funding through a Clean Water Act (CWA) Section 319 grant to fund the installation of On-Site Septic Facilities (OSSFs) in the Attoyac Bayou watershed in an effort to improve water quality in the Attoyac Bayou, which is listed as impaired for bacterial contamination.

Funding for this project is provided by the **Texas Commission on Environmental Quality (TCEQ)** Nonpoint Source Program and the **Environmental Protection Agency (EPA)** to address nonpoint sources of pollution. Failing OSSFs have been identified as potential sources of pollution in the Attoyac Bayou Watershed Protection Plan. Funding will be available to install approximately 23 OSSFs within the watershed.

Who is eligible to receive grant funding?

Property owners within the Attoyac Bayou watershed are eligible to apply for grant funding. The property must have a failing septic system (or no septic system), and the property owner must qualify as either low income, very low income, or extremely low income.

What are the income requirements for this grant program?

In order to qualify for funding under this project, applicants must meet certain income requirements. Grants are reserved for individuals or households at less than or equal to 150% of the Median Household Income (MHI), based upon household size. The MHI used for determining eligibility is based upon the average MHI for Rusk, Shelby, Nacogdoches, and San Augustine Counties.

How do I determine if my septic system is failing?

The most common signs of septic system failure are the smell of sewage, sewage leaking on the lawn, and sewage backing up into the home. In order to determine if your system is truly failing, it will be necessary for the system to be inspected.

If my septic system is failing, will it be reported to the Texas Commission on Environmental Quality?

No. The goal of this program is to replace failing septic systems within the Attoyac Bayou watershed in order to improve water quality and public health, not to identify failing systems for fines and enforcement purposes.

Will I have to hire contractors (installers, site evaluators, designers, etc.)?

Contractors for this project will be selected by the Angelina & Neches River Authority (ANRA) through a competitive sealed bidding process.

Will this program pay for all of my costs for replacing my septic system?

It is ANRA's intention to have this program fund 100% of the cost of installation of a suitable on-site septic facility for qualified grant recepients. The property owner would be responsible for on-going maintenance and upkeep of of the system.

For More Information

Angelina & Neches River Authority
Brian Sims
Environmental Division Manager
210 E. Lufkin Ave
Lufkin, TX 75901
Phone: 936-632-7795
Email: bsims@anra.org

Funding Source

TCEQ Nonpoint Source Program CWA §319(h)

In cooperation with the Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency

APPENDIX F - Grant Program Income Categories Fact Sheet

ANRA

ANGELINA & NECHES RIVER AUTHORITY

Attoyac Bayou On-Site Septic System (OSSF) Remediation Grant Program Income Categories

To be eligible for funding, an individual or household must be at or below 150% of the Median Household Income (MHI) for Rusk, Shelby, Nacogdoches, and San Augustine Counties. Preference will be given to individuals and households in lower income brackets.

Household Size	Annual Maximum Gross Income Categories				
	<50% of MHI	75% of MHI	100% of MHI	125% of MHI	150% of MHI
1	$14,441	$21,661	$28,882	$36,102	$43,322
2	$16,504	$24,756	$33,008	$41,260	$49,511
3	$18,567	$27,850	$37,134	$46,417	$55,700
4	$20,630	$30,945	$41,260	$51,574	$61,889
5	$22,280	$33,420	$44,560	$55,700	$66,840
6	$23,931	$35,896	$47,861	$59,826	$71,792
7	$25,581	$38,371	$51,162	$63,952	$76,743
8	$27,231	$40,847	$54,463	$68,078	$81,694

APPENDIX G - Homeowner Application

COUNTY: _____ **ID#** _____ **Score:** _____

ANRA
ANGELINA & NECHES RIVER AUTHORITY

Attoyac Bayou Watershed On-Site Septic Facility Grant Program

Homeowner Application

Date: _____

APPLICANT INFORMATION

Name of Applicant: _____ Home Phone: _____

Mailing Address: _____ Other Phone: _____

City: _____ State: _____ Zip Code: _____

County: _____

If the mailing address is a post office box, complete the section below for physical location:

Physical Address: _____ City: _____ State: _____ Zip: _____

1. Is the property located within the Attoyac Bayou watershed? ☐ YES ☐ NO
2. Do you own the property where the system is to be installed? ☐ YES ☐ NO
3. Do you occupy the property for the majority of the year (>51% of the time)? ☐ YES ☐ NO

If you answered NO to any of the above questions, do not proceed with this application. Only homeowners residing in a non-seasonal principal residence within the Attoyac Bayou watershed may qualify for this grant program.

4. How long have you occupied this residence? _____ years _____ months
5. Will the septic system be installed at the above physical address? ☐ YES ☐ NO
6. Do you currently have electricity in the home? ☐ YES ☐ NO

   If NO, state the reason why you do not have electric service: _____
7. Is there a well located on the property? ☐ YES ☐ NO

   If YES, is the well currently used as a water source? ☐ YES ☐ NO

Funding for this project is provided by the **Texas Commission on Environmental Quality (TCEQ)** Nonpoint Source Program and the **Environmental Protection Agency (EPA)** through a Clean Water Act Section 319 grant to address nonpoint sources of pollution.

COUNTY: _____ ID# _____ Score: _____

8. How many persons currently live in the home? _____

9. Total Household Income (include income for ALL individuals living in the home, including minors).

   $ _____

10. List the annual income for all individuals in the home. List each individual with the amount of income and source of income (wages, social security, pension, etc.) by the individual's name.

HOUSEHOLD COMPOSITION AND INCOME INFORMATION				
Household Member #	**Name**	**Relationship to Head of Household**	**ANNUAL INCOME**	**Source of Income**
1				
2				
3				
4				
5				
6				
7				
8				

Funding for this project is provided by the **Texas Commission on Environmental Quality (TCEQ)** Nonpoint Source Program and the **Environmental Protection Agency (EPA)** through a Clean Water Act Section 319 grant to address nonpoint sources of pollution.

COUNTY: _____ ID# _____ Score: _____

PROPERTY INFORMATION

11. Please provide a legal description of the property (*as described in the deed record*):

Subdivision: _____

Section: _____ Block: _____ Lot: _____

Document: _____ Volume: _____ Page: _____

Tax #: _____ Acres: _____ or Lot Size: _____

Brief Description of Property Location (*continue on back if necessary*):

_____

_____

_____

_____

CURRENT SEPTIC SYSTEM CONDITION

12. Is there currently a septic system on the property? ☐ YES ☐ NO

If you answered YES, please complete the following information to the best of your knowledge.

Describe the current system at your residence (*if it is unknown, simply write "unknown"*).

Year Installed: _____ Type of System: _____

Size of Tank: _____ ☐ Concrete ☐ Metal ☐ Other: _____

Additional Information (*continue on back if necessary*):

_____

_____

_____

_____

13. Describe the extent of failure, including the length of time the system has been failing. Please be specific (*continue on back if necessary*).

_____

_____

_____

_____

Funding for this project is provided by the **Texas Commission on Environmental Quality (TCEQ)** Nonpoint Source Program and the **Environmental Protection Agency (EPA)** through a Clean Water Act Section 319 grant to address nonpoint sources of pollution.

COUNTY: _____ ID# _____ Score: _____

REQUIRED DOCUMENTATION

In order to verify the information in this application, the following documentation is required and must be submitted with the application:

Proof of Ownership

Please provide the following:

☐ Copy of recorded deed to the home showing you as the legal owner of the property.

Proof of Income

Please provide one (1) of the following (*Black out social security and bank account numbers*):

☐ 2014 Federal Income Tax Return for **all residents of your household age 18 and over.**

☐ Copies of the past 3 – 6 months' pay stubs **and** a copy of the 2013 Federal Income Tax Return for **all residents of your household age 18 and over.**

☐ If you are not required to file taxes, please submit a benefit verification letter or year-end statement from Social Security.

Proof of Electric Service at Property

Please provide the following:

☐ A copy of the most recent electric utility bill. The address on the bill must be of the property, not a P.O. Box.

PLEASE NOTE: This application will not be accepted for the program if proper income documentation and a copy of the recorded deed to the property are not included with the application.

Funding for this project is provided by the **Texas Commission on Environmental Quality (TCEQ)** Nonpoint Source Program and the **Environmental Protection Agency (EPA)** through a Clean Water Act Section 319 grant to address nonpoint sources of pollution.

COUNTY: _____ ID# _____ Score: _____

PLEASE READ BEFORE SIGNING

I, the undersigned applicant, do hereby certify that the information provided herein is true and accurate to the best of my knowledge and understand that the information will be used to determine my eligibility for participation in the **Attoyac Bayou Watershed On-Site Septic Facility (OSSF) Grant Program**.

Further, I understand I may be required to furnish additional information and all other documents deemed necessary by the County of residence and the Angelina & Neches River Authority (ANRA) to verify or confirm my property ownership, income, utility service, and condition of the current on-site septic facility (or lack thereof).

Furthermore, I give the permitting authority of the County of residence, as well as ANRA, permission to inspect and photograph the property listed above for the purpose of determining the severity of any public health nuisance related to the on-site septic facility on the property in order to determine eligibility for this program.

If selected for the project, and if I agree to participate, I understand that contractors for the design and installation of the system will be chosen by ANRA. I hereby give permission for the contractors to access the property for the purpose of designing an appropriate system for the property, as well as performing the installation of the system. I also authorize the permitting authority of the County of residence, as well as ANRA, access to the property for the purpose of inspecting the installed system. I understand and agree that photographs of the property and system may be taken as part of the inspection process.

I, the undersigned applicant, do hereby agree that it is my responsibility as the homeowner to ensure there is proper plumbing in the home so that state regulations will be met when the home is connected to a new on-site septic facility.

I, the undersigned applicant, understand that this is an application only and in no way commits either myself, the County of residence, ANRA, the Texas Commission on Environmental Quality (TCEQ), or the Environmental Protection Agency (EPA) to any obligation to this program.

I, the undersigned applicant, understand that any approval granted on the basis of false or inaccurate information supplied herein is automatically revoked. I understand that if I have given materially false or misleading information or concealed information for the purpose of misleading the grant selection committee that I can be asked to reimburse fully the expense of the on-site septic facility that was paid for by this grant project. I agree to conform to all applicable laws of the State of Texas and the County of residence.

Homeowner shall indemnify and hold harmless ANRA, its officers, directors, partners, employees, agents, successors, and assigns, each and any of them, from and against all claims, costs, losses, and damages, arising out of the design, placement, and installation on the on-site-septic system on Homeowner's property, including but not limited to, bodily injury, sickness, disease or death, injury to or destruction of tangible property, loss of use of tangible property, or mental anguish.

_____ _____

Applicant's Signature Date

_____ _____

Applicant's Signature Date

Funding for this project is provided by the **Texas Commission on Environmental Quality (TCEQ)** Nonpoint Source Program and the **Environmental Protection Agency (EPA)** through a Clean Water Act Section 319 grant to address nonpoint sources of pollution.

APPENDIX H - Scoring Criteria Form

ANRA
ANGELINA & NECHES RIVER AUTHORITY

Attoyac Bayou On-Site Septic Facility (OSSF) Remediation
SCORING CRITERIA

Application # _____

County: _____

PRIORITY ZONES BASED ON PROXIMITY TO IMPAIRED STREAM SEGMENT	**Possible Points**	**Points Awarded**
Priority Zone 1 -*OSSF within 2000-ft buffer zone of the Attoyac Bayou*	45	
Priority Zone 2 - *OSSF within 2000-ft buffer zone of a named tributary to the Attoyac Bayou(Terrapin, Waffelow, Naconiche, Big Iron Ore, or West Creeks)*	35	
Priority Zone 3 -*OSSF within remainder of the watershed*	10	
DISTANCE TO SAM RAYBURN RESERVOIR (BY STREAM MILE)	**Possible Points**	**Points Awarded**
Less than 5 miles	10	
5 to 10 miles	5	
10 to 25 miles	4	
25 to 50 miles	3	
50 to 75 miles	2	
Greater than 75 miles	1	
OSSF SYSTEM CONDITION	**Possible Points**	**Points Awarded**
Non-Existent System - *An OSSF does not exist; Does not include new construction.*	25	
Failed System - *Sewage odor, backup in house, effluent discharge on ground.*	20	
Non-conforming System - *The system in place is not appropriate for the soil type.*	10	
HOUSEHOLD INCOME Based on the average Median Household Income (MHI) for the four counties in the Attoyac Bayou Watershed	**Possible Points**	**Points Awarded**
50% of MHI – *individuals or households at or below 50% of the MHI*	25	
75% of MHI – *Individuals or households at or below 75% of the MHI*	20	
100% of MHI – *individuals or households at or below 100% of the MHI*	15	
125% of MHI - *individuals or households at or below 125% of the MHI*	10	
150% of MHI - *individuals or households at or below 150% of the MHI*	5	
	TOTAL SCORE	

In the event of a tie in scoring, preference will be given to systems in closest proximity to the Attoyac Bayou (Segment 0612), as this would be most protective of water quality.

Reviewed By: _____ **Date Reviewed:** _____

APPENDIX I - Public Notice Inviting Bids

ANRA

ANGELINA & NECHES RIVER AUTHORITY

PUBLIC NOTICE INVITING BIDS

The Angelina & Neches River Authority (ANRA) hereby gives notice that sealed unit price Bids will be received for the **INSTALLATION OF AEROBIC ON-SITE SEWAGE FACILITIES** in the portions of Rusk, Shelby, Nacogdoches, and San Augustine Counties that lie within the Attoyac Bayou Watershed.

ANRA will open Bids on Monday, February 8, 2016 at 10:00 AM at its Central Office at 210 E. Lufkin Avenue, Lufkin, TX. After the official Bid closing time, the Bids will be publically opened and read aloud. Bid awards will be made by the ANRA Board of Directors at their regular quarterly meeting in February 2016.

A MANDATORY Pre-Bid Conference is a prerequisite to bidding. Bids **WILL NOT** be accepted from any firm not in attendance at the pre-Bid conference.

Bid documents are available at the ANRA Central Office, on the ANRA website (www.anra.org), by email request to Brian Sims, Environmental Division Manager (bsims@anra.org), or by faxing a request for a Bid packet to 936-632-2564.

This project is financed by a Clean Water Act Section 319 grant from the U.S. Environmental Protection Agency through the Texas Commission on Environmental Quality.

The Angelina & Neches River Authority reserves the right to accept the bid that best serves the needs of ANRA, to reject any and/or all bids, and to waive minor specifications to best serve ANRA.

APPENDIX J - Request for Proposals - OSSF Installation

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

ANRA
ANGELINA & NECHES RIVER AUTHORITY

REQUEST FOR PROPOSALS

(Sealed Bids)

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed

RFP Number:	CWA-2016-01
Date Issued:	January 14, 2016
Date Due:	February 8, 2016 at 10:00 AM Sealed Bids will be opened at this time at the ANRA Central Office, 210 E. Lufkin Ave., Lufkin, TX

This project is financed by a Clean Water Act Section 319 grant from the U.S. Environmental Protection Agency (USEPA) through the Texas Commission on Environmental Quality (TCEQ).

PREPARED IN COOPERATION WITH THE
TEXAS COMMISSIONON ENVIRONMENTAL QUALITY AND
U.S. ENVIRONMENTAL PROTECTION AGENCY

This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement to Texas Commission on Environmental Quality. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

Table of Contents

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

Public Notice Inviting Bids

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Bid documents are available at the ANRA Central Office, on the ANRA website (www.anra.org), by email request to Brian Sims, Environmental Division Manager (bsims@anra.org), or by faxing a request for a Bid packet to 936-632-2564.

This project is financed by a Clean Water Act Section 319 grant from the U.S. Environmental Protection Agency through the Texas Commission on Environmental Quality.

The Angelina & Neches River Authority reserves the right to accept the bid that best serves the needs of ANRA, to reject any and/or all bids, and to waive minor specifications to best serve ANRA.

Important Dates

RFP Issue Date:	January 14, 2016
Pre-Bid Meeting (Mandatory)	Thursday, January 28, 2016 at 5:30 PM Friday, January 29, 2016 at 10:00 AM Two separate Pre-Bid Meetings have been arranged to accommodate potential bidders' work schedules. Bidders can attend either meeting. The content presented at each meeting will be the same. **Attendance at one of the Pre-Bid Meetings is mandatory to submit a bid for this project.**
Proposal Due Date:	Monday, February 8, 2016 at 10:00 AM
Tentative Award Date:	Tuesday, February 9, 2016 at 10:00 AM
Project Completion:	August 31, 2016

Submittal Requirements

Responses to the RFP are due by 10:00 AM on Monday, February 8, 2016. One (1) unbound hard copy of the proposal response is required. Submission must be delivered in a **sealed envelope** labeled on the exterior with the following:

Bidder/Firm Name:	_____
RFP Name:	Installation of OSSFs in the Attoyac Bayou Watershed
RFP Number:	CWA-2016-01
Date Issued:	January 14, 2016
Date Due:	February 8, 2016 at 10:00 AM

Submissions are to be delivered to:

Angelina & Neches River Authority
ATTN: Brian Sims
210 E. Lufkin Ave.
Lufkin, TX 75901

***** LATE PROPOSALS WILL NOT BE CONSIDERED *****

Contact Information

For questions concerning this project, please contact:

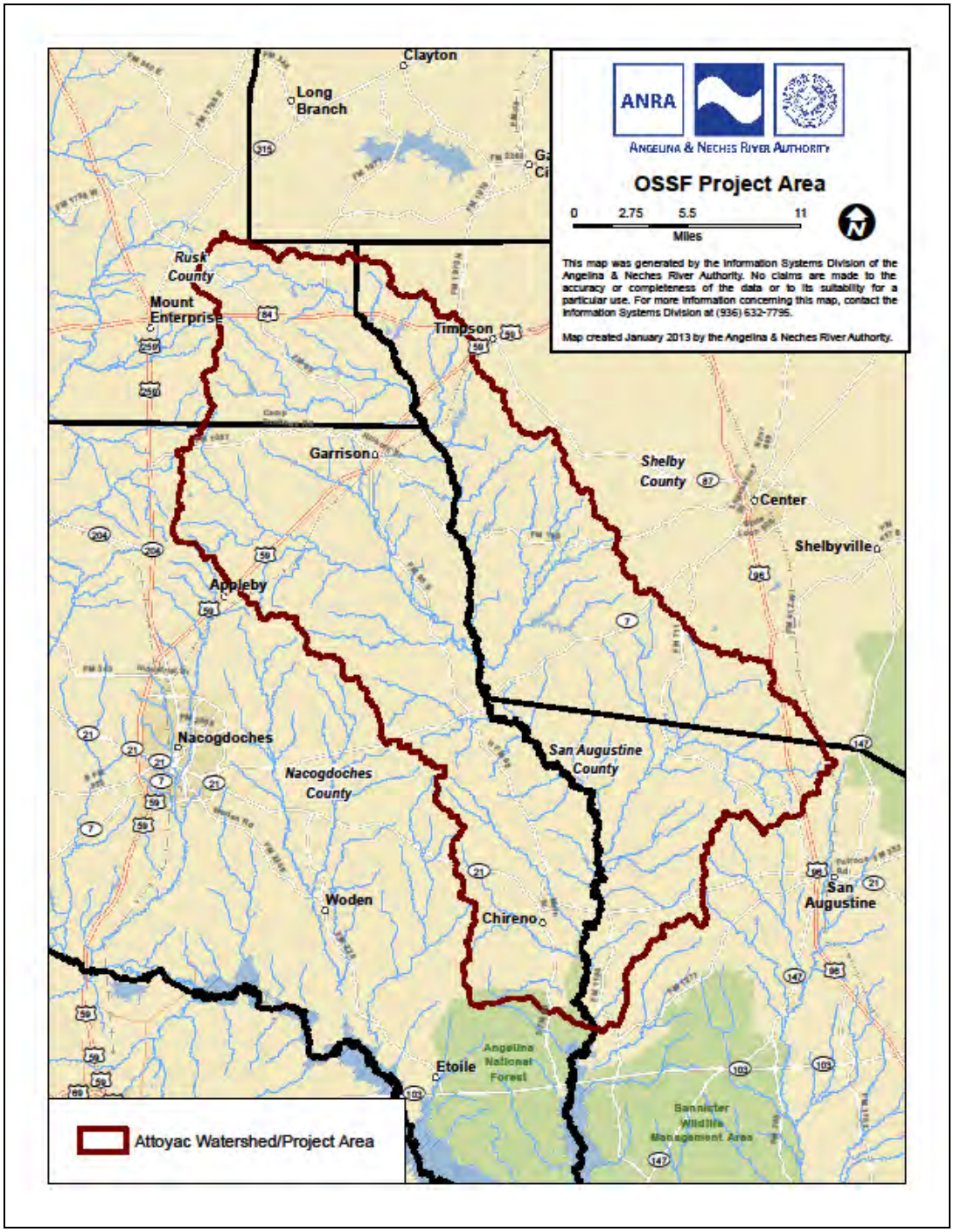
Brian Sims
Environmental Division Manager
Angelina & Neches River Authority
210 E. Lufkin Ave.
Lufkin, TX 75901
Email: bsims@anra.org
Phone: 936-633-7527
Fax: 936-632-2564

Project Background

The Attoyac Bayou is impaired for elevated levels of *E. coli* bacteria. *The Attoyac Bayou Watershed Protection Plan* identifies failing or non-existent On-Site Sewage Facilities (OSSFs) as one of the leading potential sources of the bacterial source contributors in the watershed. Through a Clean Water Act (CWA) Section 319 grant from the Texas Commission on Environmental Quality (TCEQ), the Angelina and Neches River Authority (ANRA) is attempting to address this potential source of bacteria by replacing or installing up to 23 OSSFs within the Attoyac Bayou watershed.

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

Map of Project Area



Scope of Work

The Angelina & Neches River Authority seeks **sealed bid** proposals from Licensed Installers to provide labor and materials to install On-Site Sewage Facilities (OSSFs) in the portions of Rusk, Shelby, Nacogdoches, and San Augustine counties that lie within the Attoyac Bayou Watershed (see Map of Project Area on page 5).

ANRA has contracted with a Registered Sanitarian to design systems to be installed as part of this project. Aerobic OSSF designs for this project will be completed by David Arnold, R.S. #3382. Every effort will be made to design the systems as consistently as possible. All installations will be for single family residences, with plant sizes typically being either 500 GPD or 750 GPD. In some instances, dual systems may be installed on one property to deal with flow requirements. Two example designs are included in the RFP. Installers will be provided with overview maps, site photographs, and system designs prior to installation.

As of the date of this request, all available systems have not been awarded to homeowners. Therefore, designs are not available for all systems to be installed as a part of this grant. Please refer to the provided examples as to the types and sizing of systems to be expected. In some cases, systems are being installed at locations where there is not a system in place. In the majority of circumstances, the installation is to replace a failing conventional septic system, so it will be necessary to pump, fill, and abandon the existing system.

As of the date of this Request for Proposal, eight (8) designs have been completed. The remaining designs are not included as examples in this packet. However, they are available for review. It is anticipated that between 20 -23 systems will be installed as part of this project prior to August 31, 2016. The total number of systems installed is dependent upon unit costs and the total available grant funding for this project.

One (1) successful bidder will install all on-site sewage facilities for this project. Minority owned, women owned, and locally owned businesses are encouraged to apply.

Licensing Requirements

The Installer must be licensed by the Texas Commission on Environmental Quality (TCEQ) as an **Installer Class II (OS II)**. For installations in San Augustine County, the Installer must be registered with ANRA.

Rules and Regulations

Work to be performed under this project must be performed according to the following Rules and Regulations:

Health & Safety Code, Chapter 366 On-Site Sewage Disposal Systems
Title 30, TAC Chapter 285 On-Site Sewage Facilities
Title 30, TAC Chapter 30, Subchapters A and G Occupational Licenses and Registrations
Order Adopting Rules of the Angelina & Neches River Authority for On-Site Sewage Facilities

Insurance Requirements

The Installer must maintain a policy of liability insurance in the minimum amount of $1,000,000 per occurrence, listing ANRA as the certificate holder/beneficiary, to cover any claims arising out of the performance of its services under this Agreement. The Installer shall provide ANRA with a copy of its certificate of liability insurance at contract execution.

Federal Conditions and Forms

This project is funded, in whole or in part, by a federal grant from the U.S. Environmental Protection Agency through the Texas Commission on Environmental Quality. This project is funded through the Federal Clean Water Act (CWA) Section 319 grant program to address nonpoint sources (NPS) of pollution.

The successful bidder for this project must agree to follow the Federal Conditions for this grant, including completing any necessary federal forms. A copy of the Federal Conditions and Forms document is included as an attachment (Attachment #1) to this Request for Proposal. A copy of the Disadvantage Business Enterprise (DBE) Program Subcontractor Participation Form is also attached (Attachment #2).

These documents are not required to be included in the sealed Bid proposal, but will be required prior to contract execution if your firm's bid is accepted.

ANRA Standard Form of Agreement

A copy of ANRA's Standard Form of Agreement will be provided at the Pre-Bid Meeting.

ANRA General Contract Conditions

A copy of ANRA's General Contract Conditions will be provided at the Pre-Bid Meeting.

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

Example System Design #1

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed

RPF# CWA-2016-01

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

D&S Environmental Services

4283 SOUTHWOOD DRIVE
LUFKIN, TX 75904
(936) 632-0585

JN80716
January 14, 2016

ON-SITE SEWAGE FACILITY DESIGN

Owner: [redacted]
Address: San Augustine TX 75972
County: San Augustine
Designer: David Arnold, RS # 3382
Installer: TCEQ Licensed Installer II (TBA-request for proposal)

PROJECT DESCRIPTION AND LOCATION:
Aerobic System Design for a single-family residence located on identified 5.0 acre tract in the [redacted] The property is in San Augustine County. (See attached map)

DESIGN CRITERIA:

Water Source: Public
Type of Dwelling: Residential (Singlewide)
No. Of Bedrooms: 2
No. Of Residents: 1
Estimated Daily Flow: 180 Gallons per Day (w/low flow fixtures)

SPRAYFIELD DESIGN:

Land Disposal Application Rate: 0.041 Gallons/Sq. Ft. /Day
Area Required: 4390.25 Sq. Ft.
Area Designed: 7693.00 Sq. Ft.
Overlap: 0.00 Sq. Ft.

AEROBIC SYSTEM & COMPONENTS REQUIRED:

Treatment Plant Manufacturer: TCEQ Approved System
Plant Sizing: 2bdrm <2501 Sq.Ft. = 360 GPD
Model Number: 500 GPD Aerobic System (TBA)
Pump Tank Capacity: 500-Gallon (minimum)
Trash Tank Capacity: 325-Gallon (minimum)
Effluent Pump: ½ HP Submersible or Equivalent
Disinfection: Approved Liquid Chlorinator
Alarms: Audible & Visible High Water Alarm
Effluent Pump Timer Requirement: optional/20' setback maintained
Final Disposal: Surface Irrigation
(2) Rainbird Maxi-Paw sprinklers with # 10 Low Angle Nozzle or Equivalent

VARIANCE REQUEST:
None

1/14/16

STATE OF TEXAS
DAVID ARNOLD
3382
REGISTERED
PROFESSIONAL SANITARIAN

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

JN80516
January 14, 2016

DESIGN NOTE:

Property lines shown are based on owner/owner representative information only. Slight adjustments to the spray head locations may be required because of vegetative obstructions. Setback distances must be maintained where applicable. (See Site Design Note)

CALCULATIONS:

1. **SINGLE FAMILY RESIDENCE**
   2 BEDROOM HOME=180GPD

   TOTAL = 180GAL/DAY

   180 gal/day / .041 = 4390.25 SQ.FT. REQUIRED

   35' x35' x 3.14 =3846.50 SQ.FT. /PER SPRINKLER HEAD

   Overlap=0.00 SQ.FT.
   0'x0'x.7854/2=0.00'

   HEAD #1 (35' RADIUS) 360 DEGREE ROTATION = 3846.50 SQ. FT.
   HEAD #2 (35' RADIUS) 360 DEGREE ROTATION = 3846.50 SQ. FT.

   TOTAL DESIGNED = 7693.00 SQ.FT.

The information contained herein is to serve as design documentation for the installation of an aerobic sewer system with surface irrigation.

This aerobic system is to be installed and maintained in accordance with all state and local on-site sewage facility regulations. Upon commencement of construction, minor design changes may be required due to physical constraints at the job site. Any variance request or major construction change deemed necessary at the time of construction will require notification by the installer to the designer and the local regulatory agency. The installer shall obtain approval for these changes by the regulating agency.

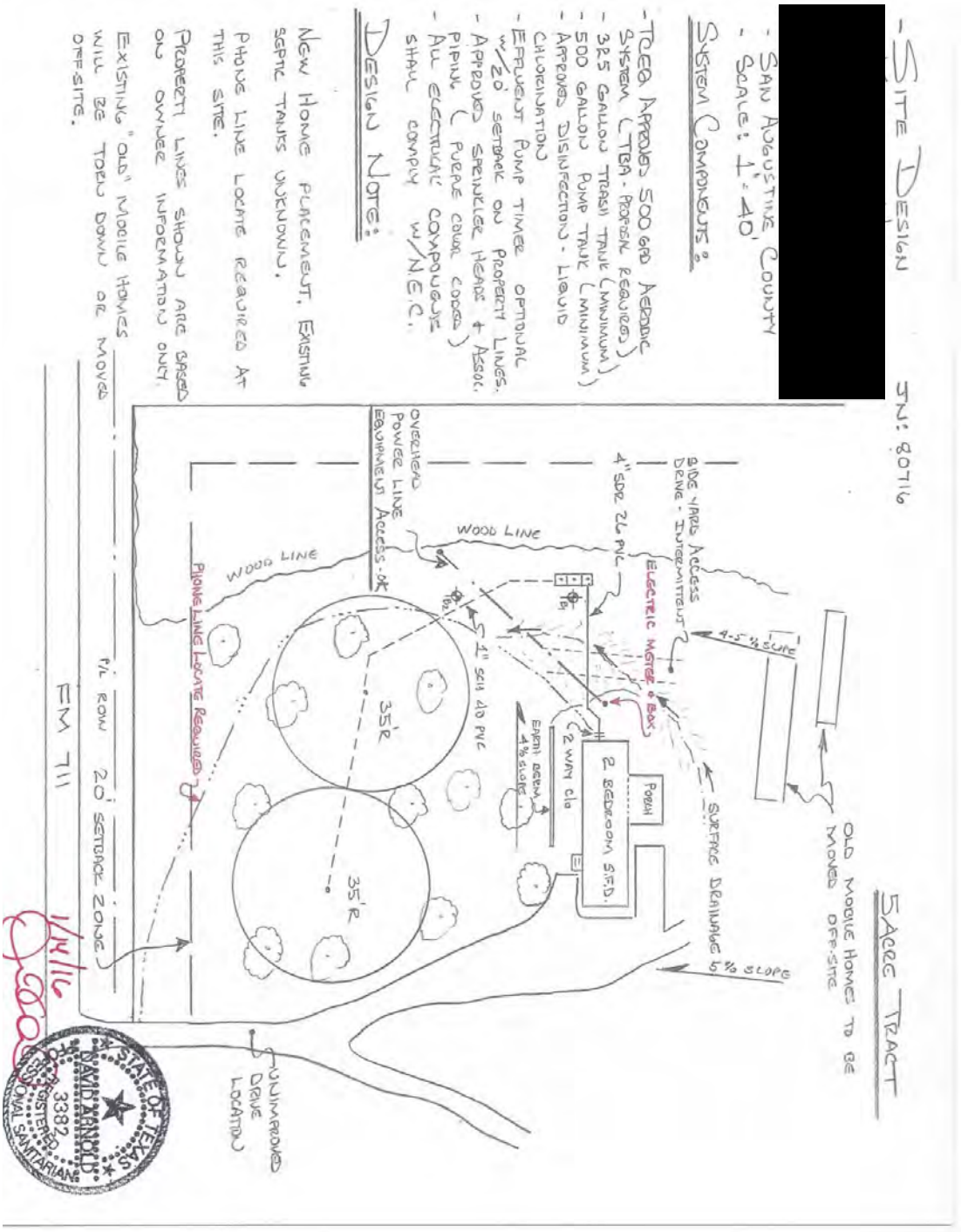
The specifications used in this design were based on TCEQ On-Site Sewage Facility Regulations. Any attempt to modify this aerobic system design to allow for the treatment of waters other than domestic waste or to exceed the design capacity of this system with increased hydraulic loading will require re-evaluation by the local regulatory agency. A reasonable attempt has been made to accurately depict the location of the residence, property lines, outbuildings, underground utilities, sewer line connections, and proposed realty improvements.

This designer does not warrant the materials, installation, or proper operation of this aerobic system for any period of time if installed by a representative of a company other than D&S Environmental Services.

This designer is not responsible for identifying, locating and/or marking boundary lines for any property owner or property owner representative. Any boundary lines represented herein are based on owner information and any existing boundary markings such as pins, posts, flags and fencing.

1/14/16

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01



Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

SITE EVALUATION FORM Job Number 80116

DATE: 1/12/16 SITE VISIT @ 1:30 PM

HOME/BUSINESS OWNER [redacted]
SUBDIVISION: SECTION LOT BLOCK
SURVEY: G [redacted] ABSTRACT [redacted]
STREET ADDRESS SAN AUGUSTINE COUNTY
ACREAGE/LOT SIZE 5 ACRE TRACT

TOPOGRAPHY

SLOPE
FLAT: (UNDER2%) SLIGHT: (UNDER 6%) ✓ SEVERE: (OVER 30%)
VEGETATION
GRASS/BRUSH: LIGHTLY WOODED: ✓ HEAVILY WOODED: ✓ PARTIAL
SITE DRAINAGE: POOR ✓ ADEQUATE GOOD OTHER

FLOOD PLAIN

Property is located:
OUTSIDE THE 100 YEAR FLOOD PLAIN ✓
PARTIALLY IN THE 100 YEAR FLOOD PLAIN
IN THE 100 YEAR FLOOD PLAIN
IN 100 YEAR FLOOD PLAIN AND FLOODWAY

WATER SUPPLY

PUBLIC ✓ COMMUNITY PRIVATE
SIZE OF WELL
DEPTH OF WELL FEET YEAR DRILLED DRILLER:

- ALL WELL REQUIRED DISTANCES MUST BE MAINTAINED
- IF NEIGHBORING WELLS EXIST THEY MUST BE SHOWN ON THE DESIGN

WASTEWATER USAGE RATE

TYPE OF FACILITY RESIDENTIAL USAGE RATE 180 GPD

SOIL ANALYSIS

X	SOIL TEXTURE B_1	B_2 SOIL CLASS	LONG TERM LOADING RATE
	COURSE SAND/GRAVEL	Ia	>.50
	SAND/LOAM SAND	Ib	0.38
X	SANDY/LOAM/LOAM 0"-14"	0"-14" II	0.25
X	SANDY CLAY LOAM/SANDY CLAY/CLAY LOAM/SILTY CLAY LOAM/ SILTY LOAM/SILT 14"-20"	III 14"-20"	0.20
X	CLAY/SILTY CLAY 20"+	20"+ IV	0.10

INDICATION OF SEASONAL WATER TABLE YES ✓ NO
DEPTH

NOTE: Subsurface horizons with colors of red, yellow and brown generally indicate good soil aeration and drainage throughout the year. Subsurface horizons that are in colors of gray, olive or blackish colors indicate poor aeration and soil drainage. Any soil profile that has the grayish colors indicative of high water tables within 36 inches of the surface or has ground water visible in the test bore less than 48 inches below the ground surface shall be deemed unsuitable for conventional subsurface disposal due to internal drainage.

IS THE SOIL SUITABLE FOR A CONVENTIONAL SYSTEM? YES ✓ NO

I, David Arnold, a Registered Sanitarian and Licensed Site Evaluator, did personally conduct the evaluation on [redacted]
ADDRESS/LEGAL DESCRIPTION

I certify these results are true and correct for the property evaluated.

1/14/16
Date

Signature of Site Evaluator SE # OS0029868

D&S Environmental Service
936/632-038

SITEEVAL

1

Example System Design #2

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed

RPF# CWA-2016-01

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

DS Environmental Services

4283 SOUTHWOOD DRIVE
LUFKIN, TX 75904
(936) 632-0585

JN80516
January 14, 2016

ON-SITE SEWAGE FACILITY DESIGN

Owner: [redacted]
Address: San Augustine TX 75972
County: San Augustine
Designer: David Arnold, RS # 3382
Installer: TCEQ Licensed Installer II (TBA-request for proposal)

PROJECT DESCRIPTION AND LOCATION:
Aerobic System Design for a single-family residence located on identified 10.0 acre tract in the [redacted] The property is in San Augustine County. (See attached map)

DESIGN CRITERIA:

Water Source: Public
Type of Dwelling: Residential (Wood frame w/concrete foundation)
No. Of Bedrooms: 4
No. Of Residents: 2
Estimated Daily Flow: 300 Gallons per Day (w/low flow fixtures)

SPRAYFIELD DESIGN:

Land Disposal Application Rate: 0.041 Gallons/Sq. Ft. /Day
Area Required: 7317.08 Sq. Ft.
Area Designed: 7457.30 Sq. Ft.
Overlap: 392.70 Sq. Ft.

AEROBIC SYSTEM & COMPONENTS REQUIRED:

Treatment Plant Manufacturer: TCEQ Approved System
Plant Sizing: 4bdrm <2501 Sq.Ft. = 480 GPD
Model Number: 500 GPD Aerobic System (TBA)
Pump Tank Capacity: 500-Gallon (minimum)
Trash Tank Capacity: 325-Gallon (minimum)
Effluent Pump: ½ HP Submersible or Equivalent
Disinfection: Approved Liquid Chlorinator
Alarms: Audible & Visible High Water Alarm
Effluent Pump Timer Requirement: optional/20' setback maintained
Final Disposal: Surface Irrigation
(3) Rainbird Maxi-Paw sprinklers with # 10 Low Angle Nozzle or Equivalent

VARIANCE REQUEST:
None

1/14/16

STATE OF TEXAS
DAVID ARNOLD
3382
REGISTERED
SANITARIAN

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

JN80516
January 14, 2016

DESIGN NOTE:

Property lines shown are based on owner/owner representative information only. Slight adjustments to the spray head locations may be required because of vegetative obstructions. Setback distances must be maintained where applicable. (See Site Design Note)

CALCULATIONS:

1. **SINGLE FAMILY RESIDENCE**
   4 BEDROOM HOME=300GPD

   TOTAL = 300GAL/DAY

   300 gal/day / .041 = 7317.08 SQ.FT. REQUIRED

   30' x30' x 3.14 =2826.00 SQ.FT. /PER SPRINKLER HEAD
   40' x40' x 3.14 =5024.00 SQ.FT. /PER SPRINKLER HEAD
   Overlap=392.70 SQ.FT.
   20'x50'x.7854/2=392.70'

   HEAD #1 (40' RADIUS) 180 DEGREE ROTATION = 2512.00 SQ. FT.
   HEAD #2 (40' RADIUS) 180 DEGREE ROTATION = 2512.00 SQ. FT.
   HEAD #3 (30' RADIUS) 360 DEGREE ROTATION = 2826.00 SQ.FT.

   TOTAL DESIGNED = 7457.30 SQ.FT.

The information contained herein is to serve as design documentation for the installation of an aerobic sewer system with surface irrigation.

This aerobic system is to be installed and maintained in accordance with all state and local on-site sewage facility regulations. Upon commencement of construction, minor design changes may be required due to physical constraints at the job site. Any variance request or major construction change deemed necessary at the time of construction will require notification by the installer to the designer and the local regulatory agency. The installer shall obtain approval for these changes by the regulating agency.

The specifications used in this design were based on TCEQ On-Site Sewage Facility Regulations. Any attempt to modify this aerobic system design to allow for the treatment of waters other than domestic waste or to exceed the design capacity of this system with increased hydraulic loading will require re-evaluation by the local regulatory agency. A reasonable attempt has been made to accurately depict the location of the residence, property lines, outbuildings, underground utilities, sewer line connections, and proposed realty improvements.

This designer does not warrant the materials, installation, or proper operation of this aerobic system for any period of time if installed by a representative of a company other than D&S Environmental Services.

This designer is not responsible for identifying, locating and/or marking boundary lines for any property owner or property owner representative. Any boundary lines represented herein are based on owner information and any existing boundary markings such as pins, posts, flags and fencing.

1/14/16

STATE OF TEXAS
DAVID ARNOLD
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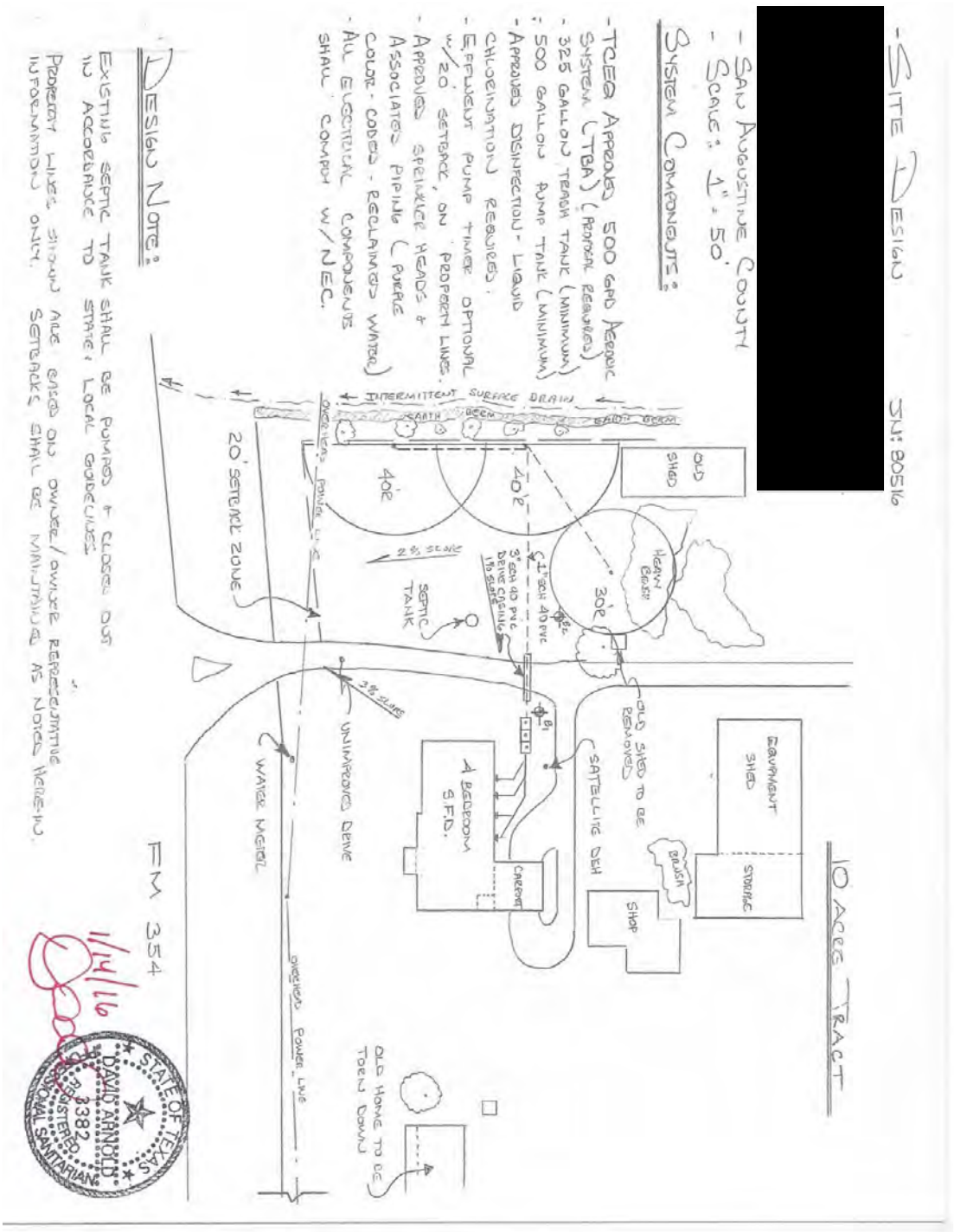
PROFESSIONAL SANITARIAN

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01



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SITE EVALUATION FORM

DATE: 1/12/16 @ 11:40 AM SITE VISIT Job Number:_____
HOME/BUSINESS OWNER [redacted]
SUBDIVISION: SECTION LOT BLOCK
SURVEY: [redacted]
STREET ADD
ACREAGE/LOT SIZE: 10 Acre Tract

TOPOGRAPHY

SLOPE
FLAT: (UNDER2%) _____ SLIGHT: (UNDER 6%) ✓ SEVERE: (OVER 30%) _____
VEGETATION
GRASS/BRUSH: ✓ LIGHTLY WOODED: ✓ HEAVILY WOODED: _____
SITE DRAINAGE: ____POOR ✓ADEQUATE ____GOOD ____OTHER

FLOOD PLAIN

Property is located:
OUTSIDE THE 100 YEAR FLOOD PLAIN ✓
PARTIALLY IN THE 100 YEAR FLOOD PLAIN _____
IN THE 100 YEAR FLOOD PLAIN _____
IN 100 YEAR FLOOD PLAIN AND FLOODWAY_____

WATER SUPPLY

PUBLIC ✓ COMMUNITY _____ PRIVATE_____
SIZE OF WELL_____ YEAR DRILLED_____ DRILLER:_____
DEPTH OF WELL_____FEET

- ALL WELL REQUIRED DISTANCES MUST BE MAINTAINED
- IF NEIGHBORING WELLS EXIST THEY MUST BE SHOWN ON THE DESIGN

TYPE OF FACILITY Residence 4 BDM **WASTEWATER USAGE RATE** USAGE RATE 300 GPD

SOIL ANALYSIS

X	SOIL TEXTURE B_1	B_2 SOIL CLASS	LONG TERM LOADING RATE
	COURSE SAND/GRAVEL	Ia	>.50
	SAND/LOAM SAND	Ib	0.38
	SANDY/LOAM/LOAM	II	0.25
X	SANDY CLAY LOAM/SANDY CLAY/CLAY LOAM/SILTY CLAY LOAM/ SILTY LOAM/SILT 0"-4"	III 0"-4"	0.20
X	CLAY/SILTY CLAY 4"+	4"+ IV	0.10

INDICATION OF SEASONAL WATER TABLE _____YES ✓NO DEPTH _____
Red Clay Shallow At This Site

NOTE: Subsurface horizons with colors of red, yellow and brown generally indicate good soil aeration and drainage throughout the year. Subsurface horizons that are in colors of gray, olive or blackish colors indicate poor aeration and soil drainage. Any soil profile that has the grayish colors indicative of high water tables within 36 inches of the surface or has ground water visible in the test bore less than 48 inches below the ground surface shall be deemed unsuitable for conventional subsurface disposal due to internal drainage.

IS THE SOIL SUITABLE FOR A CONVENTIONAL SYSTEM? ____YES ✓NO

I, David Arnold, a Registered Sanitarian and Licensed Site Evaluator, did personally conduct the evaluation on
3639 FM 354 San Augustine TX 75972
ADDRESS/LEGAL DESCRIPTION

I certify these results are true and correct for the property evaluated.

1/14/16
Date

Signature of Site Evaluator SE # OS0029868

D&S Environmental Service
936/632-058

SITEEVAL

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Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

Instructions to Bidders

Please include the following completed forms in your sealed bid proposal:

- ☐ Bid Proposal Cover Page, with signature
- ☐ Pricing Proposal – Item Detail Costs, including Base Costs and Add On Costs
- ☐ List of Subcontractors (if applicable)
- ☐ Questionnaire

Please include the following documents in your sealed bid proposal:

- ☐ Copy of Installer Class II (OS II) license from the Texas Commission on Environmental Quality
- ☐ ANRA OSSF Professionals Registration Form. The form is included in Appendix A. If you have previously registered with ANRA, this document is not required for the bid proposal.
- ☐ Certificate of Liability Insurance ($1,000,000 coverage)
  If available, include the Certificate of Liability Insurance with the proposal. Proof of insurance will be required prior to contract execution.

Responses to the RFP are due by 10:00 AM on Monday, February 8, 2016. One (1) unbound hard copy of the proposal response is required. Submission must be delivered in a **sealed envelope** labeled on the exterior with the following:

Bidder/Firm Name:	_____
RFP Name:	Installation of OSSFs in the Attoyac Bayou Watershed
RFP Number:	CWA-2016-01
Date Issued:	January 14, 2016
Date Due:	February 8, 2016 at 10:00 AM

Submissions are to be delivered to:

Angelina & Neches River Authority
ATTN: Brian Sims
210 E. Lufkin Ave.
Lufkin, TX 75901

***** LATE PROPOSALS WILL NOT BE CONSIDERED *****

Bid Proposal Cover Page

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed

RFP Number:	CWA-2016-01
Date Issued:	January 14, 2016
Date Due:	February 8, 2016 at 10:00 AM Sealed Bids will be opened at this time at the ANRA Central Office, 210 E. Lufkin Ave., Lufkin, TX

Installer agrees to supply the products or services at the prices stated below in accordance with the terms, conditions, and specifications contained in this RFP.

Company Name: _____

Owner Name: _____

Address: _____

_____

_____

Telephone: _____

Fax: _____

Email: _____

Signature: _____ Date: _____

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

Pricing Proposal – Item Detail Costs

Installer, please provide a FIRM, FIXED TOTAL COST for the On-Site Septic Facilities listed below. All prices must include back filling and grading, material, labor, equipment, supervision, transportation (up to 50 miles round trip), and overhead. The proposed price must also include all other costs, direct or indirect, that is not itemized elsewhere, but that will affect the price of said system.

The anticipated number of systems for this grant project is 20 – 23 systems total, depending on unit cost and available grant funds. Systems will be installed in the portions of Rusk, Shelby, Nacogdoches, and San Augustine counties that lie within the Attoyac Bayou watershed.

Base Costs

	Base Bid	
SYSTEM COMPONENTS	**500 GPD Aerobic**	**750 GPD Aerobic**
Treatment Plant Manufacturer	TCEQ Approved System	TCEQ Approved System
Pump Tank Capacity	500 gallon (minimum)	750 gallon(minimum)
Trash Tank Capacity	325 gallon (minimum)	500 gallon (minimum)
Effluent Pump	½ HP Submersible (or equivalent)	½ HP Submersible (or equivalent)
Disinfection	Approved Liquid Chlorinator	Approved Liquid Chlorinator
Alarms	Audible & Visible High Water Alarm	Audible & Visible High Water Alarm
Effluent Pump Timer Requirement	Optional w/20' setback on property lines	Optional w/20' setback on property lines
Final Disposal	Surface Irrigation	Surface Irrigation
Sprinklers	3 Rainbird Maxi-Paw sprinklers with # 10 Low Angle Nozzle (or equivalent)	4 Rainbird Maxi-Paw sprinklers with # 10 Low Angle Nozzle (or equivalent)
Maintenance Contract	2 Year Contract	2 Year Contract
Maintenance Inspections	4X per year for 2 years	4X per year for 2 years
BID PRICE	$	$

Permit Fees

The Installer will assist the homeowner in preparing the permit application. The cost of the permit fees is to be paid by the Installer and invoiced to ANRA for reimbursement with the cost of the system. The permit fees for each county in the project area are as follows:

County	Authorized Agent	Permit Fee
Rusk	Rusk County	$ 275.00
Shelby	TCEQ Region 10 (Beaumont)	$ 210.00
Nacogdoches	Nacogdoches County	$ 300.00
San Augustine	Angelina & Neches River Authority	$ 420.00

Filing Fees

The Installer will file the Affidavit to the Public for the homeowner with the county of residence. The cost of the filing fee will be paid by the Installer and invoiced to ANRA for reimbursement with the cost of the system. The filing fees for each county in the project area are as follows:

County	Filing Fee
Rusk	$16 (1st page) / $4 (additional)
Shelby	$26 (1st page) / $4 (additional)
Nacogdoches	$26 (1st page) / $4 (additional)
San Augustine	$26 (1st page) / $4 (additional)

Add-On Costs

Additional items not included in the base cost of the system should be included below.

Additional Costs	Bid Price
Pump and Fill existing septic tanks	$
Timer on systems with 10'setback, each	$
Class II Soil backfill (if adequate amount is not available at jobsite), per cubic yard	$
Additional Sprinkler Heads (material and installation), each	$
Additional Risers (material and installation), each	$
Additional PVC pipes for undisclosed stub outs (material and installation), per linear foot	$
Additional electrical conduit (material and installation), per linear foot	S
Mileage (>50 miles round trip), per mile	$

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

List of Subcontractors

If subcontractors are to be used for a portion of this project (excavation, installation, electrical, system maintenance, etc.), a list of subcontractors must be provided. Use additional sheets if necessary.

Company Name:	
Owner Name:	
Address:	
Telephone:	
Fax:	
Services Provided:	

Company Name:	
Owner Name:	
Address:	
Telephone:	
Fax:	
Services Provided:	

Company Name:	
Owner Name:	
Address:	
Telephone:	
Fax:	
Services Provided:	

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

Questionnaire

PLEASE COMPLETE THE FOLLOWING INFORMATION:

Previous Experience
Number of years of experience the proposer has had providing similar services: _____ years

Do you have previous experience performing work for state or federal grant projects (such as Texas Commission on Environmental Quality, Texas Water Development Board, Texas State Soil and Water Conservation Board, or the Environmental Protection Agency)?

_____ YES _____ NO

Please briefly describe previous experience:
_____
_____
_____
_____

Licenses/Certifications/Insurance
Do you have the required licenses, certifications, and insurance coverage as required in the RFP specifications?

_____ YES _____ NO

Have you included copies of these documents with your RFP Response? *Failure to provide this information may cause your proposal to be rejected*.

_____ YES _____ NO

Ability to Perform Work
If awarded this project, does your firm have the ability to install up to 23 aerobic OSSFs between February 10, 2016 and August 31, 2016?

_____ YES _____ NO

Please briefly describe the staffing (number, years of experience, etc.) available for this project, as well as the equipment available to perform the work:

_____
_____
_____
_____

Installation of On-Site Sewage Facilities in the Attoyac Bayou Watershed
RPF# CWA-2016-01

APPENDIX A – ANRA OSSF Professionals Registration Form

ANRA
ANGELINA & NECHES RIVER AUTHORITY

ON-SITE SEWAGE FACILITIES PROFESSIONALS REGISTRATION FORM

Information provided on this form will be used to verify the status of On-Site Sewage Facility (OSSF) professional licensure with the Texas Commission on Environmental Quality (TCEQ). The information will be used to disseminate information from the Angelina & Neches River Authority OSSF Program to the OSSF professionals in our service area. This information will also be used to provide a list of OSSF professionals to the general public as part of ANRA's OSSF application process. The list will be available through ANRA's office and on ANRA's website under the OSSF section at http://www.anra.org/divisions/wastewater/ossf/index.html. The information provided to ANRA is subject to release under the Public Information Act, Texas Government Code Chapter 552.

☐ Please check this box if you do **NOT** wish to have any of your information posted to our website or provided with OSSF application packets.

Fields marked with an asterisk (*) are required:

Registration Type:* ☐New ☐Revision ☐Annual Renewal

REGISTRANT INFORMATION

Name:* _____
Company: _____
Address:* _____
_____
_____

Telephone:* (____) _____
Fax: (____) _____
E-mail: _____
Company Website: _____

REGISTRATION CATEGORY:*

	License #*	Exp. Date
☐OSSF Installer Class II (OSII)	_____	_____
☐OSSF Installer Class I (OSI)	_____	_____
☐Registered Sanitarian (RS)	_____	_____
☐Site Evaluator (SE)	_____	_____
☐Maintenance Provider	_____	_____

Additional Information (Alternate contact phone #, email address, etc.)
_____
_____
_____

An email address is required if you wish to receive updates from the Angelina & Neches River Authority regarding the On-Site Sewage Facilities Program. Email addresses provided to ANRA will not be included on ANRA's website or with the list of registered professionals provided to the public.

***** PLEASE INCLUDE A COPY OF YOUR CURRENT TCEQ LICENSE(S) WITH YOUR REGISTRATION FORM*****

Submitted by: _____ _____
Signature *Date*

Please return this form to ANRA's office in person, by mail, by fax, or by email.

Angelina & Neches River Authority
210 E. Lufkin Avenue
Lufkin, TX 75901

Phone: 936-632-7795
Fax: 936-632-2564
Email: ossf@anra.org

APPENDIX K - Request for Proposals Addendum No. 1- OSSF Installation

ANGELINA & NECHES RIVER AUTHORITY

ADDENDUM No. 1

Request for Proposals CWA-2016-01
INSTALLATION OF ON-SITE SEWAGE FACILITIES IN THE ATTOYAC BAYOU WATERSHED
Addendum Issued 1/29/2016

CLARIFICATIONS AND MODIFICATIONS TO THE RFP

For the purposes of calculating the Base Bid for aerobic On-Site Sewage Facilities to be installed for this Project, and to assure that Installers are bidding on the same quantities and types of materials, please use the following assumptions:

1.) PVC Sewer Pipe: The Base Bid should include 50' of 4" SDR 26 PVC or 4" Schedule 40 PVC pipe to connect the residence to the treatment system. Any pipe in excess of 50' in length may be billed as an Add-On cost on a linear foot basis, with the price to include both materials and labor.

2.) Sprinkler Pipe: The Base Bid should include 200' of ¾" purple Schedule 40 PVC pipe for the irrigation of effluent from the treatment system. Any pipe in excess of 200' in length may be billed as an Add-On cost on a linear foot basis, with the price to include both materials and labor.

3.) Electrical Conduit: The Base Bid should include 60' of conduit and wiring to connect residential electrical service to the treatment system. Any conduit and wiring in excess of 60' in length may be billed as an Add-On cost on a linear foot basis, with the price to include both materials and labor.

This Addendum is posted on ANRA's website at the following address:

http://www.anra.org/about/public_information/news/OSSF_bid_invitation_2016-01.html

PREPARED IN COOPERATION WITH THE
TEXAS COMMISSIONON ENVIRONMENTAL QUALITY AND
U.S. ENVIRONMENTAL PROTECTION AGENCY

This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement to Texas Commission on Environmental Quality. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.

APPENDIX L - Bid Calculation Worksheet

ANGELINA & NECHES RIVER AUTHORITY

RFP Name: Installation of OSSFs in the Attoyac Bayou Watershed
RFP Number: CWA-2016-01
Date Issued: 1/14/2016
Date Due/Bid Opening: 2/8/2016 10:00 AM

BID CALCULATION WORKSHEET

BID PROPOSAL				
BASE BID	**Bid Price**		**Estimated Quantity**	**Extended Price**
500 GPD Aerobic OSSF, each	$	-	15	$ -
750 GPD Aerobic OSSF, each	$	-	8	$ -
Subtotal				**$ -**
ADD-ON BID				
Pump and fill existing tanks, each	$	-	23	$ -
Timer on systems w/ 10' setback, each	$	-	5	$ -
Class II Soil backfill, yd3	$	-	4	$ -
Additional Sprinkler Heads, material & installation, each	$	-	4	$ -
Additional Risers, material & intallation, each	$	-	10	$ -
Additional PVC pipes, sewer pipe, linear foot	$	-	400	$ -
Additional electrical conduit, linear foot	$	-	50	$ -
Mileage (>50 miles round trip), per mile	$	-	400	$ -
Subtotal				**$ -**
TOTAL BID PRICE				**$ -**

ADDITIONAL PROJECT COSTS				
PERMIT FEES	**Fee**		**Estimated Quantity**	**Extended Price**
Rusk County	$	275.00	1	$ 275.00
Shelby County	$	210.00	2	$ 420.00
Nacogdoches County	$	300.00	8	$ 2,400.00
San Augustine County	$	420.00	12	$ 5,040.00
Subtotal			23	**$ 8,135.00**
FILING FEES	**Fee**		**Estimated Quantity**	**Extended Price**
Rusk County	$	16.00	1	$ 16.00
Shelby County	$	26.00	2	$ 52.00
Nacogdoches County	$	26.00	8	$ 208.00
San Augustine County	$	26.00	12	$ 312.00
Subtotal			23	**$ 588.00**
OSSF SYSTEM DESIGN	**Fee**		**Estimated Quantity**	**Extended Price**
Aerobic OSSF Design	$	750.00	23	$ 17,250.00
Subtotal			23	**$ 17,250.00**

TOTAL ESTIMATED COST FOR PROJECT FOR THIS BID PROPOSAL	
Base Bid Cost	$ -
Add-On Bid Cost	$ -
Permit Fees	$ 8,135.00
Filing Fees	$ 588.00
OSSF System Design	$ 17,250.00
TOTAL	**$ 25,973.00**

TOTAL ESTIMATED COST FOR PROJECT FOR THIS BID PROPOSAL	$ 25,973.00
TOTAL AMOUNT BUDGET FOR OSSF INSTALLATION (23 OSSFs @$7,000/ea)	$ 161,000.00
AMOUNT OVER OR UNDER BUDGET	**$ (135,027.00)**