The background of the slide is a photograph of a bayou. The water is calm and reflects the surrounding trees and sky. The trees are mostly bare, suggesting a late autumn or winter setting. The sky is overcast and grey.

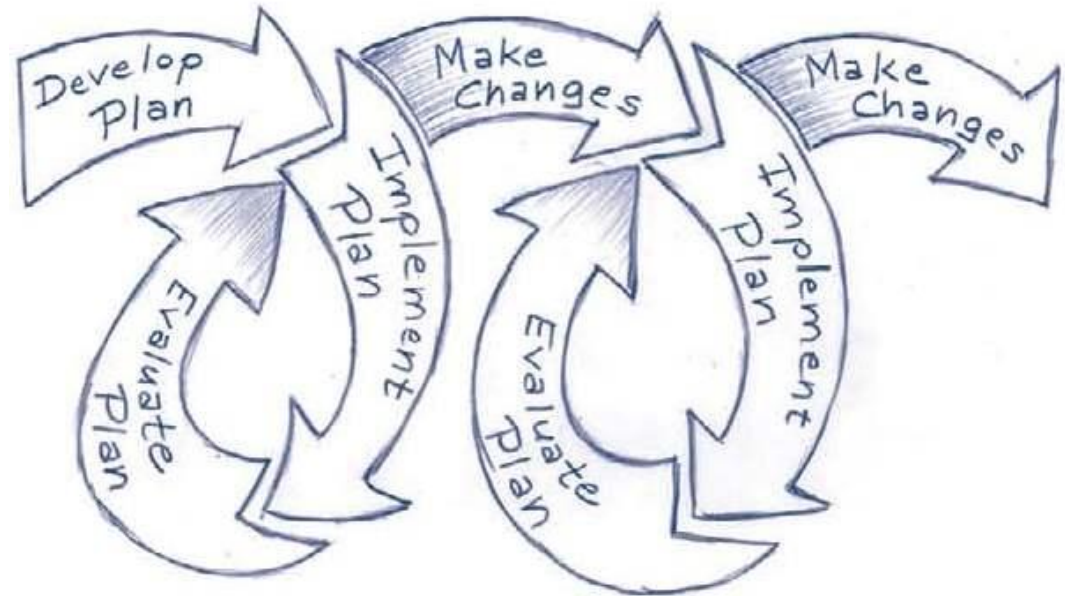
**ATTOYAC BAYOU WATERSHED
PROTECTION PLAN OVERVIEW**
February 20, 2014

Attoyac Bayou WPP – Draft 1

- 1st complete draft of the WPP
- Combines earlier draft chapters and results from specific project tasks
- Presents an assessment of the watershed, water quality and reasons bacteria levels are above the current water quality standard
- Recommends management measures to reduce bacteria levels in the watershed
- We need you to review the document and make sure everything has been described appropriately, assessments and management recommendations are reasonable, and that timelines and goals are achievable

Chapter 1 - Watershed Management

- Definition of a Watershed
- Watershed Impact on Water Quality
- The Watershed Approach
- WPP Development Process
- Watershed Coordinator
- Private Property Rights
- Adaptive Management



Chapter 2 – Regional History

- Pre-History
- European Exploration & Caddoan Culture
- Early Texas
- Railroads
- Agriculture
- Logging
- Oil & Natural Gas



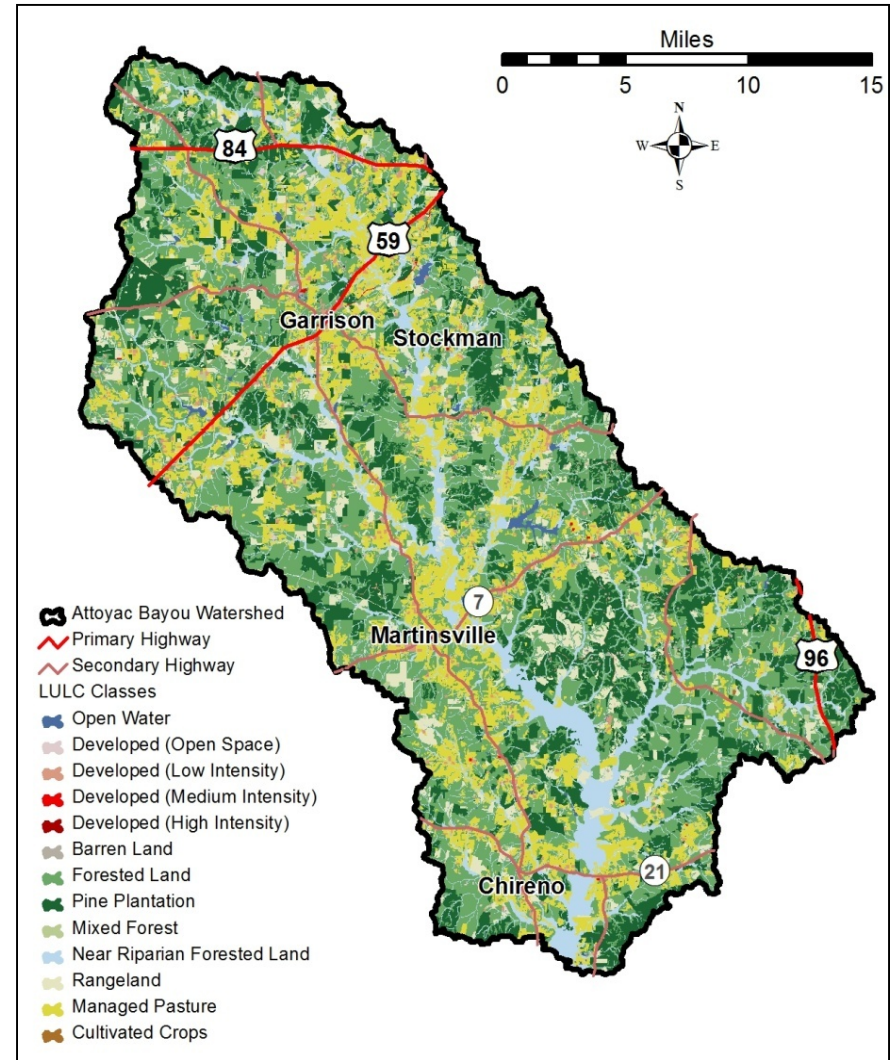
Typical logging scene in East Texas after arrival of the railroad.



Cutover forest land in East Texas.

Chapter 3 – Watershed Characteristics

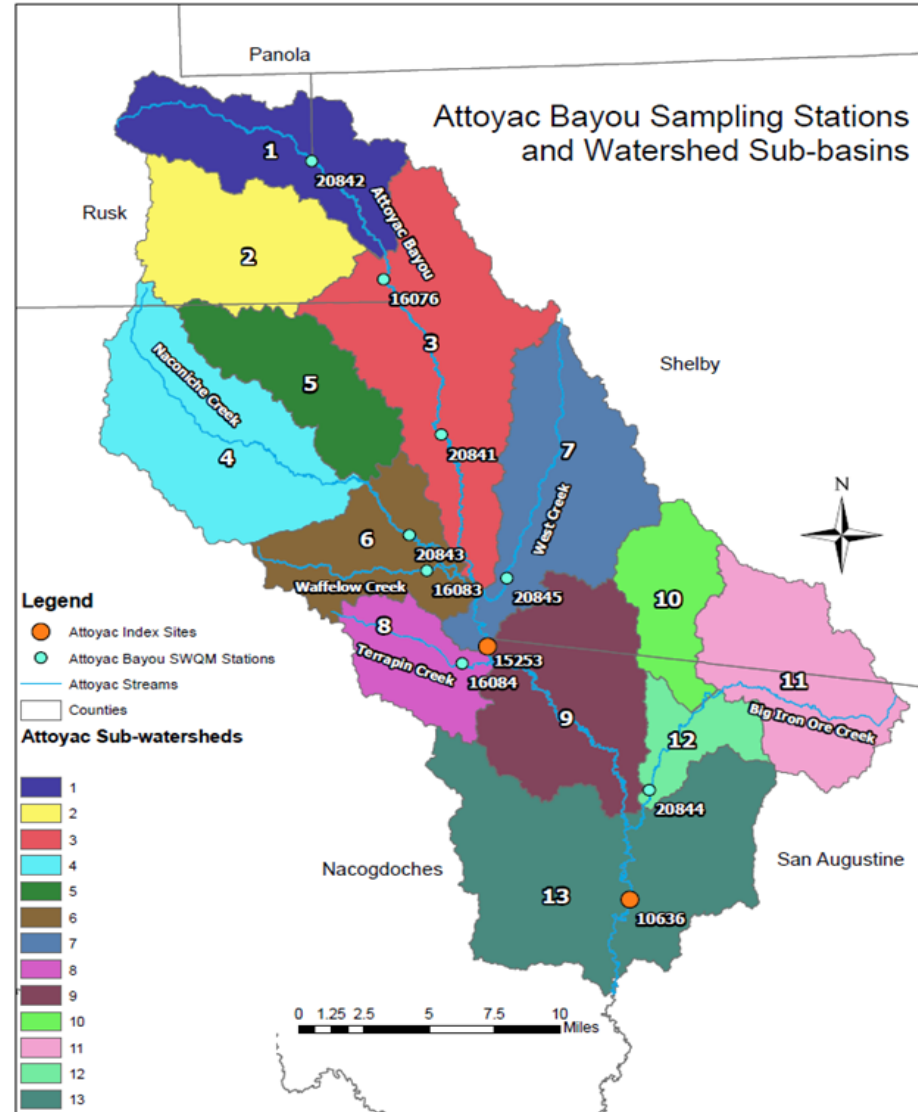
- Attoyac Bayou Watershed Location
- Watershed Boundaries
- Topography
- Soils
- Landuse/Landcover
- Ecoregions
- Climate
- Water Resources
- Population



Attoyac Bayou watershed landuse and landcover

Chapter 4 – Water Quality Assessments

- Water Body Assessments
- Designated Uses
- Assessment Units
- Monitoring Station Locations
- Index Sites
- Watershed Subbasins
- Texas Surface Water Quality Standards
- Historic Water Quality



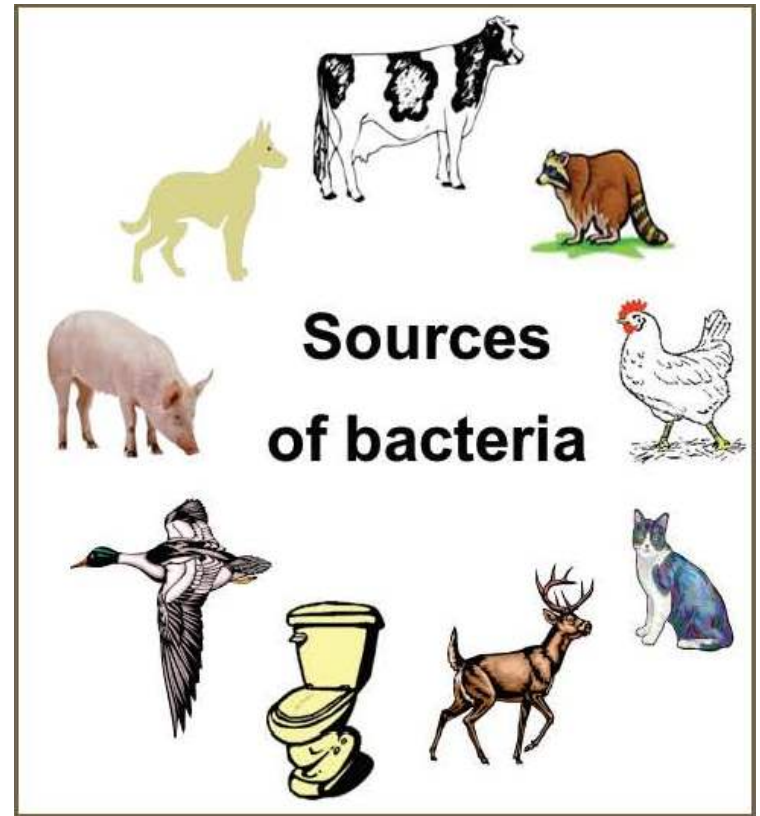
Chapter 5 – Current Watershed Conditions

- Demographics
- Agricultural Production
- Forestry Production
- Need to add summary of Oil & Gas production
- Anything else?

County	Industry Output (in millions of \$)		Employment (# of jobs)		Labor Income (in millions of \$)		Indirect Business Tax (million \$)
	Direct Impacts	Total Impacts	Direct Impacts	Total Impacts	Direct Impacts	Total Impacts	
Nacogdoches	135.32	197.48	678	1,166	28.72	46.82	1.24
Rusk	87.50	123.69	562	861	20.62	31.65	0.53
San Augustine	24.58	32.66	163	231	5.03	7.43	0.13
Shelby	115.90	171.11	698	1,141	36.05	53.56	1.45
Totals	363.30	524.94	2,101	3,399	90.42	139.46	3.35

Chapter 6 – Potential Sources of Pollution

- Residential On-Site Sewage Facilities
- Pets
- Livestock
- Poultry
- Wastewater Treatment Plants
- Oil and Gas On-Site Sewage Facilities
- Wildlife and Feral Animals
- Illegal Dumping

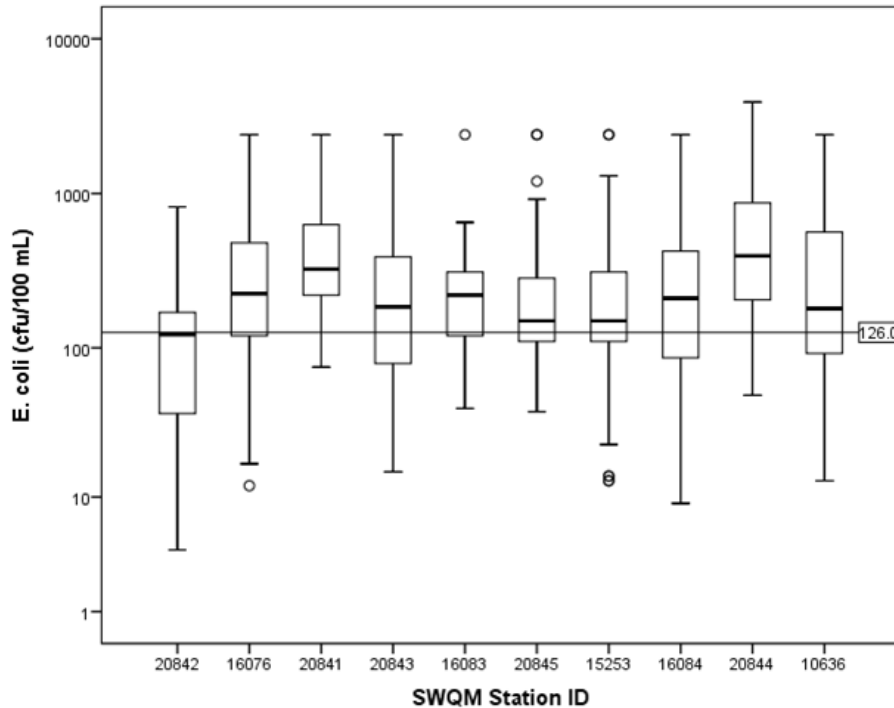


Chapter 7 – Watershed Pollutant Source Assessment

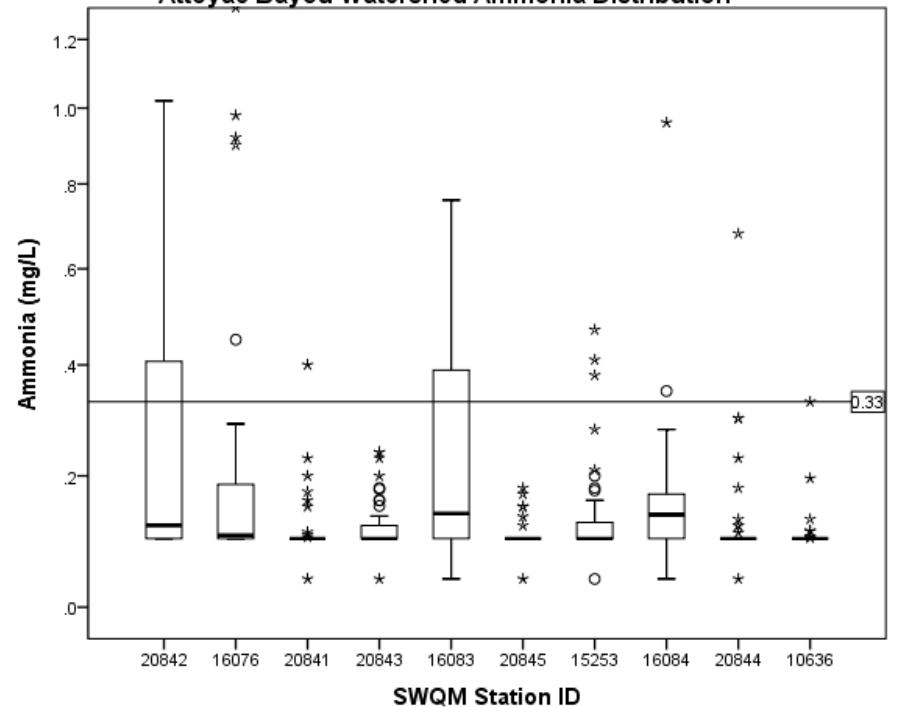
- Project Water Quality Monitoring
 - *E. coli* levels above standard
 - No significant differences in *E. coli* levels between sites
 - Ammonia not problematic

Station	Number of Samples	Minimum	Maximum	Geometric Mean	Assessment Unit (AU)	AU Geometric Mean
10636	64	13	2400	241.1	0612_01	241.1
15253	50	13	2400	173.4	0612_02	244.7
20841	40	75	2400	376.5	0612_02	
16076	38	12	2400	208.6	0612_03	162.3
20842	14	4	820	82.1	0612_03	
20844	56	49	3900	454.3	NA	NA
16084	43	9	2400	194.3	NA	NA
20845	43	38	2400	346.6	NA	NA
16083	25	40	2400	201.9	NA	NA
20843	46	15	2400	189.5	NA	NA

Attoyac Bayou and Tributaries *E. coli* Summary: Upstream to Downstream



Attoyac Bayou Watershed Ammonia Distribution



Chapter 7 – Watershed Pollutant Source Assessment

■ Load Duration Curves

- Establish numeric load reduction goal to achieve current standard plus a 10% margin of safety
- ‘High flow’ reduction was used as a somewhat conservative reduction goal

Load Duration Curve (Station 10636 2010-2012; n=62)

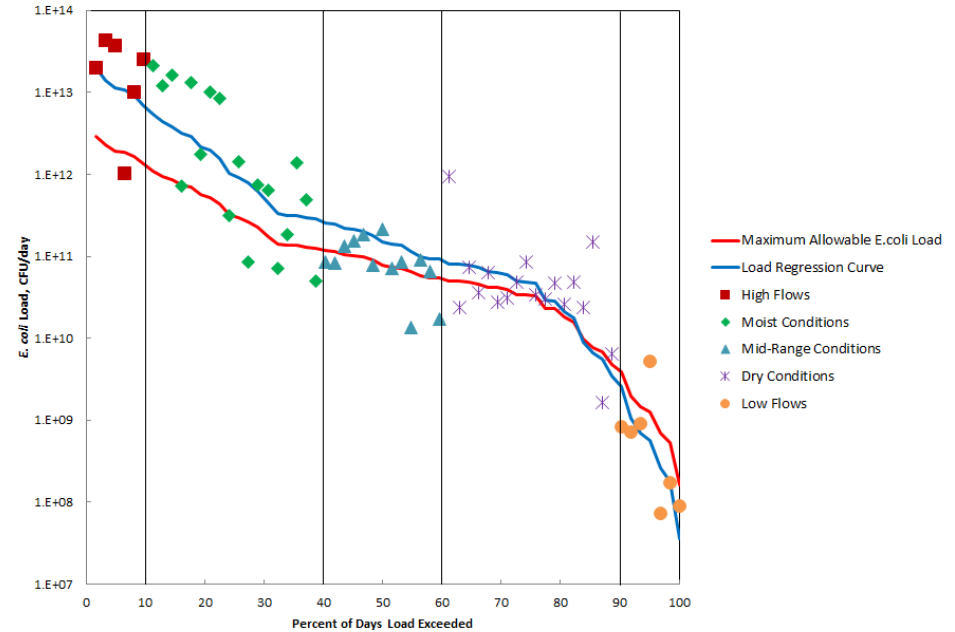
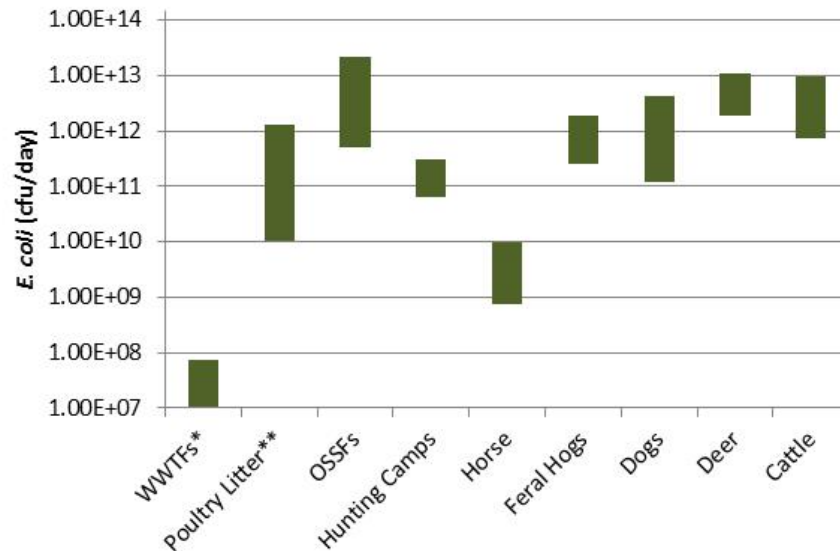
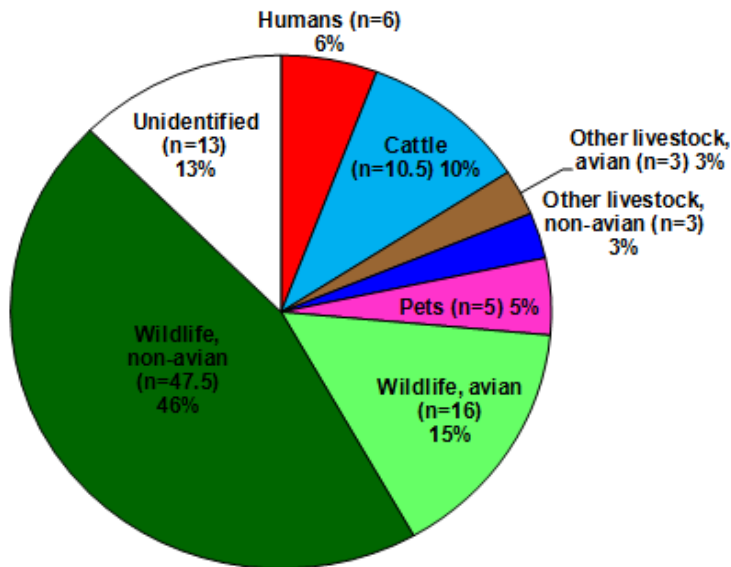
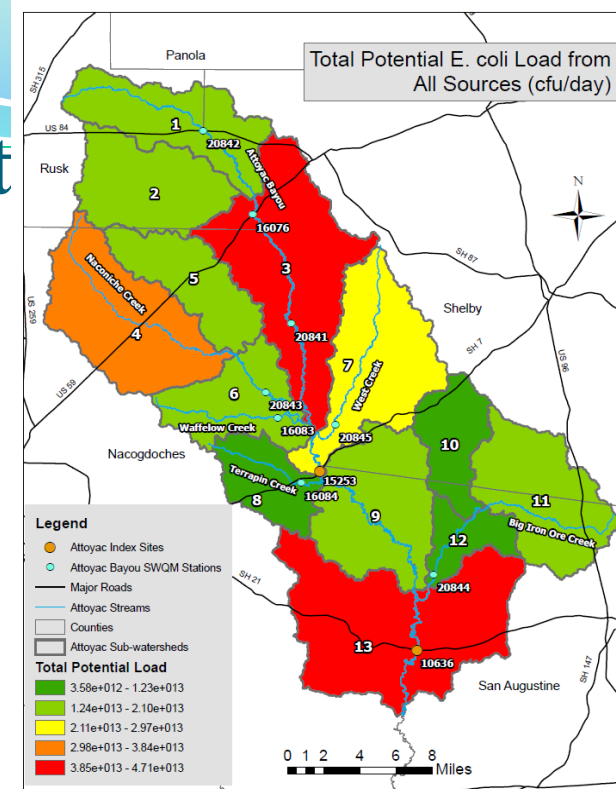


Table 7.3. *E. coli* loadings and reductions needed to meet the water quality goal at Station 10636 (Hwy 21) as determined by LDC analysis

Flow Condition	% Exceedance	% Reduction Needed to Meet Goal	Daily Loading (cfu/day)	Estimated Annual Load (cfu/year)	Daily Loading Reduction Needed (cfu/day)	Annual Loading Reduction Needed (cfu/year)
High Flows	0-10	85	1.20E+13	4.38E+14	1.02E+13	3.73E+14
Moist Conditions	10-40	71	1.70E+12	1.86E+14	1.31E+12	1.43E+14
Mid-Range Flows	40-60	53	1.65E+11	1.21E+13	9.07E+10	6.62E+12
Dry Conditions	60-90	27	4.25E+10	4.66E+12	1.63E+10	1.78E+12
Low Flows	90-100	N/A*	7.68E+08	2.80E+10	N/A	N/A

Chapter 7 – Watershed Pollutant Source Assessment

- SELECT Model
 - Ranked source contribution potential
 - Demonstrated highest potential contribution areas
- BST identified bacteria sources in the waterbody and their % contribution



Chapter 8 – Watershed Goals

- **Mission Statement**
 - “Promote the conservation and stewardship of the Attoyac Bayou watershed...”
- **Goals**
 - Meet Designated Water Quality Standards
 - Determine and Recommend and Appropriate Water Quality Standard
 - Improve Awareness and Understanding of Local Water Quality Concerns
 - Encourage Voluntary Adoption of Practices that Improve Water Quality through Better Watershed Stewardship

Chapter 9 – Watershed Management Strategies

- Management Recommendations driven by 2 key factors:
 - Ability to reasonably manage bacteria source
 - Proximity to waterbody
- Cattle and Other Livestock
- Feral Hogs
- OSSFs

Chapter 10 – Financial Assistance

- Lists potential sources of funding that can be sought to implement the WPP
 - Federal Programs
 - Farm Bill Programs
 - Clean Water Act
 - Others
 - State Programs
 - Clean Rivers Program
 - Water Quality Management Plan Program
 - Others

Chapter 11 – Education and Outreach

- Role of the Watershed Coordinator
- Documents education and outreach to date
 - Website
 - News releases
 - Meetings
 - Texas Watershed Steward program
- Highlights future needs and planned events
 - Field days
 - Workshops
 - Meetings
 - Newsletters
 - Roadway signage

Chapter 12 – Measuring Success

- Water quality targets
 - Numeric water quality goal for *E. coli* at index sites
 - 113 cfu/100mL
- Interim measurable milestones
 - Implementation goals and schedule
 - Separated into incremental groups
 - 0-3 years
 - 4-6 years
 - 7-10 years

Chapter 13 – Plan Implementation

- Clearly describes plan implementation goals
- Presented in table format and includes:
 - Name of Management or Education Item
 - Party responsible for implementing the item
 - Planned implementation goals:
 - number of items and when they will be done
 - Unit and Total Costs
- Discusses technical assistance needs
- Implementation coordination

Other Components to be Added

- Executive Summary
- Complete Table of Contents
- List of Acronyms
- More Photos
- References Section
- Appendices
 - 9 Key Elements of Successful WPPs
 - Load Reduction Calculations

Stakeholder Input Needed

- Please take a copy of the WPP with you or download at: www.attoyac.tamu.edu/
- Review the plan and let us know if anything needs to be added, corrected or removed.
- Email comments or mail/deliver written comments by March 21st

Lucas Gregory
Texas Water Resources Institute
2260 TAMU
College Station, TX 77843-2260
lfgregory@ag.tamu.edu

Anthony Castilaw
Castilaw Environmental Services, LLC
510 E. Pilar St.
Nacogdoches, TX 75961
acastilaw@castilawenvironmental.com

Attoyac Bayou Watershed Protection Plan Development

About Meetings Reports & Publications Maps & Data Contacts Resources

The Attoyac Bayou is a sub-watershed within the Upper Neches River Watershed extending approximately 82 miles through Rusk, Nacogdoches, San Augustine, and Shelby Counties before emptying into Sam Rayburn Reservoir. Several rural communities can be found throughout the area, with the majority of the lands in the watershed being used for cattle and poultry operations, forestry or recreational/wildlife uses.

The Attoyac Bayou is one of many rural watersheds listed as an impaired water body on the Texas Water Quality Inventory and 303(D) List due to high levels of *E. coli* bacteria. Three monitoring stations managed by the Angelina-Neches River Authority (ANRA), the US Geological Survey (USGS), and Texas Commission on Environmental Quality (TCEQ) have been providing water quality data on the bayou for a number of years. *E. coli* data were first collected beginning in 2000 and has consistently resulted in elevated *E. coli* levels that exceed

[Download](#) the draft Watershed Protection Plan

In the News

[Forest Pest Seminar set Feb. 14 in Lufkin](#)

[Meeting in Nacogdoches on Feb. 20 will focus on improving Attoyac Bayou water quality](#) AgriLife Today, February 3, 2014

[Attoyac Bayou bacterial tracking subject of May 16 Nacogdoches meeting](#) AgriLife Today, April 29,

Any Questions?



Lucas Gregory
Texas Water Resources Institute
979-845-7869
lfgregory@ag.tamu.edu