Attoyac Bayou WPP Development Update

Lucas Gregory
Texas Water Resources Institute

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Texas A&M AgriLife Research | Extension

Attoyac Bayou Approach

- To collect additional data in the Attoyac Bayou Watershed to better characterize the hydrology and *E. coli* levels present, assess the current uses of the water body

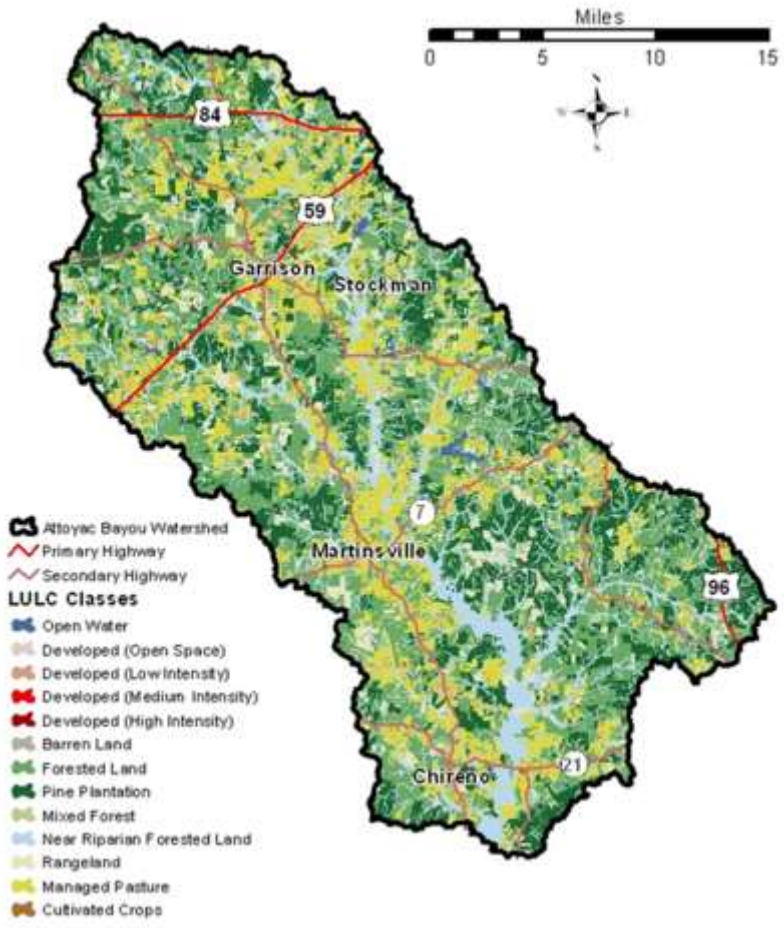
- Work to provide a local watershed partnership needed information to develop a plan to reduce in stream *E. coli* levels

Project Tasks

- Coordinate stakeholder involvement
- Conduct watershed survey and update GIS information
- Surface Water Quality Monitoring
- LDC and SELECT Modeling
- Recreational Use Attainability Analysis
- Bacterial Source Tracking
- Development of Watershed Protection Plan

Watershed Survey and GIS Update

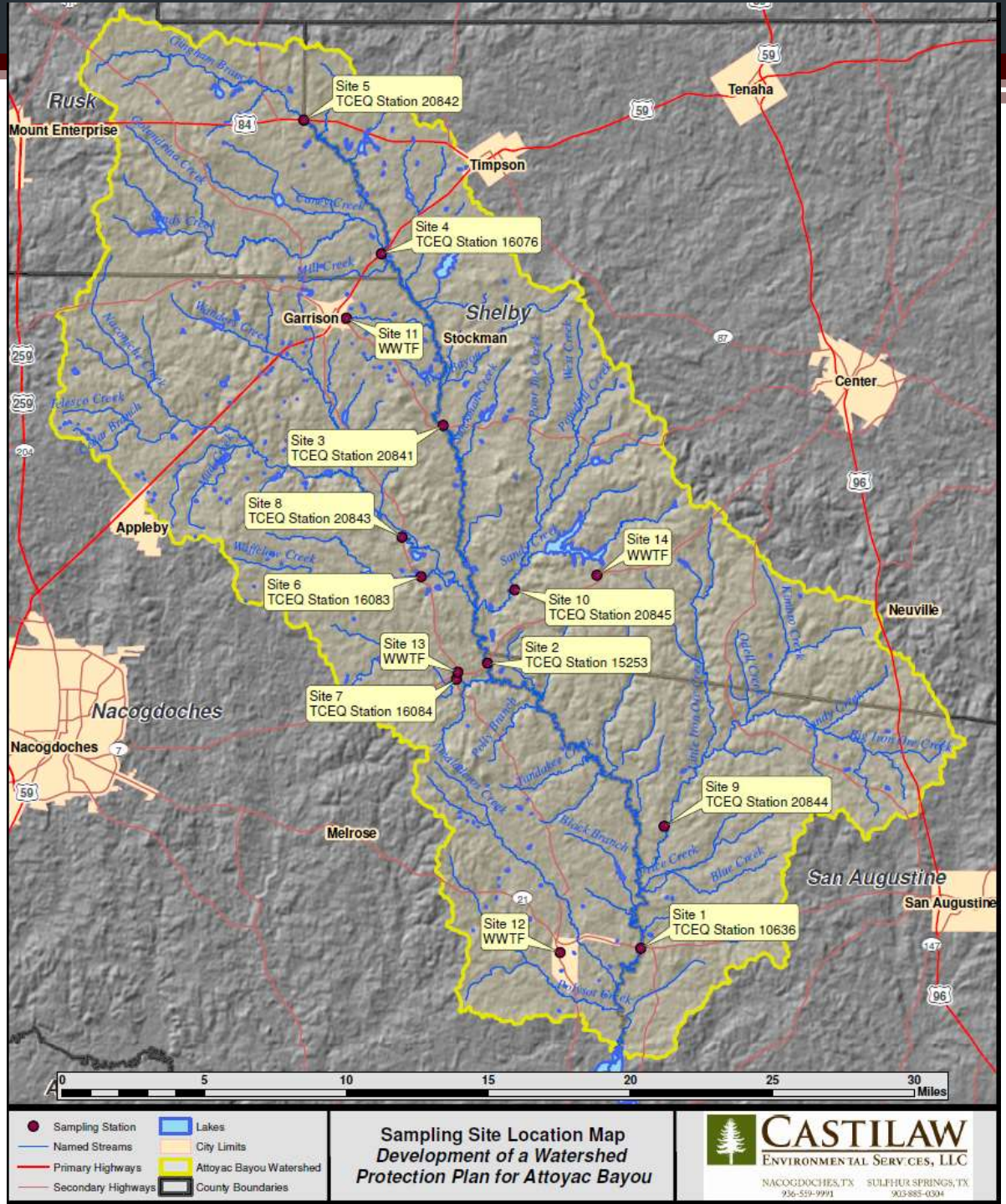
- Gather existing data
  - Animal population data
  - Soils data
  - Monitoring Stations
- Create an updated LU/LC layer
  - Combining most recent aerial imagery and on the ground verification
- Identify potential sources of pollution in the watershed



Surface Water Quality Monitoring

- Water samples collected bi-weekly at 10 locations
- Routine field parameters (Stream Temperature, pH, DO, Conductivity, Flow)
- Laboratory analysis for E-coli enumeration using IDEXX, plus ammonia N, nitrate-nitrite N, Total P, dissolved Ortho-P, and Total Suspended Solids

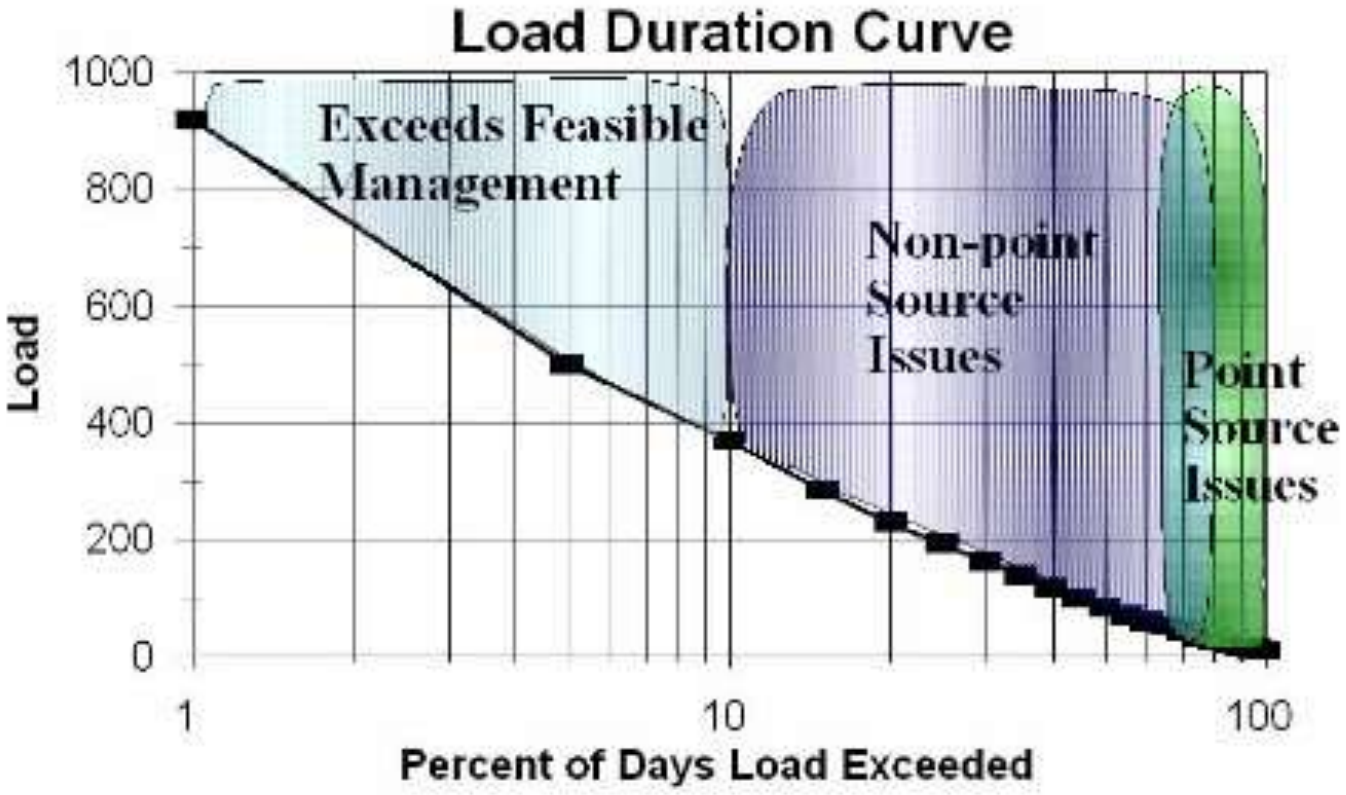
- Sampling completed in August 2012


Site 5
TCEQ Station 20842
Site 4
TCEQ Station 16076
Site 11
WWTF
Site 3
TCEQ Station 20841
Site 8
TCEQ Station 20843
Site 6
TCEQ Station 16083
Site 13
WWTF
Site 7
TCEQ Station 16084
Site 14
WWTF
Site 10
TCEQ Station 20845
Site 2
TCEQ Station 15253
Site 9
TCEQ Station 20844
Site 12
WWTF
Site 1
TCEQ Station 10636
Rusk
Mount Enterprise
Timpson
Tenaha
Garrison
Shelby
Stockman
Center
Appleby
Nacogdoches
Nacogdoches
Melrose
Neuville
San Augustine
San Augustine
0 5 10 15 20 25 30
Miles
Sampling Station
Named Streams
Primary Highways
Secondary Highways
Lakes
City Limits
Attoyac Bayou Watershed
County Boundaries
Sampling Site Location Map
Development of a Watershed
Protection Plan for Attoyac Bayou
CASTILAW
ENVIRONMENTAL SERVICES, LLC
NACOGDOCHES, TX 936-559-9991
SULPHUR SPRINGS, TX 903-885-0304

Load Duration Curves

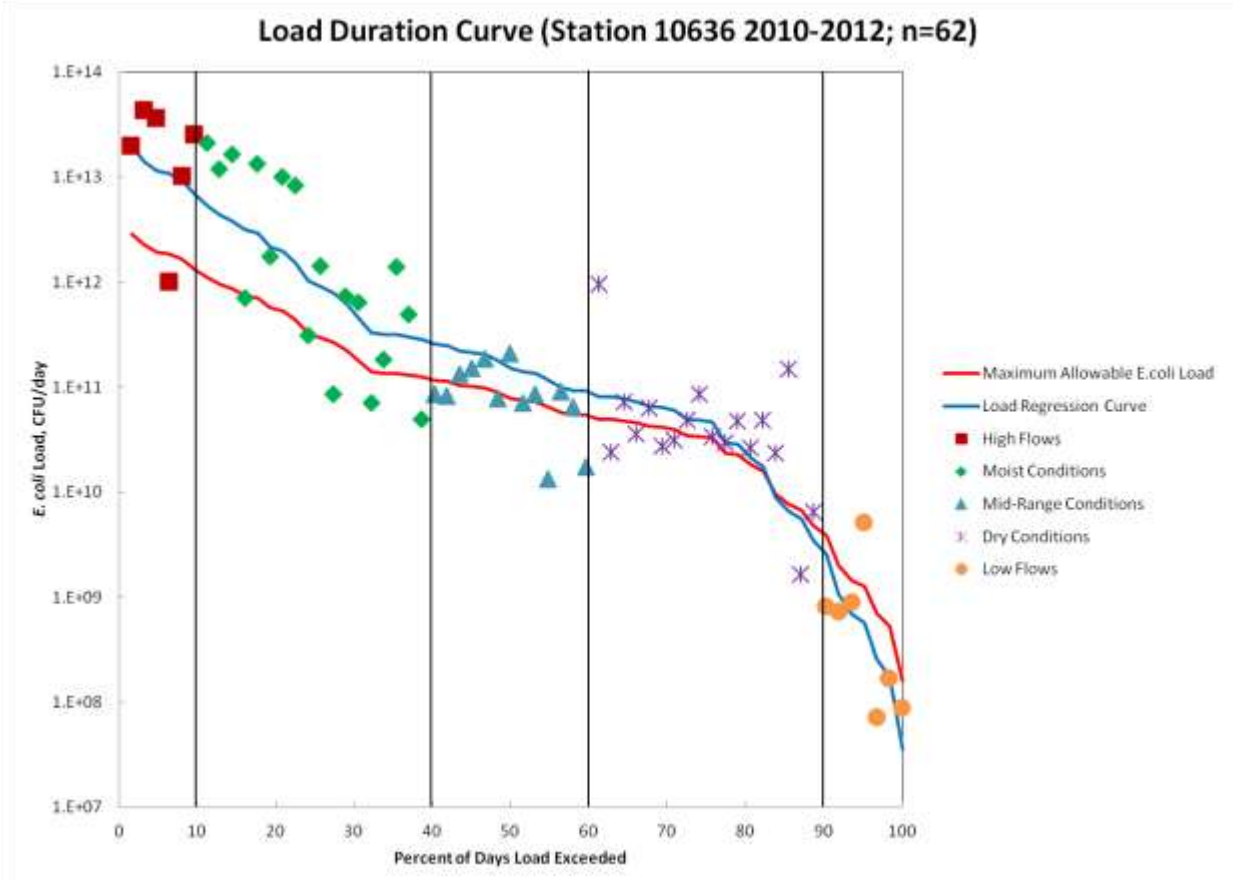
- Combines concentrations of a pollutant with flow at the same time to develop a load
- The LDC illustrates the load of a pollutant versus the time that a given load is exceeded
- Able to calculate a percent reduction needed to meet water quality standard

LDC Usefulness (source ID based on LDC)



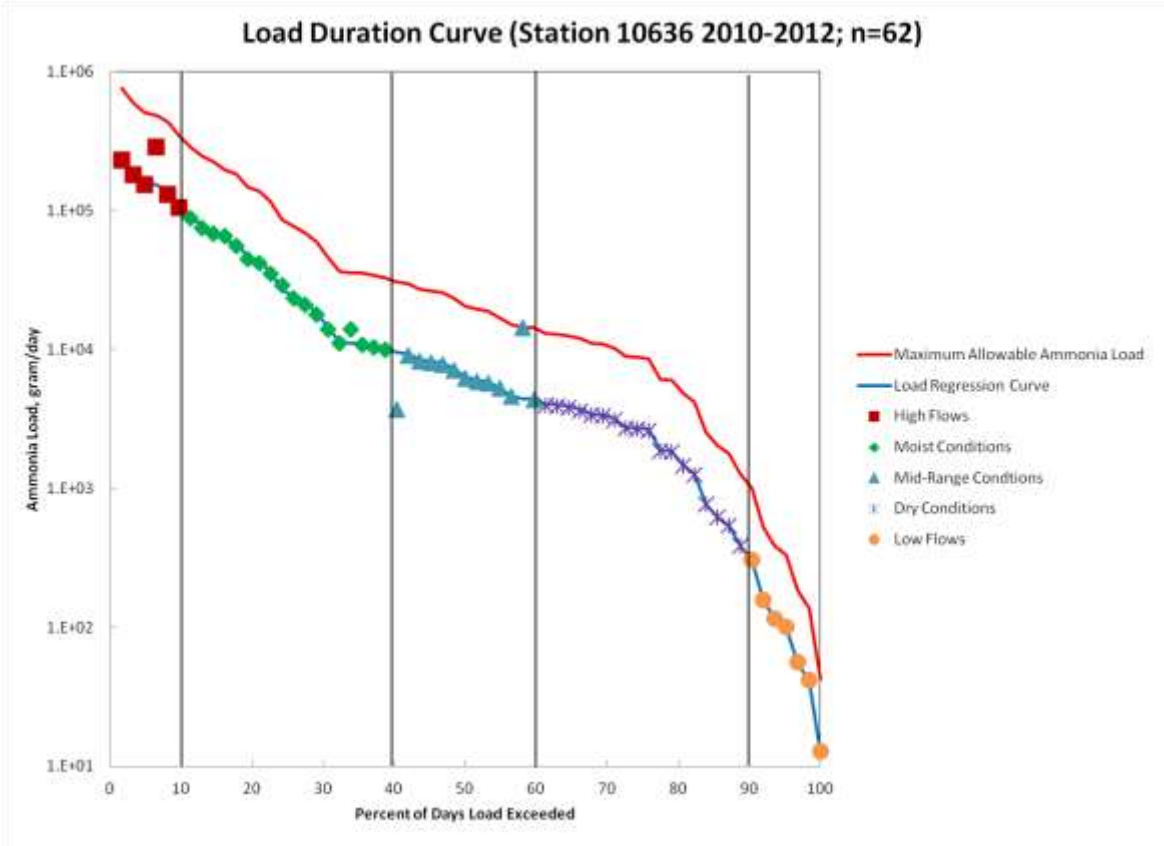
Attoyac at SH 21 (10636)

Flow Condition	% Exceedence	Percent Reduction	Daily Loading Reduction Needed (cfu/day)	Daily Loading (cfu/day)
High Flows	0-10	83	1.00E+13	1.20E+13
Moist Conditions	10-40	68	1.26E+12	1.70E+12
Mid-Range Flows	40-60	48	8.24E+10	1.65E+11
Dry Conditions	60-90	18	1.34E+10	4.25E+10
Low Flows	90-100	N/A	N/A	7.68E+08



Attoyac at SH 21 (10636)

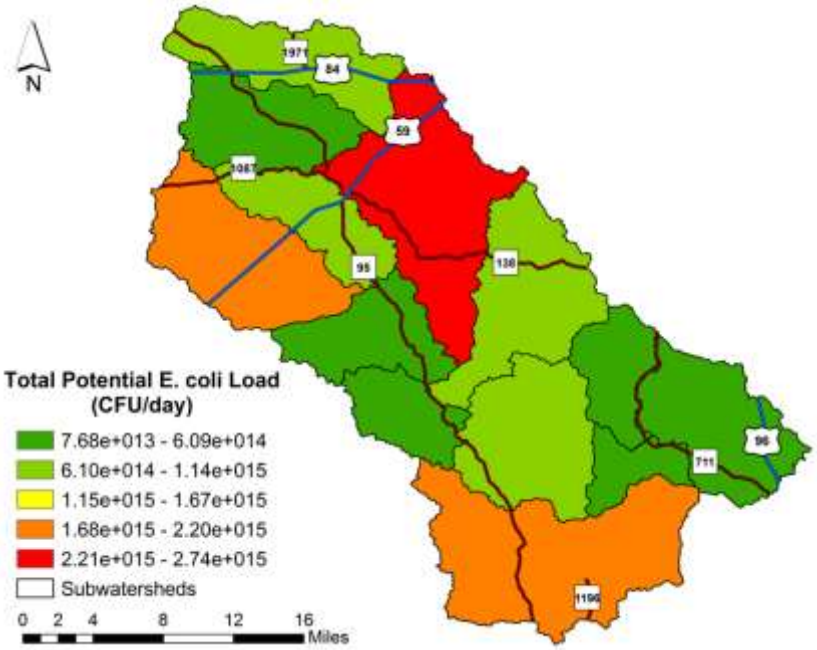
Flow Condition	% Exceedance	Percent Reduction Needed	Daily Loading (g/day)
High Flows	0-10	N/A	1.96E+05
Moist Conditions	10-40	N/A	6.85E+04
Mid-Range Flows	40-60	N/A	1.18E+04
Dry Conditions	60-90	N/A	5.77E+03
Low Flows	90-100	N/A	3.28E+03

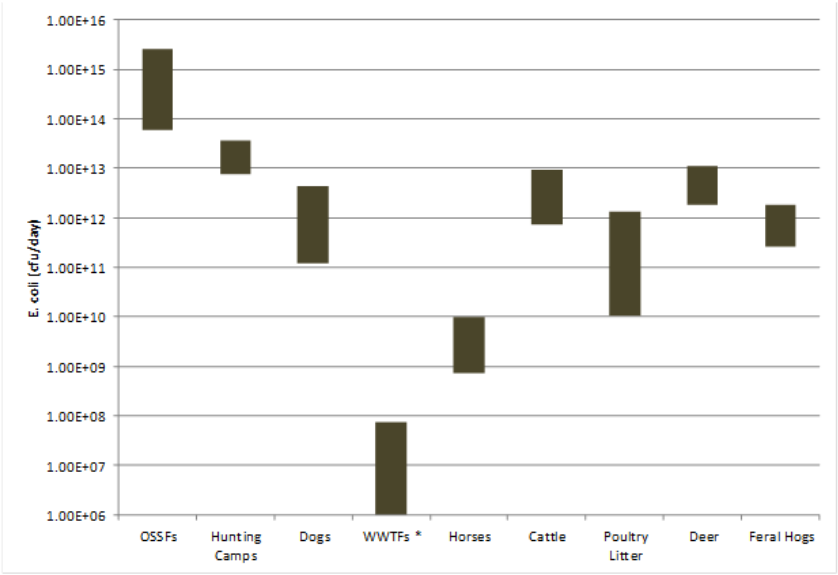


Spatially Explicit Load Enrichment Calculation Tool

- An automated GIS tool to assess bacteria loads using spatial factors
  - Land Use
  - Human and Animal Population Densities
  - Slope of Landscape
  - Soil Types
  - Distance from the Creek
- Identifies nonpoint sources most likely contributing to *E. coli* contamination in each "subwatershed"
- Presents the "worst-case scenario" as the model does not account for bacterial die-off
- Helps stakeholders target areas of greatest concern where management solutions should be focused

Aggregate Output



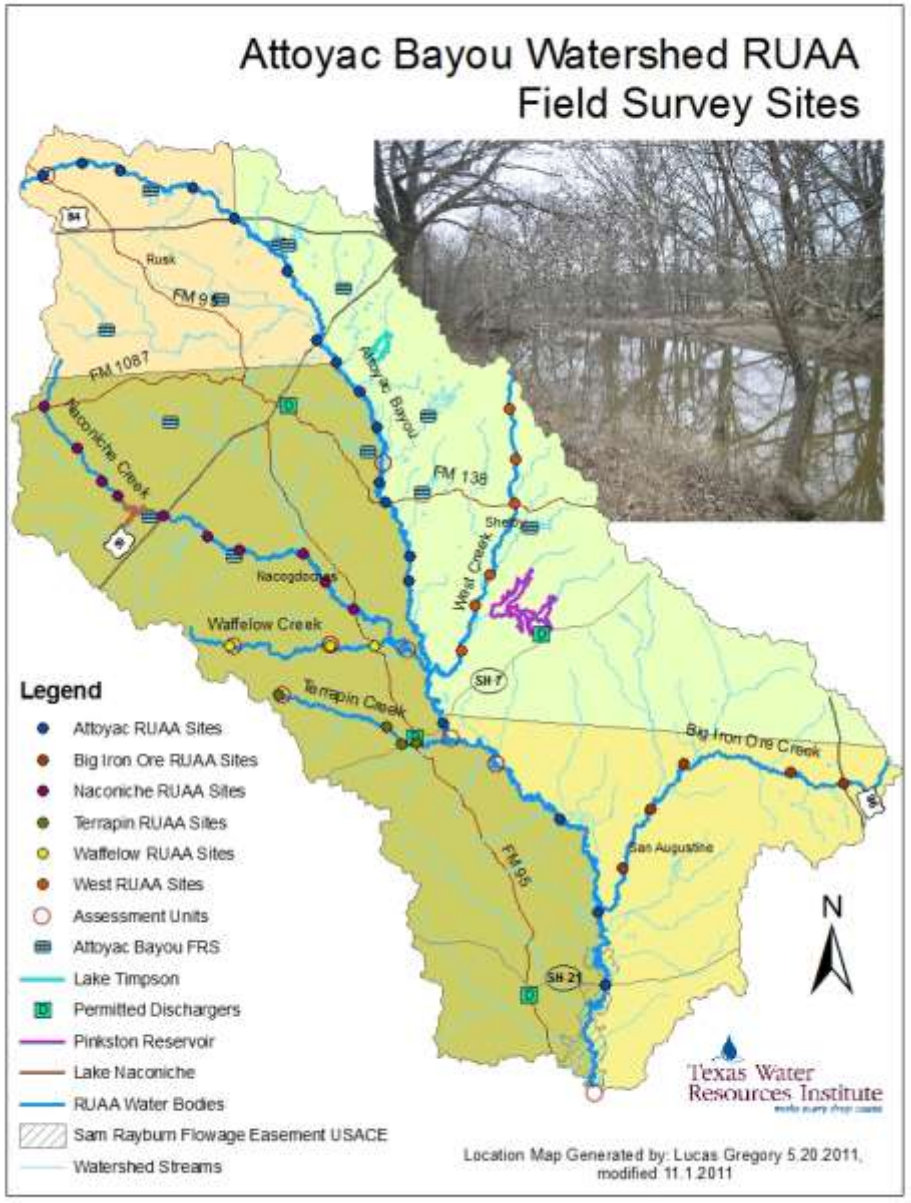


Daily Potential *E. coli* Load Ranges per Source

Potential *E. coli* Sources	**Daily Potential *E. coli* Load (CFU/day)**
Cattle	7.37×10^{11} - 9.57×10^{12}
Horses	7.44×10^{8} - 9.72×10^{9}
Deer	1.88×10^{12} - 1.08×10^{13}
Feral Hogs	2.59×10^{11} - 1.86×10^{12}
Poultry Litter	1.06×10^{10} - 1.31×10^{12}
OSSFs	6.00×10^{13} - 2.48×10^{15}
Dogs	1.23×10^{11} - 4.38×10^{12}
WWTFs	0 - 7.57×10^{7}
Hunting Camps	7.69×10^{12} - 3.59×10^{13}

RUAA Overview

- Used to assess the physical, chemical, biological, and economic factors affecting attainment of water body use
- Identify and assign attainable uses and criteria to water bodies
- Ultimate purpose is to establish the most appropriate water quality standard for individual bodies of water taking into consideration its unique features



RUAA Findings

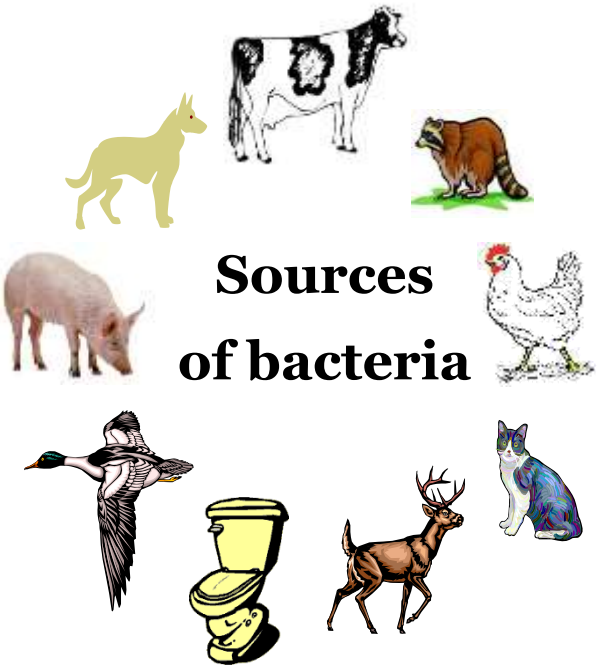
- No recreation (primary or secondary) was directly observed during field work
- Evidence of recreation was observed at ten (10) of the forty-three (43) survey sites
  - All indicative of secondary or non contact recreation in the form of fishing or bank-based activities.
- Obstructions to recreation were common
  - Steep banks, thick brush, private property, woody debris, snakes, alligators

RUAA Findings

- Landowner surveys note primary contact recreation as infrequent; secondary and non-contact recreation are noted to occur more often
- Public access to water bodies is limited to public road crossings
- Litter, foot prints, fishing debris common along the waterway
- Animal usage was common

What is Bacterial Source Tracking (BST)?

- Data collection and analysis to determine the sources of fecal contamination in a waterbody
- Based on uniqueness of bacteria from individual sources
- A variety of different methods are used
- Differs from modeling in that it is not a predictive tool and does not require calibration and validation of input variables

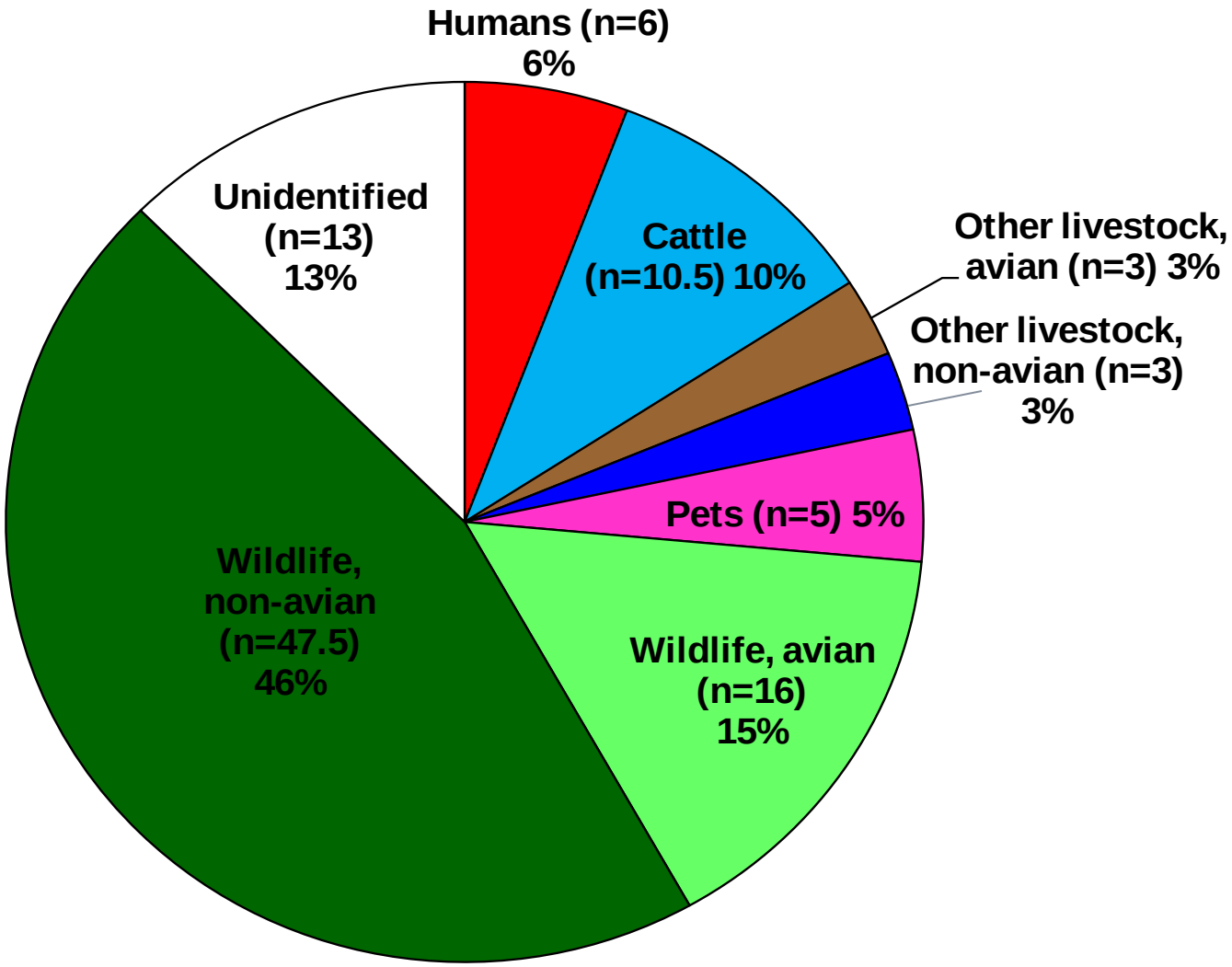


Known-Source Fecal Additions from Attoyac Bayou

- Screened 113 total isolates from 113 individual fecal samples

- Ultimately, 59 isolates were validated and added to the Texas *E. coli* BST Library
  - Domesticated animals and livestock (35 total)
    - Poultry litter (18), beef cattle (13), dairy cattle (3), and goose (1)
  - Wildlife (24 total)
    - Feral hog (7), squirrel (6), duck (4), deer (3), coyote (3), and armadillo (1)

E. coli BST Results
Base + Storm Samples (7-Way Split)



WPP Development Status

- First 6 'background' chapters of the WPP have been drafted and have been distributed to watershed partnership members for review
  - Watershed Management
  - Regional History
  - Watershed Characteristics
  - Historic Water Quality
  - Current Watershed Conditions
  - Potential Sources of Pollution

- Remaining components of the WPP will combine results of the watershed assessment and local stakeholder knowledge

WPP Development Status

- Watershed Steering Committee will be relied upon to initially develop remaining WPP components
  - Water quality goals
  - Prioritizing needed management
  - Management recommendations
  - Implementation milestones
- Recommendations will be presented to full watershed partnership

Timeline for Project

- Next meeting: tonight
- Steering committee meet monthly for next several months
  - Develop draft WPP items
- Partnership meeting late summer
  - Select recommendations to include in the WPP
- First WPP draft complete Fall 2013
- Final draft WPP complete Winter 2013
- EPA review Spring 2014

Project Partners

- Angelina & Neches River Authority
- Castilaw Environmental Services, LLC
- Stephen F. Austin State University
- Texas A&M AgriLife Research
- Texas Water Resources Institute

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Soil Water TSSWCB

SFA

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Castilaw Environmental Services, LLC

ANRA
Angelina & Neches River Authority

United States Environmental Protection Agency

Funding

- Grant from the Texas State Soil and Water Conservation Board from their Clean Water Act, Section 319 Program supported by U.S. Environmental Protection Agency

Attoyac Bayou WATERSHED PARTNERSHIP

Any Questions?

attoyac.tamu.edu

Lucas Gregory
Texas Water Resources Institute
lfgregory@ag.tamu.edu
979.845.7869

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