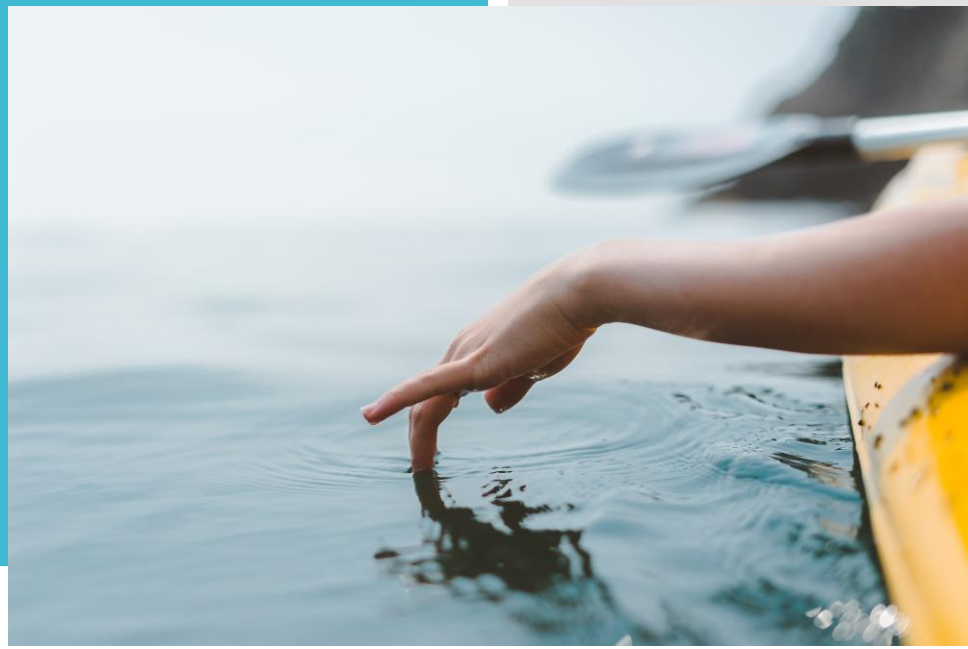
CANEY CREEK WATERSHED TMDL PROJECT

November 1, 2018

Steven Johnston



Meeting Agenda

- 4:00 – 4:05 Welcome - Open Meeting
- 4:05 – 4:50 Review Caney Creek Project Results
- 4:50 – 5:10 Forming a Coordination Committee - Discussion
- 5:10 – 5:20 Wrap Up and Next Steps
- 5:20 – 5:40 Coastal Communities Project
- 5:40 – 6:00 Open Q&A / Adjourn

Why Are We Here?

Portions of Caney Creek and Linnville Bayou do not meet the State's Water Quality Standards for Contact Recreation.

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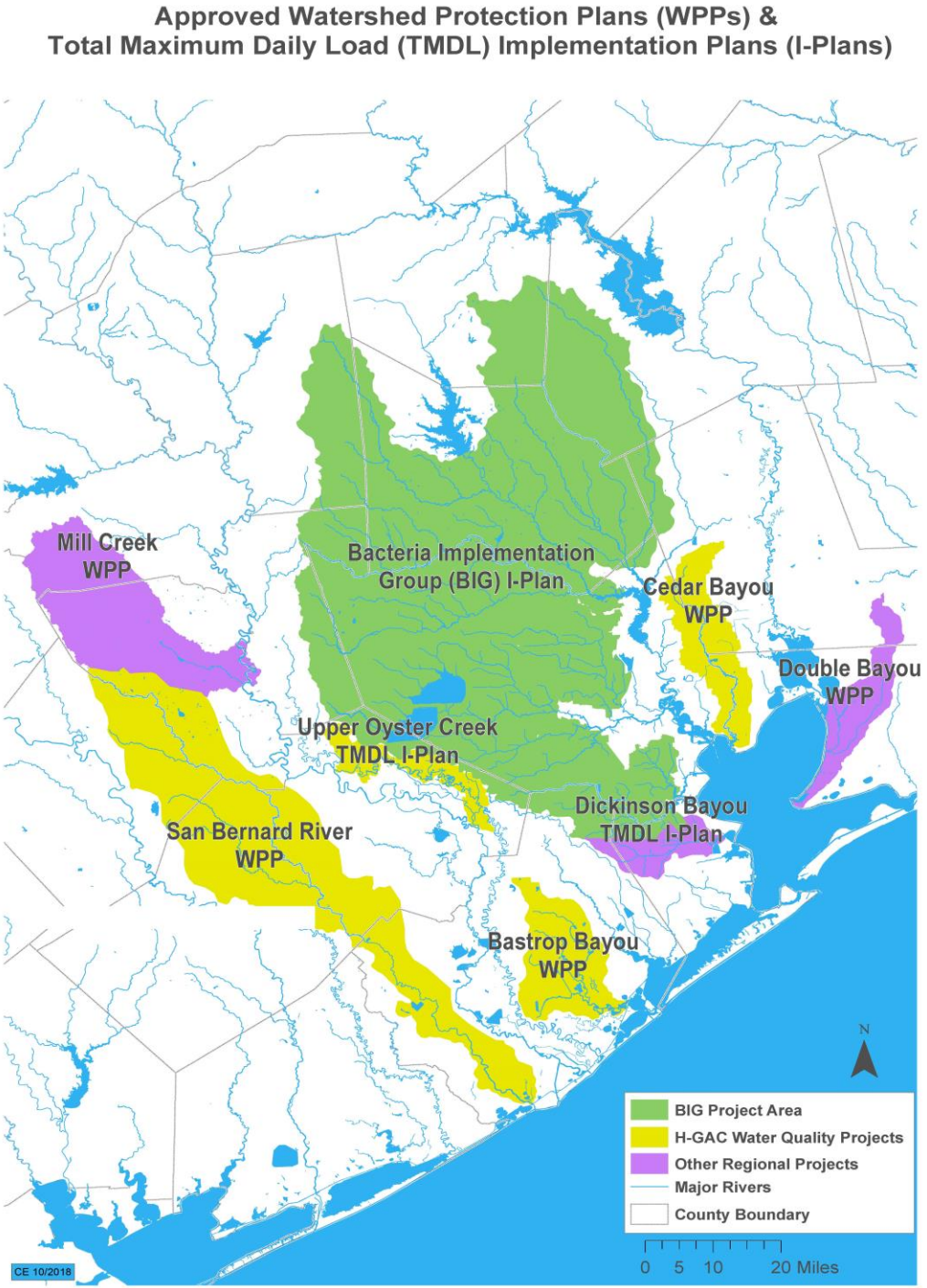
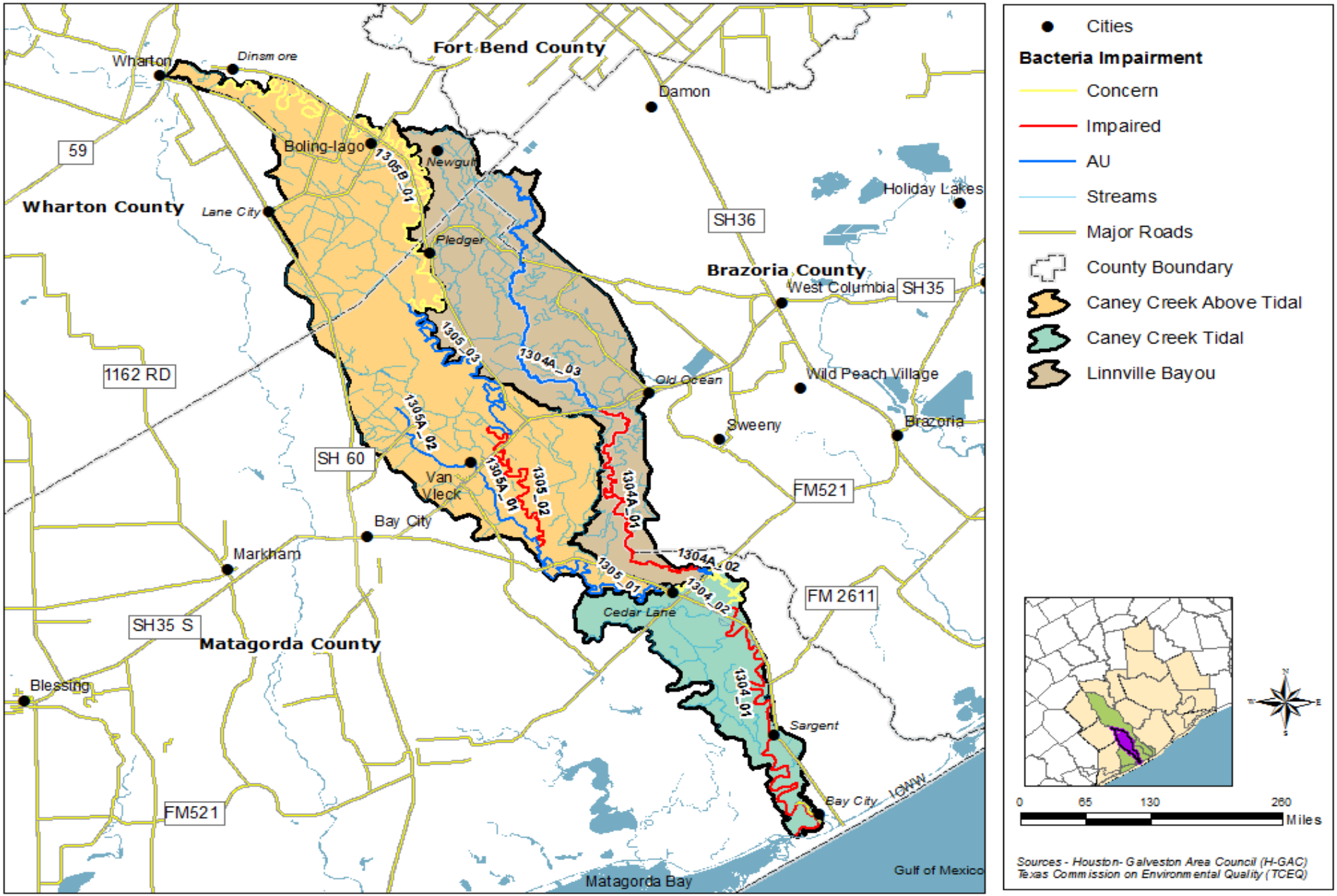
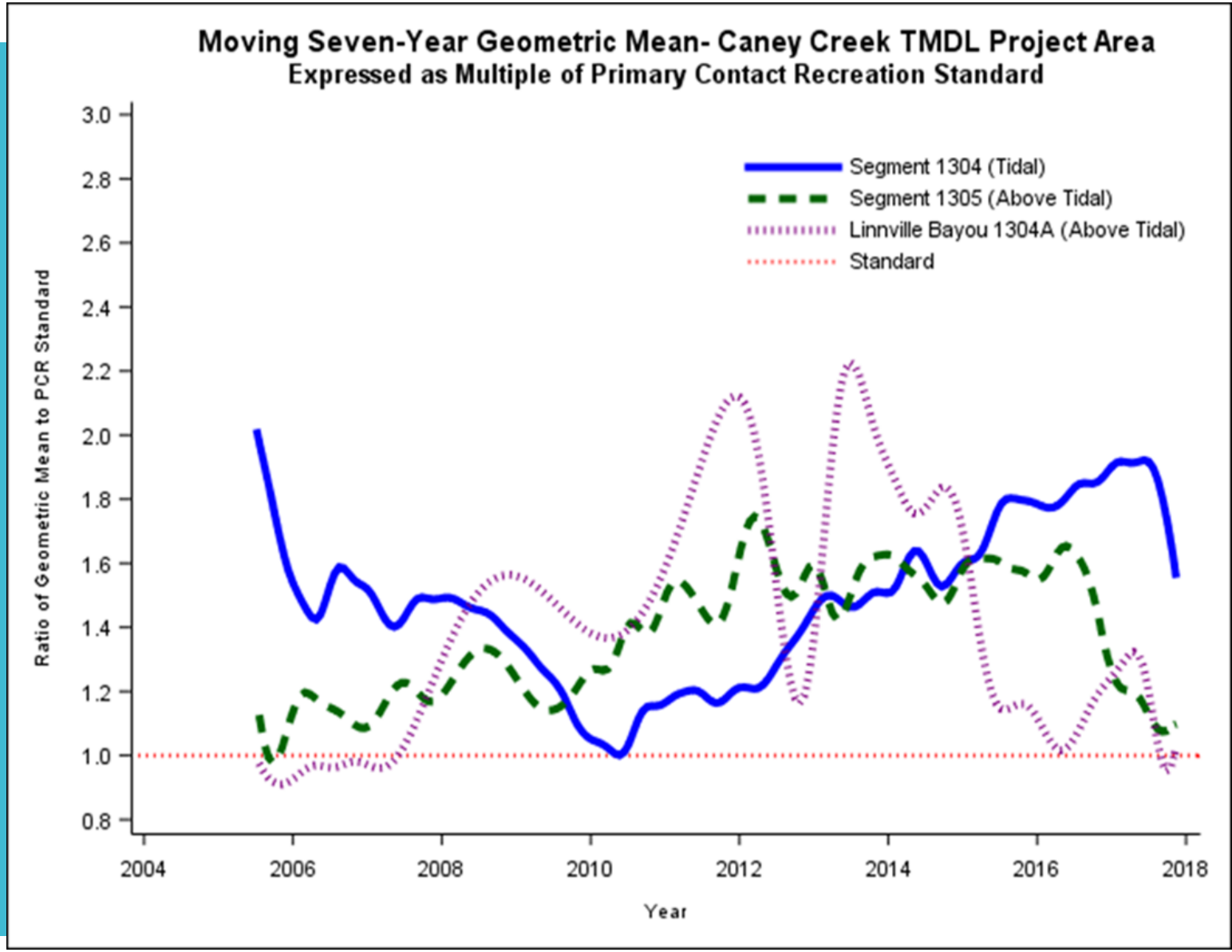
Watershed Based Plans



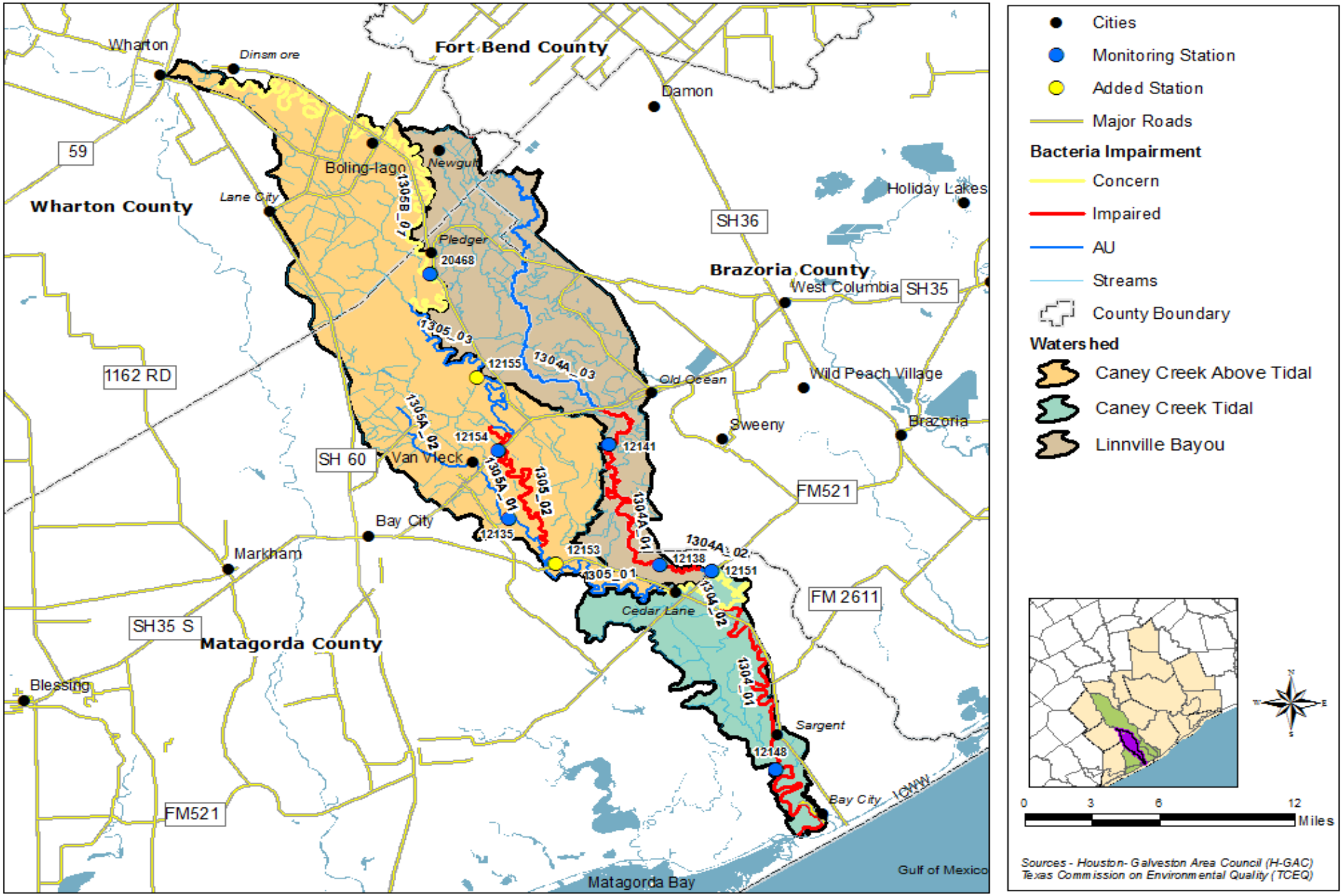
CANEY CREEK WATERSHED



Bacteria Trends



MONITORING STATIONS

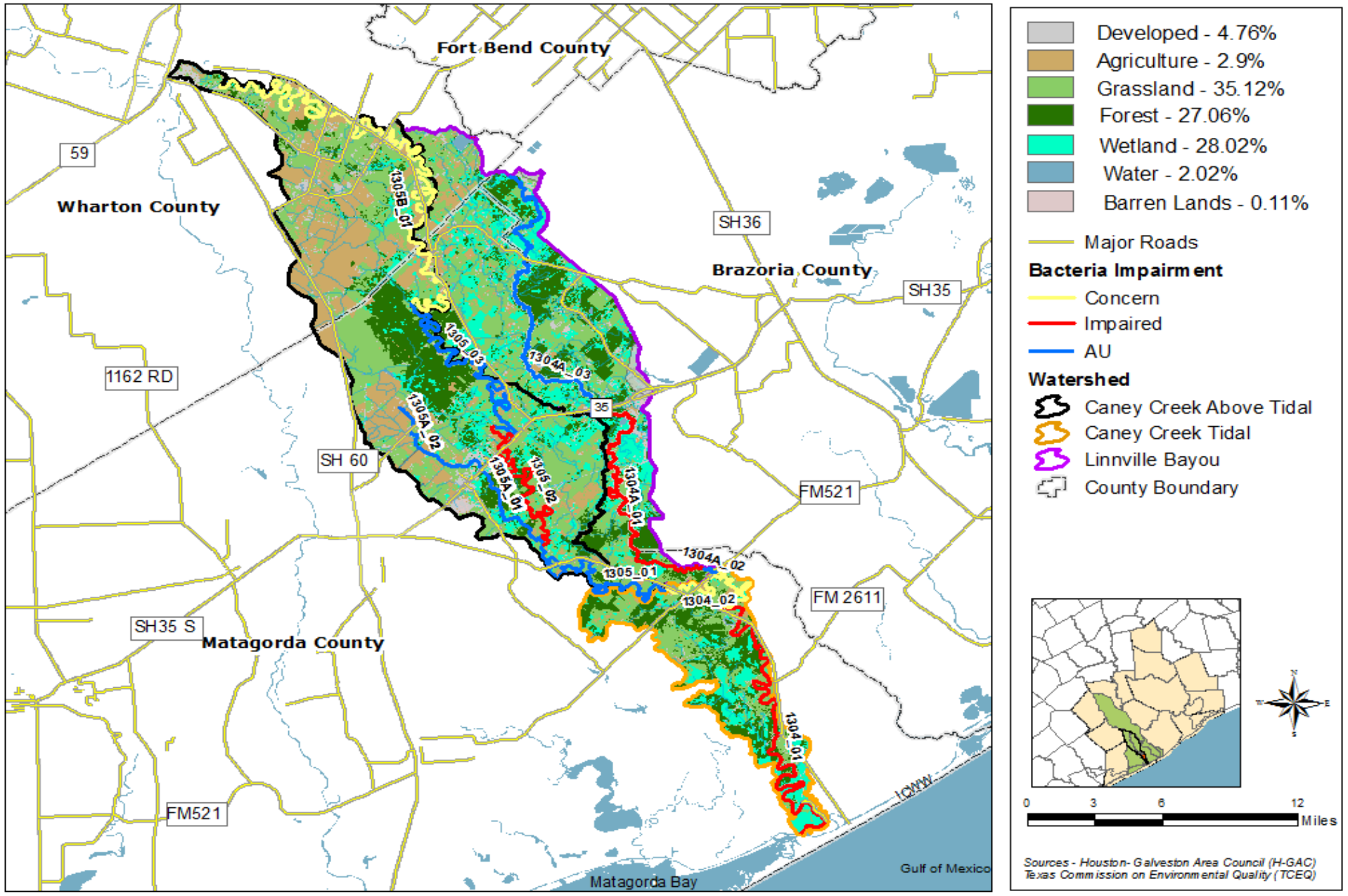


Possible Sources of Bacteria

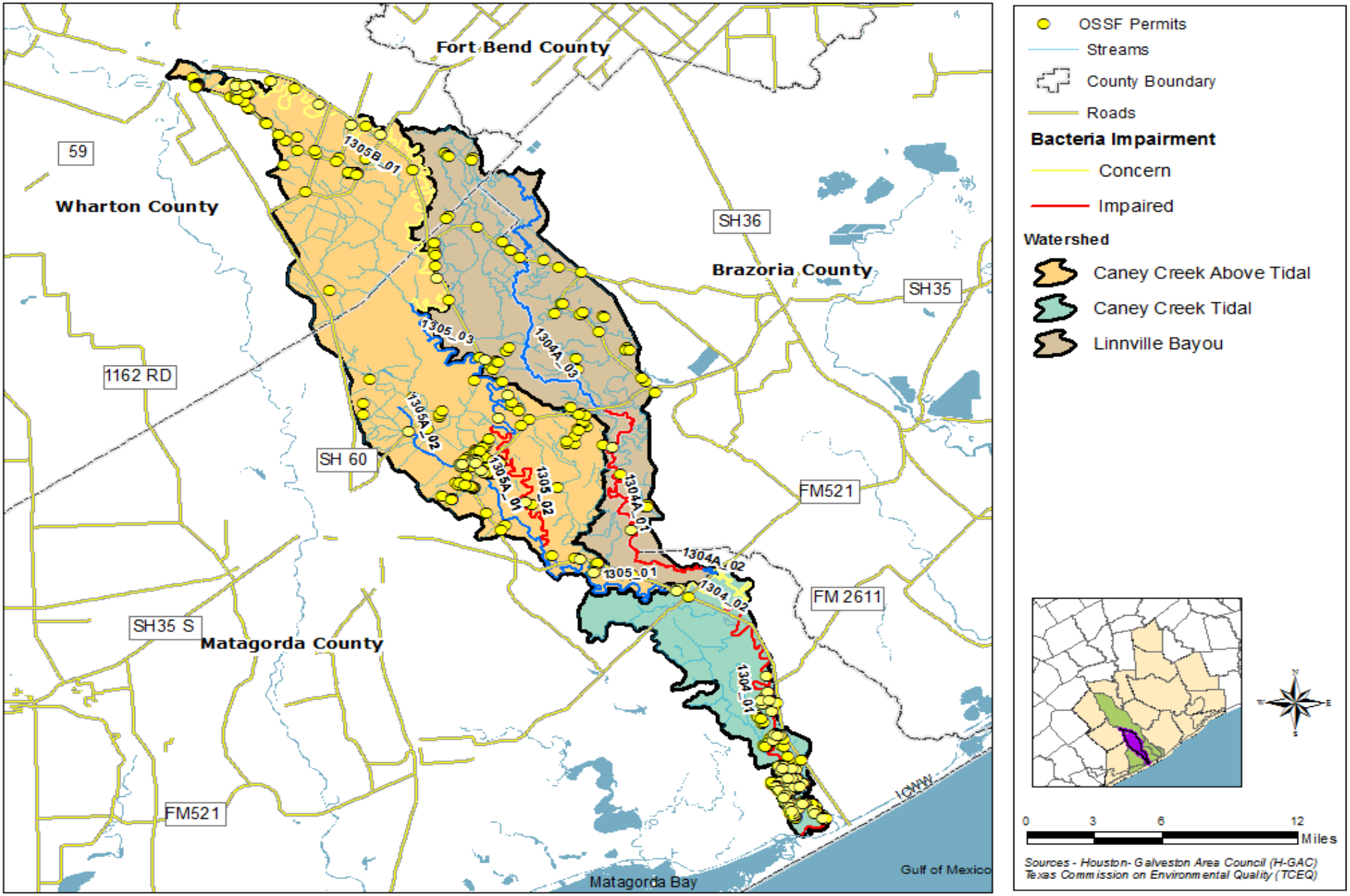
- Domestic pets (dogs, cats)
- Leaking wastewater infrastructure
- Wildlife (deer, bird, raccoon, etc.)
- Onsite Sewage Treatment
- Urban lawns and landscaping
- Streets and parking lots
- Agriculture/Pasture

Basin Data

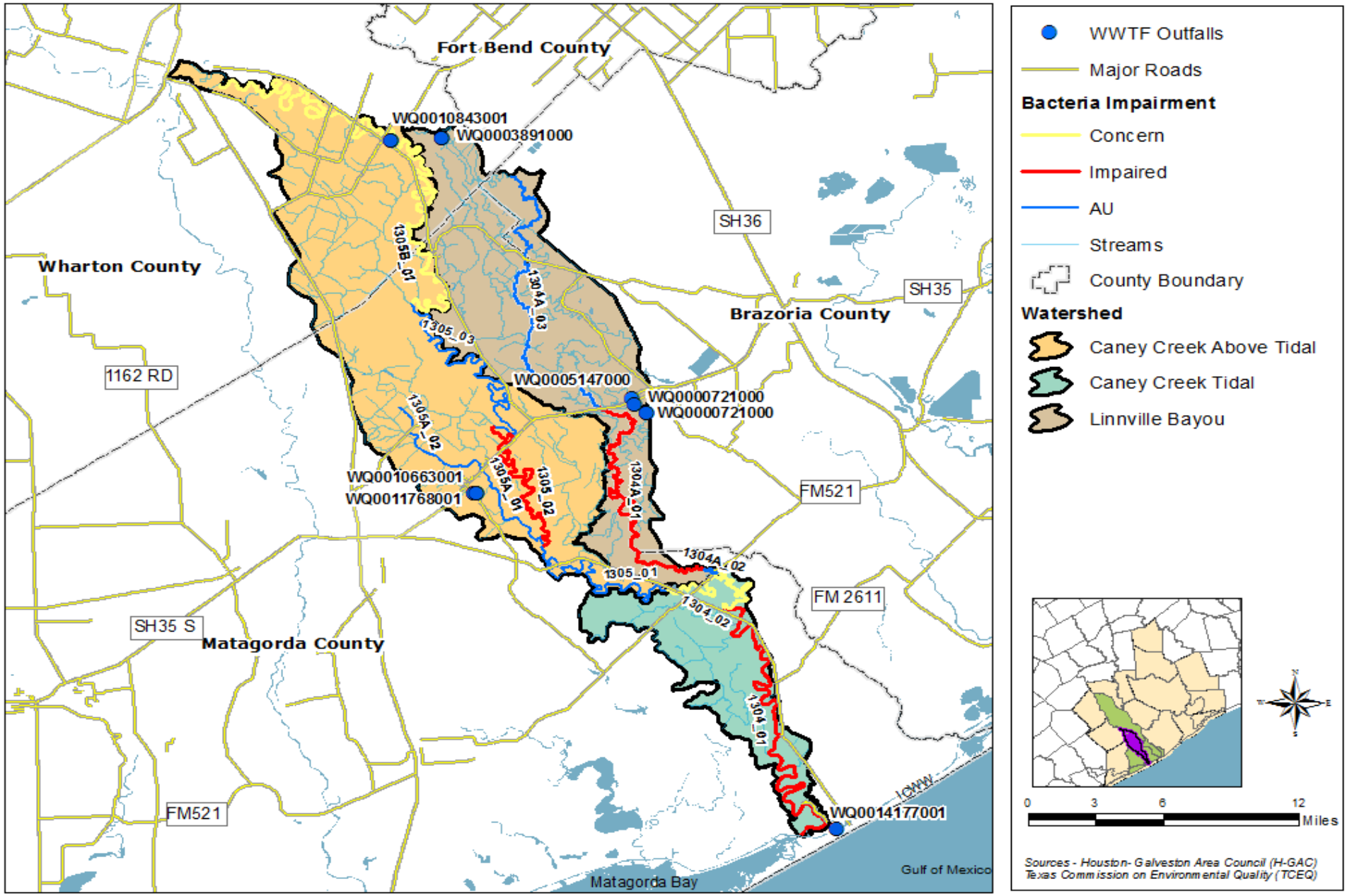
Caney Creek: Land Cover



Caney Creek: OSSFs



Caney Creek: WWTF Outfalls



Potential Agricultural Sources

Watershed	Pasture/Grassland Area (Acres)	Cattle and Calves	Hogs and Pigs	Sheep and Lambs	Equine	Poultry
Brazoria	262112	78907	4218	1435	4572	6033
Matagorda	240492	53283	47	304	1141	1261
Wharton	256621	57168	131	395	1687	242
Caney Creek Tidal	9904.68	2194	2	13	47	52
Linnville Bayou	23429.63	5804	127	63	215	244
Caney Creek Above Tidal	40842.56	9069	13	56	224	144

Pets / Feral Hogs

Segment	Estimated Households	Dogs	Cats
Caney Creek Tidal	185	108	118
Linnville Bayou	357	208	228
Caney Creek Above Tidal	3,003	1,754	1,916
Total	3,545	2,070	2,262

Watershed	Suitable Area (Acres)	Suitable Area (Sq. Mile)	Feral Hog Population
Caney Creek Tidal	28,182.51	44.04	342-570
Linnville Bayou	63,782.74	99.66	774-1291
Caney Creek Above Tidal	100,742.43	157.41	1223-2038

Determining Pollutant Loadings – LDC Approach

- Load Duration Curve (LDC) Method Used
- Method is widely accepted by EPA and Texas for development of bacteria WBPs
- Modification of LDCs for tidal streams pioneered by State of Oregon and being used in Texas for TMDL development.
- TMDLs adopted by TCEQ and approved by EPA in 2016 for Tidal segments of Mission & Aransas Rivers used Modified FDCs/LDCs

LDC Development Requires

- streamflow data,
- bacteria (Enterococci & *E. coli*) data,
- salinity data (for Modified Approach)
- the relevant bacteria criterion

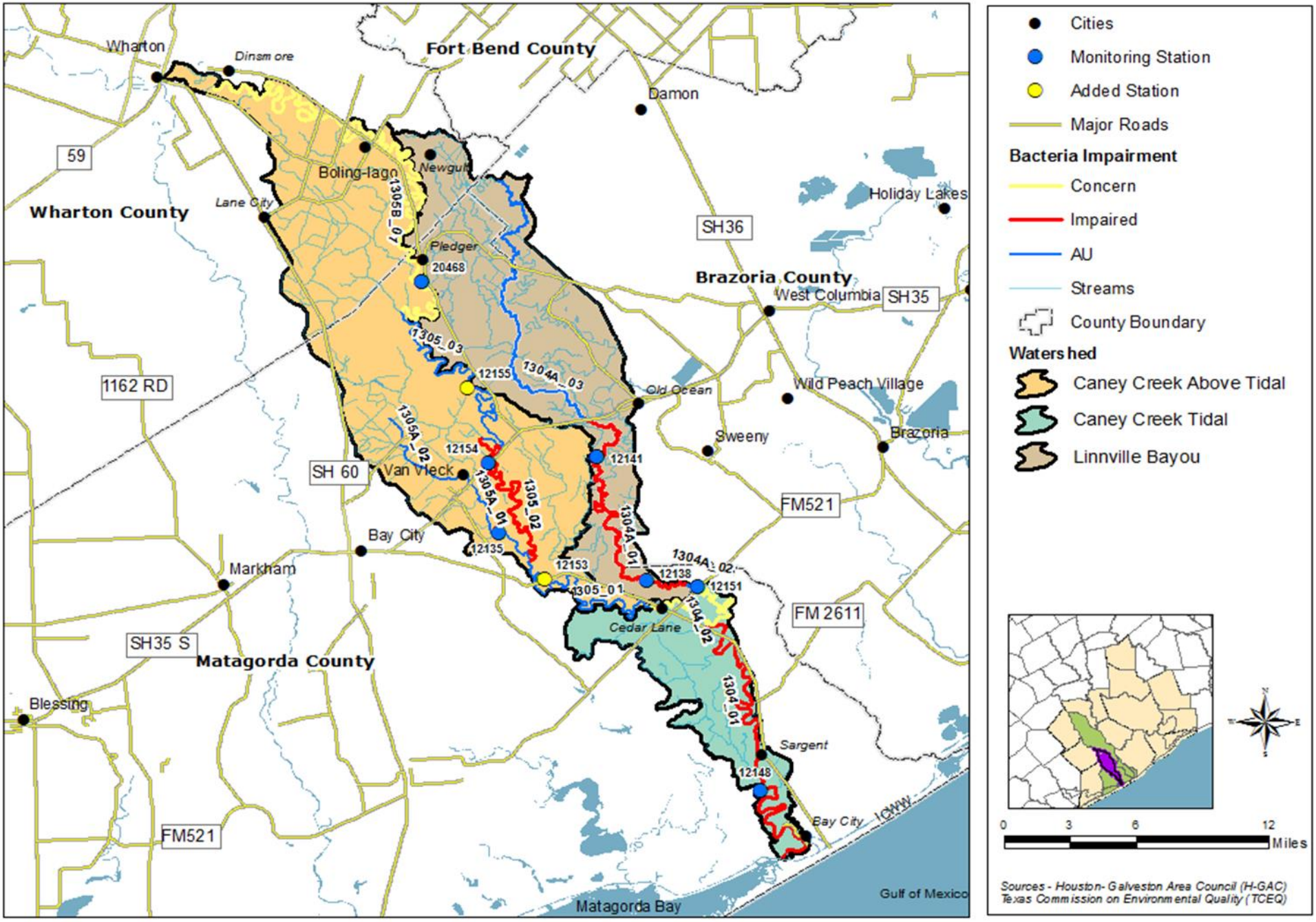
Steps to Develop LDCs

1. Calculate daily freshwater using drainage area ratio approach
2. Develop FDCs, including **seawater** contribution (for each tidal station)
3. Develop LDCs (allowed loadings)
4. Estimate existing loading from measured bacteria data

First Step

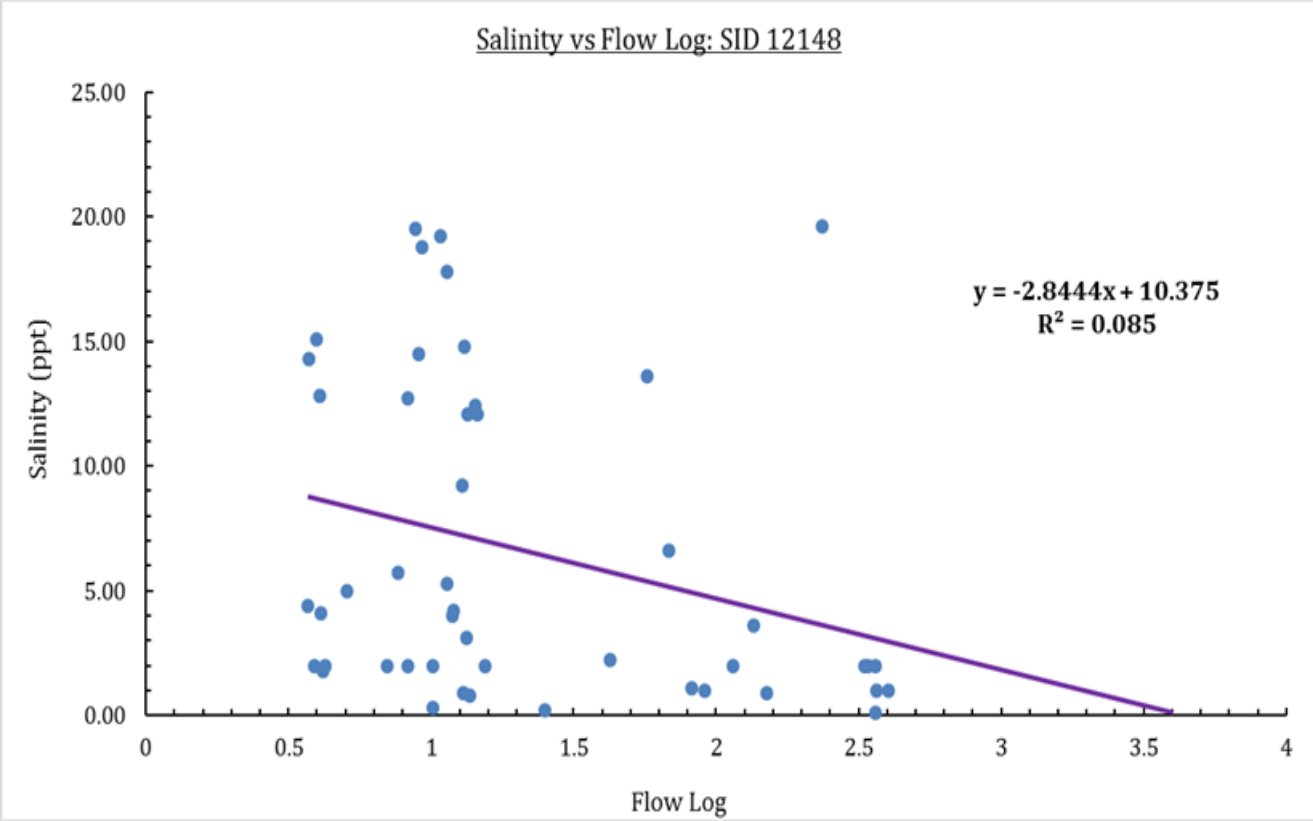
Develop a daily streamflow record (typically 10 to 20 years of data)

- No long term flow in Caney Creek. New height level gauge at Station 12153 (Feb 2017 – Aug 2017)
- Nearby U.S. Geological Survey flow gauge stations: San Bernard River and Tres Palacios
- Selected U.S. Geological Survey gage 08162600
- Selected flow period: 1/1/2004 – 12/31/2017

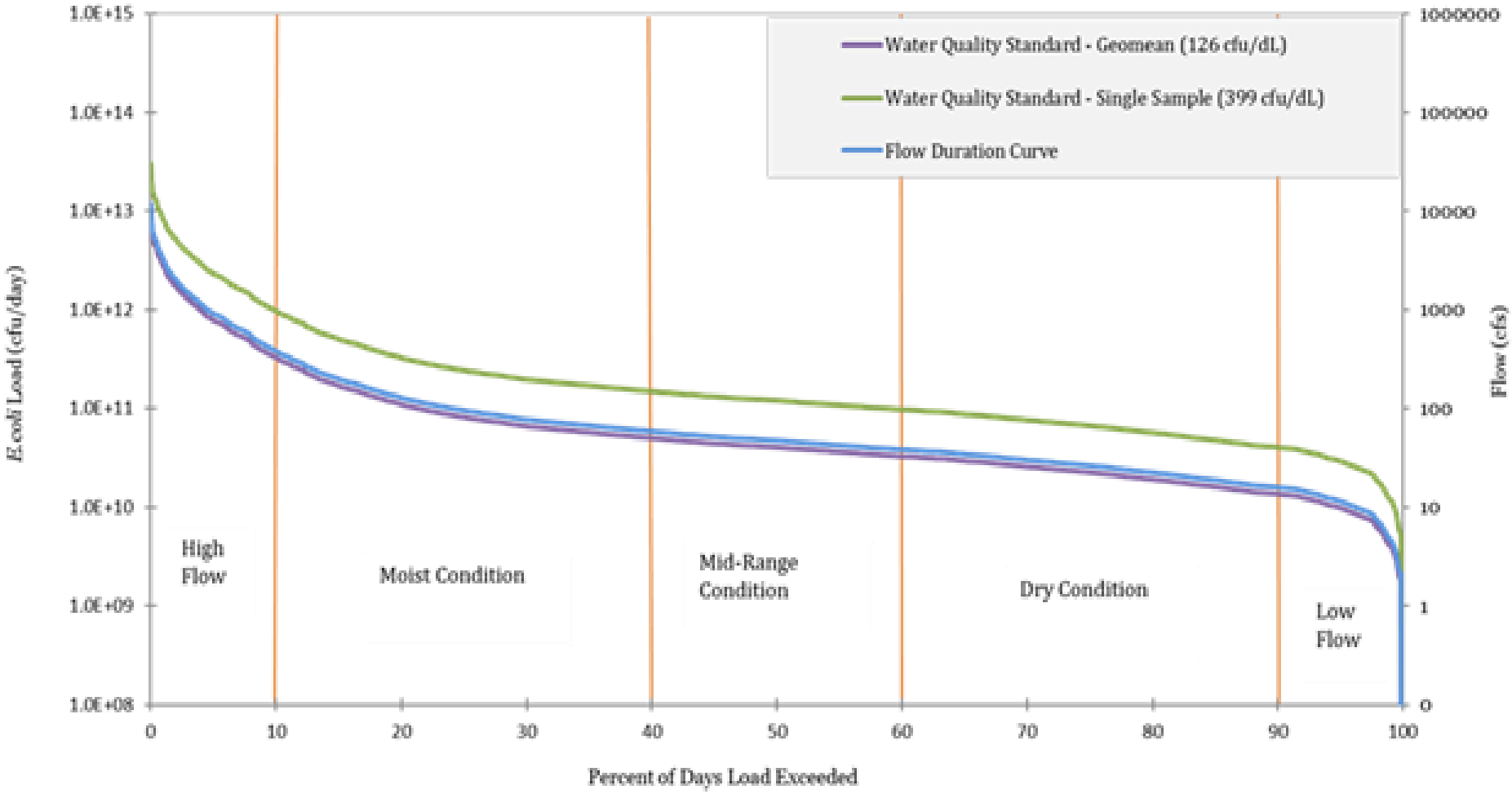

Wharton
Dinsmore
Fort Bend County
Damon
59
Boling-Iago
Newgulf
Lane City
Wharton County
1305B_07
Pledger
20468
Holiday Lakes
SH36
Brazoria County
West Columbia
SH35
1305_03
12155
1304A_03
1162 RD
Old Ocean
Wild Peach Village
Sweeny
Brazoria
1305A_02
12154
12141
SH 60
Van Vleck
1305A_01
1305_02
FM521
Bay City
12135
12153
1304A_01
1304A_02
12138
12151
Markham
1305_01
1304_02
FM 2611
Cedar Lane
SH35 S
Matagorda County
Blessing
1304_01
Sargent
12148
Bay City
ICWW
FM521
Gulf of Mexico
Matagorda Bay
Cities
Monitoring Station
Added Station
Major Roads
Bacteria Impairment
Concern
Impaired
AU
Streams
County Boundary
Watershed
Caney Creek Above Tidal
Caney Creek Tidal
Linnville Bayou
0
3
6
12
Miles
Sources - Houston-Galveston Area Council (H-GAC)
Texas Commission on Environmental Quality (TCEQ)

Second Step: Flow Duration Curves

- Daily record of streamflow data ranked highest to lowest to give a flow duration curve.
- Develop relationship of measured surface salinities to streamflows from FDCs



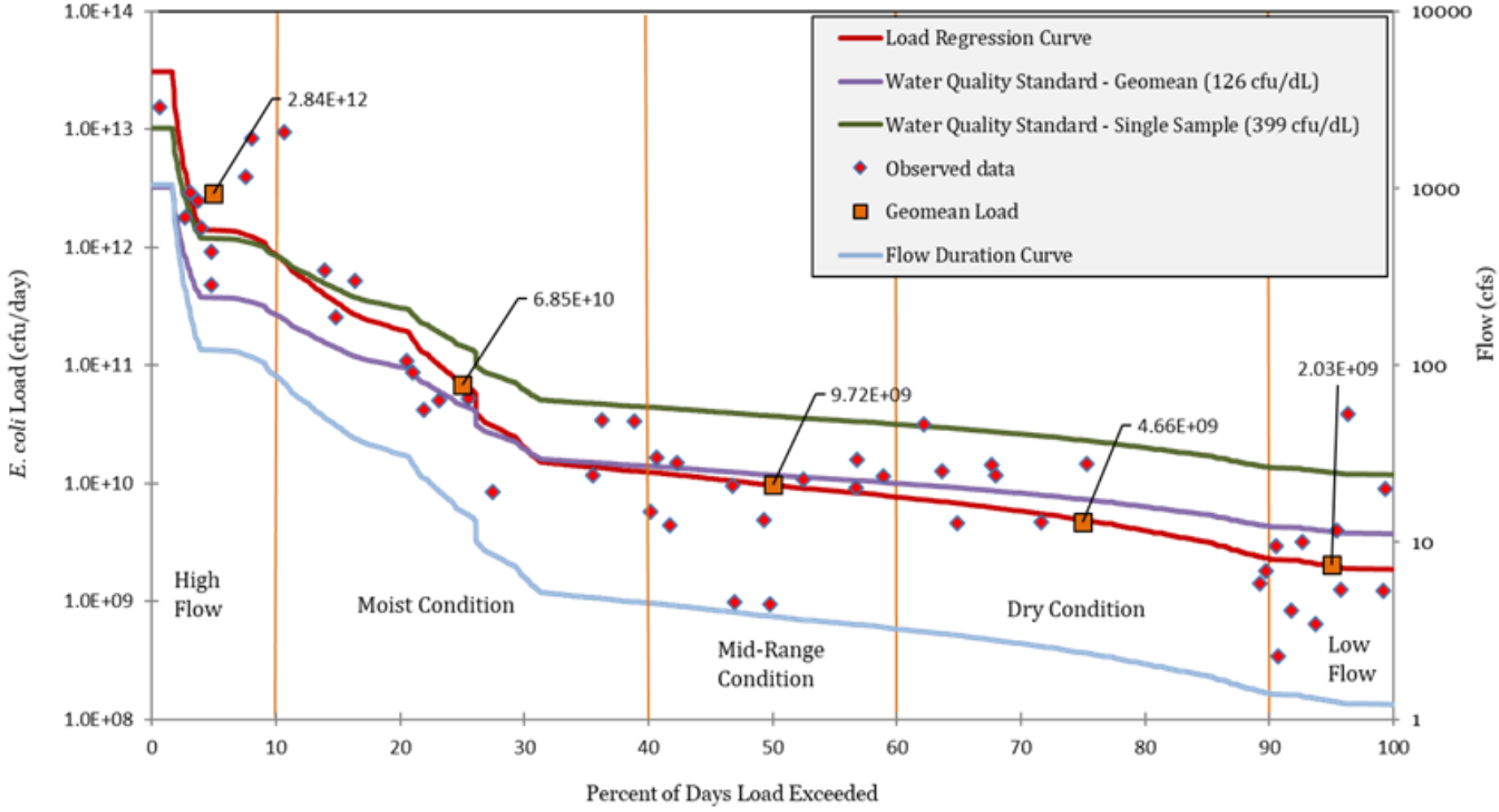
FLOW DURATION CURVE



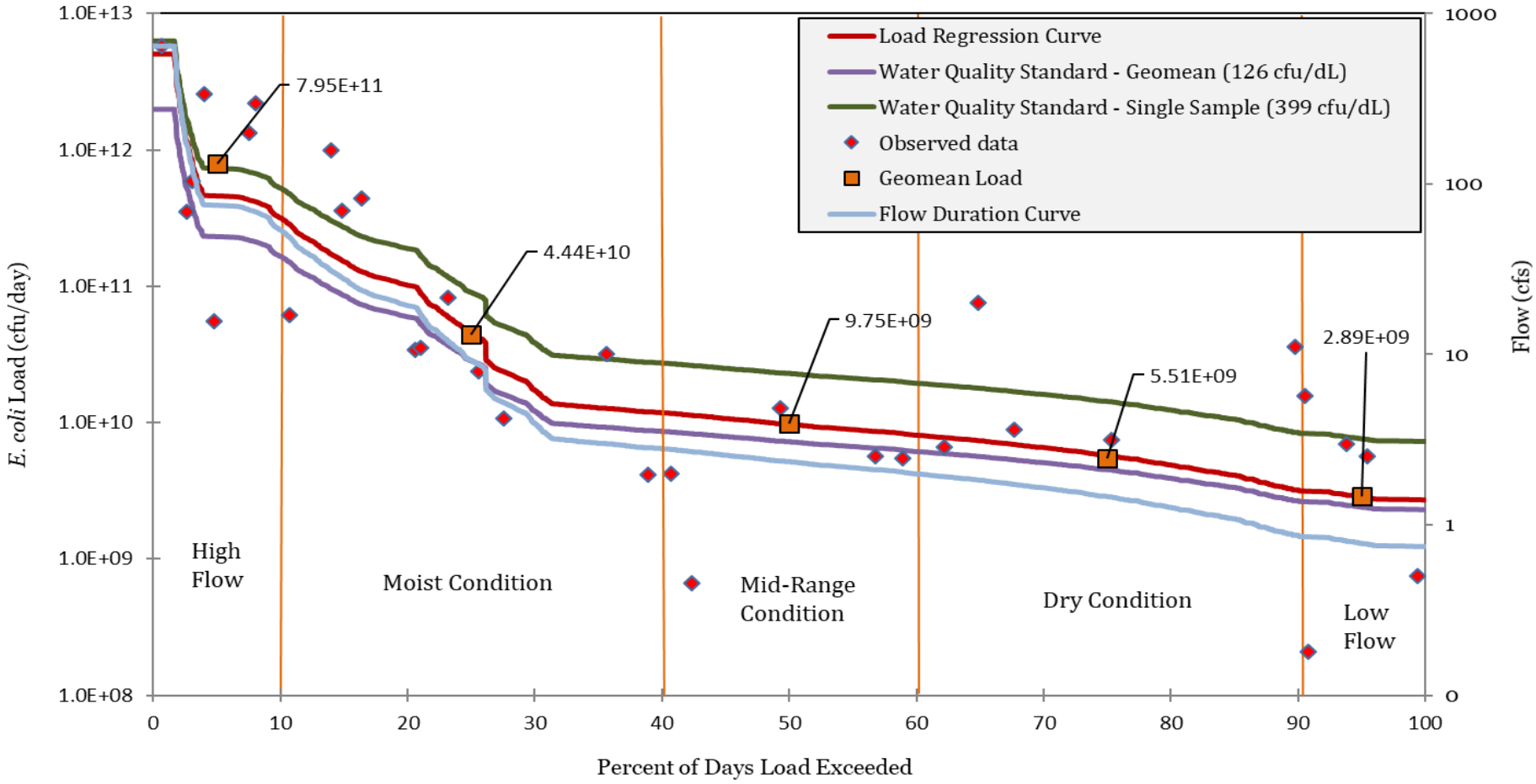
Third / Fourth Steps: Load Duration Curves

- Third Step (Allowable Load): The existing Enterococci (or *E. coli*) criterion is multiplied by the flow on each day and the appropriate conversion factor to give units of MPN/day.
- Standard Curves are calculated using primary contact recreation use protective criteria as geometric mean and single sample:
  - Tidal geometric mean criterion = 35 MPN/100 mL of Enterococci
  - Tidal single sample criterion = 104 MPN/100 mL of Enterococci
  - Freshwater geometric mean criterion = 126 MPN/100 mL of *E. coli*
  - Freshwater single sample criterion = 399 MPN/100 mL of *E. coli*
- Fourth Step (Existing Load): Measured bacteria multiplied by the flow on the day measured.

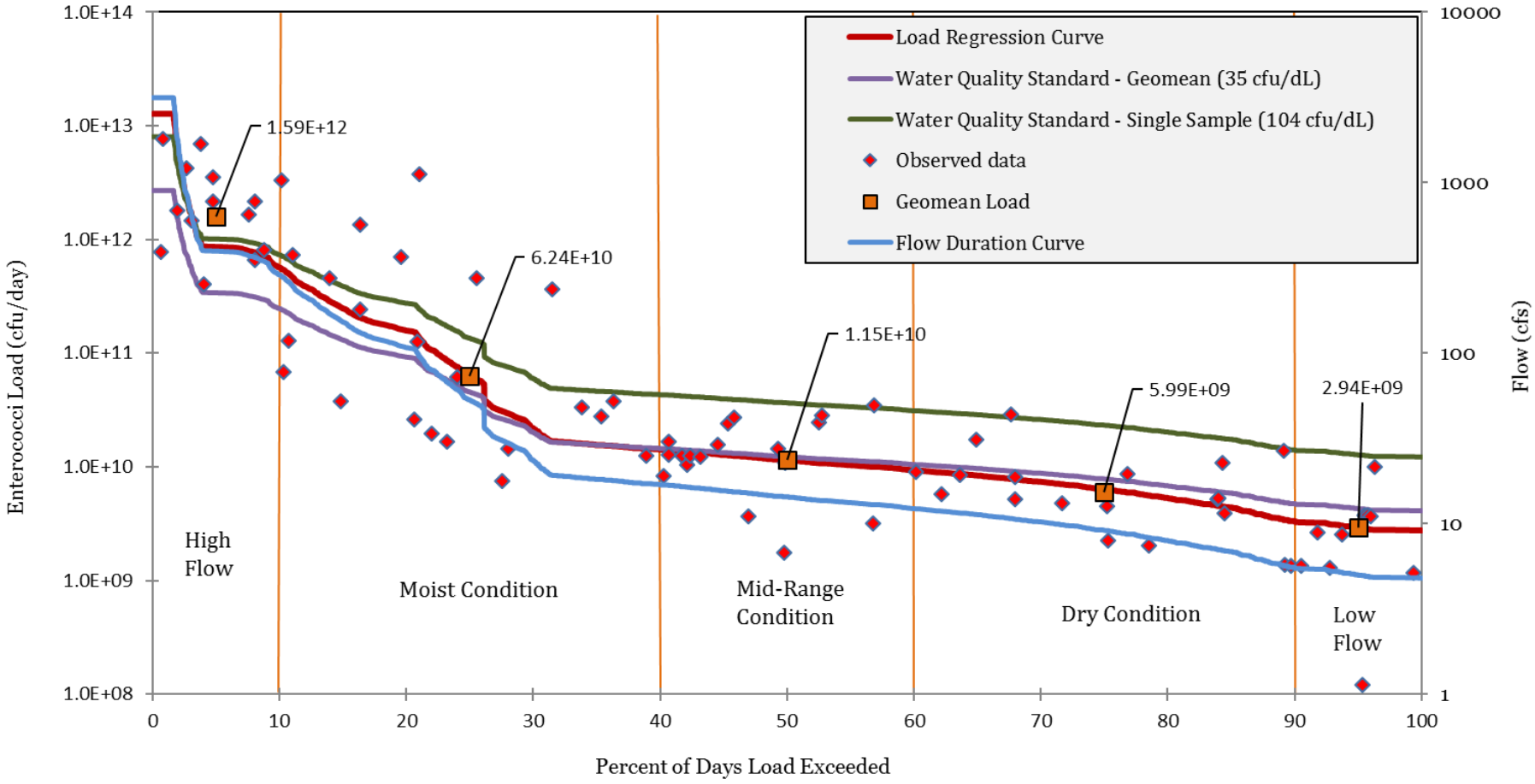
LOAD DURATION CURVES
Caney Creek Above Tidal 1305_02



LOAD DURATION CURVES
Linnville Bayou 1304A_01



LOAD DURATION CURVES
Caney Creek Tidal 1304_01



BACTERIA REDUCTION

Flow Condition	Exceedance Range	1304_01		1304A_01		1305_02	
		Enterococci		*E. coli*		*E. coli*	
		35 MPN/100mL		126 MPN/100 mL		126 MPN/100 mL	
		Geometric Mean (MPN/100mL)	Required Percent Reduction	Geometric Mean (MPN/100mL)	Required Percent Reduction	Geometric Mean (MPN/100mL)	Required Percent Reduction
High Flow	(0-10%)	102.14	65.73%	264.89	52.43%	582.01	78.35%
Moist	(10-40%)	48.29	27.52%	197.47	36.19%	187.80	32.91%
Mid-Range	(40-60%)	32.65	0.00%	169.26	25.56%	103.83	0.00%
Dry	(60-90%)	29.00	0.00%	159.71	21.11%	83.04	0.00%
Low Flow	(90-100%)	23.81	0.00%	149.55	15.75%	64.48	0.00%

TMDL

$TMDL = WLA (WLA_{wwtf} \text{ and } WLA_{sw}) + LA + FG + MOS$

Draft TMDL – (Preliminary)

AU	Indicator Bacteria	TMDL (Billion MPN/day)	MOS (Billion MPN/day)	WLA_{wwtf} (Billion MPN/day)	WLA_{sw} (Billion MPN/day)	LA (Billion MPN/day)
1304_01	Enterococci	339.49	3.30	0.59	1.33	334.26
1304A_01	*E. coli*	231.01	11.55	0.24	7.80	211.42
1305_02	*E. coli*	375.41	18.77	0.75	0.01	355.89

What's a Coordination Committee?

A proactive group of local and regional stakeholders helping to create and drive content for the TMDL / I-Plan and/or WPP documents.

Role of the Coordination Committee

- Attend Public Meetings
- Participate in Work Groups
- Act as Community Ambassadors
- Provide Input on Priorities for the Watershed
- Identify Appropriate Management Measures
- Provide Input on Documents & Reports

What are Management Measures?

Existing measures are a menu of voluntary strategies stakeholders can use to reduce bacteria levels in Caney Creek.

Group Discussion

(1) POTENTIAL INTERESTS

- Citizens
- Education
- Environmental Groups
- Government Interest
- Industry and Business
- Parks / Recreation
- Resource Agency
- Watersheds
- Wildcard
- Others?

(2) NUMBER OF REPRESENTATIVES

- Ideal size of the committee?
- Other committees range from 31 members to 18.
- Number should be fairly distributed by interest.

(3) PROCESS TYPES

FORMAL

- Formal nominations
- Recorded votes
- Written rules of order

INFORMAL

- Informal nominations
- Consensus-based
- Ground rules

(4) MISSING PIECES

- Who should be here that isn't?
- Are we missing major industry or stakeholder groups?

Coordination Committee Decision Process

FORMAL

- Estab[illegible]s that g[illegible]ern the actio[illegible]of the committee
- Adhere to G[illegible]en Meeting[illegible]t Requi[illegible]ments

INFORMAL

- Develop a set of ground rules that will be used to govern the committee
- Committee members approve ground rules and their use

Informal Ground Rules

- Speak up
- Disagree respectfully
- Silence is presumed consent
- Listen during discussions
- Respect opinions and don't criticize people
- Be open to new ideas
- Silence cell phones
- Have fun

Implementation: Workshops, Training and Resources

Texas Stream Team Training – February 2018

Texas Watershed Stewards Training/July 11, 2017

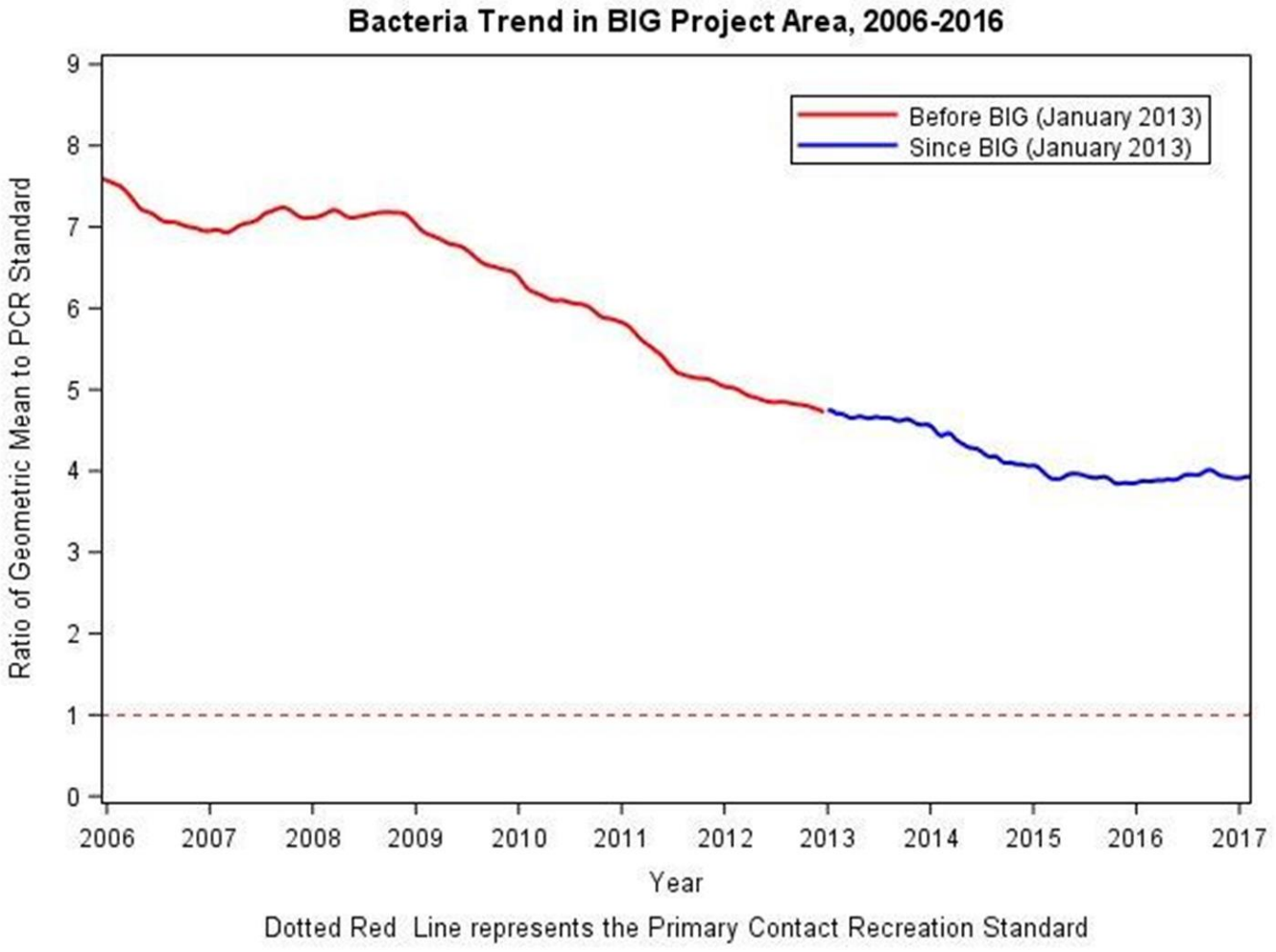
Implementation: Outreach and Education

https://coastalcommunitiestx.weebly.com/materials.html

Next Steps in the I-Plan / WPP Process

- Coordination Committee (CC) – Discuss I-Plan/WPP Measures (January 2019)
- H-GAC Drafts Reduction Measures (February 2019)
- CC – Reviews Draft Measures (March 2019)
- H-GAC Drafts I-Plan / WPP (April 2019)
- CC – Reviews Draft Plan (May 2019)
- I-Plan/WPP Draft Submitted to TCEQ (June 2019)

Do Watershed Plans Work?



Thank You!

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