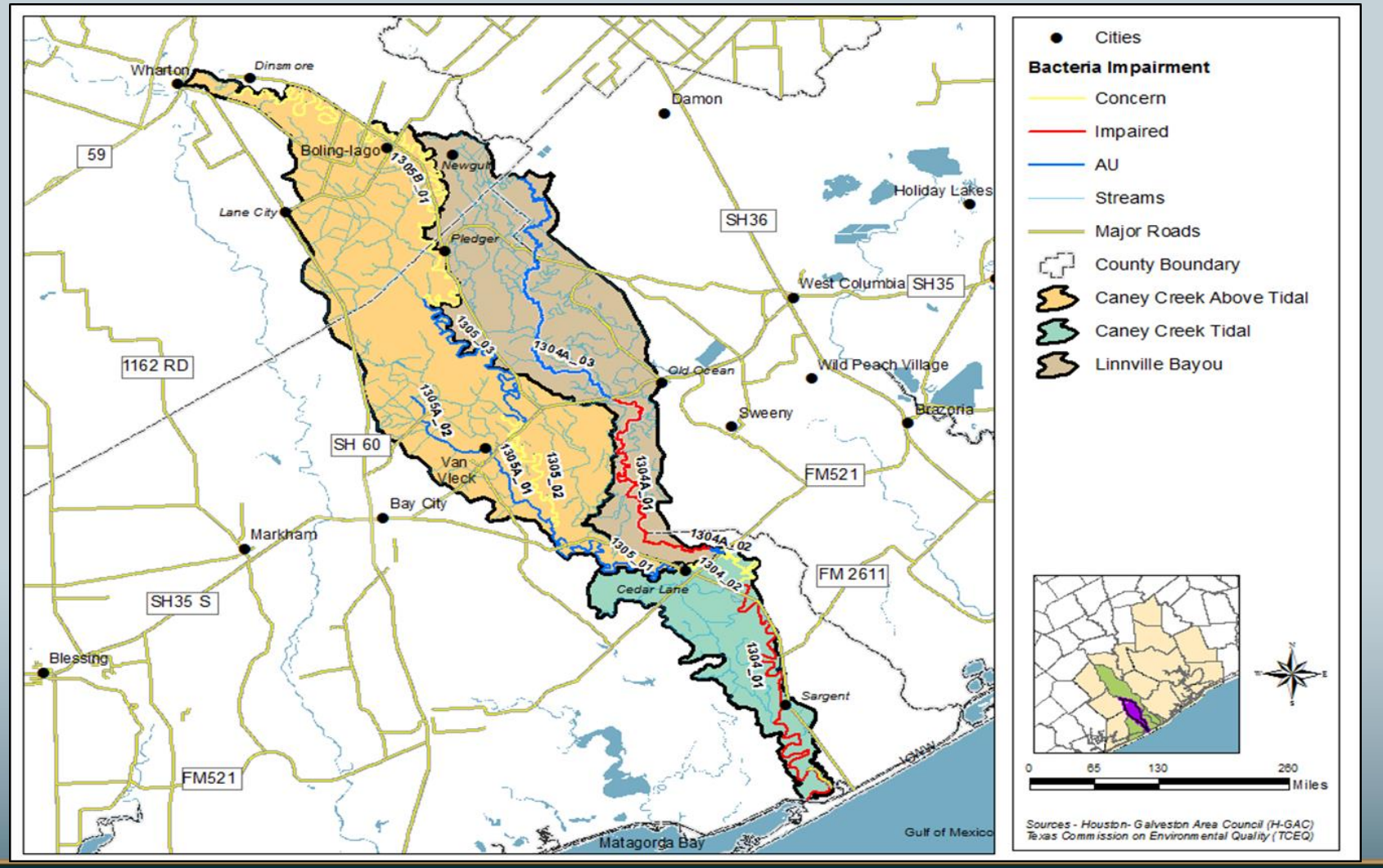
CANEY CREEK TMDL PROJECT

Caney Creek CC Meeting
December 10, 2019

Meeting Agenda

- 5:30 – 5:35 Welcome – Open Meeting
- 5:35 – 5:45 Project Review
- 5:45 – 6:15 Project Data/Mapping Update
- 6:15 – 7:15 Review Draft BMPs
- 7:15 – 7:25 Implementation
- 7:25 – 7:30 Meeting Wrap Up/Next Steps
- Adjourn

Why Are We Here?



Project Review

- 5/14/2018 CC Meeting #1
- 2/21/2019 CC Meeting #2
- 7/11/2019 CC Meeting #3
- 12/10/2019 CC Meeting #4

Caney Creek TMDL Update

- Technical Support Document Revised
  - Submitted in 2018
  - Resubmitted to TCEQ August 2019
- TMDL Document
  - Submitted in July 2019
  - Resubmitted to TCEQ for review September 2019

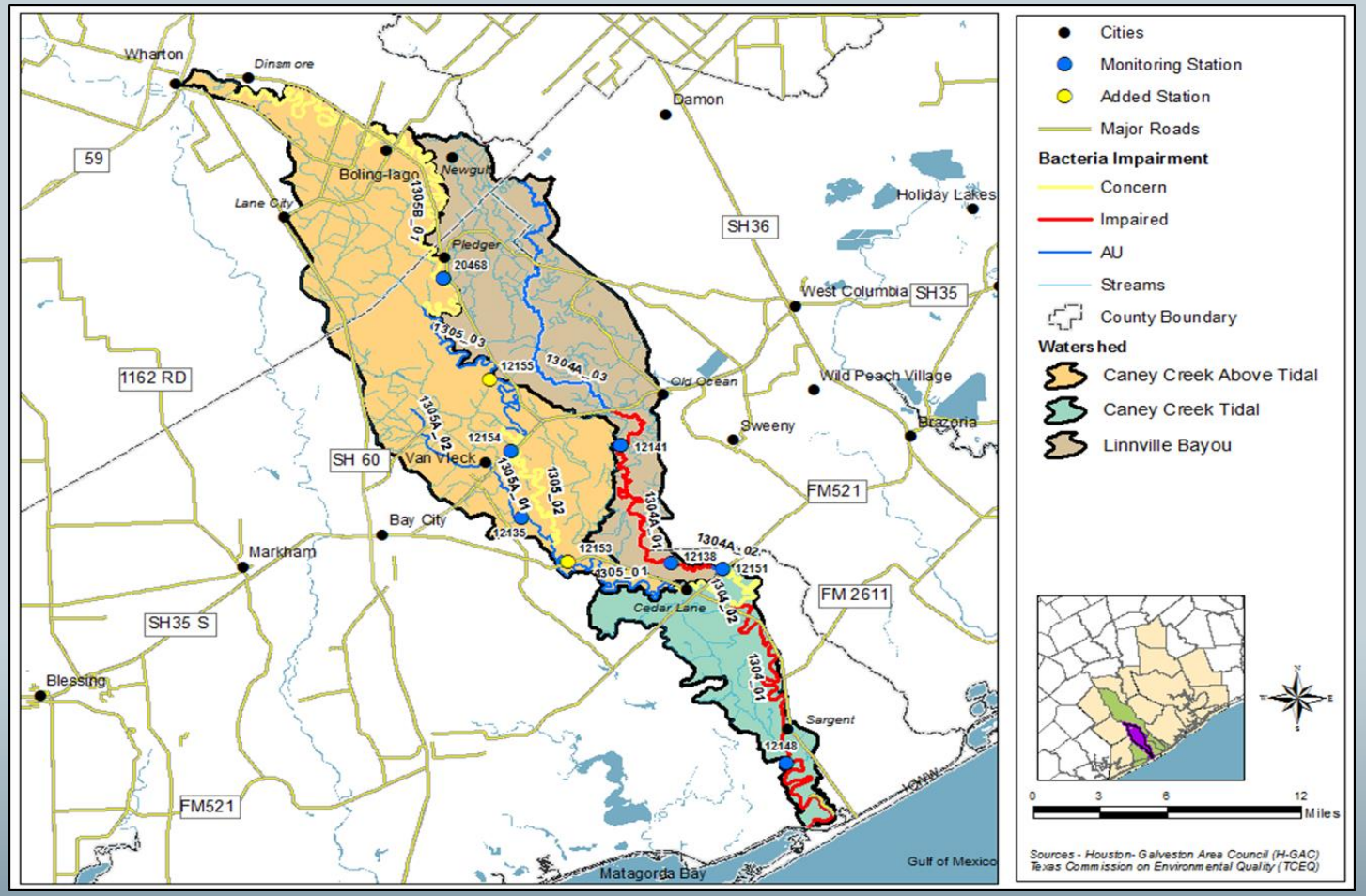
Technical Support Document for Two Total Maximum Daily Loads for Indicator Bacteria in the Caney Creek Watershed

Segments: 1304 and 1304A
Assessment Units 1304_01 and 1304A_01

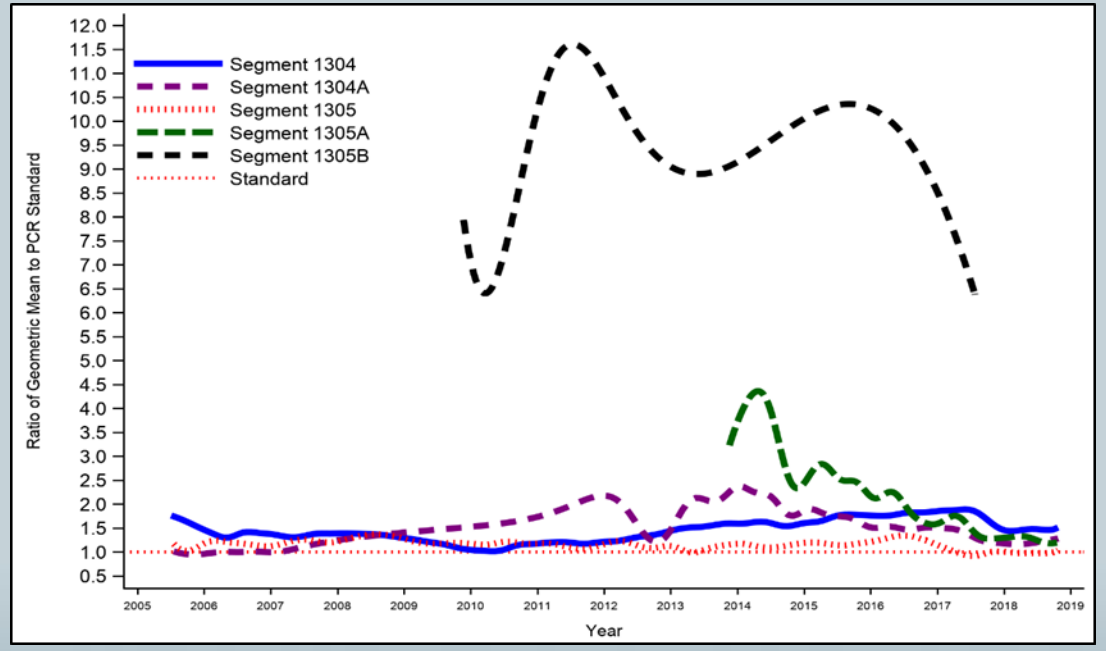
December 2019

“Naturalized Flow”

- External Sources
  - WWTFs
- Internal Sources
  - Irrigation
  - Industrial

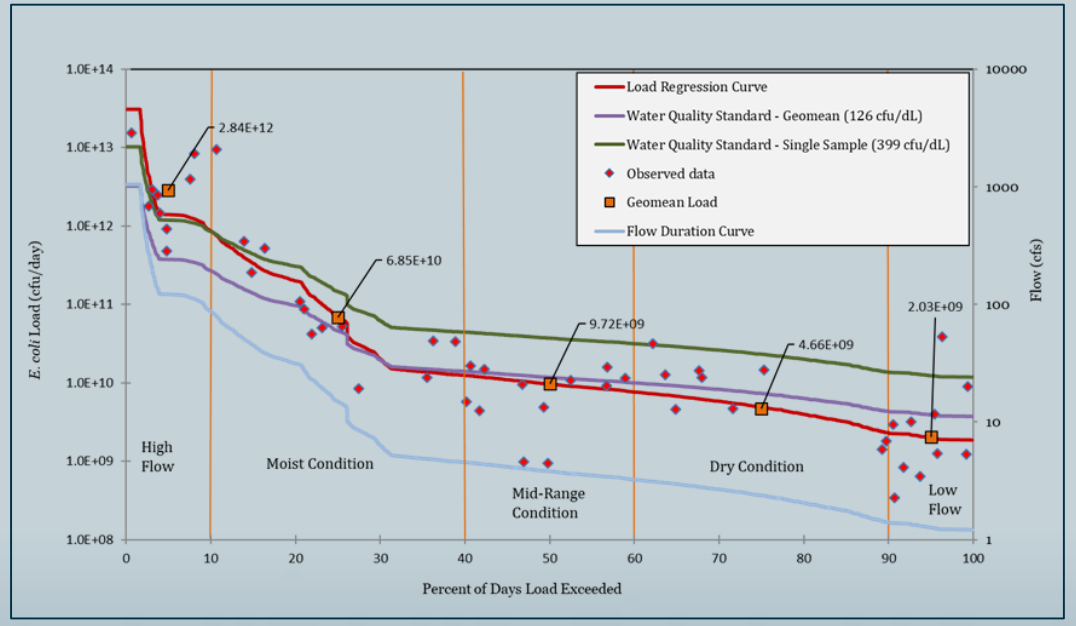


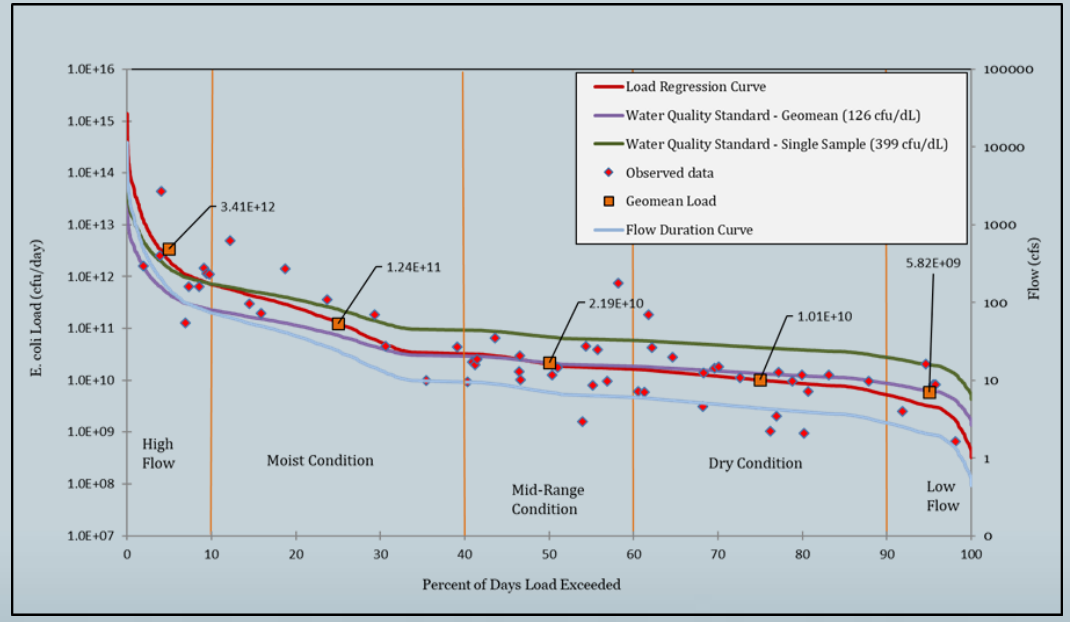
Data Adjustments



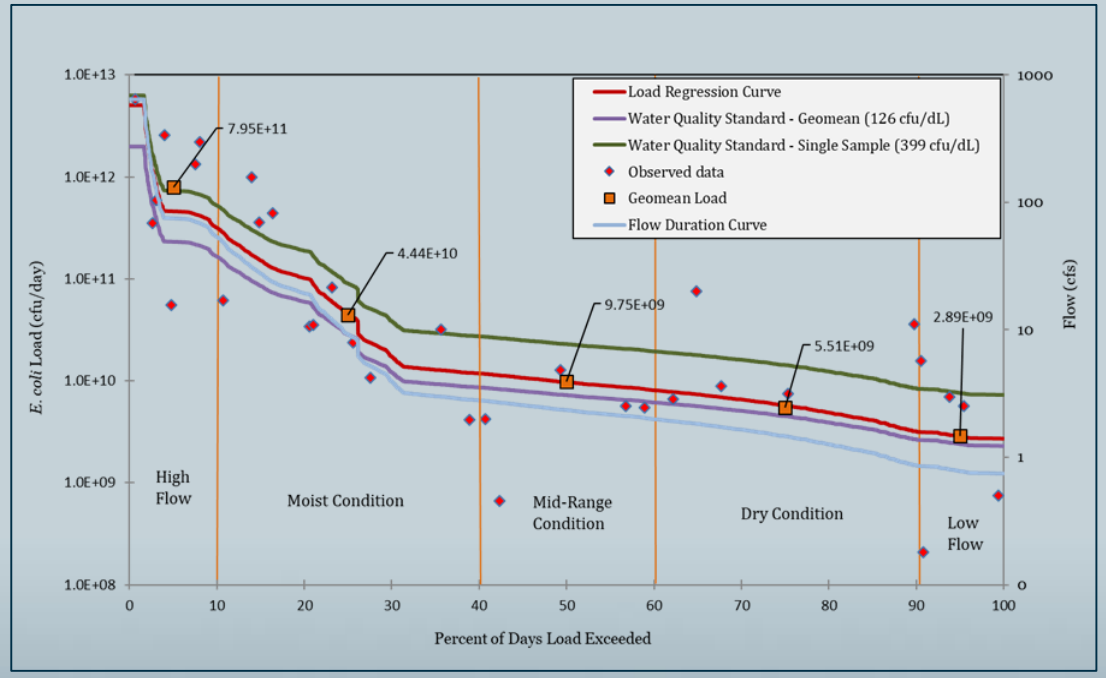
AU	SID	Indicator	Earliest Date	Most Recent Date	Samples	Geometric Mean
1304_01*	12148	Enterococci	1/7/2004	10/25/2018	105	47.8
1304_02	12151	Enterococci	4/20/2004	10/18/2018	28	53.7
1304A_01	12141	E. Coli	1/7/2004	10/25/2018	38	205
1304A_02	12138	E. Coli	4/8/2014	7/26/2017	2	5.6
1305_01	12153	E. Coli	2/2/2017	10/18/2018	10	55.5
1305_02	12154	E. Coli	1/7/2004	10/25/2018	58	147.4
1305_03	12155	E. Coli	2/2/2017	8/22/2017	9	243.1
1305A_01	12135	E. Coli	11/19/2013	10/18/2018	21	68.8
1305B_01	20468	E. Coli	11/23/2009	8/22/2017	15	664.6

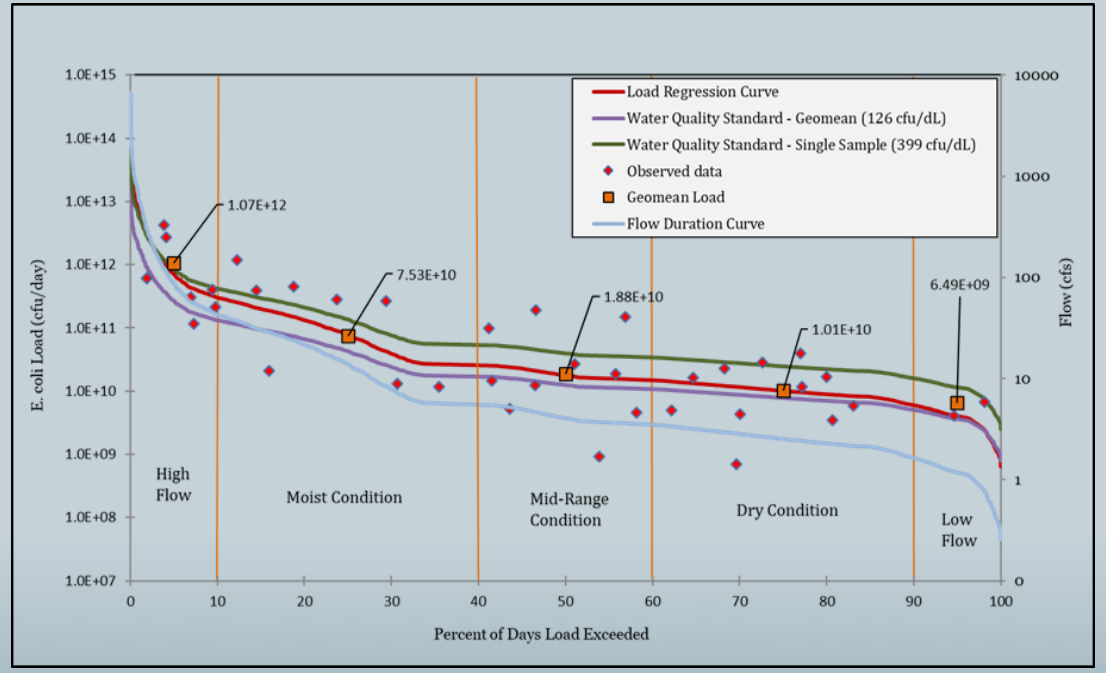
Load Duration Curve for Station 12154 at SH 35 (1305_02)



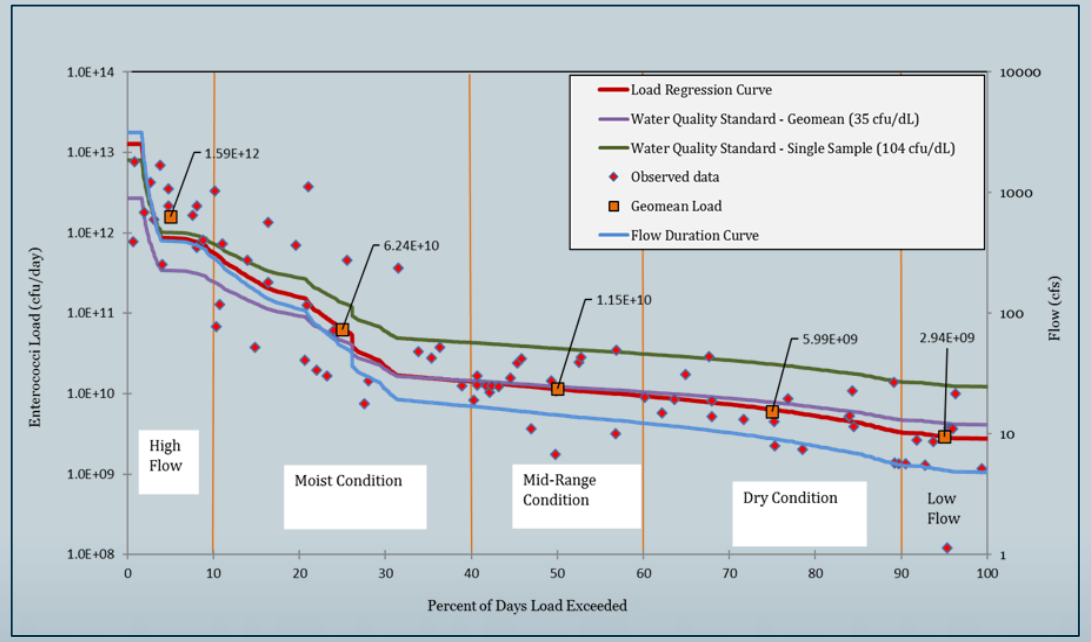


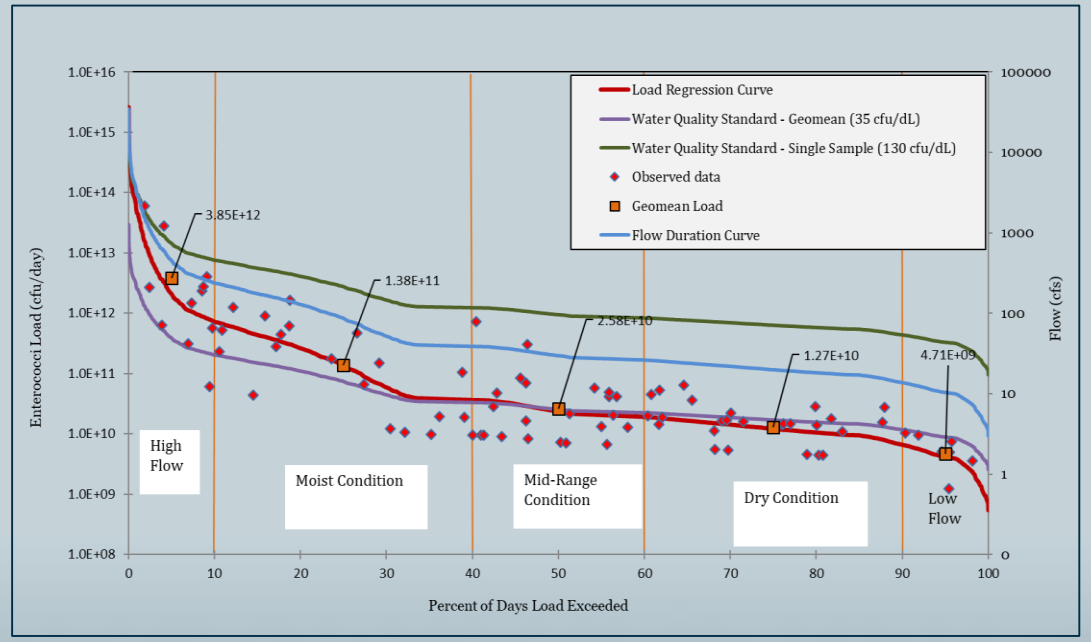
Load Duration Curve for Station 12141 at SH 35 (1304A_01)





Load Duration Curve for Station 12148 at Chambless Rd. (1304_01)





Percent Load Reductions

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%

			1304_01		1304A_01
			Enterococci		E. coli
			35 cfu/100mL		126 cfu/100 mL
Flow Condition	Exceedance Range	Geometric Mean (cfu/100mL)	Required Percent Reduction	Geometric Mean (cfu/100mL)	Required Percent Reduction
High Flow	(0-10%)	239.64	85.39%	356.93	64.70%
Moist	(10-40%)	64.92	46.09%	228.62	44.89%
Mid-Range	(40-60%)	33.62	0.00%	181.01	30.39%
Dry	(60-90%)	25.97	0.00%	163.89	23.12%
Low Flow	(90-100%)	17.24	0.00%	151.42	16.79%

Revised TMDL

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

AU	Indicator Bacteria	TMDL (Billion cfu/day)	MOS (Billion cfu/day)	WLA_{wwtf} (Billion cfu/day)	WLA_{sw} (Billion cfu/day)	LA (Billion cfu/day)
1304_01	Enterococci	387.70	2.32	0.59	0.93	383.86
1304A_01	E. coli	268.66	13.43	0.24	9.08	245.91

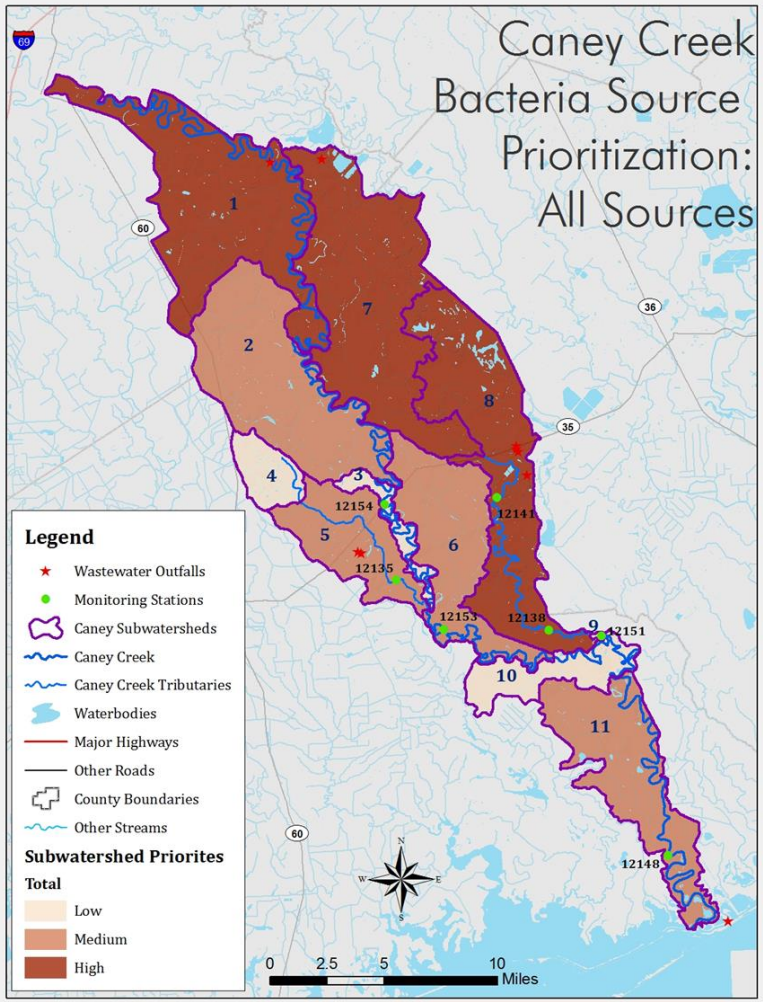
Draft Caney Creek I-Plan/WPP Update

- Summary of TMDL/TSD
- Prioritizes Sources
- Identifies Management Measures
- Identifies Implementing Partners
- Identifies Potential Funding Sources

Aquatic Life Parameters in the Caney Creek Watershed

Name	Assessment Unit	Parameter	Data Date Range	Criteria	No. Samples	Exceedance Value	Category
Caney Creek Tidal	1304_01	Dissolved Oxygen Grab	12/1/2007 - 11/30/2014	4	54	2.83	CS
Caney Creek Tidal	1304_02	Dissolved Oxygen Grab	12/1/2007 - 11/30/2014	4	4	3.55	CS
		Total Phosphorus	12/1/2007 - 11/30/2014	0.66	4	1.14	CS
Linnville Bayou	1304a_01	Dissolved Oxygen Grab	12/1/2007 - 11/30/2014	4	19	1.8	CS
		Chlorophyll-a	12/1/2007 - 11/30/2014	14.1	14	32.8	CS
Caney Creek Above Tidal	1305_02	Habitat	12/1/2007 - 11/30/2014	20	1	15	CS
Caney Creek Above Tidal	1305_03	Dissolved Oxygen 24hr. Average	12/1/2007 - 11/30/2014	5			NS
		Dissolved Oxygen 24hr. Minimum	12/1/2007 - 11/30/2014	3			CN
		Total Phosphorus	12/1/2007 - 11/30/2014	0.69			CS
Caney Creek Above Tidal	1305B_01	Total Phosphorus	12/1/2007 - 11/30/2014	0.69	6	0.85	CS

Priorities and Subwatersheds



AU	SW_ID
1305_02	1
1305_02	2
1305_02	3
1305A_01	4
1305A_01	5
1304_02	6
1304A_01	7
1304A_01	8
1304_02	9
1304_01	10
1304_01	11

- Divided 1304, 1304A and 1305 watersheds into 11 subwatersheds
- Calculate an estimate source load
- Weighted each Fecal Bacteria Sources within subwatershed

Potential Fecal Load By Source

SW_ID	OSSF	Cattle	Sheep/Goats	Horses	Deer	Feral Hogs	SSOs	Dogs	Total	Load per acre
1	1.41E+11	1.04E+13	1.42E+12	3.16E+10	2.21E+11	4.58E+11	Medium	1.83E+12	1.45E+13	4.20E+08
2	1.48E+10	6.00E+12	8.19E+11	1.82E+10	1.80E+11	4.14E+11		1.48E+12	8.92E+12	3.19E+08
3	1.11E+10	1.03E+12	1.41E+11	3.14E+09	2.34E+10	4.90E+10		1.31E+11	1.39E+12	4.20E+08
4	7.42E+09	1.01E+12	1.38E+11	3.07E+09	2.04E+10	7.12E+10		2.82E+11	1.53E+12	3.28E+08
5	2.04E+11	3.49E+12	4.76E+11	1.06E+10	8.33E+10	1.65E+11	High	5.65E+11	4.99E+12	3.99E+08
6	5.94E+10	6.70E+12	9.15E+11	2.03E+10	1.55E+11	2.54E+11		5.21E+11	8.62E+12	4.65E+08
7	5.94E+10	1.13E+13	1.55E+12	3.44E+10	2.59E+11	5.03E+11		1.66E+12	1.54E+13	4.40E+08
8	6.31E+10	7.74E+12	1.06E+12	2.35E+10	2.12E+11	4.36E+11		1.07E+12	1.06E+13	3.50E+08
9	0.00E+00	4.08E+10	5.58E+09	1.24E+08	8.13E+08	8.90E+09		2.33E+09	5.86E+10	6.06E+08
10	7.42E+09	2.51E+12	3.43E+11	7.63E+09	6.14E+10	1.16E+11		8.36E+10	3.13E+12	4.05E+08
11	2.19E+11	5.21E+12	7.12E+11	1.58E+10	1.34E+11	2.89E+11	Low	1.48E+11	6.73E+12	3.28E+08
Total	7.87E+11	5.55E+13	7.58E+12	1.69E+11	1.35E+12	2.76E+12		7.76E+12	7.59E+13	3.89E+08

Load Reduction by Source

SW	OSSF	Cattle	Sheep/Goats	Horses	Deer	Feral Hogs	Dogs	SSOs	Total
1	3.77	278.17	38.00	0.85	5.91	12.24	48.79	0.00	387.73
2	0.40	160.18	21.88	0.49	4.80	11.06	39.47	0.00	238.27
3	0.30	27.62	3.77	0.08	0.62	1.31	3.51	0.00	37.22
4	1.95	265.30	36.24	0.81	5.34	18.68	74.05	0.00	402.37
5	20.04	342.47	46.79	1.04	8.19	16.17	55.47	0.00	490.16
6	0.40	45.05	6.15	0.14	1.05	1.71	3.51	0.00	58.00
7	0.79	150.03	20.50	0.46	3.44	6.66	21.93	0.00	203.79
8	0.96	118.35	16.17	0.36	3.24	6.67	16.38	0.00	162.14
9	0.00	52.73	7.20	0.16	1.05	11.49	3.01	0.00	75.65
10	0.31	106.25	14.52	0.32	2.60	4.90	3.54	0.00	132.44
11	3.49	83.01	11.34	0.25	2.14	4.61	2.36	0.00	107.20
Total	32.40	1,629.17	222.56	4.95	38.38	95.49	272.01	0.00	2,294.97

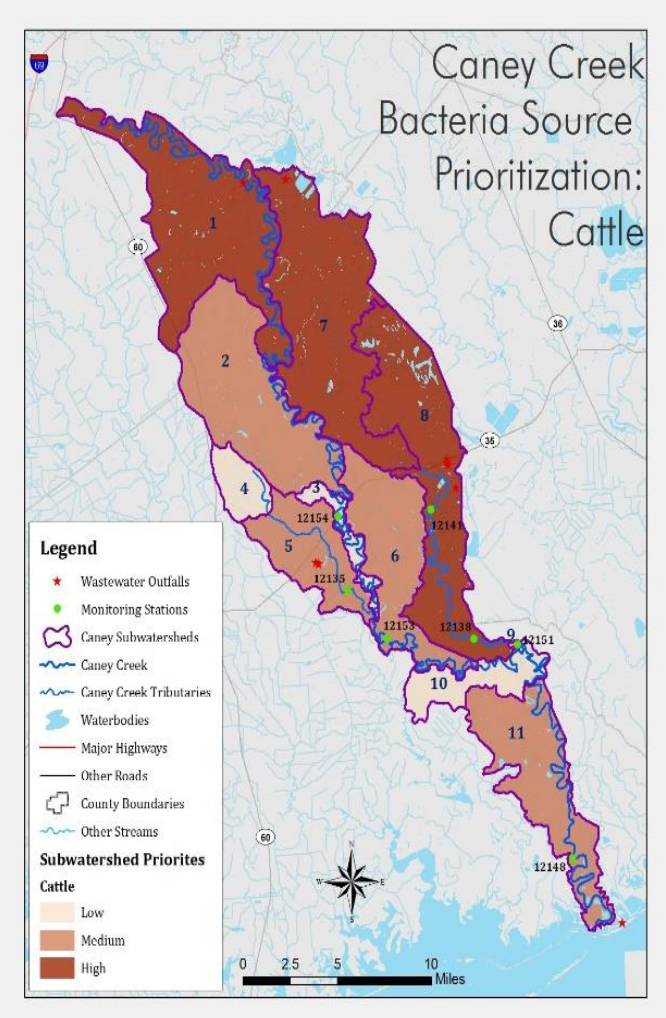
BMP Questionnaire

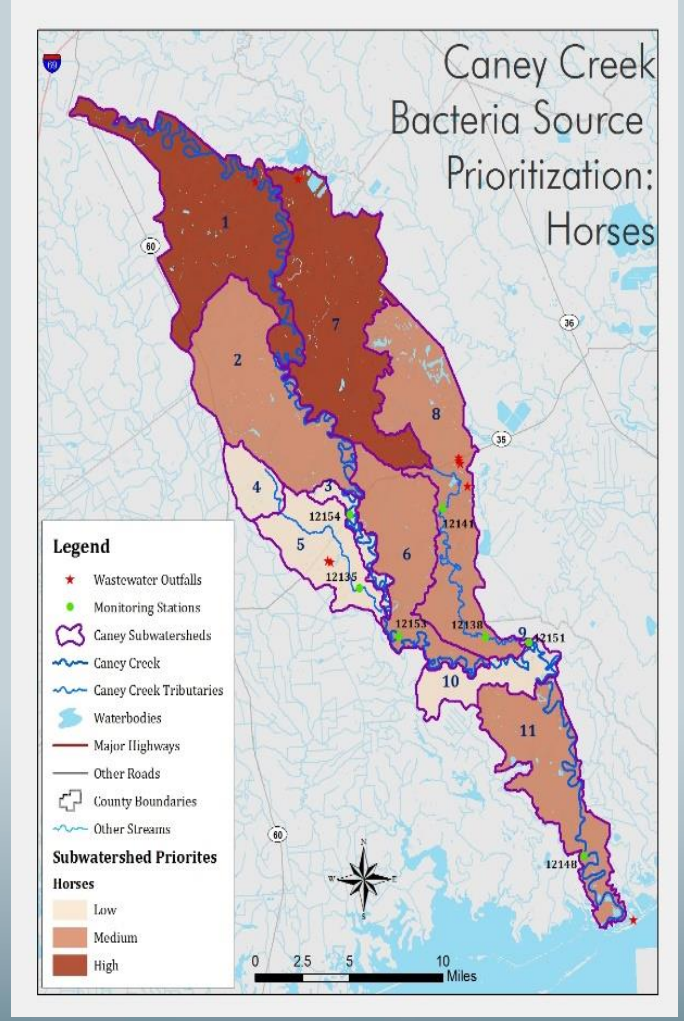
Fecal Source	Watershed Concern	Priority
Domesticated Animals	Y	5
OSSF	Y	4
Feral Hogs	Y	4
Dumping	Y	3
Collection System	Y	3
Wastewater	Y	3
CAFO	Y	2
Manure Application	N	2
Pet Waste	N	1

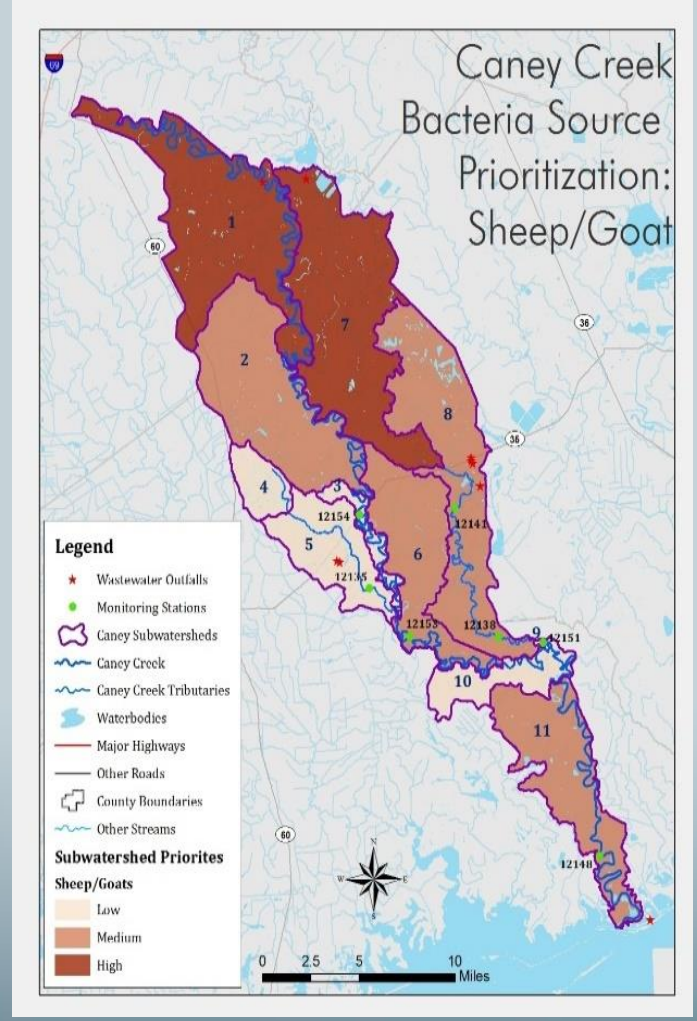
Management Measures (MM)

- *MM 1: Support Land Management Initiatives*
- *MM 2: Promote Safe OSSF Use and Maintenance*
- *MM 3: Address Fecal Deposition of Feral Populations*
- *MM 4: Maintain and Improve Wastewater Facility and Collection System Function*
- *MM 5: Reduce Stormwater Sources*

MM 1: Support Land Management Initiatives







MM 1: Support Land Management Initiatives

Pasture Animal Load Reduction

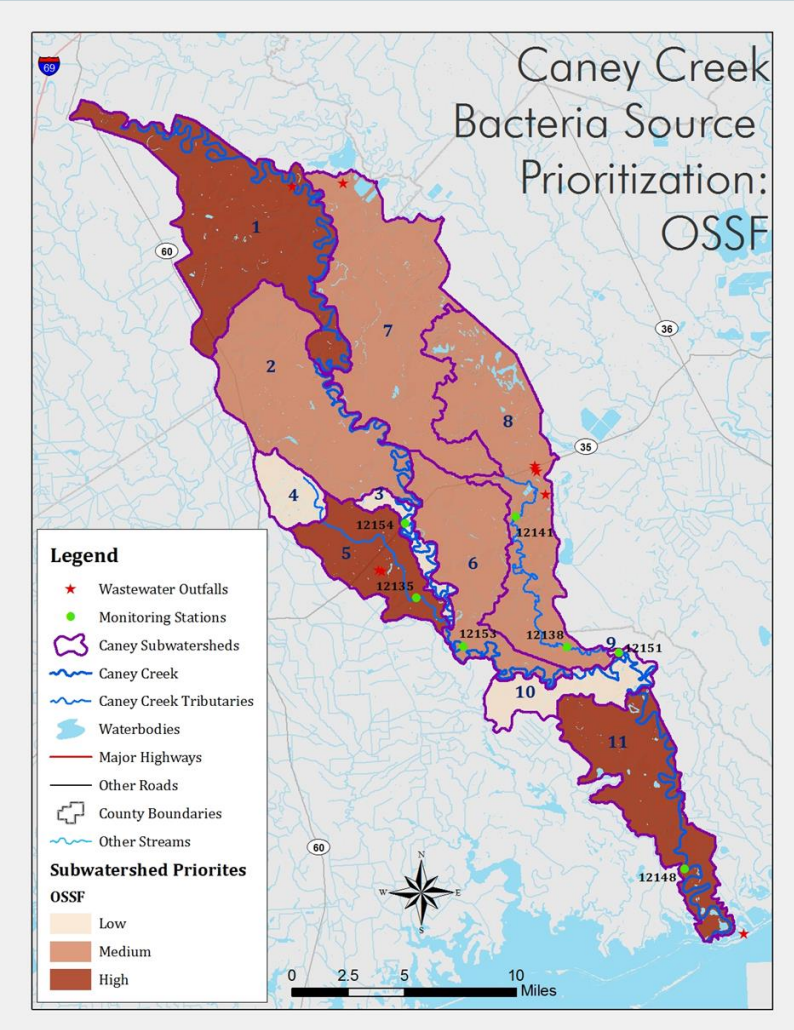
SW	Cattle	Sheep/Goats	Horses	Total
1	278.17	38.00	0.85	317.01
2	160.18	21.88	0.49	182.55
3	27.62	3.77	0.08	31.48
4	265.30	36.24	0.81	302.35
5	342.47	46.79	1.04	390.30
6	45.05	6.15	0.14	51.34
7	150.03	20.50	0.46	170.98
8	118.35	16.17	0.36	134.88
9	52.73	7.20	0.16	60.09
10	106.25	14.52	0.32	121.09
11	83.01	11.34	0.25	94.61
Total	1,629.17	222.56	4.95	1,856.68

(*In Billion cfu/day)

Estimated Unit(s) to Address

AU	Total Livestock Units to Address	Total Plans
1304_01	193	4
1304_02	100	2
1304A_01	274	5
1305_02	476	10
1305A_01	621	12
Total	1664	33

MM 2: Promote Safe OSSF Use and Maintenance



OSSF Load Reduction

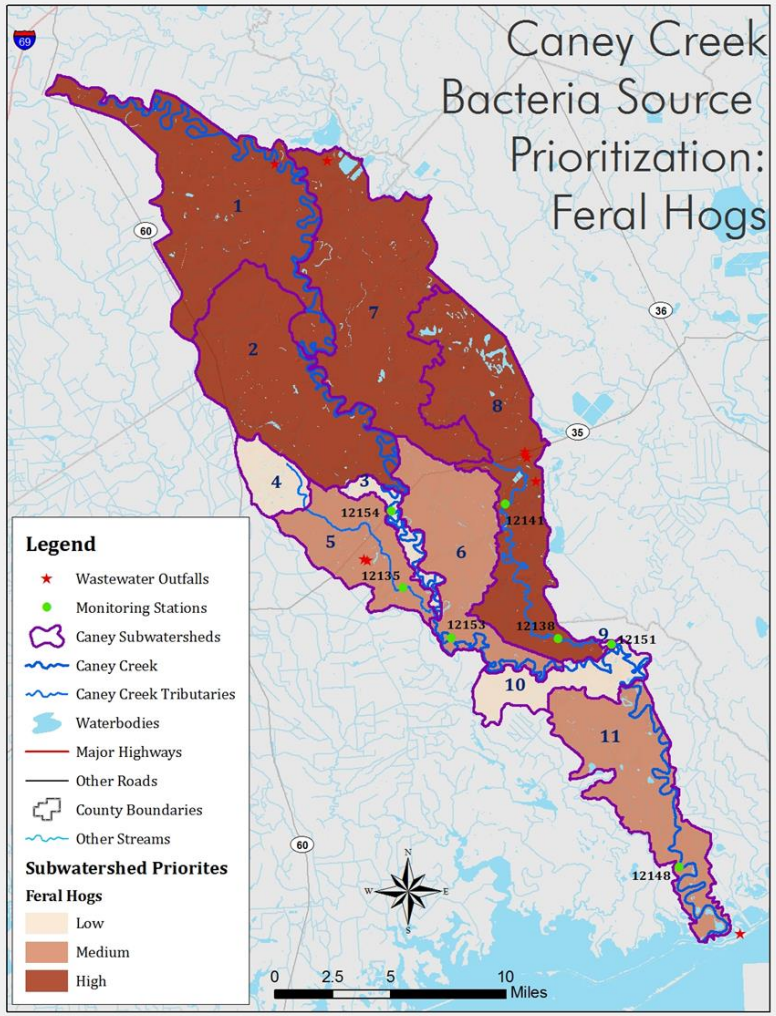
SW	OSSF
1	3.77
2	0.40
3	0.30
4	1.95
5	20.04
6	0.40
7	0.79
8	0.96
9	0.00
10	0.31
11	3.49
Total	32.40

(*In Billion cfu/day)

Estimated Unit(s) to Address

Bacteria Source	Representative Unit	Representative Unit Daily Load Billions CFU/100mL/Day	1304_01	1304_02	1304A_01	1305_02	1305A_01	Total
OSSF	1 Failing OSSF	3.70E+09	1	0	0	1	6	9

MM 3: Address Fecal Deposition of Feral Populations



Feral Hog Load Reduction

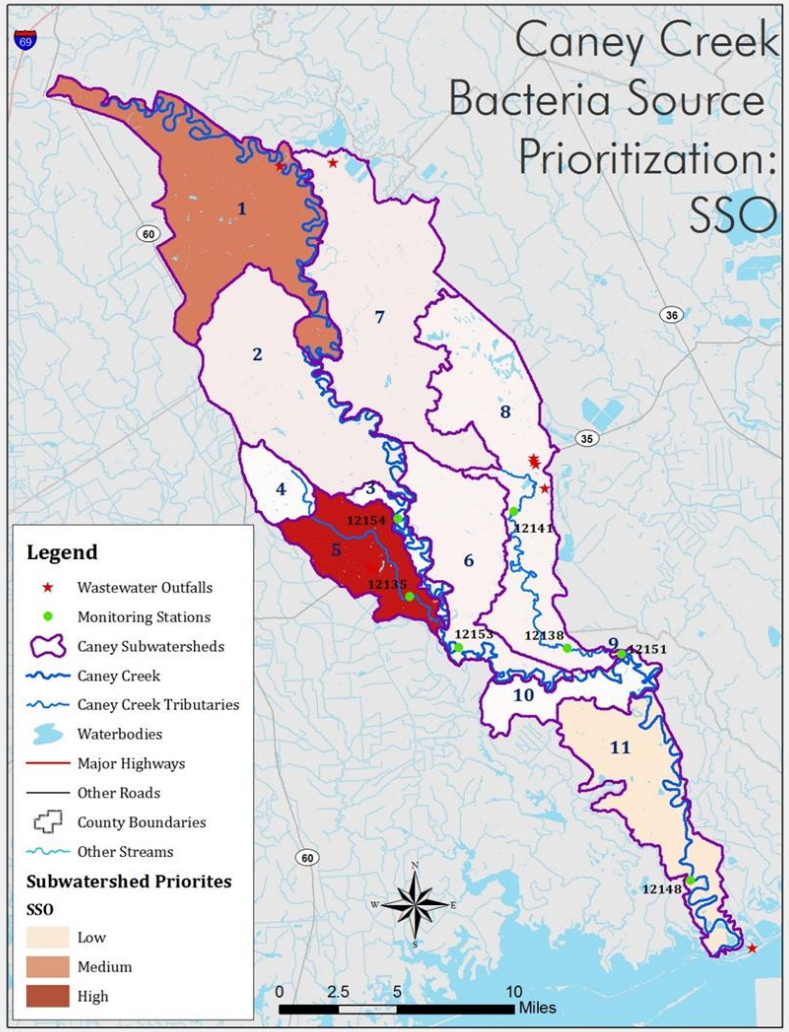
SW	Feral Hogs
1	12.24
2	11.06
3	1.31
4	18.68
5	16.17
6	1.71
7	6.66
8	6.67
9	11.49
10	4.90
11	4.61
Total	95.49

(*In Billion cfu/day)

Estimated Unit(s) to Address

Bacteria Source	Representative Unit	Representative Unit Daily Load Billions CFU/100mL/Day	1304_01	1304_02	1304A_01	1305_02	1305A_01	Total
Feral Hogs	1 Feral Hog	4.45E+09	2.14	2.97	3.00	5.53	7.83	21.46

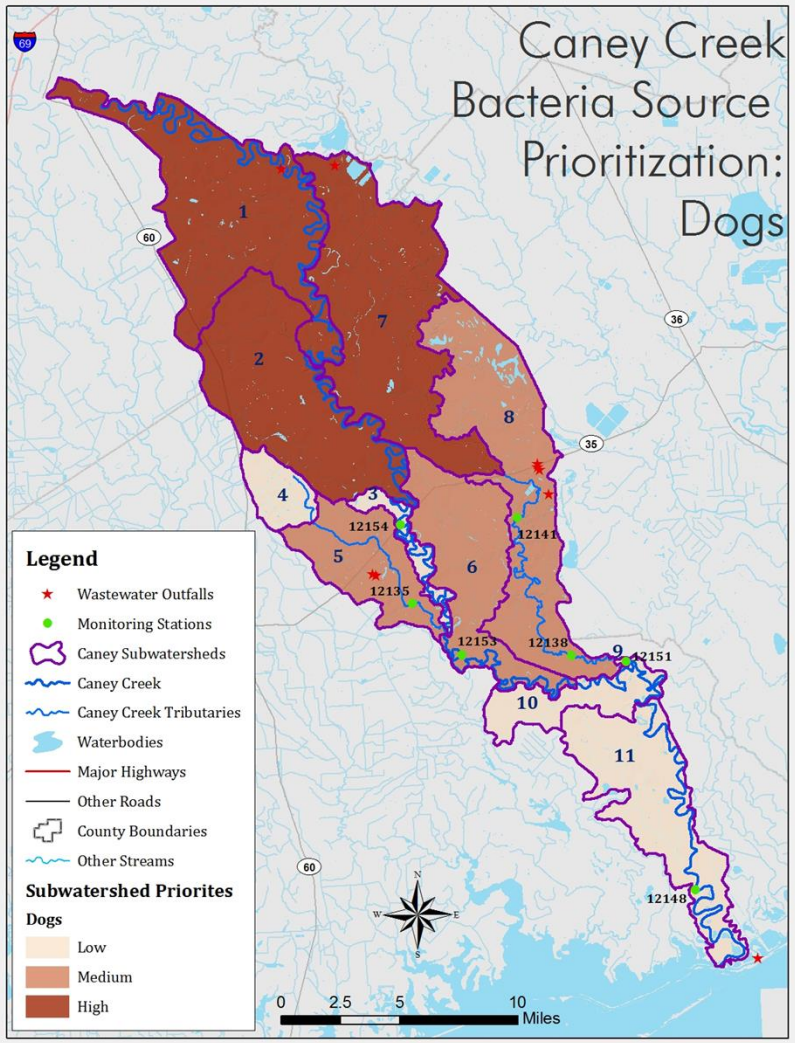
MM 4: Maintain and Improve Wastewater Treatment Facility and Collection System Function



Estimated Unit(s) to Address

Bacteria Source	Representative Unit	Representative Unit Daily Load	1304_01 (SW11)	1305A_01 (SW5)	1305B_01 (SW1)
SSOs	1 SSO	4.93E+09	1	1	1

MM 5: Reduce Stormwater Sources



OSSF Load Reduction

SW	Dogs
1	48.79
2	39.47
3	3.51
4	74.05
5	55.47
6	3.51
7	21.93
8	16.38
9	3.01
10	3.54
11	2.36
Total	272.01

(*In Billion cfu/day)

Bacteria Source	Representative Unit	Representative Unit Daily Load Billions CFU/100mL/Day	1304_01	1304_02	1304A_01	1305_02	1305A_01	Total
Dogs	1 Dog	2.5E+09	2.36	2.61	15.32	36.71	51.81	108.81

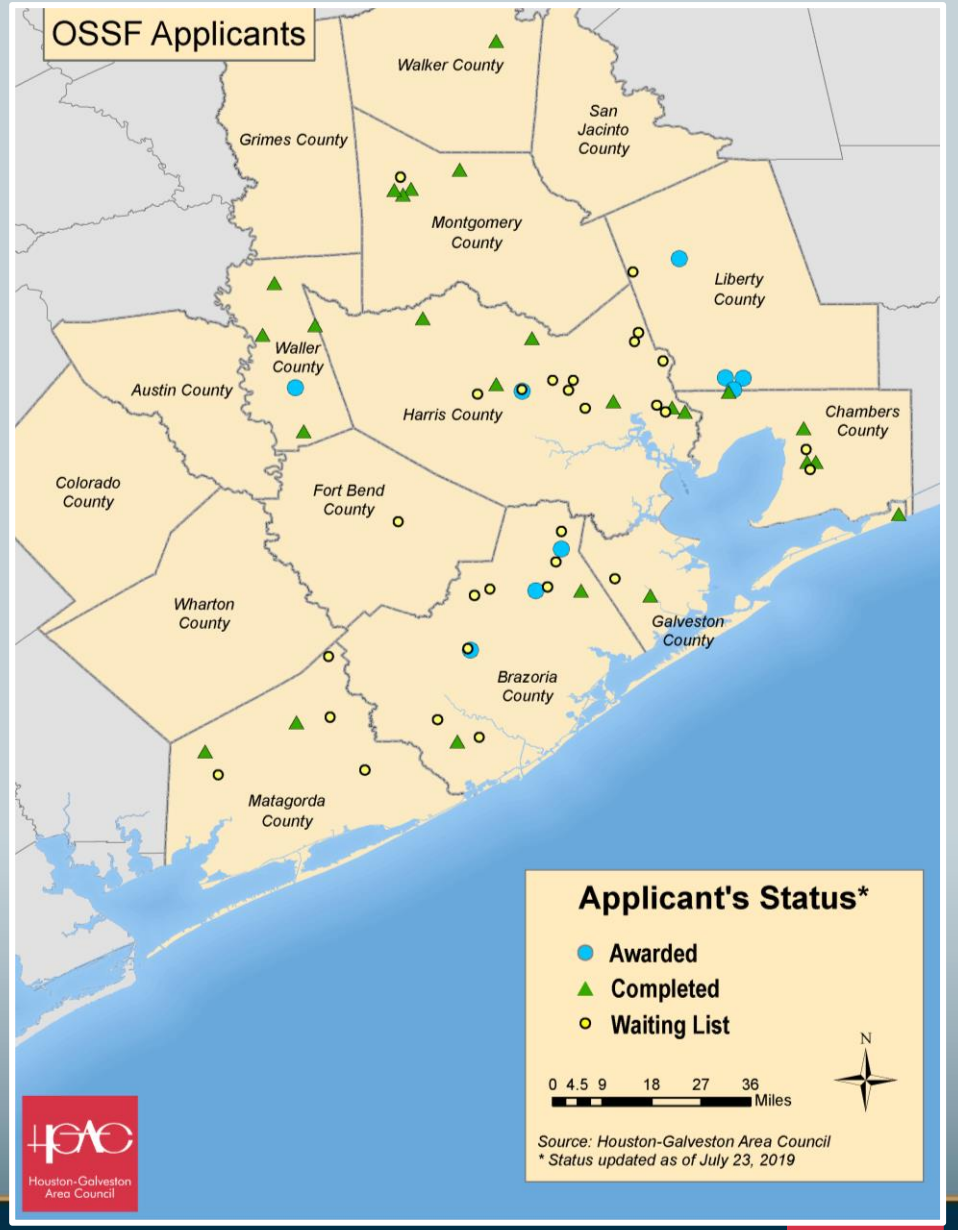
2018 - 2019 Implementation

- Outreach
  - September – Texas Stream Team Training
  - October – OSSF workshop Brazosport College

- Structural
  - Pet Waste Stations (19)

OSSF Supplemental Environmental Project

County	OSSF Replacement	OSSF Repair	Waiting List
Brazoria	3	3	8
Chambers	4	-	2
Fort Bend	-	-	1
Galveston	1	1	1
Harris	7	2	11
Liberty	-	4	1
Matagorda	2	-	4
Montgomery	2	2	1
Walker	-	1	-
Waller	4	-	-
TOTAL	23	13	29



THANK YOU!

- **Steven Johnston**
- Steven.johnston@h-gac.com
- 281-681-2579