Cotton Bayou Watershed Implementation Plan Development

Virtual Public Meeting
March 9, 2023

Meeting Outline

- **Introductions**
- *Project Overview & Updates*
- *Implementation Plan Strategies*
- *Next Steps*
- *Discussion*

Introductions

Texas Commission on Environmental Quality (TCEQ)

lead state environmental management agency

Houston-Galveston Area Council (H-GAC)

regional council of governments

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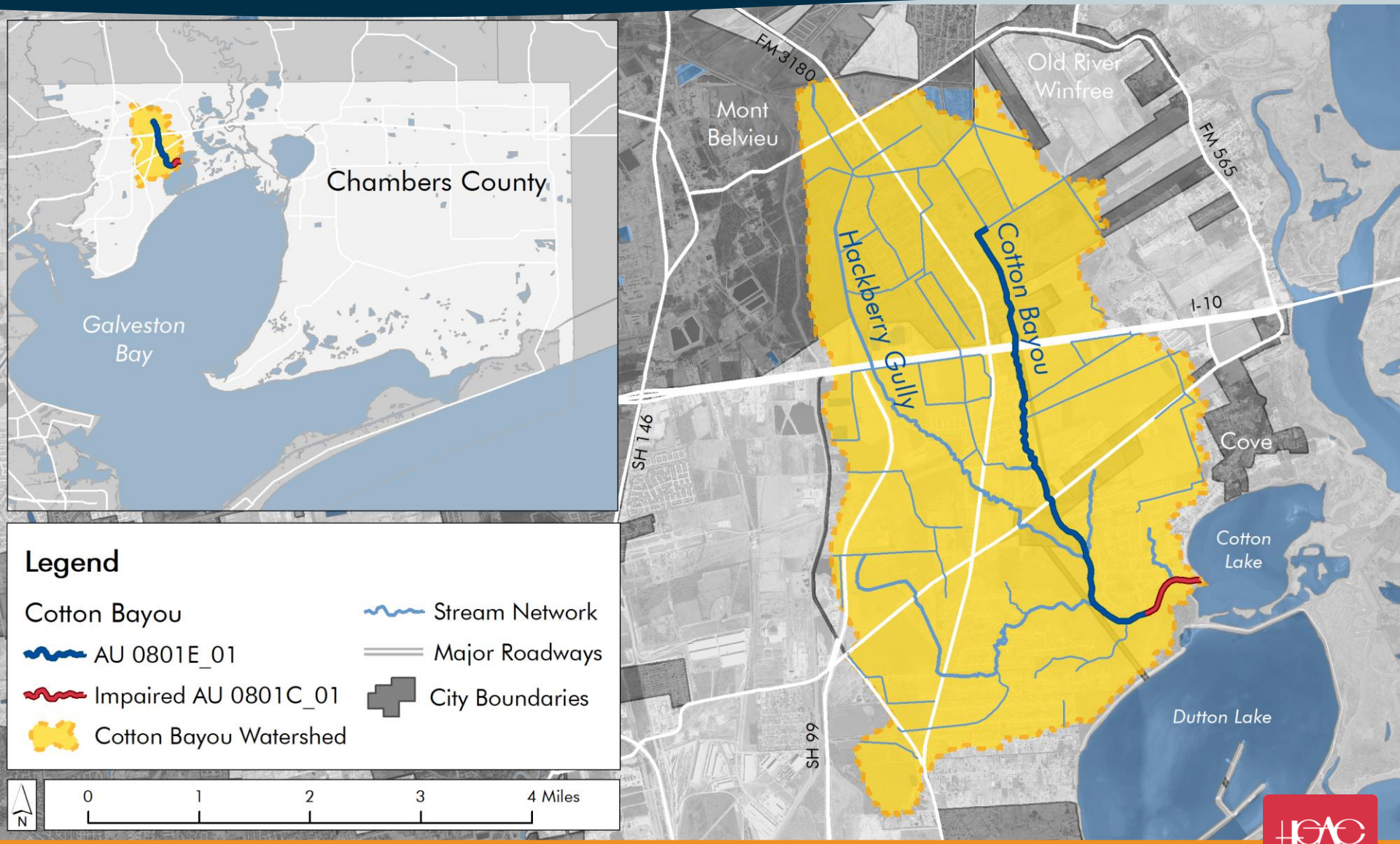
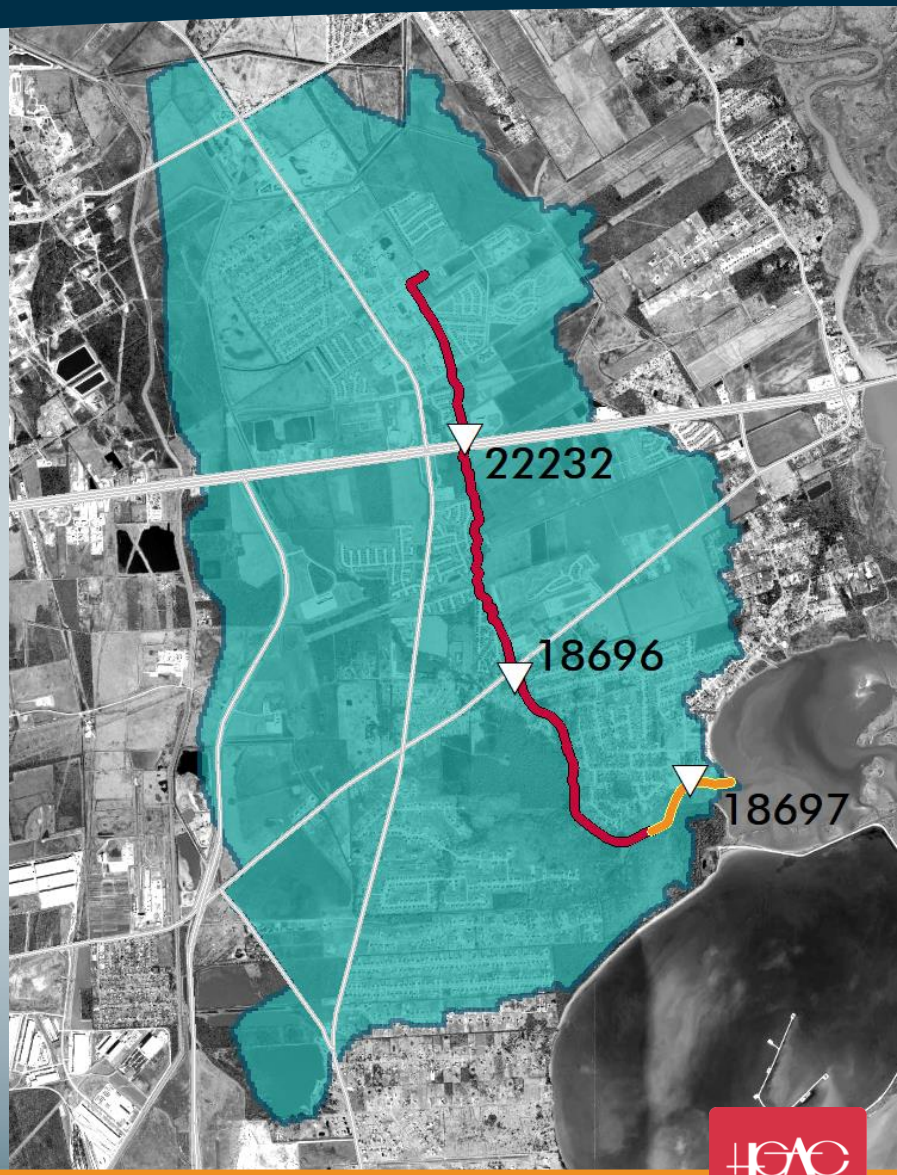
Watershed Area

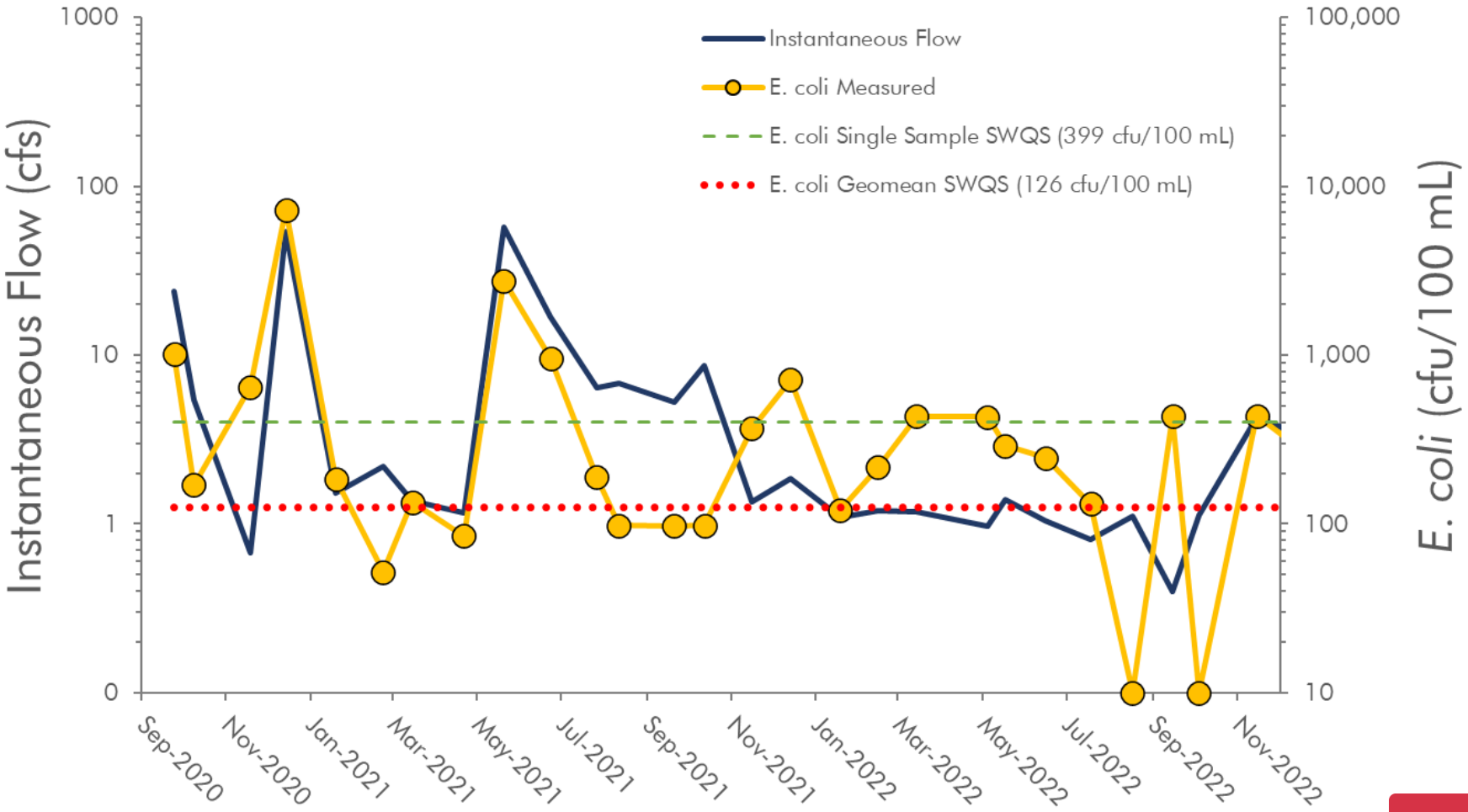


Water Quality

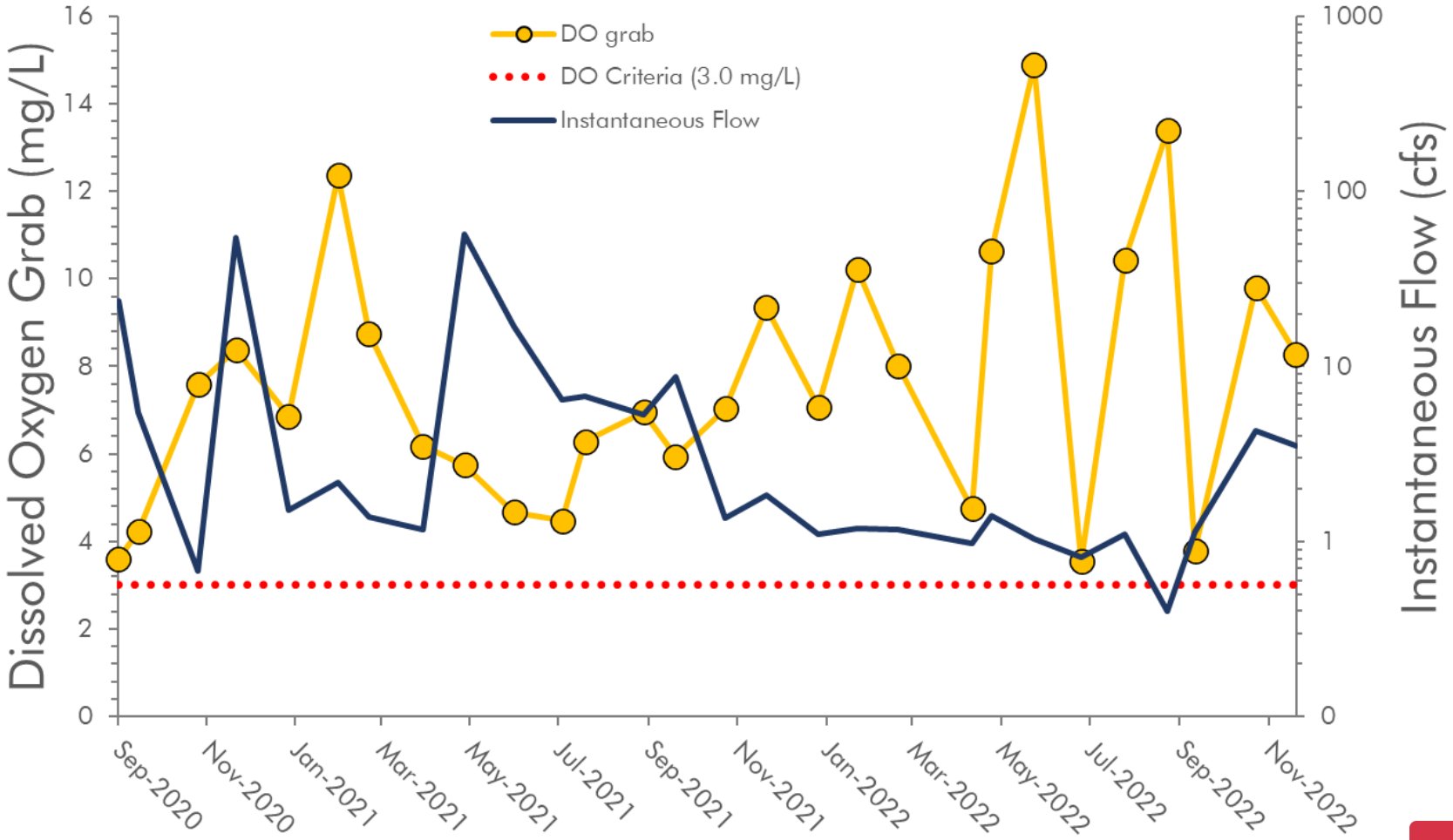
- Contact recreation use **impaired** due to high levels of fecal indicator bacteria (Enterococci) in surface water
- Other water quality **concerns** include low dissolved oxygen and high concentrations of nutrients
- Three monitoring sites including new station (22232) at I-10



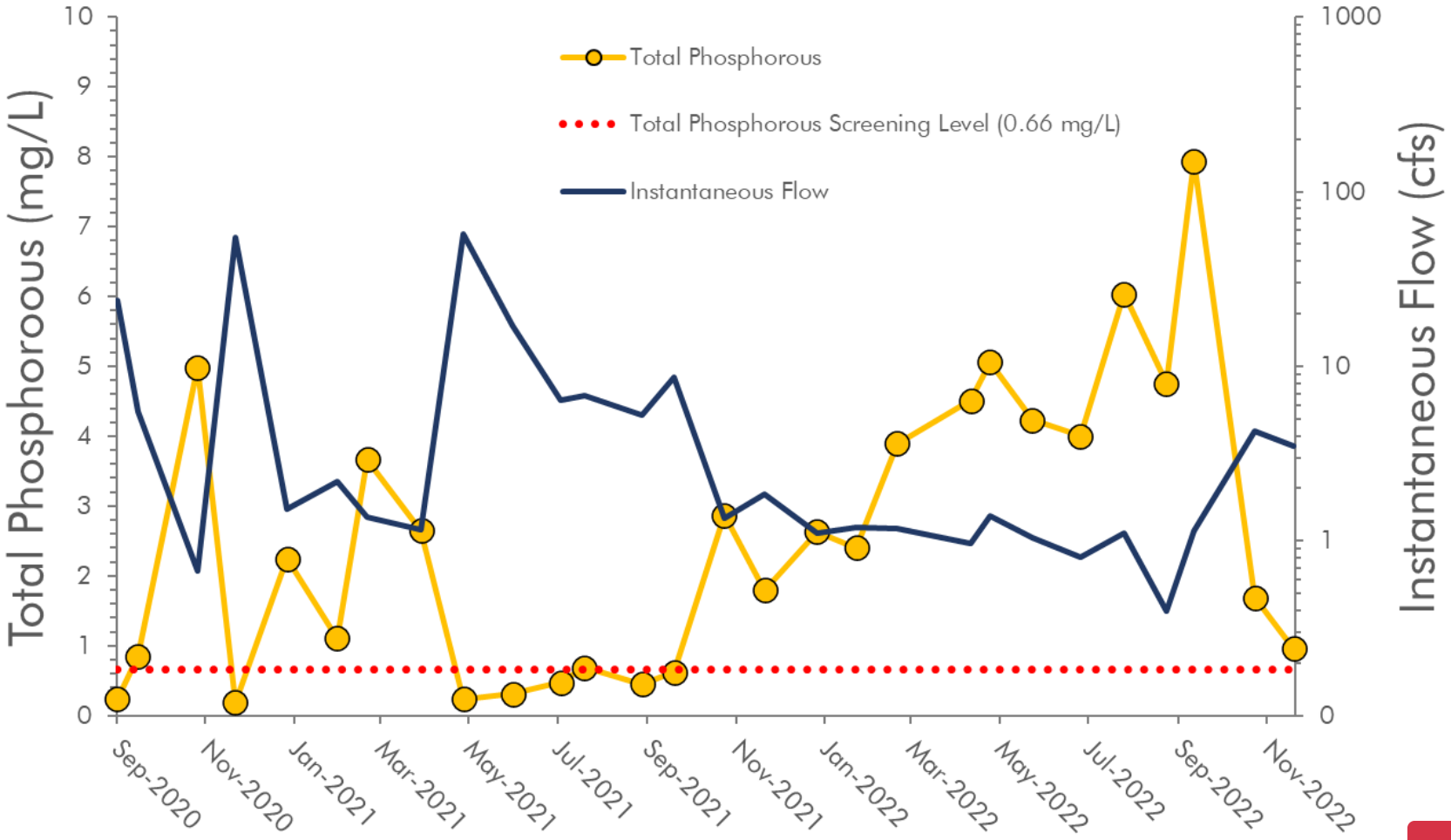
Bacteria at 22232



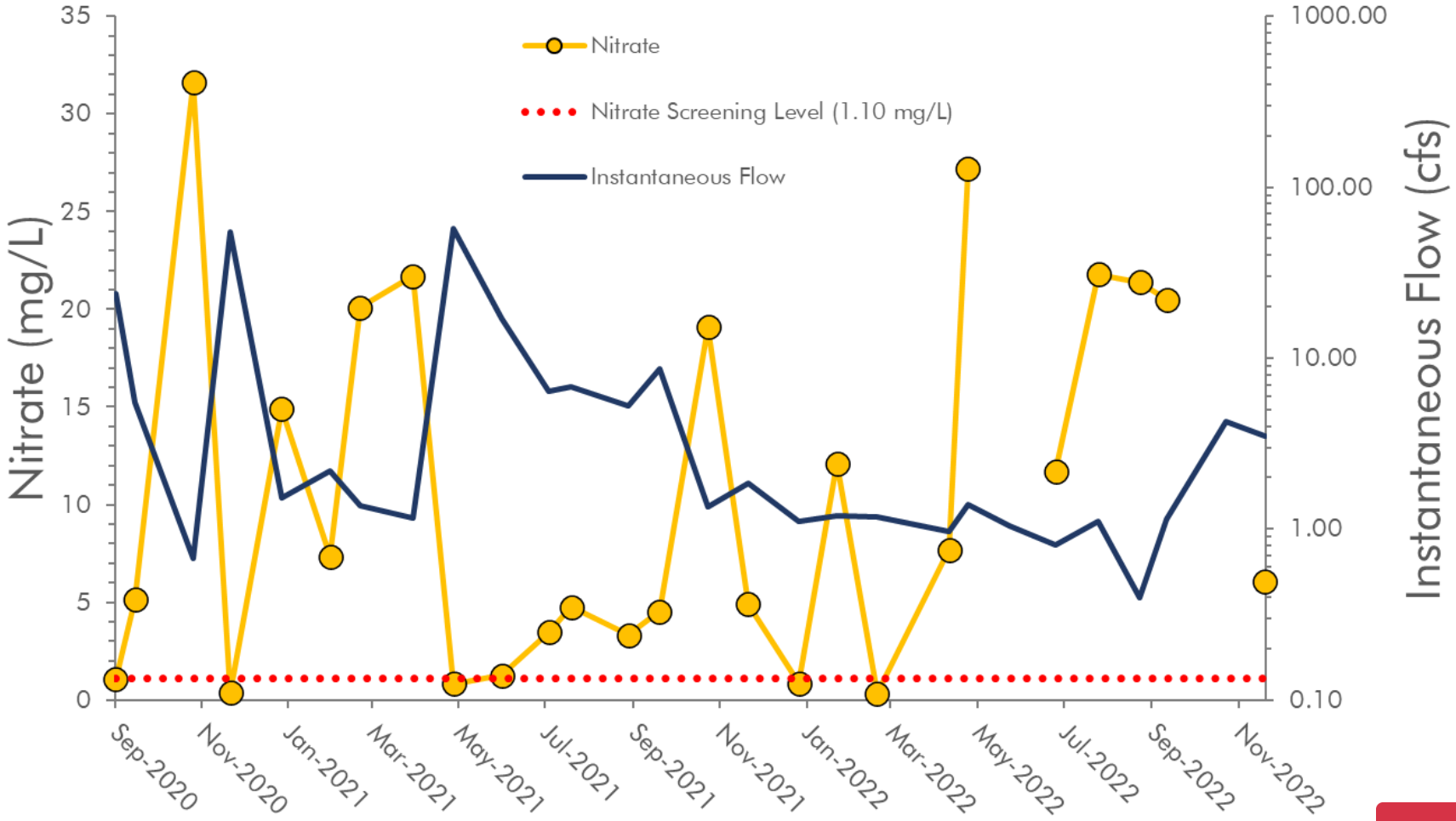
Dissolved Oxygen at 22232



Total Phosphorous at 22232



Nitrate at 22232



Bacteria Sources

- **Human Waste**
  - Wastewater
  - Septic/Aerobic Systems
  - Illicit Sewage
- **Domestic Animal Waste**
  - Pets
  - Livestock
- **Wildlife/Feral Hog Waste**
  - Deer and Other Wildlife
  - Feral Hogs

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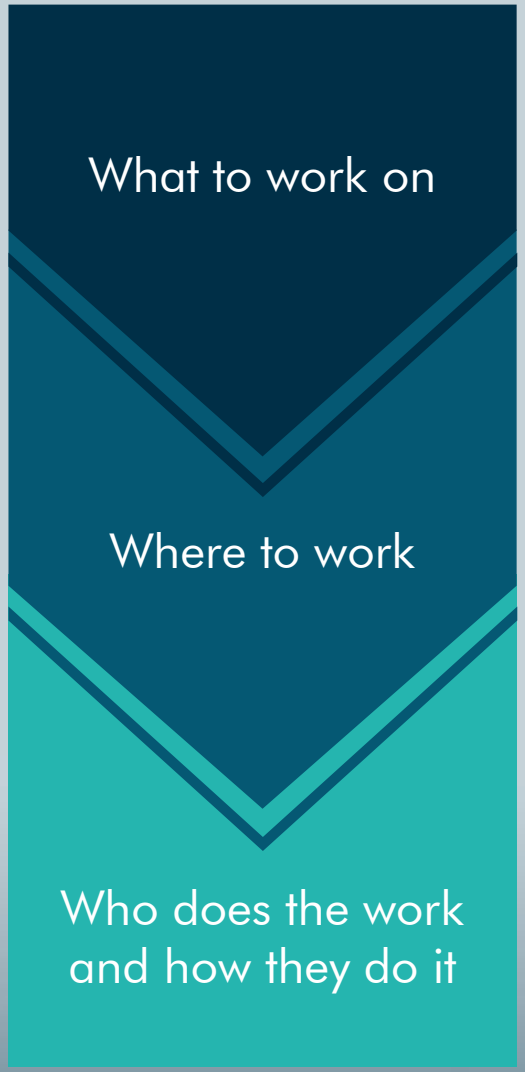
Strategies

- Actionable items to address bacteria reduction for a specific management measure
- Identify priority areas to implement actions supporting the management measure
- List parties responsible for each action and their obligations



Milestones and Schedule

- Measurable goals to reflect progress of strategies
- Implementation schedule details which milestones should be accomplished in the next five years and at what point

Adaptive Management

- Stakeholders periodically assess plan measures for efficiency and effectiveness
- Metrics:
  - Milestones
  - Schedule
  - Water quality data

Management Measures

Land Management

WHAT

Goal: Reduce bacteria loading from livestock and support nutrient reduction initiatives

Potential Strategies:

- Implement best management practices to reduce livestock exposure to waterway
- Support voluntary adoption of water quality management plans (WQMPs) and conservation management plans (CMPs)
- Manage/protect riparian corridors
- Support agricultural and riparian workshops
- Develop stormwater/riparian demonstration project

WHERE

Priority Areas:

- Watershed areas with rural land cover

WHO

Responsible Parties:

- Texas State Soil and Water Conservation Board
- Natural Resources Conservation Service
- Soil and Water Conservation District
- Drainage districts
- Texas A&M AgriLife Extension
- US Fish and Wildlife Service
- Texas Parks and Wildlife Department
- Landowners and producers
- Watershed coordinator

- Develop a minimum of [X] WQMP(s) and [X] CMP(s) per year
- Complete stormwater/ riparian project

YEAR 1

- Host at least one riparian buffer workshop

YEAR 2

- Host at least one agricultural BMP workshop
- Collaborate on proposal for stormwater/ riparian project (coordinate with Stormwater)

YEAR 3

YEAR 4

- Host at least one riparian buffer workshop and at least one agricultural BMP workshop

YEAR 5

- Provide progress report

On-Site Sewage Facilities

WHAT

Goal: Reduce fecal waste from failing on-site sewage facilities (OSSFs)

Potential Strategies:
- Educate/engage on appropriate OSSF maintenance
- Support home inspector and homeowner workshops
- Identify resources to repair or replace failing OSSFs
- Where possible, connect to centralized wastewater systems

WHERE

Priority Areas:
- Watershed areas south of I-10

WHO

Responsible Parties:
- Authorized Agents
- H-GAC
- Texas A&M AgriLife Extension
- Real estate agents
- Texas General Land Office
- USDA Rural Utilities Service

Invasive Species

WHAT

Goal: Reduce fecal deposition by feral animal populations, specifically feral hogs

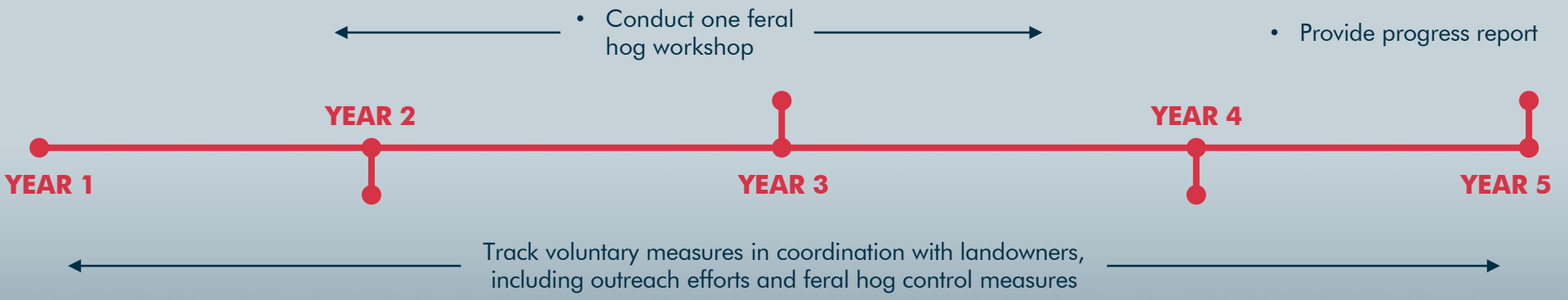
Potential Strategies:
- Manage feral hog population
- Educate/engage on best practices to discourage feral hog utilization of fringe areas

WHERE

Priority Areas:
- Watershed areas south of I-10

WHO

Responsible Parties:
- Texas A&M AgriLife Extension
- Watershed coordinator



Stormwater and Runoff

WHAT

Goal: Reduce stormwater sources of fecal wastes, including pet waste and illegal dumping

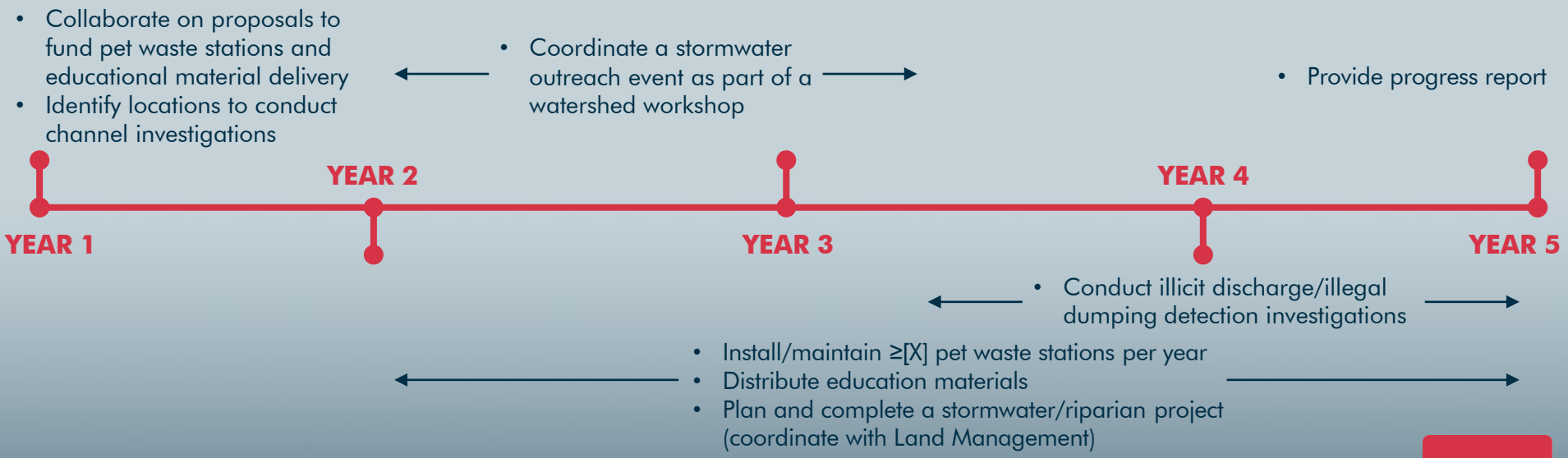
Potential Strategies:
- Educate/engage on appropriate pet waste disposal
- Install and maintain waste bag dispensers and collection stations
- Support control of feral animal population
- Identify and reduce illegal dump sites
- Develop stormwater/riparian demonstration project

WHERE

Priority Areas:
- Whole watershed

WHO

Responsible Parties:
- Local governments
- Drainage districts
- Texas A&M AgriLife Extension
- US Fish and Wildlife Service
- Texas Parks and Wildlife Department
- Watershed coordinator



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- *Project Overview & Updates*
- *Bacteria Source Estimates*
- *Survey*
- *Implementation Plan Strategies*
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Project Timeline

Implementation Plan

- Draft Implementation Plan by end of March based on discussions from today's meeting

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Discussion and Questions

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Visit our project website at:

www.h-gac.com/watershed-based-plans/cotton-bayou-tmdl

This project is funded by the Texas Commission on Environmental Quality and facilitated locally by the Houston-Galveston Area Council.

Supplementary Slides

TMDL Calculations

- The TMDL is a calculation of the criterion load at the 95th percentile of flows

- The TMDL includes allocations for regulated and unregulated sources of pollution, future growth, and a 5% margin of safety by calculating the following components:

$$TMDL = MOS + WLA_{wwtf} + WLA_{sw} + LA$$

Margin of Safety (MOS)
5% of the allowable load at 95th percentile of flows

Wasteload Allocation for WWTFs (WLA_{wwtf})
regulated wastewater treatment facility load; includes allocation for future growth

Wasteload Allocation for Stormwater (WLA_{sw})
regulated stormwater load

Load Allocation:
unregulated source load

Cotton Bayou TMDL

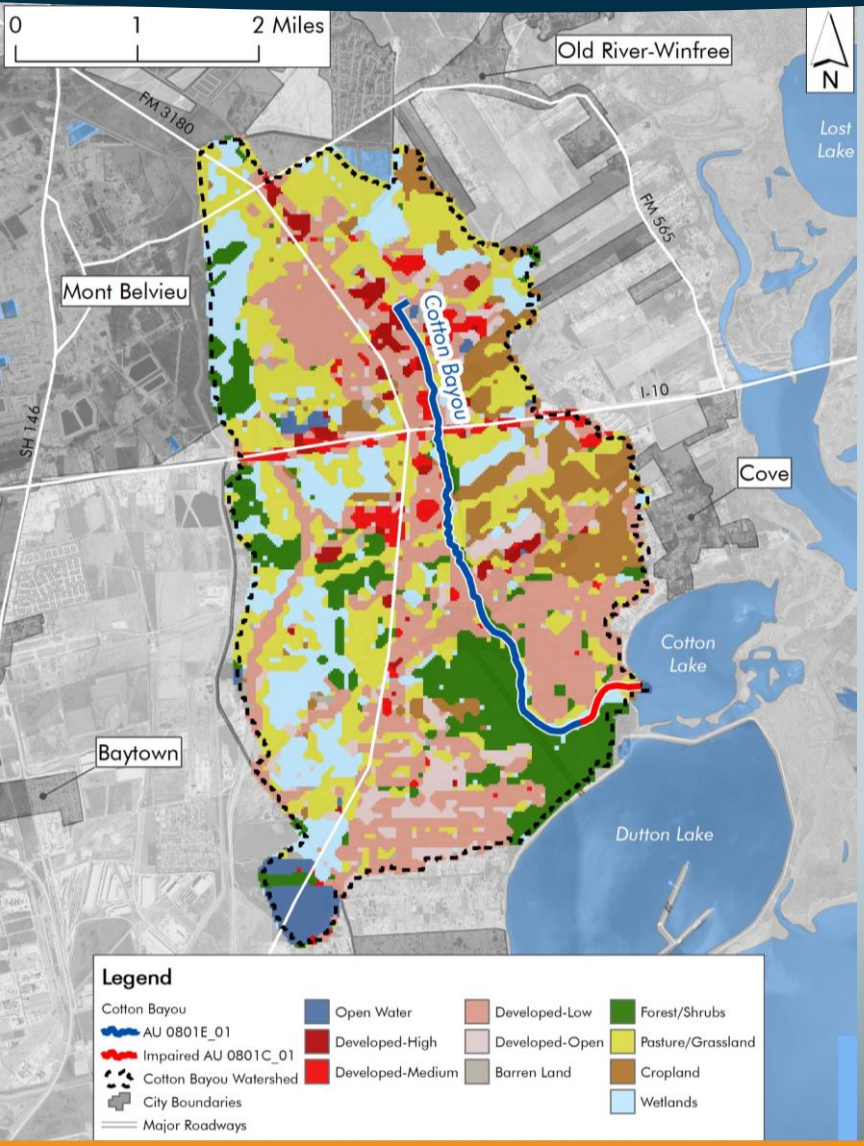
Assessment Unit	TMDL (Total Allowable Load)	MOS (Margin of Safety)	WLA_{wwtf} (includes future growth) (Wastewater Allocation)	WLA_{sw} (Stormwater Allocation)	LA (Other Sources)
0801C_01	89.17	4.46	15.25	24.39	45.07

* Units for all values = billion cfu/day of Enterococci *

Estimating Bacteria Loads

- Most current sources used (2017 or newer)
- No fate and transport considered
- No ground truthing
- No adjustments made for proximity to waterway
- No wildlife estimates beyond deer and invasive feral hogs

Land Cover



- Based on 2018 imagery
- 10 classes
- Estimated livestock, deer, and feral hogs based on appropriate land cover

On-Site Sewage Facilities

Subwatershed	Total Systems	Failing OSSFs (12% Rate)	Representative Load (billion cfu/day)	OSSF Load (billion cfu/day)
Above Tidal (0801E)	684	82	3.71	304.22
Tidal (0801C)	105	13	3.71	48.23
Total	789	95	--	352.45

- 2021 permit data combined with estimate of unpermitted systems outside service area boundaries
- Assumed 12% failure rate
- Assumed daily bacteria load from 2.8 person household

Sanitary Sewer Overflows

Subwatershed	Total Events		Total Volume (gallons/ 4 years)	Total Volume (100 mL/ day)	Representative Load (billion cfu/100 mL)	SSO Load (billion cfu/day)
Above Tidal (0801E)	Dilute	5	2,921.20	75.74	0.00005	0.00379
	Other	4	2,270.0	58.86	0.01	0.58860
Tidal (0801C)	Dilute	0	0	0	0.00005	0
	Other	0	0	0	0.01	0
Total (All)	9		5,191.20	134.60	--	0.59239

- Events reported from 2016 to 2019
- Used EPA 2004 assumption for dilute (rainfall) loads vs. loads from other causes
- No SSOs in tidal subwatershed

Dogs

Subwatershed	Estimated Households	Dog Population	Representative Load (billion cfu/day)	Dog Load (billion cfu/day)
Above Tidal (0801E)	2,819	1,731	2.50	4,327.50
Tidal (0801C)	218	134	2.50	335.00
Total	3,037	1,865	--	4,662.50

- Assumed AVMA 2018 estimate of 0.6 dogs/household
- No additional estimate for feral dogs or cats

Livestock

Subwatershed	Livestock Population		Representative Load (billion cfu/day)	Load (billion cfu/day)
Above Tidal (0801E)	Cattle	422	2.70	1,139.40
	Sheep/Goats	18	9.00	162.00
	Horses	15	0.21	3.15
Tidal (0801C)	Cattle	15	2.70	40.50
	Sheep/Goats	1	9.00	9.00
	Horses	0	0.21	0.00
Total (All Livestock)	471		--	1,354.05

- Data based on 2017 USDA agricultural census for Chambers County
- Applied ratio of appropriate land cover in the county to that in the watershed area; TSSWCB agreed with estimates in preliminary review
- Pigs and poultry excluded

Feral Hogs

Subwatershed	Feral Hog Population	Representative Load (billion cfu/day)	Load (billion cfu/day)
Above Tidal (0801E)	196	4.45	872.20
Tidal (0801C)	11	4.45	48.95
Total	207	--	921.15

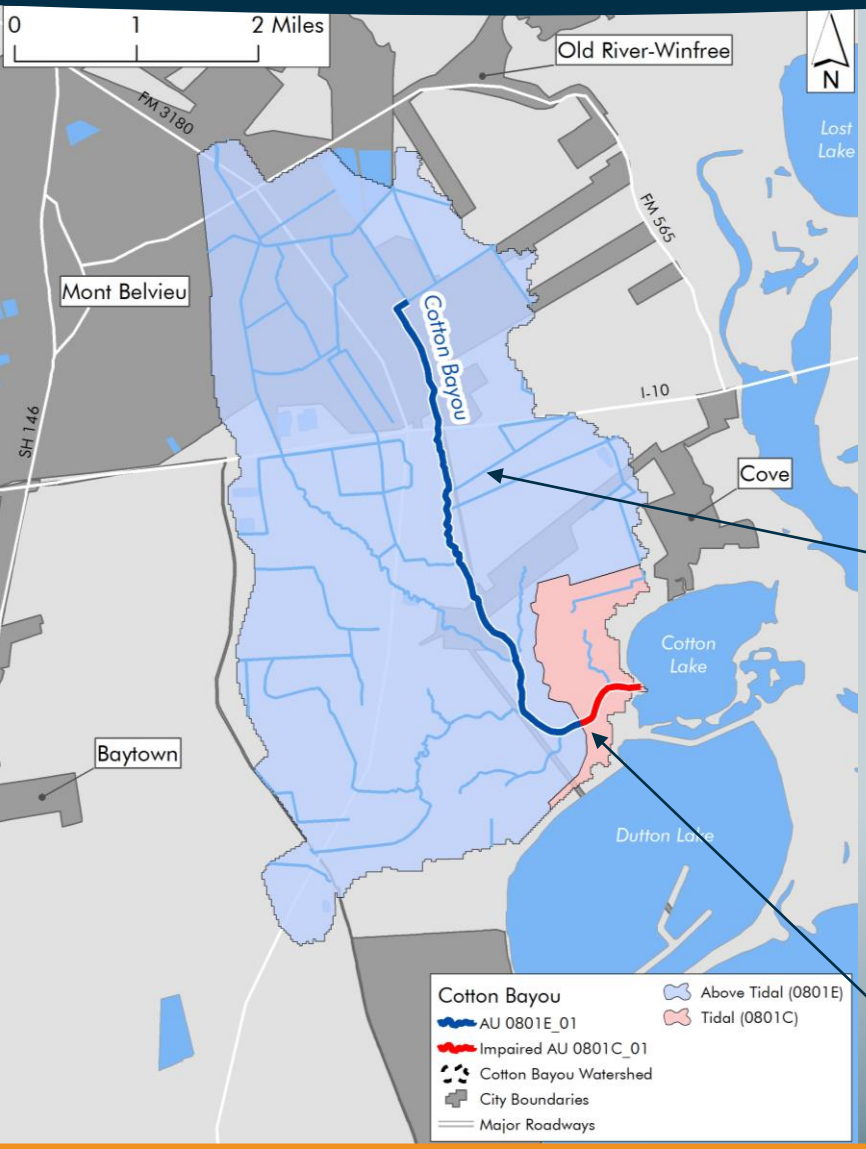
- Used AgriLife density estimates vary based on land cover
  - 8.9/square mile in low intensity development
  - 12.7/square mile in developed open space, barren land, and cropland
  - 16.4/square mile in pasture/grassland, forest/shrubs, and wetlands

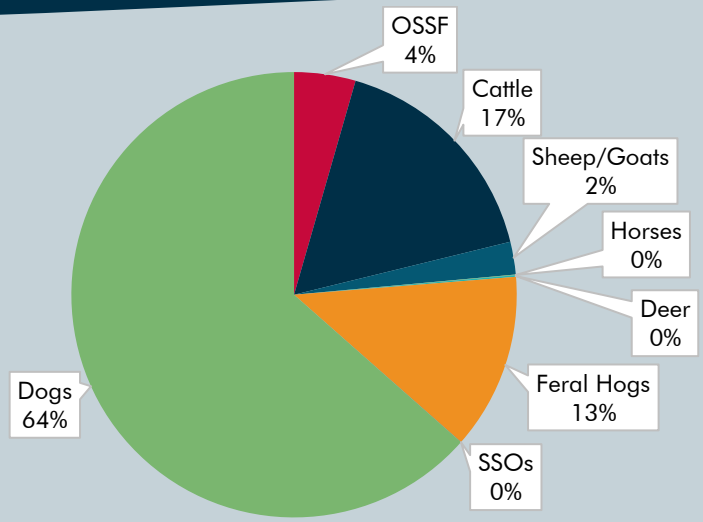
Deer

Subwatershed	Deer Population	Representative Load (billion cfu/day)	Load (billion cfu/day)
Above Tidal (0801E)	45	0.18	8.10
Tidal (0801C)	3	0.18	0.54
Total	48	--	8.64

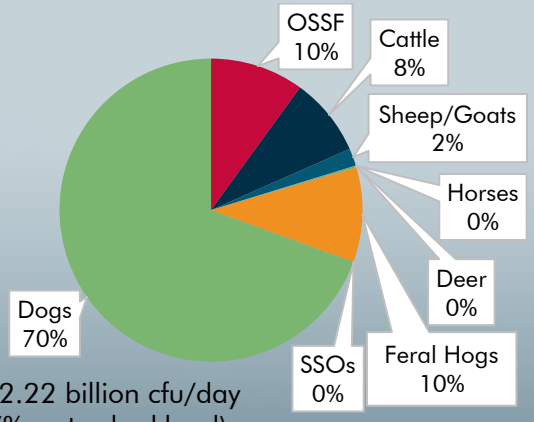
- Used average density from TPWD resource management unit reports collected between 2010 and 2019 in Deer Management Unit area 13 (Pineywoods of East Texas)
- Allocated to areas of forest/shrubs, grassland/pasture, and barren land

Bacteria Reductions





6,817.16 billion cfu/day
(93% watershed load)



482.22 billion cfu/day
(7% watershed load)

98.82% Total Reduction Needed

Representative Units

Bacteria Source	Representative Unit	Representative Unit Daily Load (billion cfu/day)	Units to Reduce to Meet Criteria, Above Tidal (0801E)	Units to Reduce to Meet Criteria, Tidal (0801C)	Units to Reduce to Meet Criteria, Total
OSSFs	1 Failing OSSF	3.71	81	13	94
Dogs	Waste of 1 Dog	2.50	1,709	132	1,841
Cattle	Waste of 1 Cow	2.70	417	15	432
Sheep/Goats	Waste of 1 Sheep/Goat	9.00	18	1	19
Horses	Waste of 1 Horse	0.21	15	0	15
Feral Hogs	1 Feral Hog	4.45	194	11	205
Deer	Waste of 1 Deer	0.18	44	3	47