Cotton Bayou Watershed Implementation Plan Development

Public Meeting
July 27, 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

TEXAS STREAM TEAM CITIZEN SCIENTIST WATER QUALITY MONITORING

Dedicated to understanding and protecting the 191,000 miles of Texas waterways

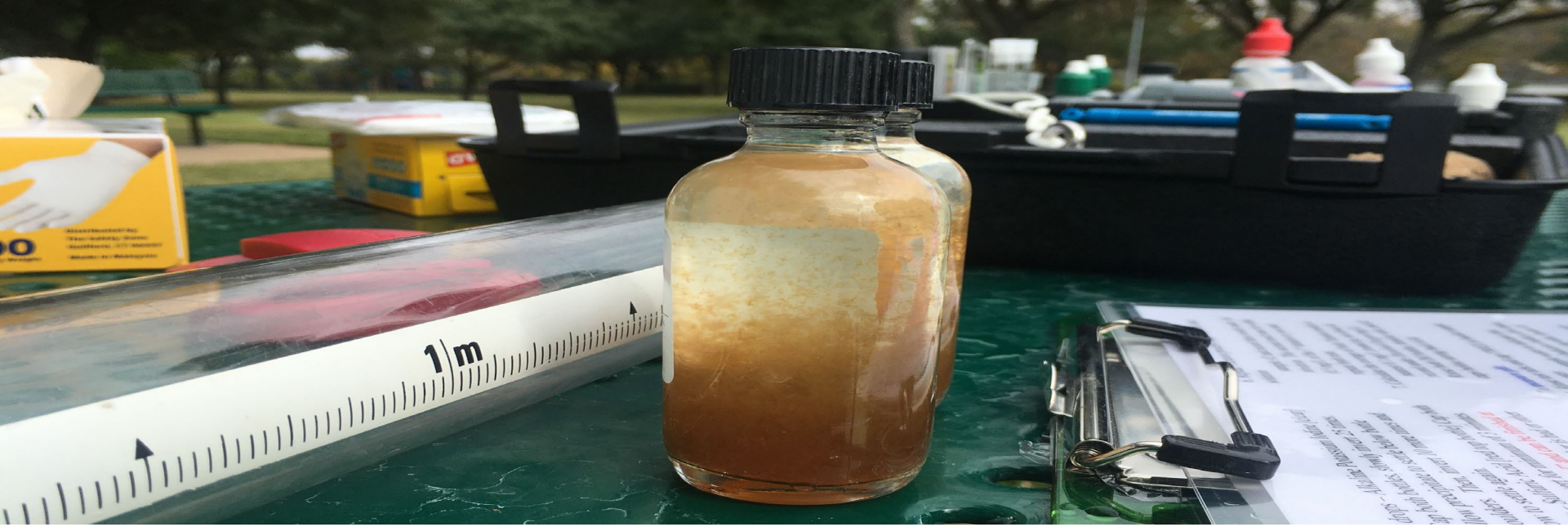
Houston-Galveston Area Council

EPA United States Environmental Protection Agency

Texas Commission on Environmental Quality

The Meadows Center for Water and the Environment

Texas Stream Team



MISSION:

To facilitate environmental stewardship by empowering a statewide network of concerned citizen scientists, partners, and institutions in a collaborative effort to promote a healthy and safe environment through environmental education, data collection, and community action.

TCEQ-Approved
Quality Assurance Project Plan

3 Phases
Of monitoring training

2 Year
Commitment to monitor monthly

CORE WATER QUALITY PARAMETERS

- Field Observations
- Temperature (Air & Water)
- Water Transparency/ Water Clarity
- Depth
- Conductivity or Salinity
- Dissolved Oxygen
- pH

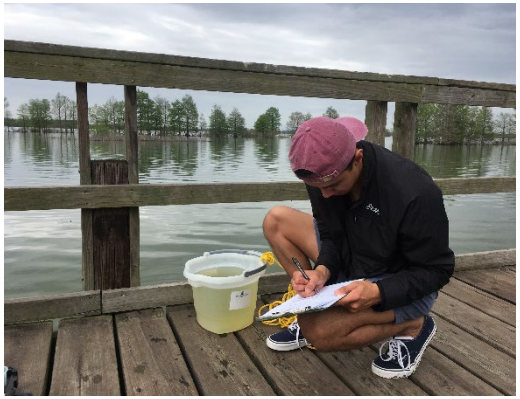
THREE-PHASE TRAINING

Phase I – Classroom

Orientation, Demonstration, Practice

Phase II – Group Field Training

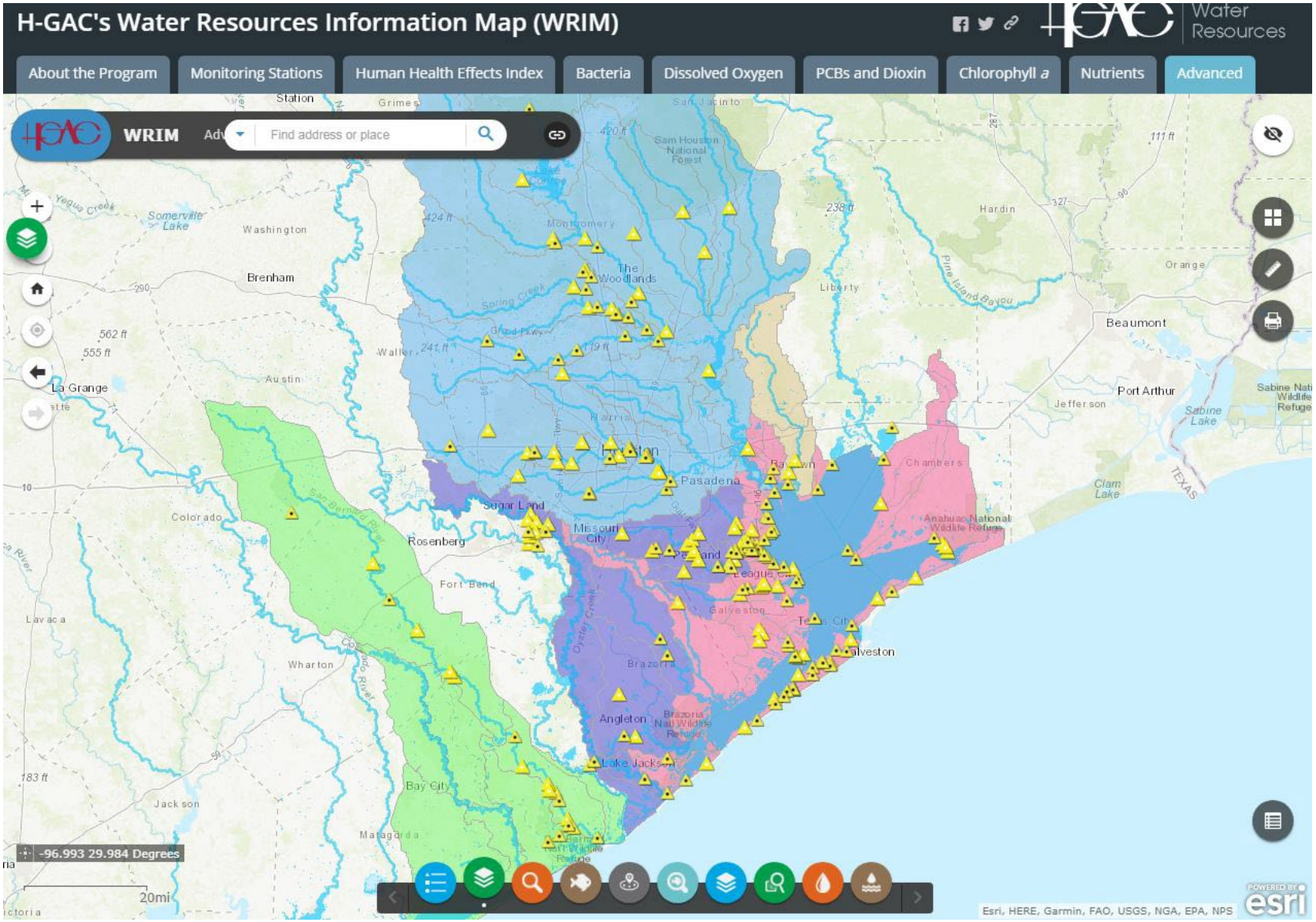
Individual Testing, Focus on Field Observations, with assistance from trainers



Phase III – Site Visit

Conduct measurements without assistance and compare results to trainers

H-GAC'S WATER RESOURCES INFORMATION MAP(WRIM)



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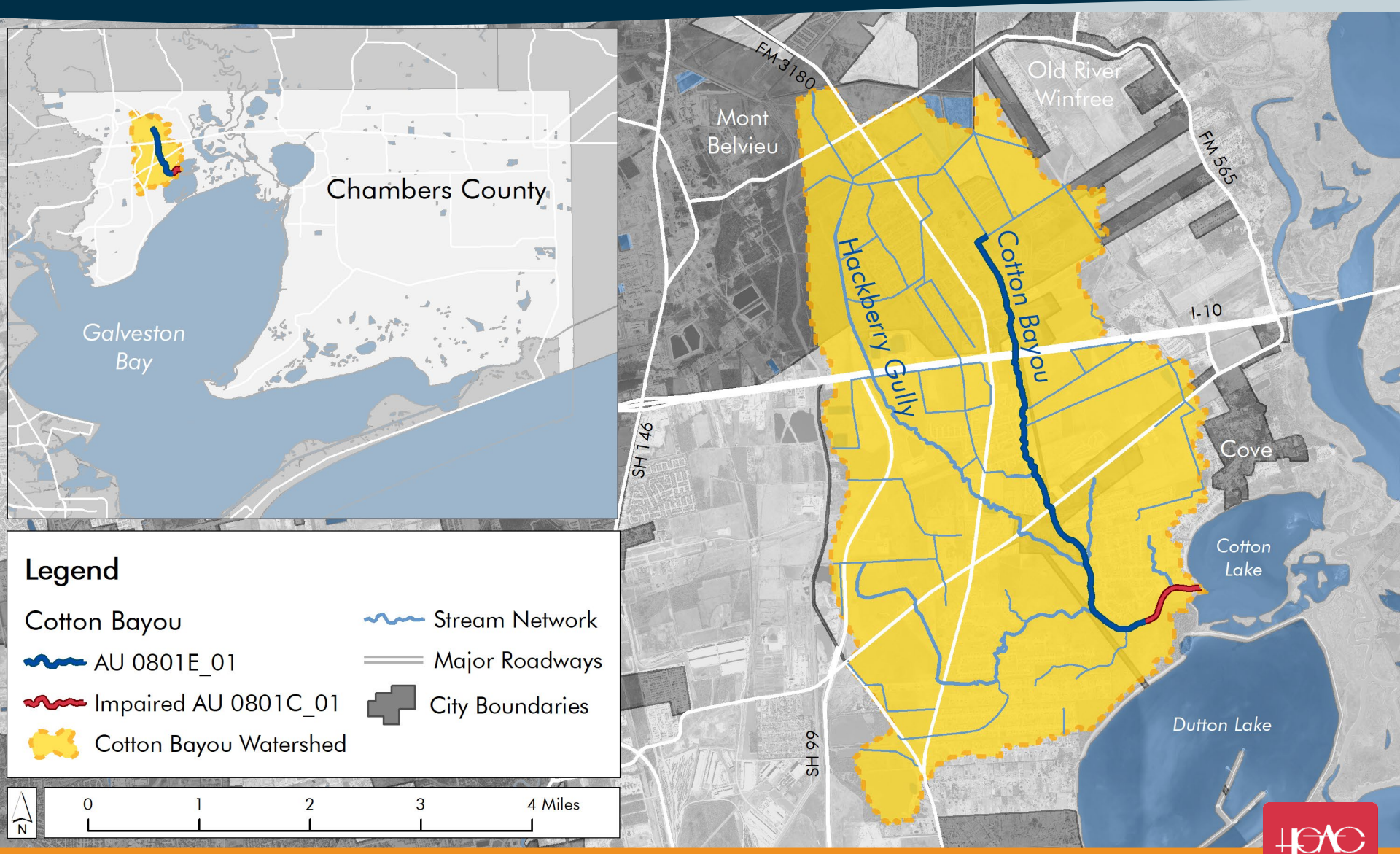
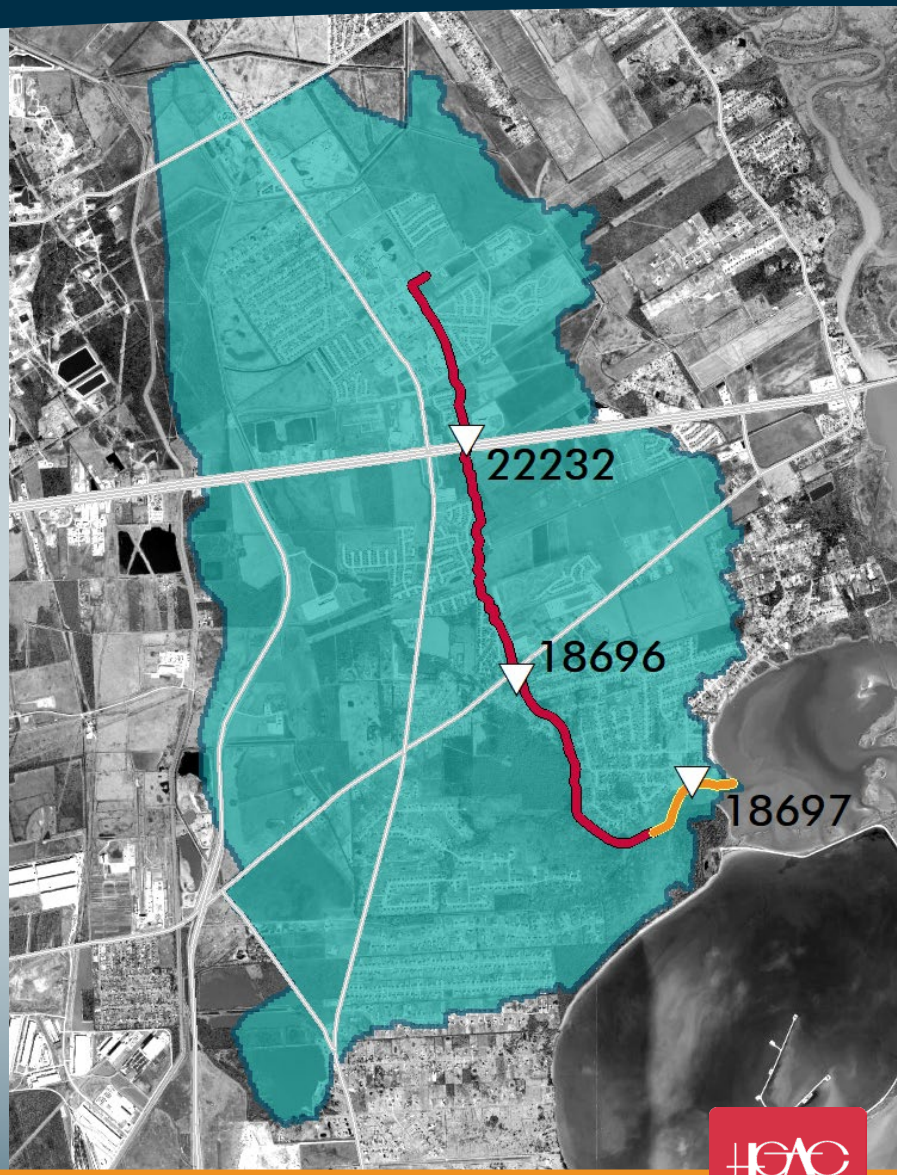
Watershed Area



Water Quality

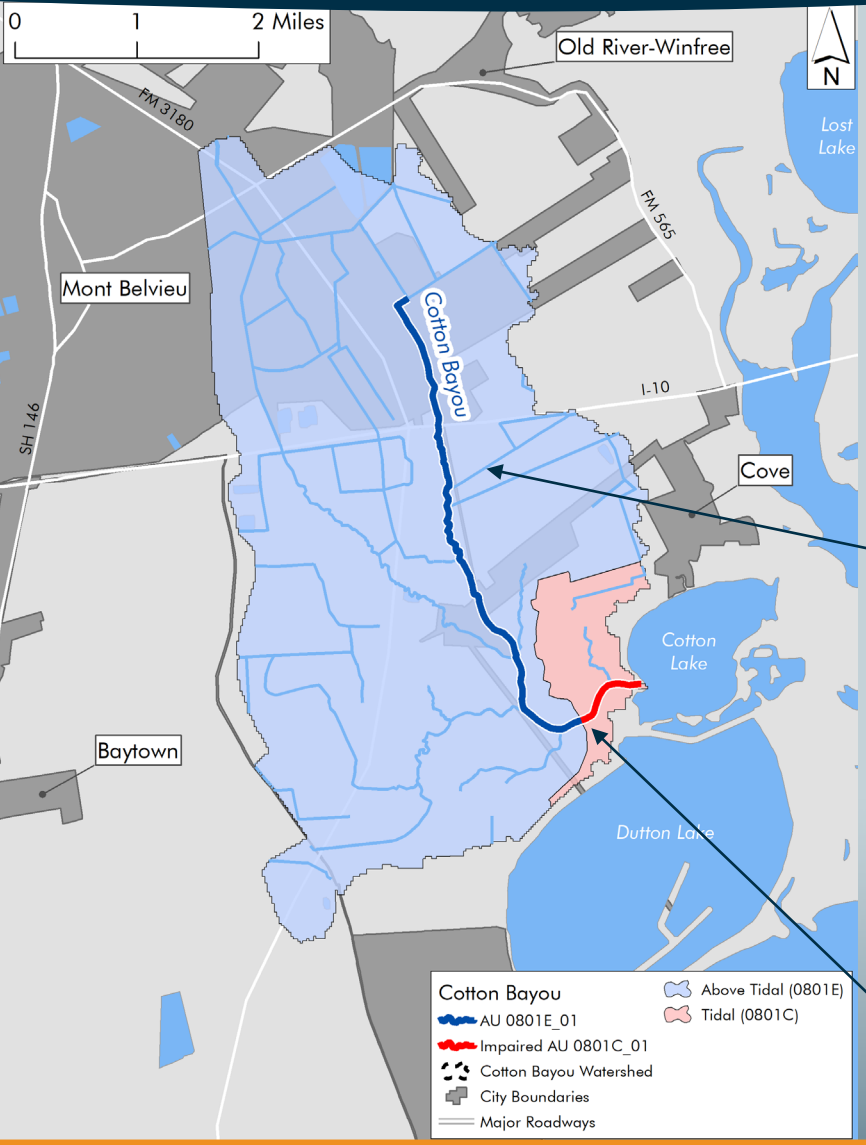
- Contact recreation use **impaired** due to high levels of fecal indicator bacteria (Enterococci) in surface water
- Other water quality **concerns** include low dissolved oxygen and high concentrations of nutrients
- Three monitoring sites including new station (22232) at I-10

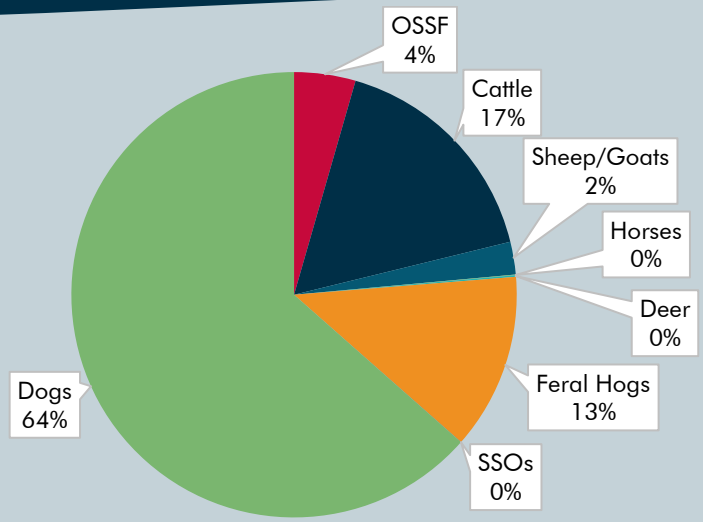


Bacteria Sources

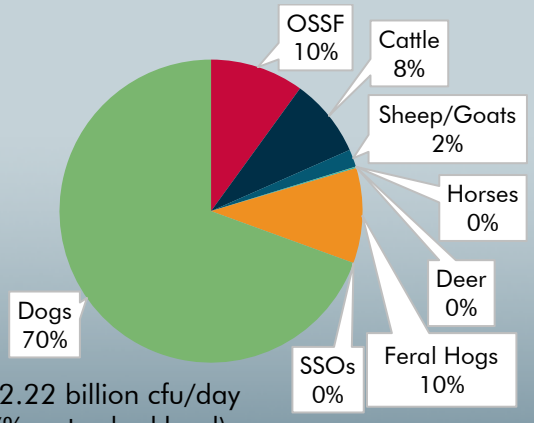
- **Human Waste**
  - Wastewater
  - Septic/Aerobic Systems
  - Illicit Sewage
- **Domestic Animal Waste**
  - Pets
  - Livestock
- **Wildlife/Feral Hog Waste**
  - Deer and Other Wildlife
  - Feral Hogs

Estimated Bacteria Loads





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



482.22 billion cfu/day
(7% watershed load)

98.78%
Reduction
Needed

Estimated Reductions by Source

Watershed	OSSF Load Reduction	Cattle Load Reduction	Sheep and Goat Load Reduction	Horse Load Reduction	Deer Load Reduction	Feral Hog Load Reduction	SSO Load Reduction	Dog Load Reduction	Total Load Reduction
Cotton Bayou Above Tidal	304.22	1,139.40	162.00	3.15	8.10	872.20	0.59	4,327.50	**6,817.16**
Cotton Bayou Tidal	48.23	40.50	9.00	0.21	0.54	48.95	0.00	335.00	**482.43**
Total Watershed	**352.45**	**1,179.90**	**171.00**	**3.36**	**8.64**	**921.15**	**0.59**	**4,662.50**	**7,299.59**

* All loads are expressed in billion cfu/day

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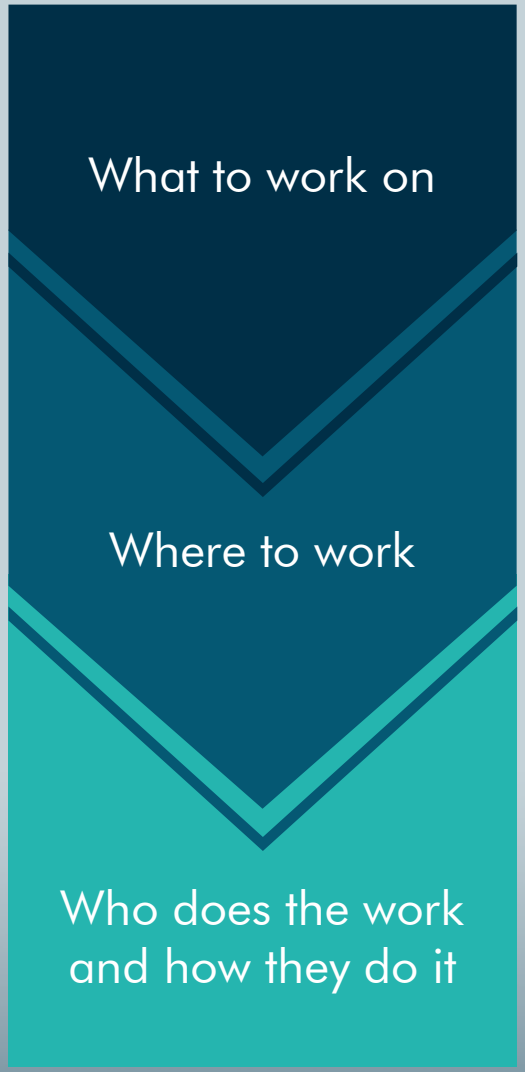
Strategies

- 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

Model-Based Ranking

Reduce stormwater sources such as pet wastes and illegal dumping

Support land management initiatives

Promote feral hog management

Promote safe OSSF use and maintenance

Maintain and improve WWTF and collection system function

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:
- Developed areas
- Watershed-wide (education)

WHO

Responsible Parties:
- Watershed coordinator
- Local governments
- H-GAC
- Texas A&M AgriLife Extension
- Texas Parks and Wildlife Department

YEAR 1
- Collaborate on proposals to fund pet waste stations and educational material delivery
- Identify locations to conduct channel investigations

YEAR 2
- Install & maintain ≥7 pet waste stations/year
- Distribute education materials
- Coordinate a stormwater outreach event as part of a watershed workshop
- Plan/initiate a stormwater/riparian project (coordinate with Land Management)

YEAR 3
- Install & maintain ≥8 pet waste stations/year
- Distribute education materials
- Conduct illicit discharge/illegal dumping detection investigations
- Complete a stormwater/riparian project (coordinate with Land Management)

YEAR 4

YEAR 5
- Provide progress report

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

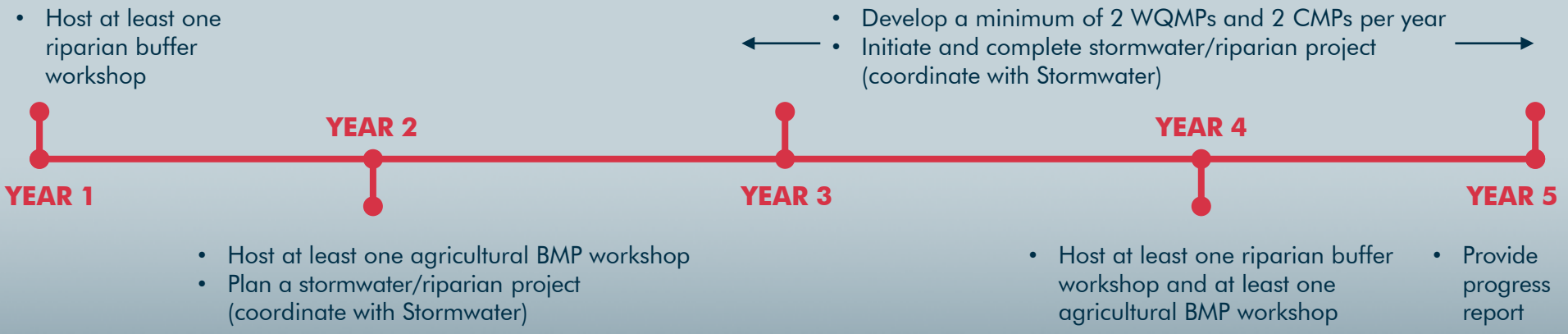
Priority Areas:

- Watershed areas with rural land cover

WHO

Responsible Parties:

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



Invasive Species

WHAT

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

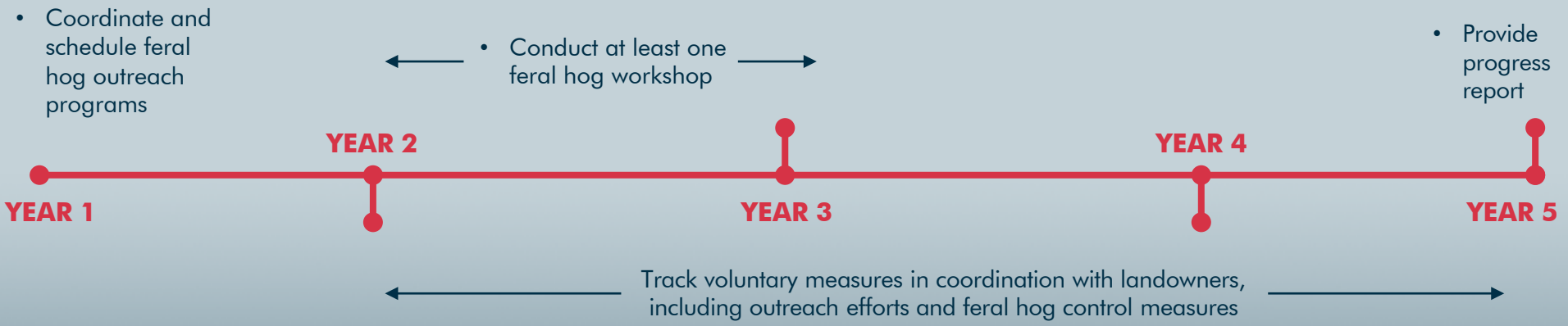
Potential Strategies:
- Manage feral hog population
- Educate/engage on best practices to discourage feral hog utilization of fringe areas

WHERE

Priority Areas:
- Areas of natural land cover (for direct management)
- Watershed-wide (education)

WHO

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



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

Wastewater Treatment

WHAT

Goal: Develop and implement strategies that reduce fecal waste from wastewater treatment facilities (WWTFs) and sanitary sewer collection systems in priority areas

Potential Strategies:
- Educate/engage on WWTF and collection system maintenance
- Support operator workshops and training programs
- Develop and conduct a fats, oils, grease, and wipes (FOG) prevention campaign

WHERE

Priority Areas:
- Watershed-wide

WHO

Responsible Parties:
- Watershed Coordinator
- Local Governments
- TCEQ
- H-GAC
- Texas A&M Engineering Extension
- USDA Rural Utilities Service
- Water Professional Associations

YEAR 1
- Develop target permittee list

YEAR 2
- Conduct a technical assistance workshop on technology, rules and regulation changes, operation and maintenance, reuse, and program assistance

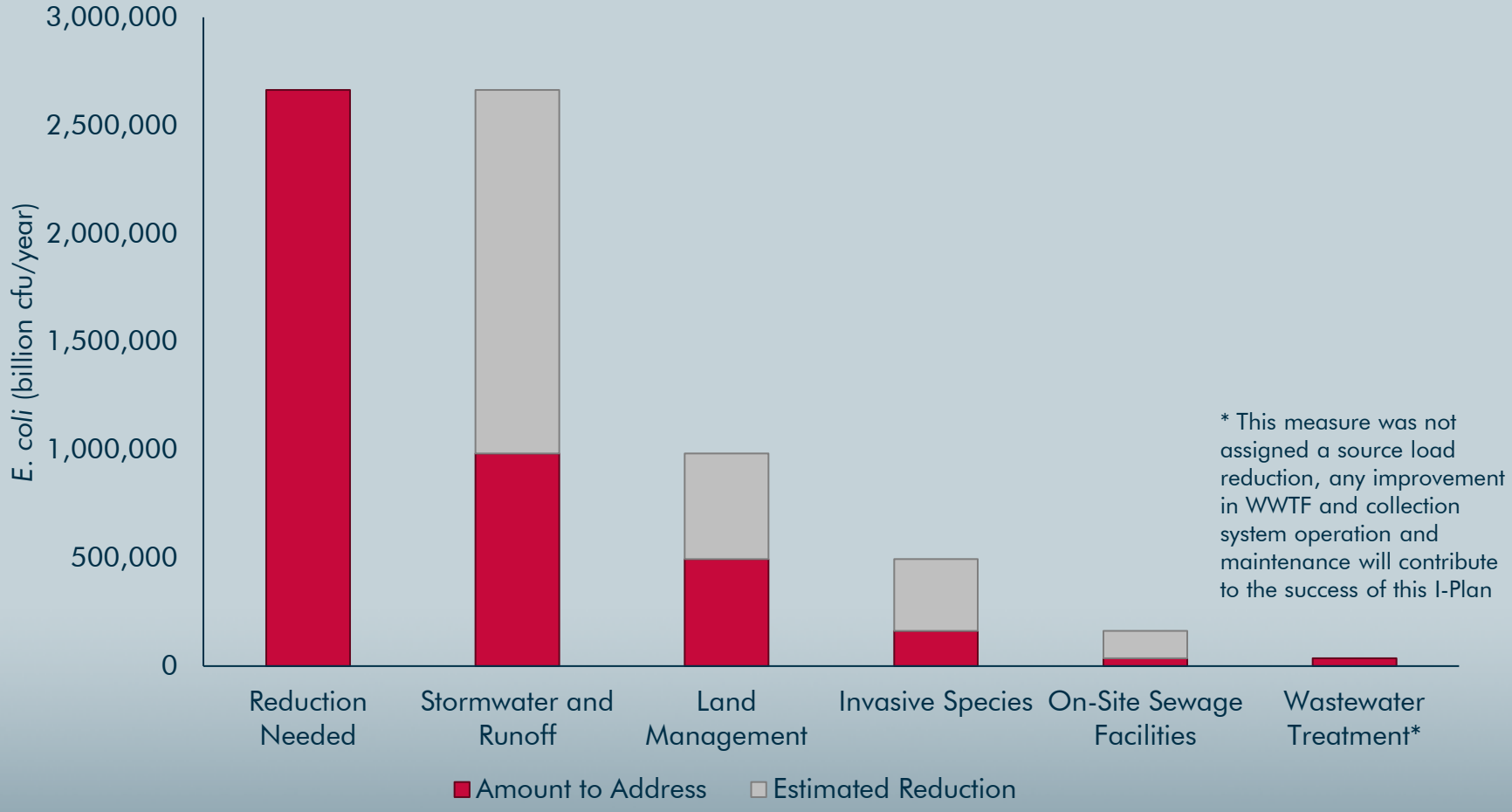
YEAR 3
- Conduct one home and business owner general outreach workshop

YEAR 4
- Conduct a technical assistance workshop on technology, rules and regulation changes, operation and maintenance, reuse, and program assistance

YEAR 5
- Provide progress report

Develop and implement a FOG blockage prevention campaign

Potential Load Reduction



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- *Bacteria Source Estimates*
- *Survey*
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Project Timeline

Implementation Plan

- Incorporate stakeholder feedback into draft Implementation Plan
- TMDL public meeting in November

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Discussion and Questions

For more information, please contact:

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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

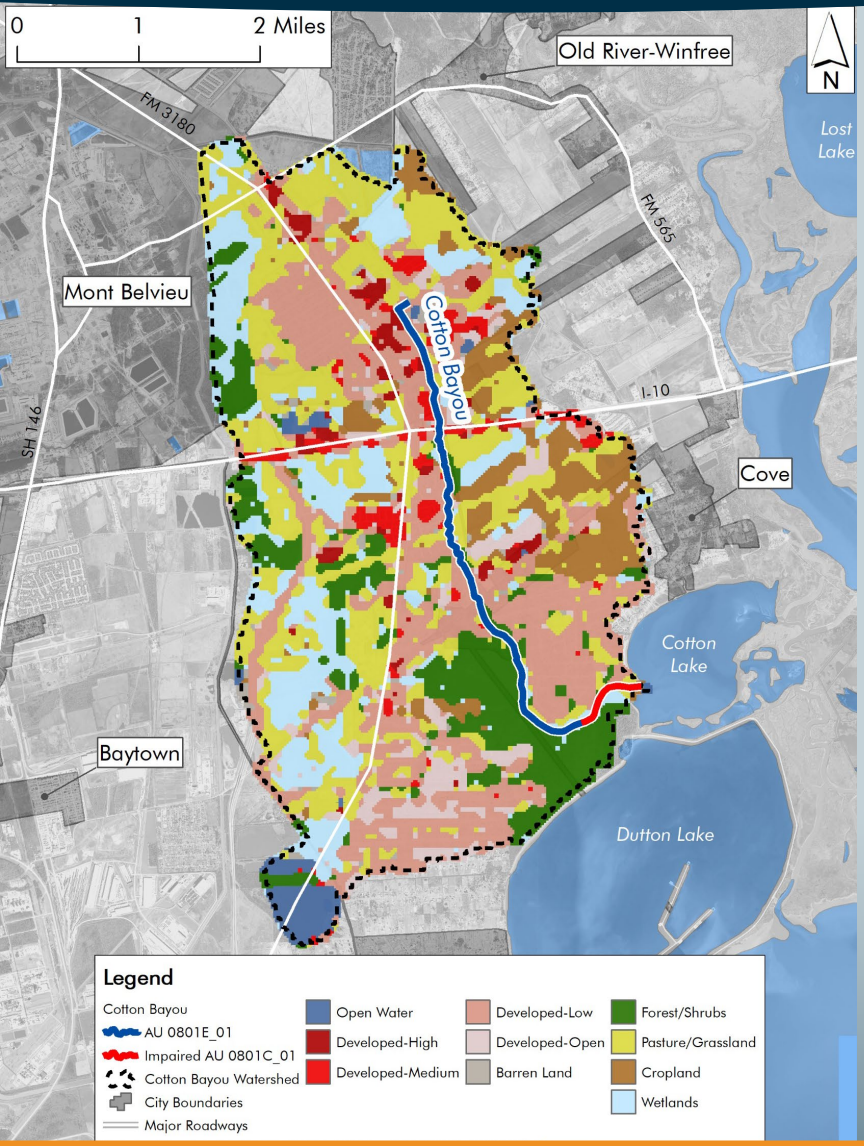
Assessment Unit	TMDL (Total Allowable Load)	MOS (Margin of Safety)	WLA_{wwtf} (includes future growth) (Wastewater Allocation)	WLA_{sw} (Stormwater Allocation)	LA (Other Sources)
0801C_01	89.17	4.46	15.25	24.39	45.07

* 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

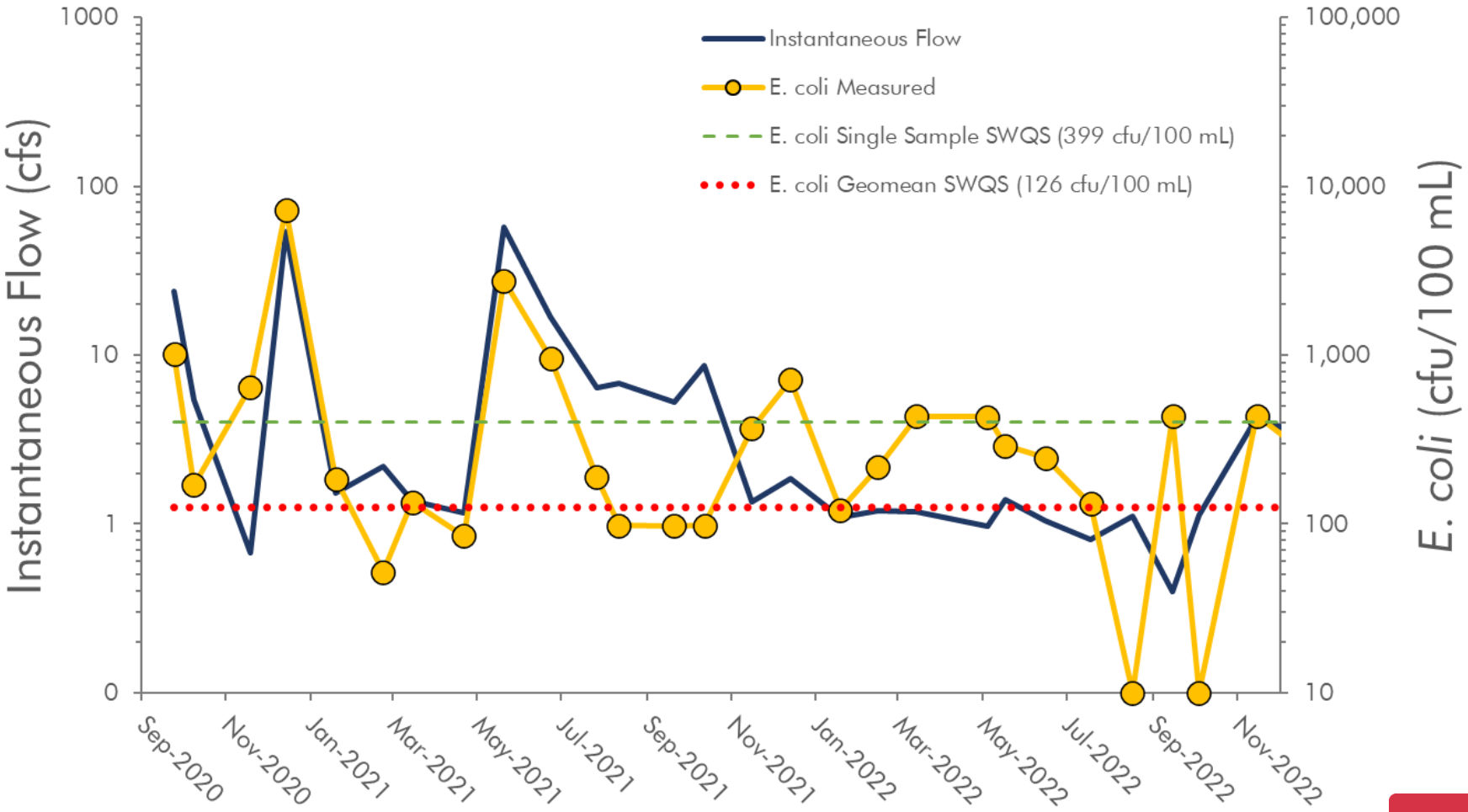
Subwatershed	Deer Population	Representative Load (billion cfu/day)	Load (billion cfu/day)
Above Tidal (0801E)	45	0.18	8.10
Tidal (0801C)	3	0.18	0.54
Total	48	--	8.64

- 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

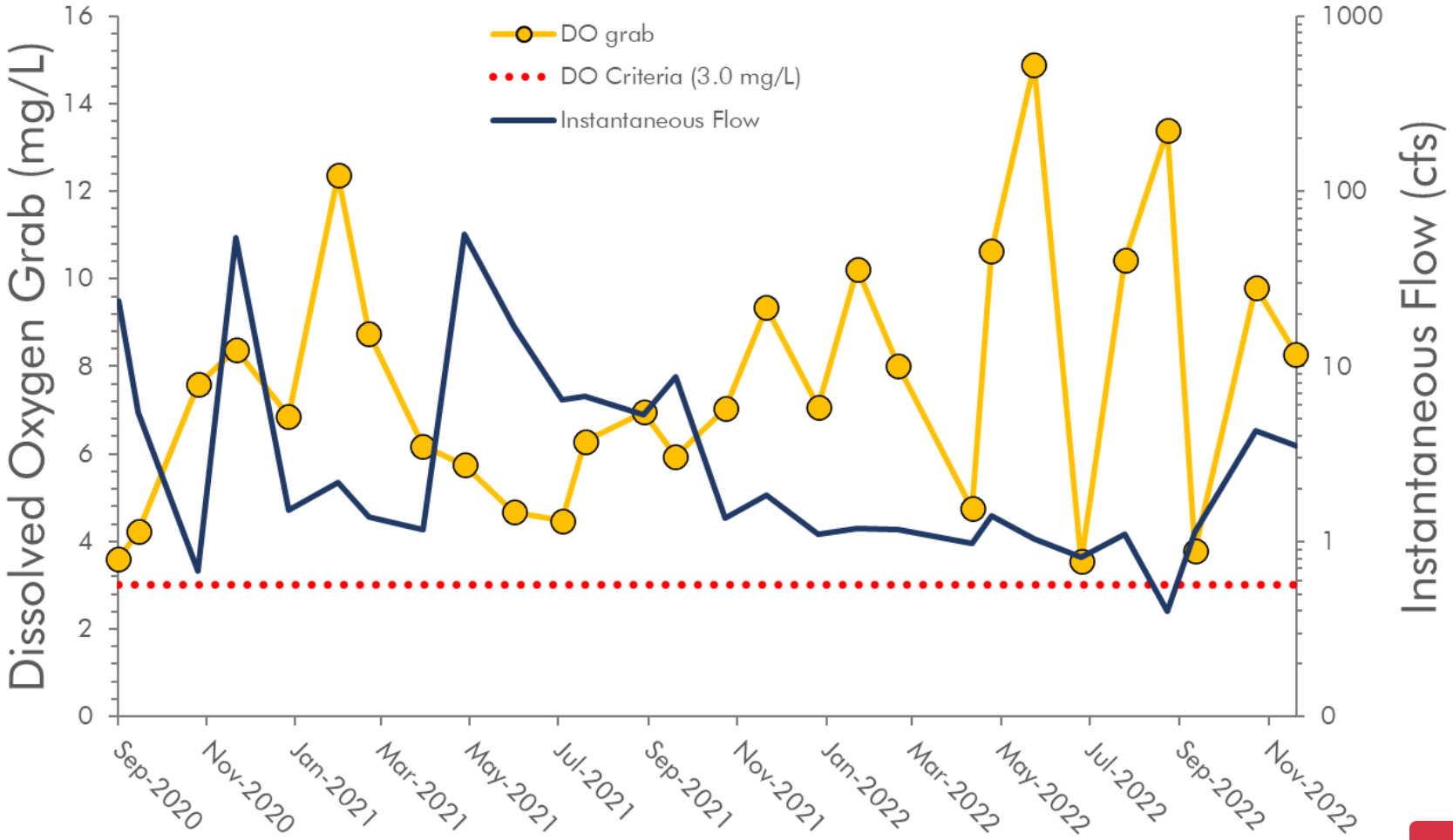
Representative Units

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

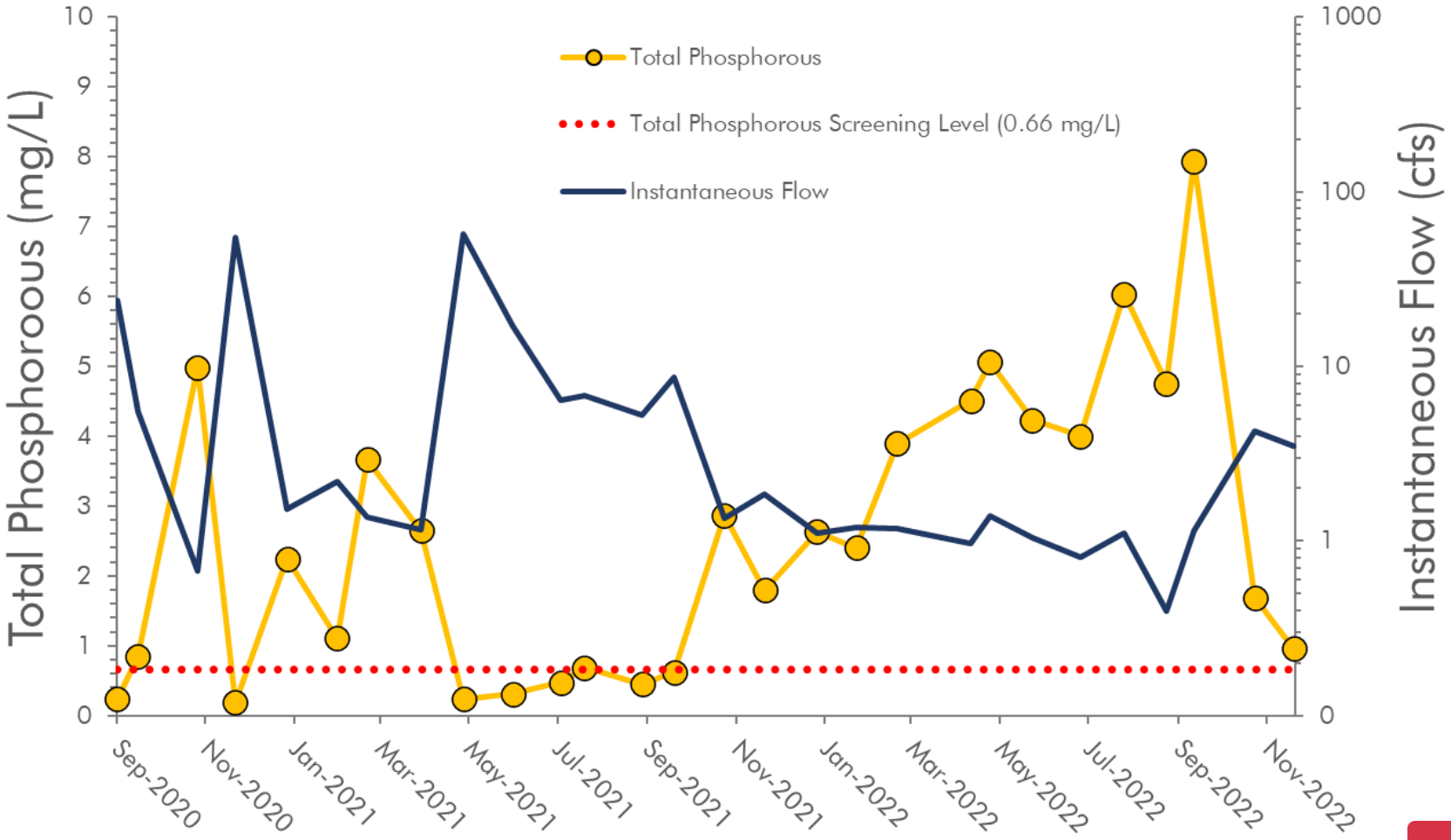
Bacteria at 22232



Dissolved Oxygen at 22232



Total Phosphorous at 22232



Nitrate at 22232