Cotton Bayou Watershed Implementation Plan Development

Virtual Public Meeting
January 26, 2023

Meeting Outline

- **Introductions**
- *Project Overview & Updates*
- *Bacteria Source Estimates*
- *Survey*
- *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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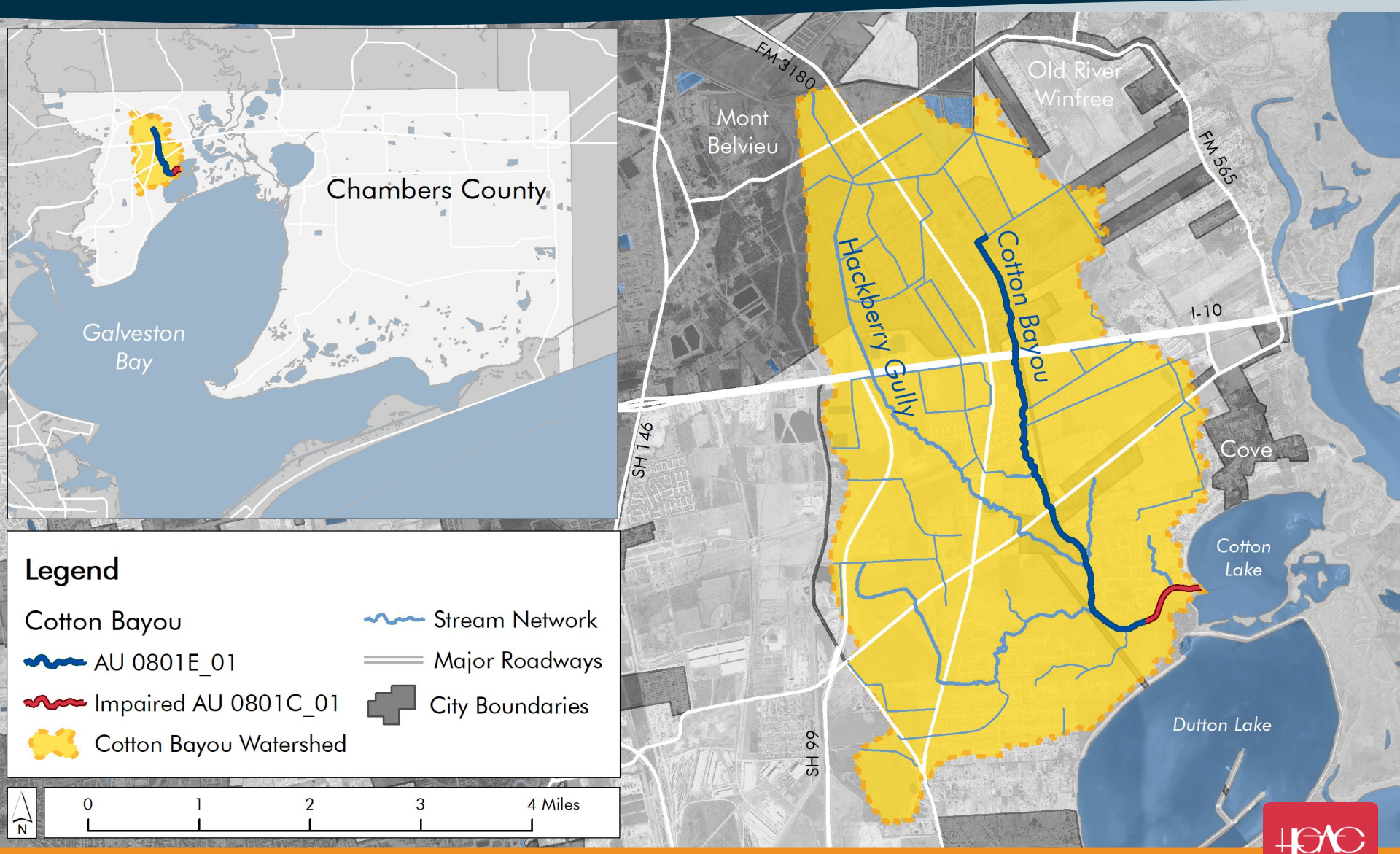
Watershed Area



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
- This project is focused on characterizing sources of fecal indicator bacteria to determine a **Total Maximum Daily Load** (TMDL) for the impaired water body

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

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 *

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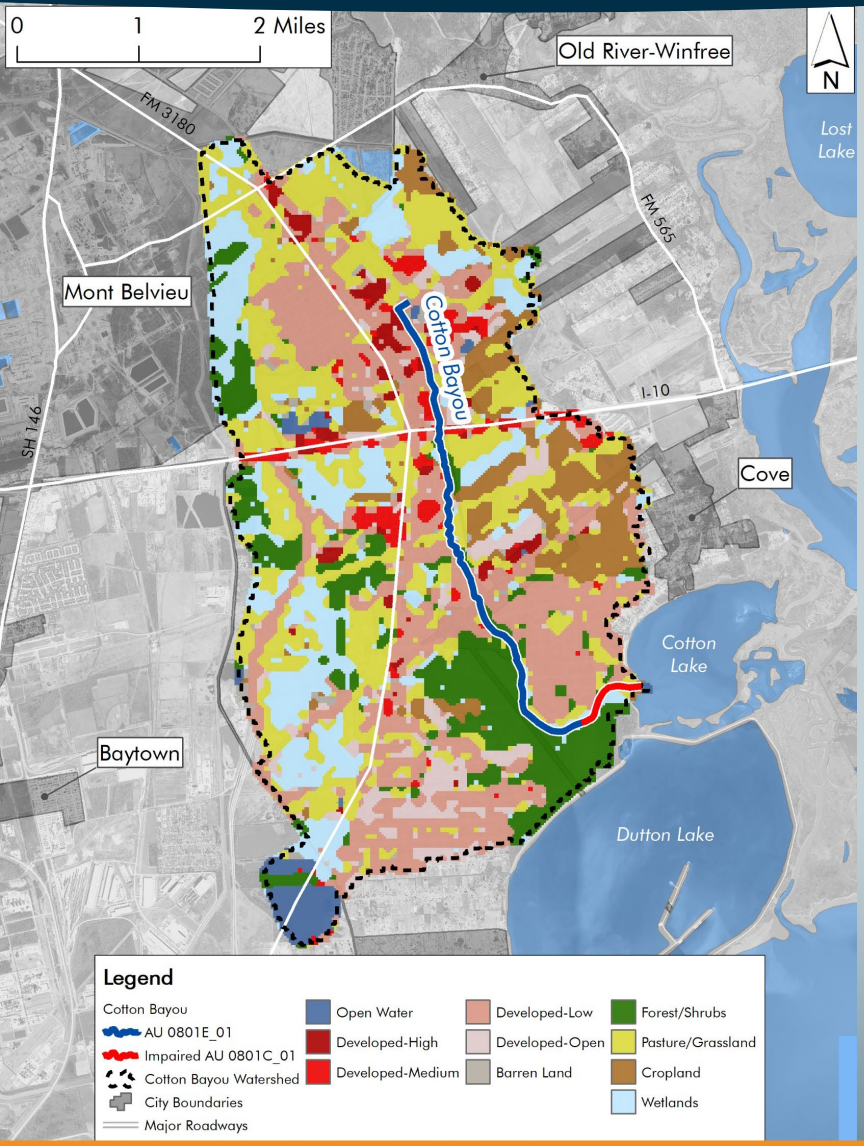
Estimating Bacteria Loads

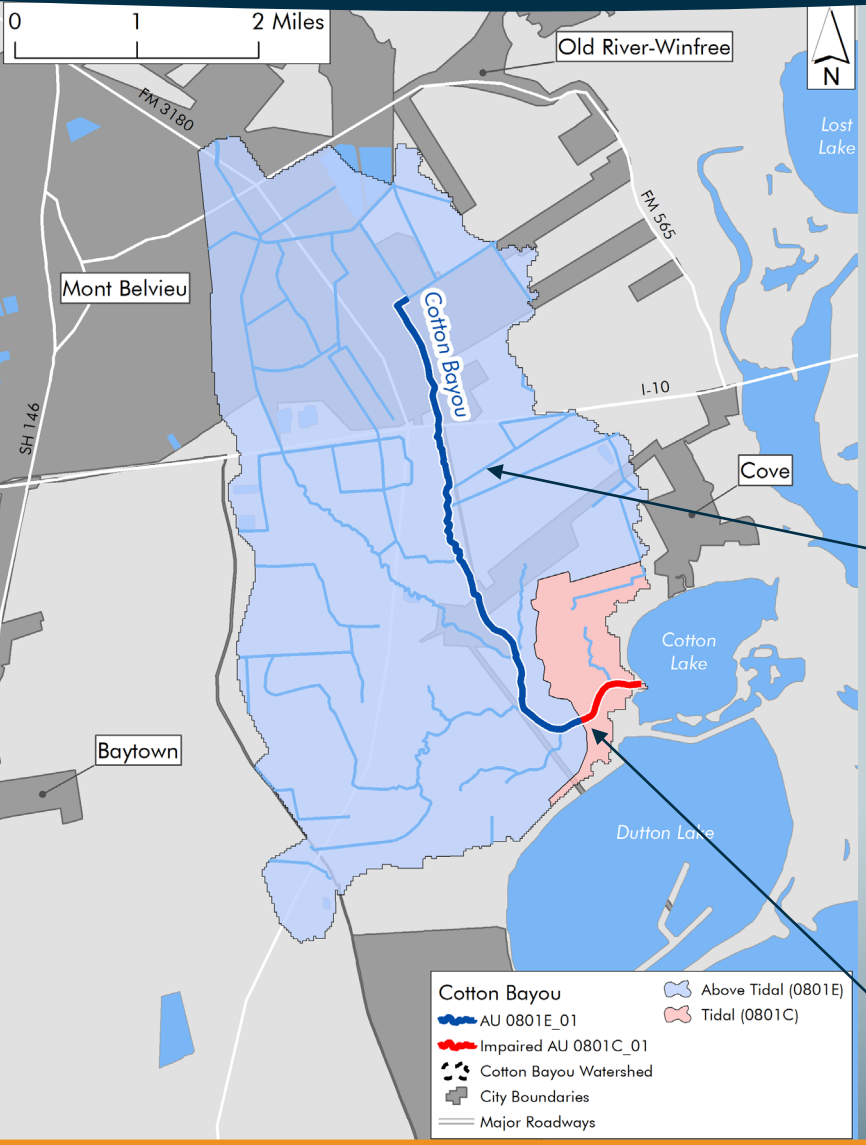
- Most current sources used (2017 or newer)
- No fate and transport considered
- No ground truthing
- No adjustments made for proximity to waterway
- No wildlife estimates beyond deer and invasive feral hogs

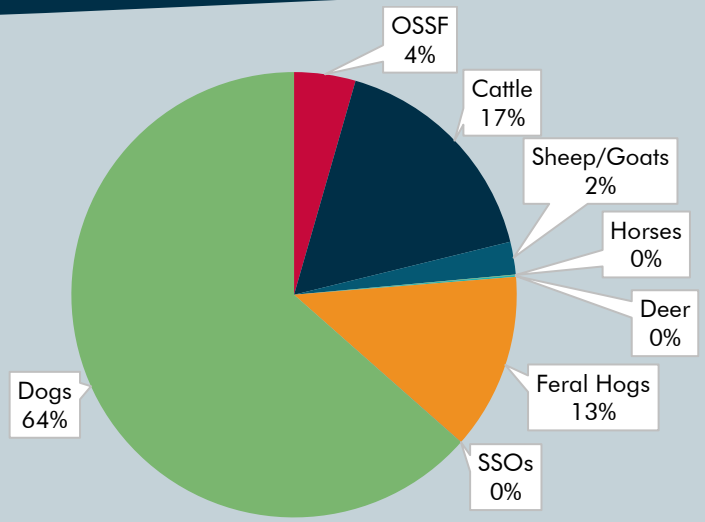
Land Cover



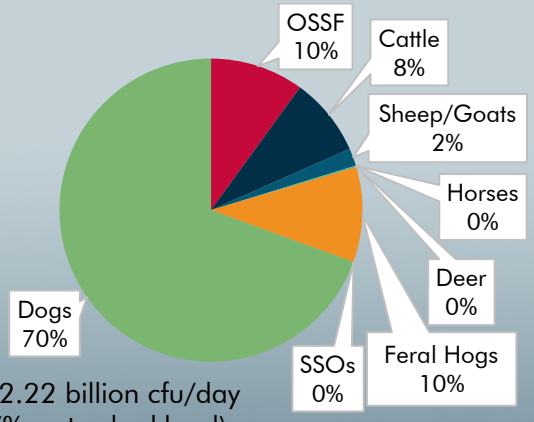
- Based on 2018 imagery
- 10 classes
- Estimated livestock, deer, and feral hogs based on appropriate land cover

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

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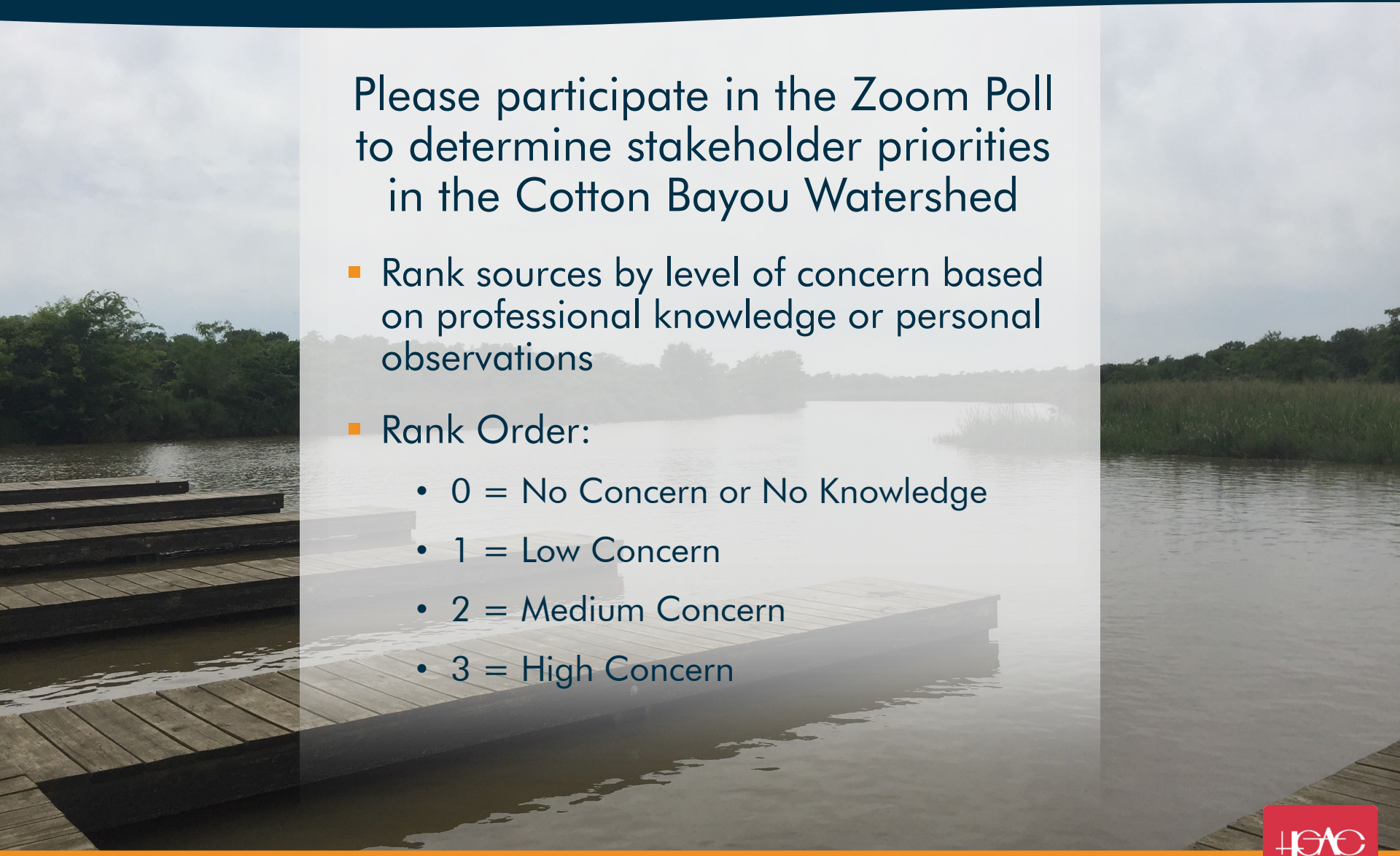
Survey



Please participate in the Zoom Poll to determine stakeholder priorities in the Cotton Bayou Watershed

- Rank sources by level of concern based on professional knowledge or personal observations
- Rank Order:
  - 0 = No Concern or No Knowledge
  - 1 = Low Concern
  - 2 = Medium Concern
  - 3 = High Concern

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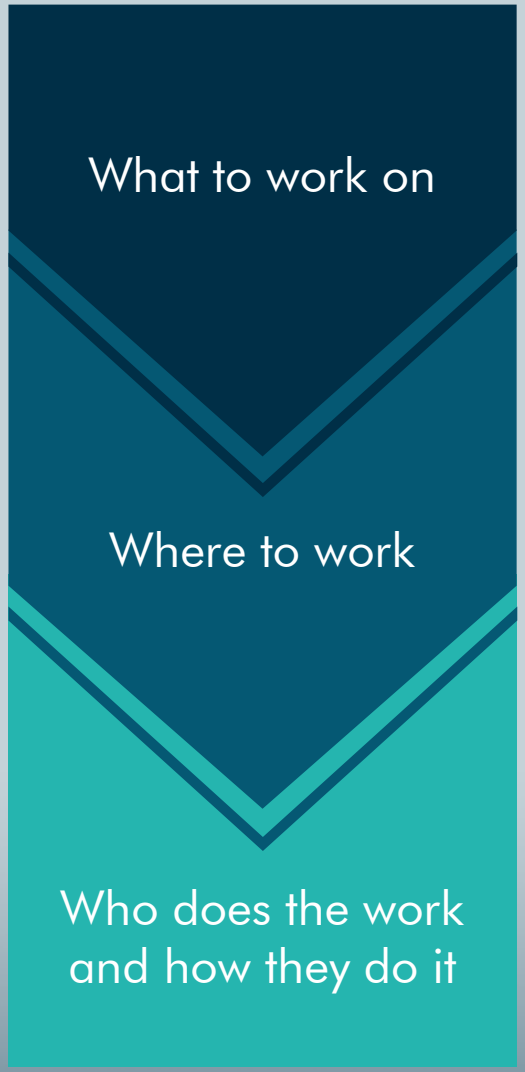
Management Measures

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

Estimated Load Reductions

- Detailed estimate of how much the bacteria load will be reduced by implementing the strategies of each management measure

- Converted to an annual load value

Example

Potential Load Reduction	Technical and Financial Assistance	Education Component	Schedule of Implementation	Interim, Measurable Milestones	Indicators of Progress	Monitoring Component	Responsible Party
172,244 billion cfu/year	Technical: Brazoria, Matagorda, and Wharton counties for permitting; H-GAC and Texas A&M AgriLife Extension for education, programs, and training. Financial: • $0–10,000 for workshops and training events. • $0–100,000 to repair, replace, or abandon OSSFs.	Workshops, technical presentations, and one-on-one meetings. Local promotional outreach such as emails; targeted mailers; notices in newsletters and newspapers; participation in fairs and events; and coordination with AAs.	• Year 1: Host one homeowner workshop. • Years 1–5: Address a minimum of nine OSSFs. • Year 2: Host one home inspector training course. • Year 4: Host one homeowner workshop or one home inspector training course. • Year 5: Provide five-year Management Measure 2 progress report.	• Number of homeowner workshops and home inspector trainings held. • Number of OSSFs addressed.	• Number of technical assistance activities provided. • Number of OSSFs addressed.	• Environmental: CRP ambient monitoring data • Programmatic: Five-year report	Watershed coordinator, AAs, H-GAC, Texas A&M AgriLife Extension, real estate agents/ inspectors, TGLO, USDA RUS

Adaptive Management

- Stakeholders periodically assess plan measures for efficiency and effectiveness
- Evaluation of progress toward achieving water quality goals
- Commitment to continued stakeholder involvement
- Metrics:
  - Milestones
  - Schedule
  - Water quality data

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Project Timeline

Implementation Plan

- Facilitate stakeholder development of an Implementation Plan

- Meet again in February
  - Outline management measures based on priorities
  - Outline milestones and implementation schedule

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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

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