

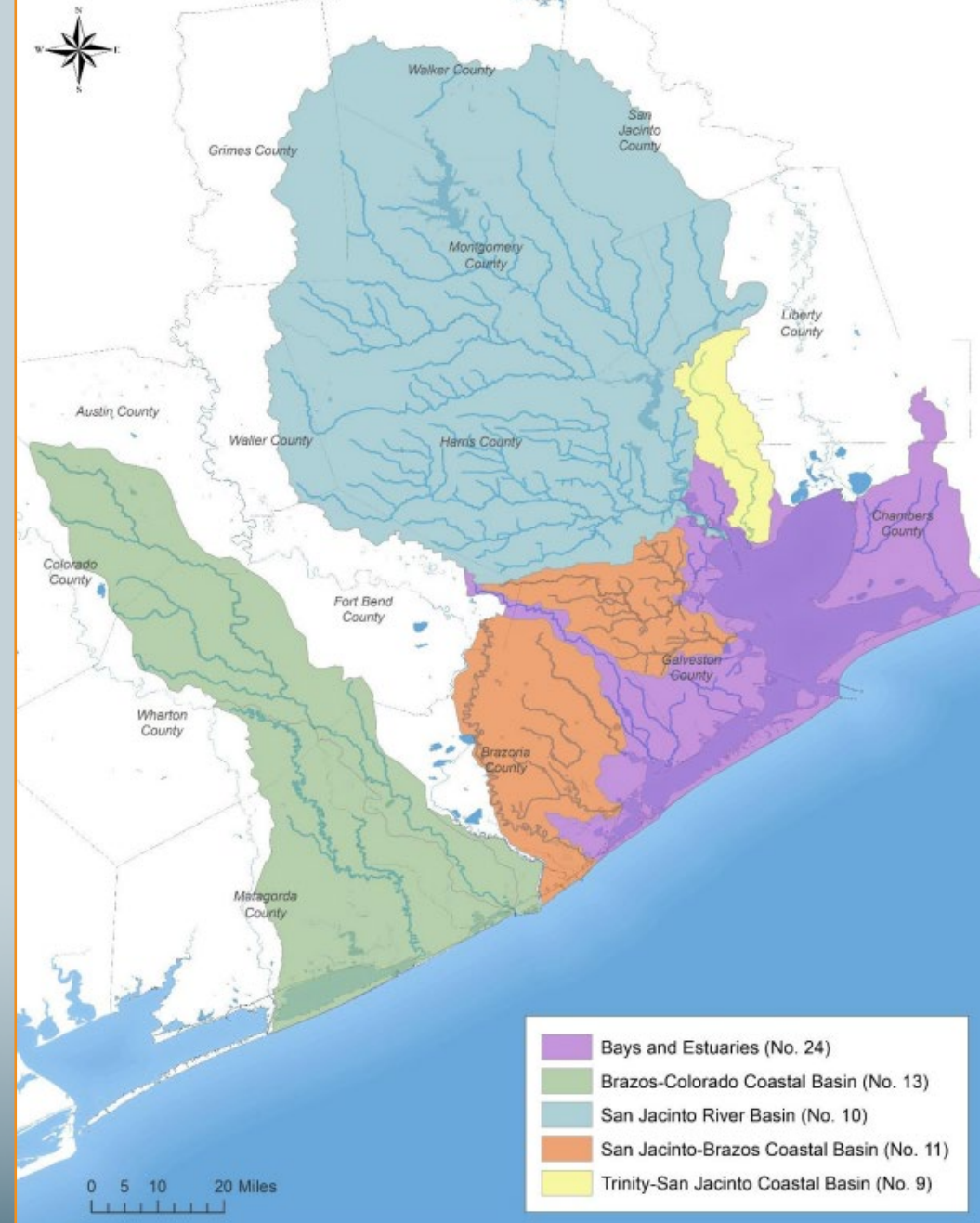
Texas Clean Rivers Program Regional Water Resources Information Map

Jenny W. Oakley, Jessica Casillas, and Sayena Marandi
Houston-Galveston Area Council

State of the Bay Symposium
Galveston, TX
February 26, 2026

Texas Clean Rivers Program

- H-GAC is one of 12 regional authorities that partner with TCEQ to administer the CRP
- Program Objectives:
 - Provide data for decision-making
 - Identify and evaluate water quality issues
 - Promote cooperative watershed planning
 - Recommend management strategies
 - Inform and engage stakeholders
- 4 river basins and coastal waters - 15 counties
- 6 regional partner organizations
- 319 active sites (+62 TCEQ/USGS sites)
 - Monthly to quarterly
 - Quality assured data
 - Routine monitoring
 - Data to SWQMIS and WRIM



Where Do We Monitor?

■ CRP Coordinated Monitoring Schedule

https://cms.lcra.org/schedule.aspx?basin=11&FY=2027

Coordinated Monitoring Schedule River Basin: 11 FY: 2027 Login

Description (key word) Station Region 12 Segment 1101 1102 1103 Submitting Entity HG WC Collecting Entity FC HC HH Monitoring Type BS RT

| Site Description | Station ID | Waterbody ID | Region | SE | CE | MT | 24 hr DO | AqHab | Benthics | Nekton | Metal Water | Organic Water | Metal Sed | Organic Sed | Conv | Bacteria | Flow | Fish Tissue | Field | Comments |
|---|------------|--------------|--------|----|----|----|----------|-------|----------|--------|-------------|---------------|-----------|-------------|------|----------|------|-------------|-------|--|
| Segment 1101 Clear Creek Tidal Map | | | | | | | | | | | | | | | | | | | | |
| CLEAR CREEK AT EGRET BAY BLVD FM 270 SE OF WEBSTER Map | 15458 | 1101 | 12 | WC | FO | RT | | | | | | | | | 3 | 3 | | | 3 | |
| CLEAR CREEK TIDAL AT THE CONFLUENCE WITH CLEAR LAKE 30 M NORTH AND 286 M WEST OF DAVIS ROAD AT VEGA COURT IN LEAGUE CITY IN HARRIS COUNTY Map | 18573 | 1101 | 12 | HG | HC | RT | | | | | | | | | 6 | 6 | | | 6 | |
| CLEAR CREEK TIDAL AT BROOKDALE DR APPROX 0.1 MI DOWNSTREAM OF GRISSOM RD IN COUNTRYSIDE PARK IN CANOE LAUNCHING AREA IN LEAGUE CITY Map | 18576 | 1101 | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | | | 4 | |
| MAGNOLIA CREEK AT W BAY AREA BLVD LEAGUE CITY APPROX 250 M UPSTREAM OF WWTP PERMIT WQ0010568-003 Map | 18611 | 1101A | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | 4 | | 4 | |
| CHIGGER CREEK AT FM528 BRIDGE IN FRIENDSWOOD Map | 18493 | 1101B | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | 4 | | 4 | |
| COW BAYOU AT NASA ROAD 1 IN WEBSTER 100 M EAST OF FM 270/EL CAMINO REAL Map | 17928 | 1101C | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | | | 4 | Added for FY2019 only |
| ROBINSONS BAYOU AT FM270 IN LEAGUE CITY Map | 18475 | 1101D | 12 | HG | UI | BS | 4 | | | | | | | | | | | | | Transferred to UI in FY25 |
| ROBINSONS BAYOU AT FM270 IN LEAGUE CITY Map | 18475 | 1101D | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | | | 4 | |
| UNNAMED TRIBUTARY OF CLEAR CREEK TIDAL IN FOREST PARK CEMETERY IMMEDIATELY UPSTREAM OF S FEEDER RD OF I 45/GULF FWY S OF NASA RD 1 IN WEBSTER Map | 18591 | 1101F | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | 4 | | 4 | |
| Segment 1102 Clear Creek Above Tidal Map | | | | | | | | | | | | | | | | | | | | |
| CLEAR CREEK AT FM2351 / CHOATE RD NEAR FRIENDSWOOD Map | 11450 | 1102 | 12 | WC | FO | RT | | | | | | | | | 3 | 3 | | | 3 | |
| CLEAR CREEK AT MYKAWA ROAD SOUTH OF SAM HOUSTON PARKWAY IN BROOKSIDE VILLAGE Map | 17077 | 1102 | 12 | WC | FO | RT | | | | | | | | | 3 | 3 | 3 | | 3 | |
| CLEAR CREEK ABOVE TIDAL AT YOST ROAD TERMINUS IN PEARLAND IN BRAZORIA COUNTY Map | 20010 | 1102 | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | 4 | | 4 | |
| COWART CREEK 9 METERS UPSTREAM FROM CASTLEWOOD DRIVE BRIDGE IN FRIENDSWOOD Map | 18677 | 1102A | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | 4 | | 4 | |
| MARYS CREEK AT MARYS CROSSING IN NORTH FRIENDSWOOD Map | 18473 | 1102B | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | 4 | | 4 | |
| HICKORY SLOUGH AT ROBINSON DRIVE IN PEARLAND Map | 17068 | 1102C | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | 4 | | 4 | |
| TURKEY CREEK AT BEAMER ROAD 1.5 KM SOUTHEAST OF FM 1959/DIXIE FARM ROAD IN FRIENDSWOOD Map | 21925 | 1102D | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | 4 | | 4 | |
| MARYS CREEK BYPASS AT EAST BROADWAY ST/FM 518 WEST OF SUNSET MEADOWS DR IN PEARLAND Map | 18639 | 1102F | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | 4 | | 4 | |
| Segment 1103 Dickinson Bayou Tidal Map | | | | | | | | | | | | | | | | | | | | |
| DICKINSON BAYOU TIDAL AT SH 146 BRIDGE EAST OF DICKINSON Map | 11455 | 1103 | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | | | 4 | |
| DICKINSON BAYOU TIDAL AT SH 3 BRIDGE IN DICKINSON CAMS733 Map | 11460 | 1103 | 12 | WC | FO | RT | | | | | | | | | 3 | 3 | | | 3 | |
| DICKINSON BAYOU TIDAL AT IH 45 Map | 11462 | 1103 | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | | | 4 | |
| DICKINSON BAYOU TIDAL AT CEMETERY ROAD NORTH OF ARCADIA Map | 11464 | 1103 | 12 | WC | FO | RT | | | | | | | | | 3 | 3 | | | 3 | |
| BENSONS BAYOU AT FM 517 / PINE DR IN DICKINSON Map | 18471 | 1103A | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | | | 4 | |
| BORDENS GULLY AT SPRUCE DRIVE IN DICKINSON Map | 20724 | 1103B | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | 4 | | 4 | replaces temp id HG-188 collect for 2 years then compare results against 18469 |
| GEISLER BAYOU AT FM517 BRIDGE 0.19MI UPSTREAM OF DICKINSON BAYOU IN DICKINSON Map | 18470 | 1103C | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | | | 4 | |
| GUM BAYOU AT FM 517 E OF DICKINSON Map | 11436 | 1103D | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | | | 4 | |
| CEDAR CREEK AT FM 517 W OF DICKINSON Map | 11434 | 1103E | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | 4 | | 4 | |
| UNNAMED TRIBUTARY OF DICKINSON BAYOU AT AVENUE L 88 METERS SOUTH TO THE INTERSECTION OF OAK LANE AND AVENUE L SOUTHWEST OF DICKINSON Map | 20477 | 1103F | 12 | WC | FO | RT | | | | | | | | | 3 | 3 | | | 3 | |
| UNNAMED TRIBUTARY OF GUM BAYOU AT OWENS DRIVE 1.51 KILOMETERS UPSTREAM OF CONFLUENCE WITH GUM BAYOU IN DICKINSON Map | 20728 | 1103G | 12 | HG | UI | RT | | | | | | | | | 4 | 4 | | | 4 | replaces temp id HG-191 this site was added after site 11448 was dropped for being a duplicate with WCFO |

What Are The Results?

■ TCEQ Surface Water Quality Web Reporting Tool

Surface Water Quality Web Reporting Tool

Find a place

Segments

Segment ID: 1102C
Segment Name: Hickory Slough
Segment Class: Unclassified
Segment Type: Freshwater Stream
Segment Size: 2.329263 Miles
Segment Desc: From the Clear Creek Above Tidal confluence to a point 0.69 km (0.43 mi) upstream of Mykawa Road
Basin Name: San Jacinto-Brazos Coastal Basin
Retired: N

| Segment ID | Station ID | Station Description | Start Date | Start Time | Start Depth | End Date | End Time | End Depth | Submitting Entity | Collecting Entity | Monitoring Type | Composite Category | Composite Type | Parameter Name | Parameter Code | |
|------------|------------|-------------------------------|------------|------------|-------------|--------------------------------|----------------------------------|-----------|---|--|-----------------|--------------------|----------------|----------------|----------------|------------------|
| 1102C | 17068 | HICKORY SLOUGH ROBINSON DRIVE | 09/19/2000 | 11:20 | 0.3 | HOUSTON-GALVESTON AREA COUNCIL | GALVESTON COUNTY HEALTH DISTRICT | Routine | - Monitoring not intentionally targeted toward any environmental condition or event | RESIDUE, TOTAL NONFILTRABLE (MG/L) | 00530 | 4 | I016447 | 29.592561 | -95.272898 | SAMPLE DEPTH <1' |
| 1102C | 17068 | HICKORY SLOUGH ROBINSON DRIVE | 09/19/2000 | 11:20 | 0.3 | HOUSTON-GALVESTON AREA COUNCIL | GALVESTON COUNTY HEALTH DISTRICT | Routine | - Monitoring not intentionally targeted toward any environmental condition or event | NITROGEN, AMMONIA, TOTAL (MG/L AS N) | 00610 | <0.05 | I016447 | 29.592561 | -95.272898 | SAMPLE DEPTH <1' |
| 1102C | 17068 | HICKORY SLOUGH ROBINSON DRIVE | 09/19/2000 | 11:20 | 0.3 | HOUSTON-GALVESTON AREA COUNCIL | GALVESTON COUNTY HEALTH DISTRICT | Routine | - Monitoring not intentionally targeted toward any environmental condition or event | NITRITE PLUS NITRATE, TOTAL ONE LAB DETERMINED VALUE (MG/L AS N) | 00630 | <0.02 | I016447 | 29.592561 | -95.272898 | SAMPLE DEPTH <1' |
| 1102C | 17068 | HICKORY SLOUGH ROBINSON DRIVE | 09/19/2000 | 11:20 | 0.3 | HOUSTON-GALVESTON AREA COUNCIL | GALVESTON COUNTY HEALTH DISTRICT | Routine | - Monitoring not intentionally targeted toward any environmental condition or event | FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry | 01351 | 2 | I016447 | 29.592561 | -95.272898 | SAMPLE DEPTH <1' |
| 1102C | 17068 | HICKORY SLOUGH ROBINSON DRIVE | 09/19/2000 | 11:20 | 0.3 | HOUSTON-GALVESTON AREA COUNCIL | GALVESTON COUNTY HEALTH DISTRICT | Routine | - Monitoring not intentionally targeted toward any environmental condition or event | FECAL COLIFORM, MEMBR FILTER, M-FC BROTH, #/100ML | 31616 | 800 | I016447 | 29.592561 | -95.272898 | SAMPLE DEPTH <1' |
| 1102C | 17068 | HICKORY SLOUGH ROBINSON DRIVE | 09/19/2000 | 11:20 | 0.3 | HOUSTON-GALVESTON AREA COUNCIL | GALVESTON COUNTY HEALTH DISTRICT | Routine | - Monitoring not intentionally targeted toward any environmental condition or event | E. COLI, MTEC, MF, #/100 ML | 31648 | 800 | I016447 | 29.592561 | -95.272898 | SAMPLE DEPTH <1' |
| 1102C | 17068 | HICKORY SLOUGH ROBINSON DRIVE | 09/19/2000 | 11:20 | 0.3 | HOUSTON-GALVESTON AREA COUNCIL | GALVESTON COUNTY HEALTH DISTRICT | Routine | - Monitoring not intentionally targeted toward any environmental condition or event | ENTEROCOCCI, ME, MF, #/100ML | 31649 | 796 | I016447 | 29.592561 | -95.272898 | SAMPLE DEPTH <1' |
| 1102C | 17068 | HICKORY SLOUGH ROBINSON DRIVE | 09/19/2000 | 11:20 | 0.3 | HOUSTON-GALVESTON AREA COUNCIL | GALVESTON COUNTY HEALTH DISTRICT | Routine | - Monitoring not intentionally targeted toward any environmental condition or event | DAYS SINCE PRECIPITATION EVENT (DAYS) | 72853 | >7 | I016447 | 29.592561 | -95.272898 | SAMPLE DEPTH <1' |
| 1102C | 17068 | HICKORY SLOUGH ROBINSON DRIVE | 10/17/2000 | 11:44 | 0.3 | HOUSTON-GALVESTON AREA COUNCIL | GALVESTON COUNTY HEALTH DISTRICT | Routine | - Monitoring not intentionally targeted toward any environmental condition or event | PH | | | | | | |

What Do The Results Mean?

- Texas Integrated Report of Surface Water Quality for Clean Water Act Sections 205(b) and 303(d).

2024 Texas Integrated Report - Assessment Results for Basin 10 - San Jacinto River

| Seg ID: 10070 - Unnamed Non-Tidal Tributary of Buffalo Bayou AU ID: 10070_01 | | | | | | | | | | | | | | | |
|---|---------------------------------------|-----------------------|------------|----------|----------|----------------|--------------------|--------------|------------------|--------------|-----|----|---------|-------------------------------------|-----|
| Use | Method | Parameter | Start Date | End Date | Criteria | #Data Assessed | Mean Data Assessed | #Exceedances | Mean Exceedances | DS Qualifier | LOS | CF | Int LOS | TCEQ Cause | Cat |
| Aquatic Life Use | Dissolved Oxygen grab minimum | Dissolved oxygen Grab | 12/01/15 | 11/30/22 | 3 | 49 | . | 17 | 0.59 | AD | NS | N | NS | Depressed dissolved oxygen in water | 5c |
| | Dissolved Oxygen grab screening level | Dissolved oxygen Grab | 12/01/15 | 11/30/22 | 5 | 49 | . | 21 | 1.27 | AD | CS | N | CS | Depressed dissolved oxygen in water | |
| General Use | Nutrient Screening Levels | Total phosphorus | 12/01/15 | 11/30/22 | 0.69 | 52 | . | 1 | 1 | AD | NC | N | NC | | |
| | | Ammonia | 12/01/15 | 11/30/22 | 0.33 | 52 | . | 3 | 1.16 | AD | NC | N | NC | | |
| | | Nitrate | 12/01/15 | 11/30/22 | 1.95 | 52 | . | 0 | . | AD | NC | N | NC | | |
| Recreation Use | Bacteria Geomean | E. coli | 12/01/15 | 11/30/22 | 126 | 52 | 830.12 | 1 | . | AD | NS | N | NS | Bacteria in water | 4a |
| Seg ID: 1007R - Hunting Bayou Above Tidal AU ID: 1007R_01 | | | | | | | | | | | | | | | |
| Use | Method | Parameter | Start Date | End Date | Criteria | #Data Assessed | Mean Data Assessed | #Exceedances | Mean Exceedances | DS Qualifier | LOS | CF | Int LOS | TCEQ Cause | Cat |
| Aquatic Life Use | Dissolved Oxygen grab minimum | Dissolved oxygen Grab | 12/01/15 | 11/30/22 | 3 | 51 | . | 10 | 1.39 | AD | NS | N | NS | Depressed dissolved oxygen in water | 5c |
| | Dissolved Oxygen grab screening level | Dissolved oxygen Grab | 12/01/15 | 11/30/22 | 4 | 51 | . | 13 | 1.91 | AD | CS | N | CS | Depressed dissolved oxygen in water | |
| General Use | Nutrient Screening Levels | Total phosphorus | 12/01/15 | 11/30/22 | 0.69 | 53 | . | 3 | 7.05 | AD | NC | N | NC | | |
| | | Ammonia | 12/01/15 | 11/30/22 | 0.33 | 53 | . | 36 | 9.15 | AD | CS | N | CS | Ammonia in water | |
| | | Nitrate | 12/01/15 | 11/30/22 | 1.95 | 53 | . | 0 | . | AD | NC | N | NC | | |
| Recreation Use | Bacteria Geomean | E. coli | 12/01/15 | 11/30/22 | 126 | 53 | 483.22 | 1 | . | AD | NS | N | NS | Bacteria in water | 4a |

H-GAC's Water Resources Information Map (WRIM)

Water Resources Information Map (WRIM)

Monitoring Stations & Data | Impairments & Concerns | Information

Impairments & Concerns

- Water Quality: Main
- Recreational Use

Pathogen Indicator Bacteria

o **What is it?** Recreational use is an assessment of the potential health risk related to activities where people come into contact with waterways, such as swimming, boating, or fishing. Elevated concentrations of pathogen indicator bacteria such as *Escherichia coli* (*E. coli*) and *Enterococcus spp.* in water indicates likely fecal contamination and are used to assess the potential presence of disease-causing pathogens in water.

o **Why do we care?** High bacterial concentrations increase the risk of contracting gastrointestinal illnesses or skin infections for swimmers or others who come into direct contact with the water.

o **How can you help?** Bacterial contamination can come from many sources. Some sources of bacteria are natural and cannot be prevented, such as fecal matter from native wildlife. Other sources of bacteria result from human activities in the watershed, and we can all play a part in preventing these sources of bacteria.

- Wastewater treatment facility (WWTF) releases** - While unauthorized releases are rare, they can result in very high levels of bacteria entering a waterway. If you suspect that an unauthorized release is occurring, you can report it by contacting the [Texas Spill-Reporting Hotline](#) at 800-832-8224 or submitting an electronic [Complaint](#).
- Sanitary sewer overflows (SSOs)** - Occasionally a sanitary sewer system releases untreated sewage directly into a waterway or its watershed, typically due to heavy rains or a blockage in the sanitary sewer lines. Prevention is the best way to help. To avoid clogs, never pour fats, oils, or grease, or flush wipes, down the drain. Learn more about how to [protect our pipes](#) and [cease the grease](#).
- On-Site Sewage Facilities (OSSFs) or "septic systems"** - Failing OSSFs can directly add raw sewage to a waterway or its watershed. If your home has an OSSF, you can help by staying current on routine maintenance and having your system inspected at regular intervals. Learn more about your OSSF through [H-GAC's homeowner wastewater assistance program](#).
- Scoop the Poop** - Fecal waste from pets and other animals, like livestock, pets, feral hogs, and other wildlife, can be deposited directly into waterways if animals have access to the water, or it can be washed into waterways with stormwater runoff when it rains. You can help by always picking up your pet's waste and disposing of it in a trash can.

Pathogen Indicator Bacteria

- Fully Supporting
- No Concern
- Not Assessed
- Use Concern
- Non-Supporting

City of Houston, Texas Parks & Wildlife, CONANP, Eri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

Powered by Esri

Water Resources Information Map (WRIM)

Monitoring Stations & Data | Impairments & Concerns | Information

H-GAC's Water Resources Information Dashboard

Monitoring Program

- Clean Rivers Program
- Texas Stream Team

Select by Station ID: (All)

Station Status

- Active
- Inactive

Station Information

Click Station Location on the map

Monitoring Program: Clean Rivers Program

Monitoring Entity: San Jacinto River Authority

Station ID: 16645

Status: Active

Description: LAKE CONROE AT MOUTH OF SANDY BRANCH COVE 2.63 KM EAST OF INTERSECTION OF HARDY SMITH ROAD AND F S 218 A

Segment and Assessment Unit: 1012_02

County: Montgomery

Basin: San Jacinto River Basin

Watershed: Lake Conroe

Click To Station Page

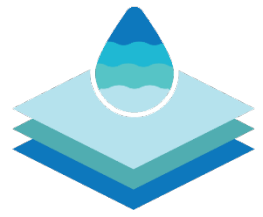
Counties: 1 | Watersheds: 1 | Stations: 1

View on Tableau Public

We are always making improvements to the WRIM, if you notice an issue or have a recommendation/request please reach out!

Jenny.Oakley@h-gac.com

713-499-6660



GALVESTON BAY
REGIONAL MONITORING DATABASE

Galveston Bay Regional Monitoring Database: What can it do for you?

Ryan Bare, PhD | Sr. Research Scientist, Director | HARC
State of the Bay | Session 3 | February 25th, 2026

This project is funded with a grant from the United States Environmental Protection Agency through the Texas Commission on Environmental Quality's Galveston Bay Estuary Program.



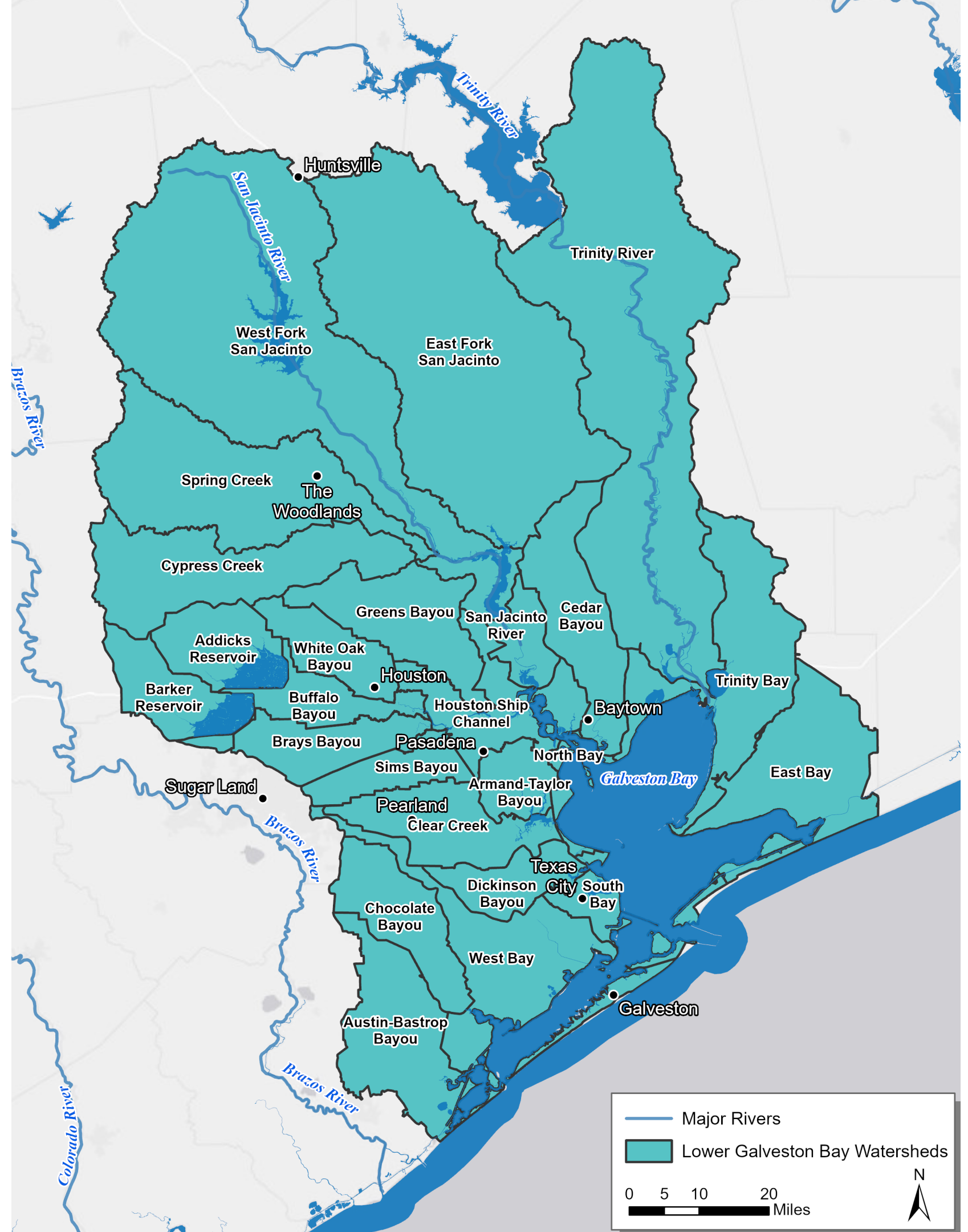
HARC

The Regional Monitoring Database

Interactive portal that supports conservation, management, and research related to the Galveston Bay system.



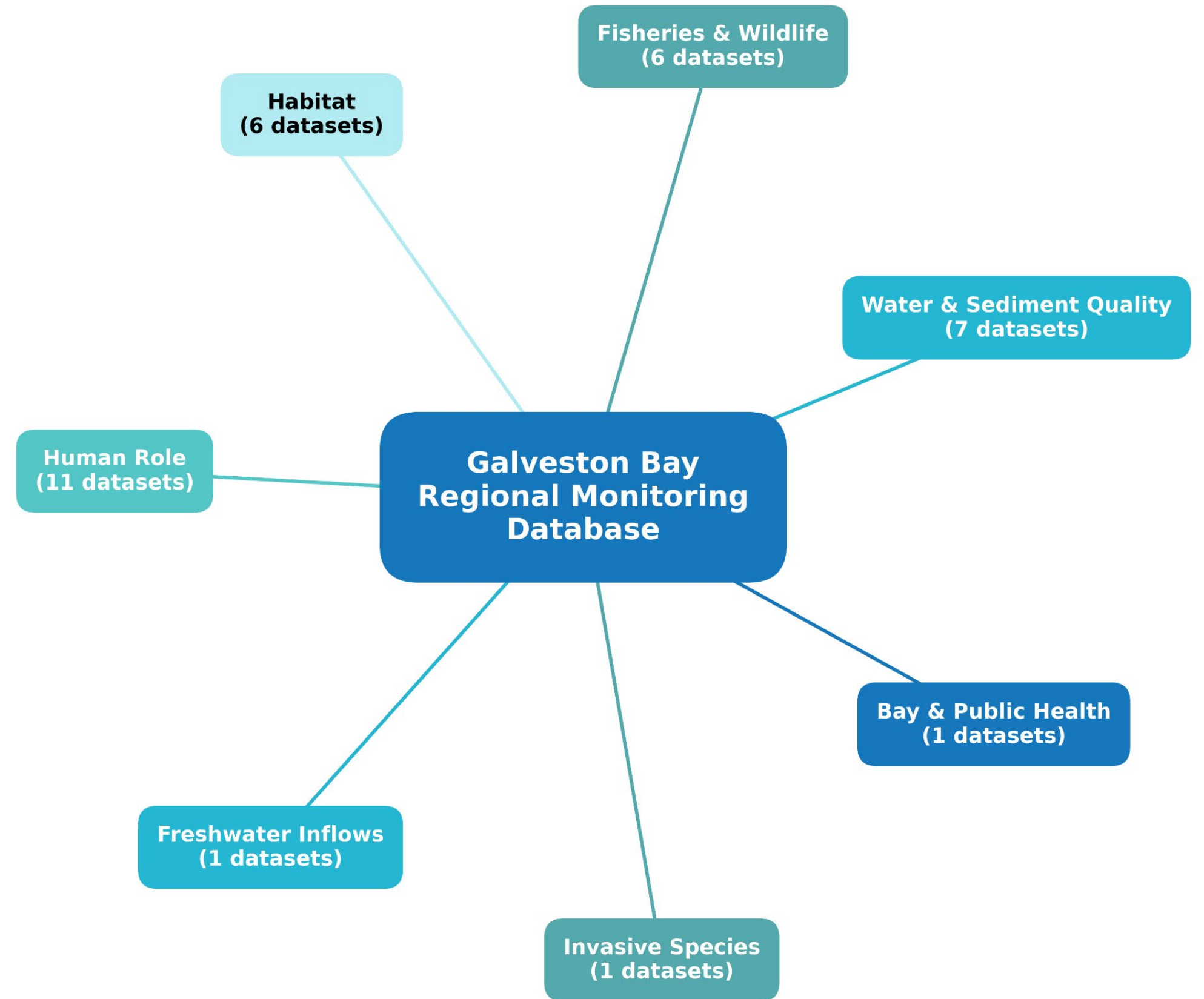
www.GalvBayData.org



Data and More Data

Seven categories:

- Habitat
- Fisheries and Wildlife
- Human Role
- Water and Sediment Quality
- Bay and Public Health
- Invasive Species
- Freshwater Inflows



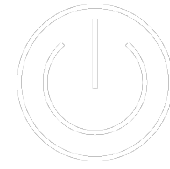
A Data Ecosystem

Total of **33** datasets
plus **13** resource links.



Range of Services

- Data Download
 - Navigate and download
- Data Catalog
 - Search and find
- Interactive Tools
 - Dynamically view and download



Clean Energy



Air Quality



Data Downloads

Directly download spatial and tabular datasets organized into Human Role, Water and Sediment Quality, Bay and Public Health, Freshwater Inflows, Habitat, Fisheries and Wildlife, and Invasive Species categories.

[↗ Open](#)



Data Catalog

Search for, filter, and access available datasets through an inventory that provides supporting information.

[↗ Open](#)



Interactive Tools

Explore, visualize, or create custom subsets of data for download using Dashboards, Interactive Charts, and Web Maps.

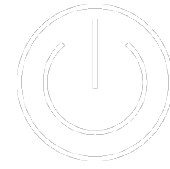
[↗ Open](#)

Benefits

- Time and resource savings
- Enhanced access to quality information (QAPP)
- Generate reproducible and updated datasets (maintained)
- Value added data with combined tables, new attributes, pre - processing



Data Download



Clean Energy



Air Quality










GALVESTON BAY
REGIONAL MONITORING DATABASE

Files from Data Download at Galveston Bay Regional Monitoring Database

 Galveston Bay Regional Monitoring Database

Select All Sort By Name ▾



| | | |
|--------------------------|---|---|
| <input type="checkbox"/> |  | Bay and Public Health 1 MB |
| <input type="checkbox"/> |  | Fisheries and Wildlife 184 MB |
| <input type="checkbox"/> |  | Freshwater Inflow 2 MB |
| <input type="checkbox"/> |  | Habitat 201 MB |
| <input type="checkbox"/> |  | Human Role 313 MB |
| <input type="checkbox"/> |  | Invasive Species 2 MB |
| <input type="checkbox"/> |  | Water, Sediment, and Ti... 887 MB |

Data Catalog

Q Enter to search by Name, Description, or ID

Data Types:

Resource

Tabular

Spatial

Categories:

Bay and Public Health

Freshwater Inflows

Human Role

Water and Sediment Quality

Fisheries and Wildlife

Habitat

Invasive Species

Data Included (Any dataset with an overlapping or inclusive data range will be returned):

Year **1960** to Year **2026**

Sort by Upload Date

46 records found

Seafood Consumption Advisories

[Download](#) 

Description:

A dataset of consumption advisory recommendations to limit or avoid eating certain species of fish or shellfish caught from water bodies (e.g., lakes, rivers, or coastal waters) due to contamination in the Lower Galveston Bay watershed.

ID: 01

Last Uploaded
03/01/2022

Update Frequency
As Available

Category
Bay and Public Health
Data Range
2009 - 2015

Source(s): Department of State Health Services - Seafood and Aquatic Life Group

Metals Environmental Quality

[Download](#) 

Description:

Reported values for analyzed inorganic metal constituents including parameters collected in sediment and water.

ID: 02

Last Uploaded
08/01/2025

Update Frequency
Annual

Category
Water and Sediment Quality
Data Range
1969 - 2024

Source(s): Texas Commission on Environmental Quality

Organics Environmental Quality

[Download](#) 

Description:

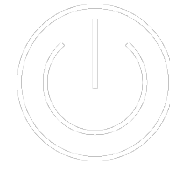
Reported values for analyzed semivolatile, volatile, and pesticide organic constituents including PAHs, PCBs, and Dioxin parameters collected in sediment and water.

ID: 03

Last Uploaded
08/01/2025

Update Frequency
Annual

Interactive Tools



Clean Energy

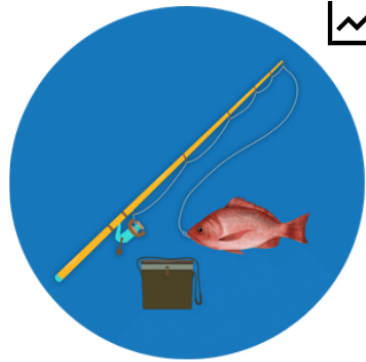


Air Quality



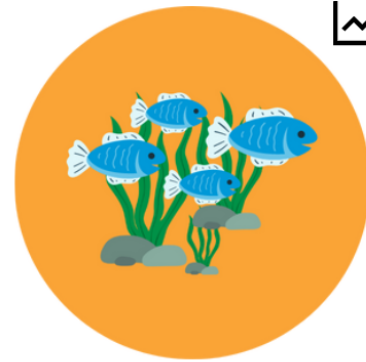
Coastal Commercial Fisheries Landings

Investigate and download coastal commercial fisheries harvest data for the value (\$) and weight (lb) of harvested species by year and waterbody using interactive charts.



Coastal Creel Survey - Fisheries Harvest

Investigate and download the total individual species caught by year and fishing activity group using an interactive chart.



Coastal Fisheries Resource (CPUE)

Investigate and download the Catch Per Unit Effort (CPUE) data by year, gear type, selected species, and subbay using an interactive chart.



Coastal Oil Spills

Investigate and download coastal oil spill data (volume and count) by year, watershed or subbay.



Non-Indigenous Aquatic Species

Explore observations of nonindigenous or invasive aquatic species by watershed and species.



North American Breeding Bird Survey

Investigate and download North American Breeding Bird Survey data by year, species group, and survey route using interactive charts.



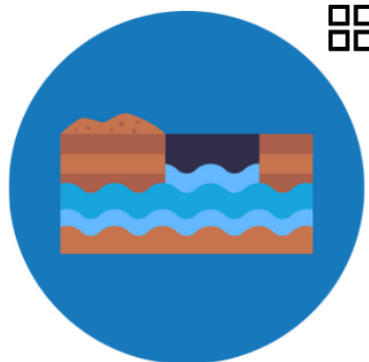
Seafood Consumption Advisories

View map of TDSHS seafood consumption advisories for freshwater and saltwater species.



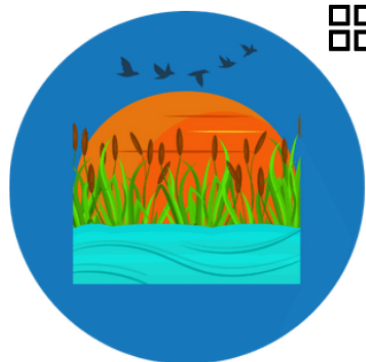
Social Vulnerability Index

Explore and visualize the Social Vulnerability Index across 4 themes by county and census tract.



Groundwater Well, Quality, and Level

Explore and download groundwater well water quality and level data by year and county.



Habitat - Ecological Mapping Systems

Explore dominant habitats aggregated from the Ecological Mapping Systems database by watershed.



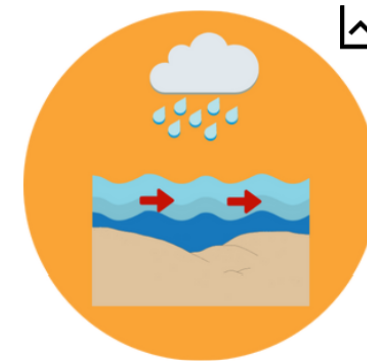
Impervious Cover (2019)

View a map of the most recent (2019) USGS National Land Cover Database percent impervious cover.



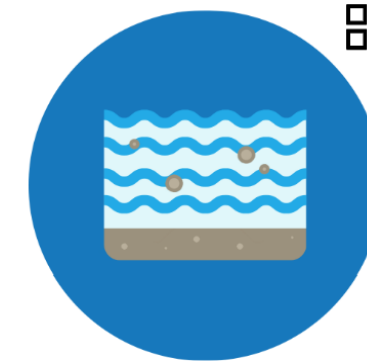
Land and Impervious Cover

Explore and download historical (2001 and 2006) and current (2016) land use/land cover and urban percent imperviousness data by watershed.



Trinity-San Jacinto Estuary Freshwater Inflows

Investigate and download estimated freshwater inflows to the Trinity-San Jacinto Estuary (Galveston Bay) by year.



Water, Sediment, and Tissue Quality

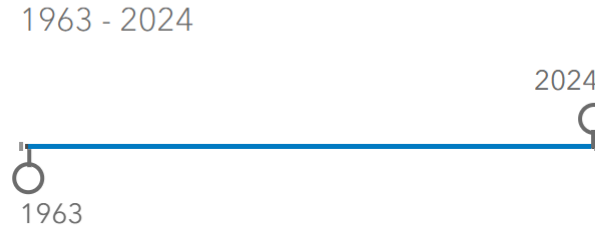
Explore and download reported values of water quality and field parameters collected from sediment, water, and historical tissue (1974 - 2012) data by parameter, year, watershed or subbay.

Water, Sediment, and Tissue Quality

Select a Primary Parameter Group

- Fecal Indicator Bacteria
- No group selected
- Fecal Indicator Bacteria
- Field Water Quality
- Metals
- Nutrients & Microbiological
- Organics
- Suspended Solids
- Tissue

Select Data Range

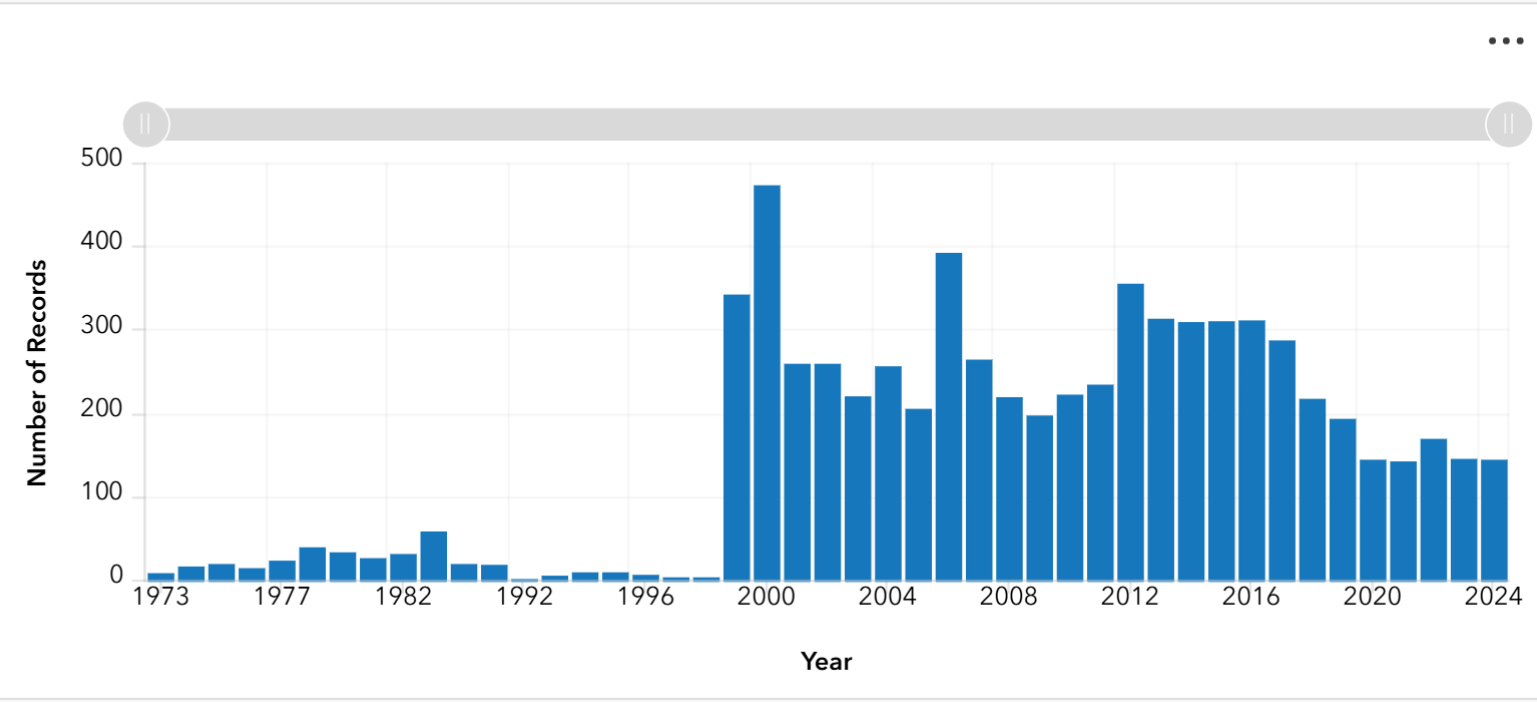
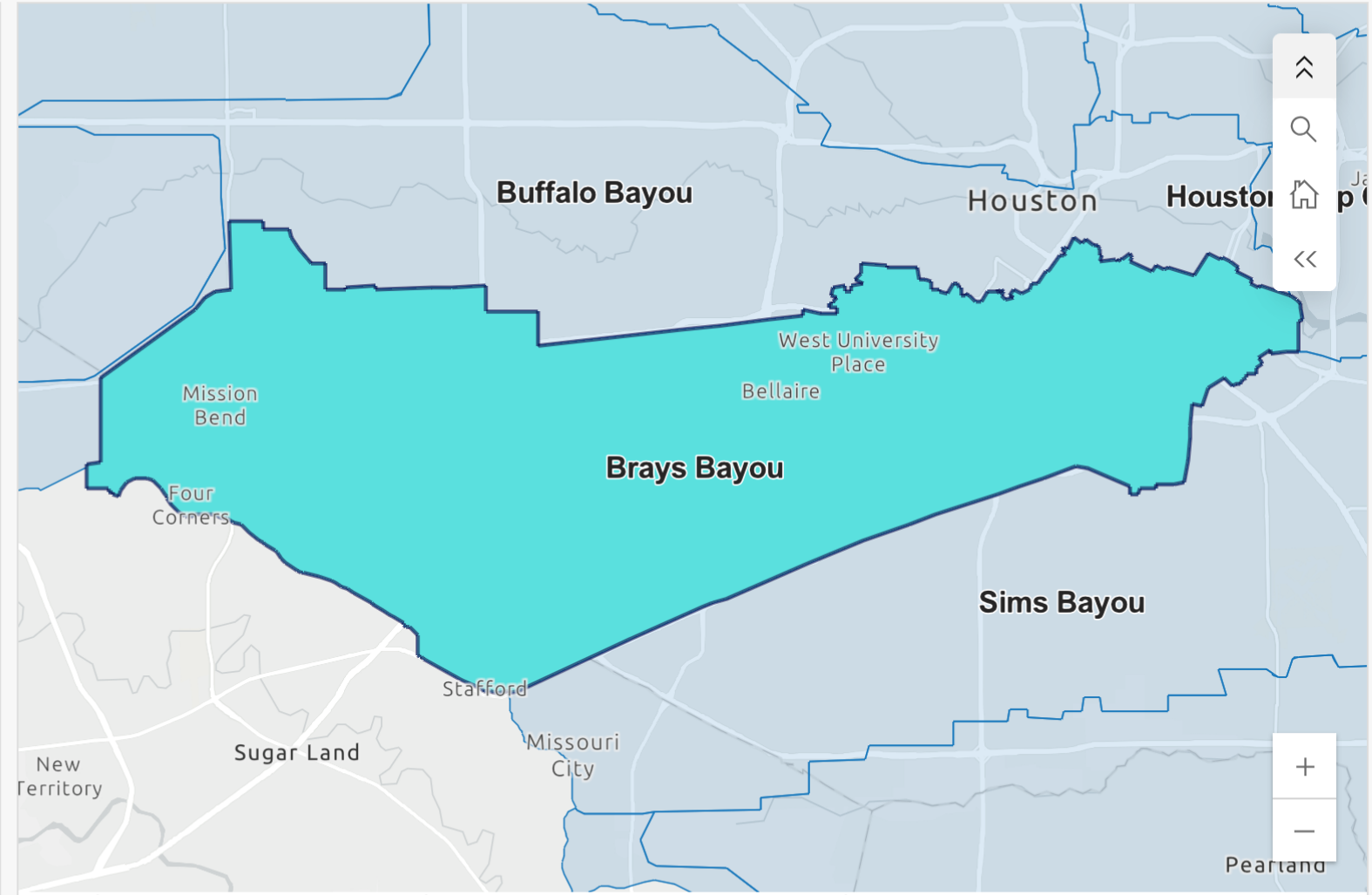


Watersheds or Subbays

- Watersheds**
- Subbays

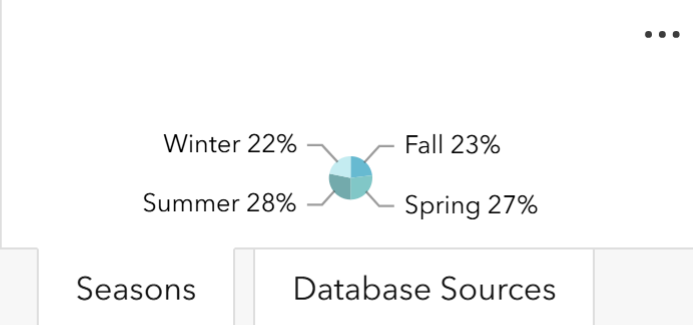
Select Watershed(s) or Subbay(s)

Brays Bayou



7k Total Records

29 Total Stations or Samples



| ID | Station_Sample_ID | RFA | Station_Desc | Basin_ID | WS_Bay | WSHED_Subbay_Name | Segment_ID | Alt_Stmty | Par_Code | Alt_Par_D |
|--------------|-------------------|---------|------------------------------|----------|--------|-------------------|------------|-----------|----------|----------------------------|
| TCEQ_1299179 | 16654 | I214040 | TRIB BRAYS BAYOU AT DUMFRIES | 10 | WS | Brays Bayou | 1007L | Non-Tidal | 31699 | E. COLI, COLILERT, IDEXX M |
| TCEQ_1405935 | 16654 | I217624 | TRIB BRAYS BAYOU AT DUMFRIES | 10 | WS | Brays Bayou | 1007L | Non-Tidal | 31699 | E. COLI, COLILERT, IDEXX M |
| TCEQ_1053722 | 16654 | I206562 | TRIB BRAYS BAYOU AT DUMFRIES | 10 | WS | Brays Bayou | 1007L | Non-Tidal | 31699 | E. COLI, COLILERT, IDEXX M |
| TCEQ_1453348 | 16654 | I227305 | TRIB BRAYS BAYOU AT DUMFRIES | 10 | WS | Brays Bayou | 1007L | Non-Tidal | 31699 | E. COLI, COLILERT, IDEXX M |

Data (first 2K records) Tissue Data (first 2K records)

Coastal Oil Spills

Select a Data Range

1998 - 2024



Watersheds or Subbays

- Watersheds
- Subbays

Select Watershed(s) or Subbay(s)

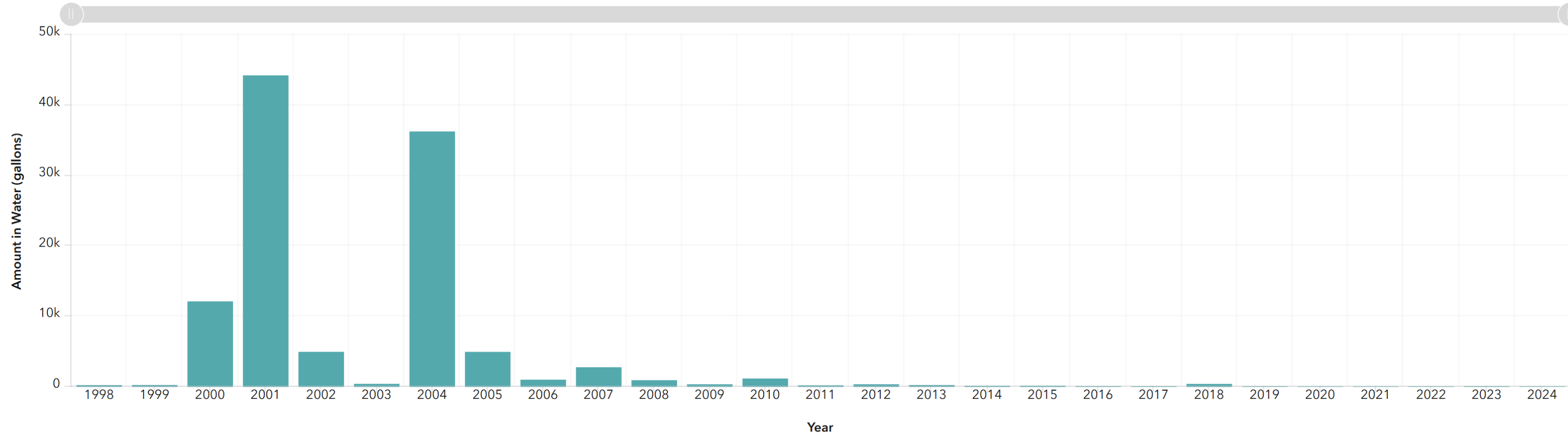
Christmas Bay Complex, East ... 5

- Christmas Bay Complex
- East Bay
- Trinity Bay
- Upper and Lower Galveston Bay
- West Bay

- Reset
- Deselect all

Select Spill Source(s) (Optional)

No Spill Source(s) Selected



- Oil Spill Amount in Water
- Counts of Oil Spill Events

| Spill_Number | Year | County | Alt_County | WS_Bay | WSHED_Subbay_Name | Spill_Source | Source_Name | Disposition | |
|--------------|------|-----------|------------|--------|-------------------------------|--------------|-------------|------------------------------|-----|
| 1998-0035 | 1998 | Galveston | | Bay | Upper and Lower Galveston Bay | Vessel | Captain Duy | GLO Jurisdiction Threat | 1/7 |
| 1998-0354 | 1998 | Brazoria | Galveston | Bay | Upper and Lower Galveston Bay | Missing | | GLO Jurisdiction Threat | 2/2 |
| 1998-0435 | 1998 | Harris | | Bay | Upper and Lower Galveston Bay | Vessel | Andino Park | GLO Jurisdiction Spill found | 3/1 |
| 1998-0517 | 1998 | Galveston | Chambers | Bay | Upper and Lower Galveston Bay | Missing | | GLO Jurisdiction Spill found | 3/2 |
| 1998-0700 | 1998 | Galveston | | Bay | Upper and Lower Galveston Bay | Missing | | GLO Jurisdiction Spill found | 4/4 |

From Data to Decisions

Clean Energy

Policy

- Inform policy and regulatory decisions

Research

- Support reproducible research and technical capacity

Funding

- Strengthen grant proposals

Management

- Identify data gaps and collaboration opportunities
- Align monitoring with regional priorities



CONTACT ME

For further information, contact me at
Rbare@HARCResearch.org and
visit www.GalvBayData.org.

Connect with HARC via [Instagram](#), [LinkedIn](#),
[Facebook](#) or [Twitter](#). Like or follow @HARCresearch.



HARC



NEXT STEPS IN ESTUARINE HABITAT

SUITABILITY MODELING:

INTEGRATING PROCESS-BASED AND DATA-DRIVEN APPROACHES

Ryan Hostak, MS
Tetra Tech
Coastal Resources



2026 State of the Bay Symposium

OBJECTIVES

KEY
QUESTION:

How can habitat suitability models (HSMs) support targeted, higher-confidence restoration and management decisions for seagrass and oyster habitats in Galveston Bay?

STEP
01

Summarize the local HSM landscape for oysters/seagrasses

STEP
02

Discuss a practical, integrated workflow for HSMs

STEP
03

Emphasize key considerations and provide HSM examples

Background on Habitat Suitability Models

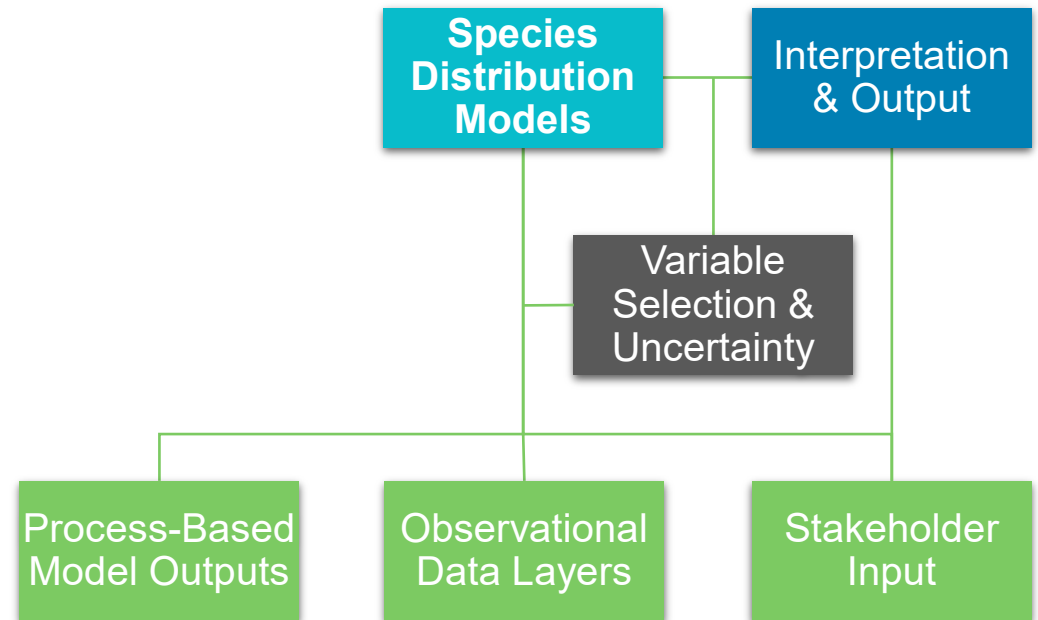
WHAT ARE HSMs?

- Spatial models estimating suitability for a target species or habitat by relating species observations to environmental and anthropogenic predictor variables

STRENGTHS & LIMITATIONS

- **Strengths:** Spatially explicit, focused guidance; integration of many data sources and modeling techniques
- **Limitations:** Sensitive to data quality/resolution, sampling bias, model choice, not a replacement for field survey

SIMPLE HSM FRAMEWORK



HSM Modeling Techniques

Process-Based and Data-Driven Models

Process-Based:

Mechanistic simulations of physical/biogeochemical processes that produce time-resolved predictor fields

- **Examples:** Hydrodynamic + sediment + water-quality + biogeochemical models; larval transport, DEB physiology
- **Strength:** mechanistic drivers, temporally explicit, connectivity
- **Limitations:** computational cost; needs sufficient calibration/inputs

Data-Driven:

Statistical model(s) that map species/habitat probability by learning species - environment relationships

- **Examples:** MaxEnt (presence-only), RF/GBM/GLM (presence/absence)
- **Strength:** strong predictive power, interpretable driver relationships, efficient
- **Limitations:** limited mechanistic insight; sensitive to variable selection and sampling bias

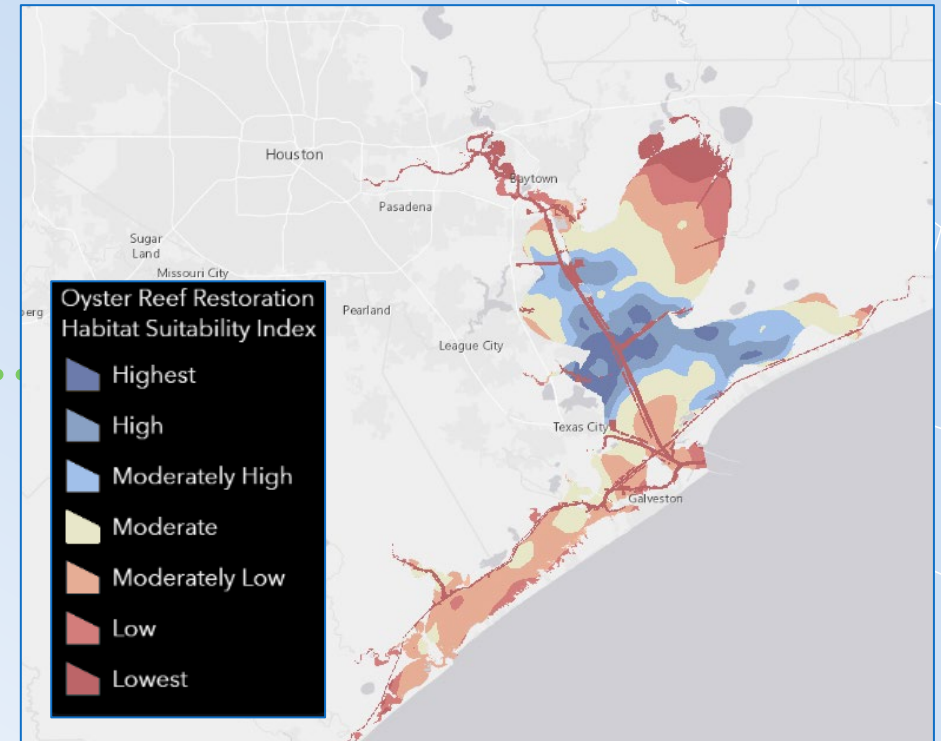
HSM in Galveston Bay

Literature Highlight

Gulf of Mexico American oyster HSI – Cake 1983
Field validation of a habitat suitability index model for the American oyster – Soniat & Brody 1988
Using species distribution models to guide seagrass management – Bittner et al. 2020

HSI Coastal Management Tools

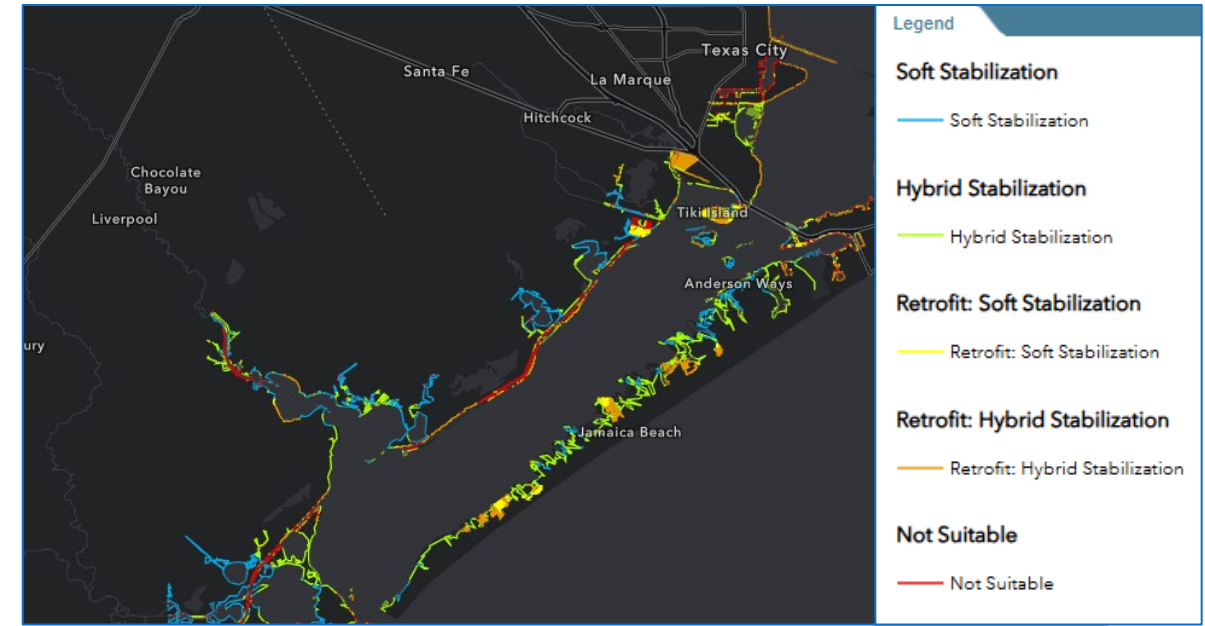
Upcoming Seagrass Habitat Suitability Modeling, Regions 1 and 2 – UTMSI/Tetra Tech
Oyster restoration siting on the Texas Coast – HRI/CCA



Honorable Mention:

A Restoration Suitability Index Model for the Eastern Oyster (in the Mission-Aransas Estuary, TX, USA – Pollack et al. 2012
Living Shoreline Site Suitability Tool – HRI/GLO

A Forward Looking HSM Framework



Other Considerations:

- **Enable scenario testing & resilience planning**
- process-model scenario testing for SDM input for future resilience
- **Support adaptive management** - update models as new data arrive; track changes in suitability and confidence over time

Data Types and Variable Selection

Data Types:

- **Species/Environmental Observations:** species distribution/condition surveys, water quality data, etc
- **Model Outputs:** salinity (seasonal mean, min, max, etc), temperature, currents & residence time, turbidity/TSS & PAR, sediment mobility indices, larval exposure
- **Physical/Human Environment:** topobathymetry, substrate, navigation channels, leases/avoidance areas, shoreline modifications
- **Stakeholder Input:** defining objectives, spatial constraints, selecting data and predictors, output development

Variable Selection:

- Use **biologically meaningful** summaries
- **Assess collinearity**; avoid reducing dimensionality
- Use **spatially aware selection** and cross-validation
- Limit predictor variables to **prevent overfitting**
- **Report importance, sensitivity, and propagated uncertainty**

Data Sources – There’s a lot of them!

Discrete and Continuous Data

| SOURCE | TYPE | SPATIAL & TEMPORAL COVERAGE | TYPICAL PARAMETERS |
|---|--|---|---|
| NOAA NOS | Continuous | Coast-wide, Conductivity in Galveston Bay at Eagle/Morgans Points, Corpus Christi Bay at Viola Turning Basin As early as 1900, typically 1990s-2000s to present | Conductivity (limited), Temp, Water Levels, Wind, Currents, Other Metocean |
| NOAA IOOS Environmental Sensor Map | Continuous | Greatest coverage in Aransas, Copano, Mesquite Bays (NOAA NERRS) and Galveston, Matagorda Bay systems (USGS NWIS) Varies, typically 2000s to present | Temp, Conductivity, Chlorophyll, pH, Salinity, Turbidity, DO, Water Levels |
| USGS WQ Data for Texas | Continuous | Greatest coverage in Galveston/Trinity Bay, Matagorda/Tres Palacios Bays Varies, typically 2020 to present | Temp, Conductivity, pH, Salinity |
| TWDB Water Data for Texas | Continuous | TWDB data across 16 stations from Sabine Lake to Baffin Bay. Varies, typically 2023 to present, some data available for past 10-20 years | Temp, Chlorophyll, Salinity, DO, Water Depth |
| Texas Seagrass Monitoring Program | Primarily Discrete, Continuous CTD in Laguna Madre | Primarily Mission Aransas to Lower Laguna Madre, opportunistic sampling in San Antonio, Little, and Galveston Bays. 2011-2018, more limited for CTD | Temp, Chlorophyll, pH, Salinity, DO, Light Attenuation, Secchi Depth, TSS, CTD |
| TCEQ SWQMIS | Discrete, seasonal | Extensive spatial coverage of bays, estuaries, and their tributaries. Data beginning in 1961, Clean Rivers Program began 1991 | Temp, Conductivity, Chlorophyll, pH, Alkalinity, Salinity, DO, Secchi Depth, TOC, Nutrients |
| Conrad Bleacher Institute, Division of Nearshore Research | Continuous | Primarily mid-lower TX Coast: Nueces Delta/Bay, Aransas, Copano, Mesquite Bays, Baffin Bay, Upper LM, San Antonio Bay Varies, as early as 1991 in Nueces Bay, typically early 2000s to present | Temp, Conductivity, Salinity, pH, DO, Water Depth |

COMPI

TGLO - COASTA

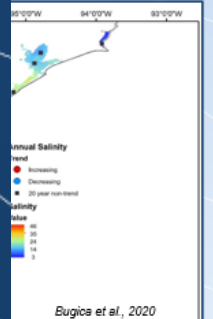
Key Inform

Shoreline Envi
Wastewater ou
Shallow water
Coastal marsh
Oyster areas (T
SAV areas (NO

NOAA IOOS - G

Key Inform

NOAA NGOFS
temperature, s
TAMU TX-LA:
temperature, s
TWDB/TGLO J



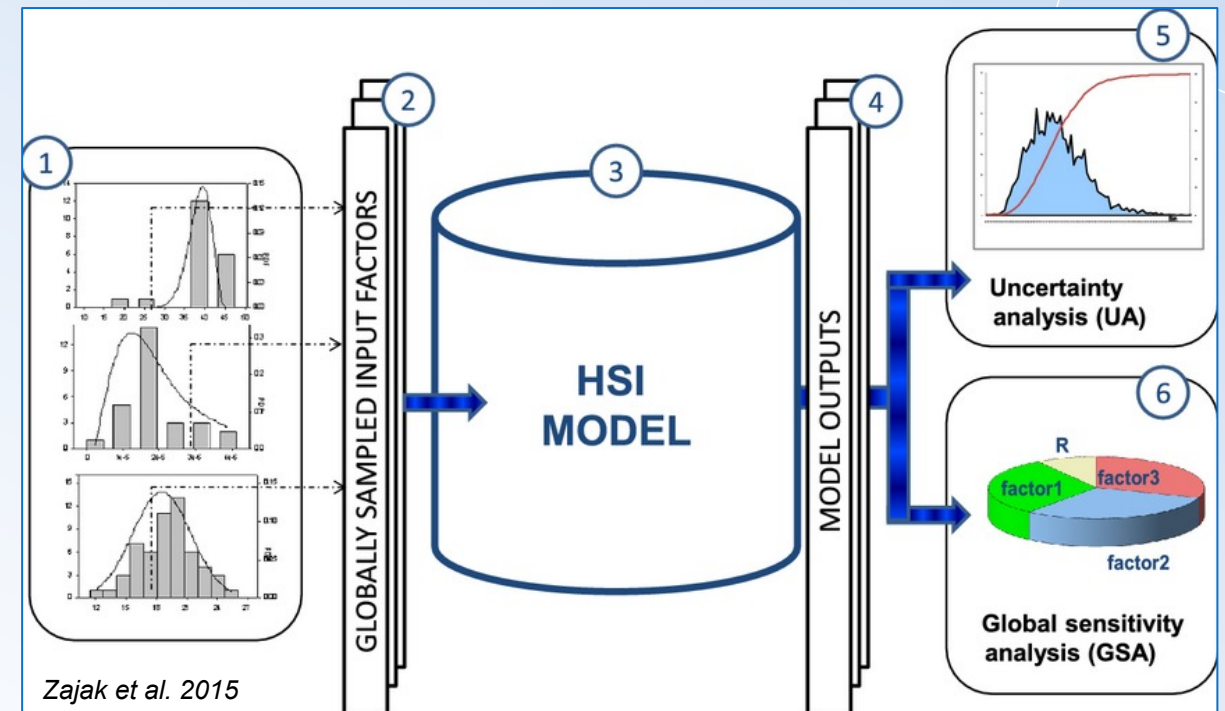
Validation, Sensitivity & Uncertainty: Sources & Approach

Practical sources of uncertainty in HSMs:

sampling bias, measurement error, process-model parameterizations, choice of SDM algorithm, spatial/temporal scale mismatch, and unmodelled ecological processes (e.g., disease, predation, human disturbance).

Significance and Approach:

- **Increase confidence in site recommendations** - spatially-aware cross validation and independent holdouts
- **Reveal weak predictions and limits** - produce per-cell uncertainty maps to support thoughtful decision making
- **Prioritize monitoring and reduce risk** - sensitivity analyses identify key suitability drivers to inform data collection
- **Make decisions transparent & defensible** - document validation metrics, model choices, and uncertainty



Process Model HSM Integration Example

Linhoss et al. 2016 - *Oyster Habitat Suitability in the Northern Gulf of Mexico*

Approach

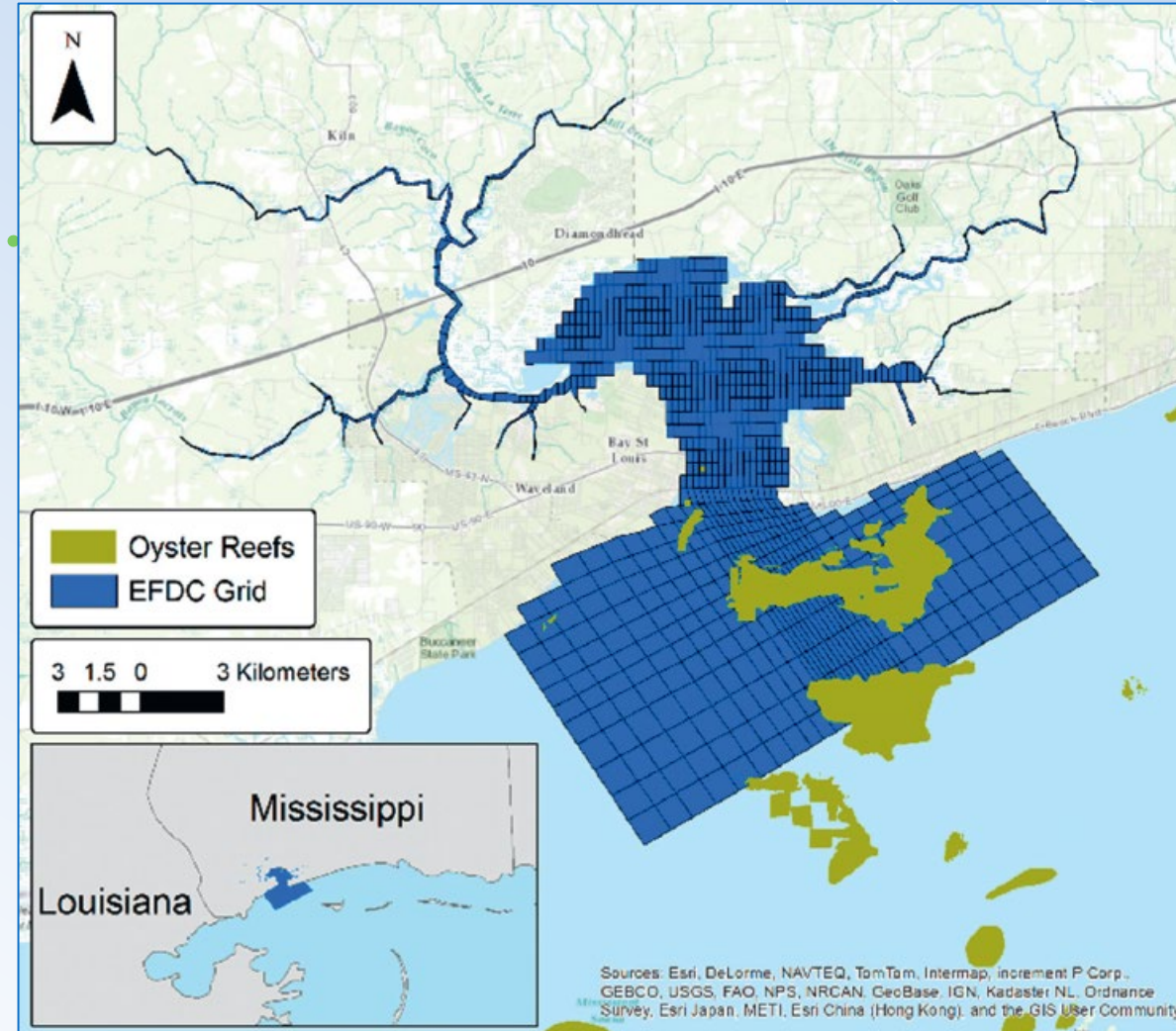
- Map oyster suitability leveraging bespoke process-model (EFDC + WASP).

Key Methods

- Predictors: salinity, depth, min DO, TSS, T
- 64 MaxEnt variants (all combos of 1–6 predictors)

Key Results

- Top drivers: salinity (~67%), then depth (~16%) and min DO (~10%)
- Single-factor maps vary; combined model best



Ensemble Seagrass HSM Example

He et al. 2022 - *Explainable artificial intelligence reveals environmental constraints in seagrass distribution.*

Approach

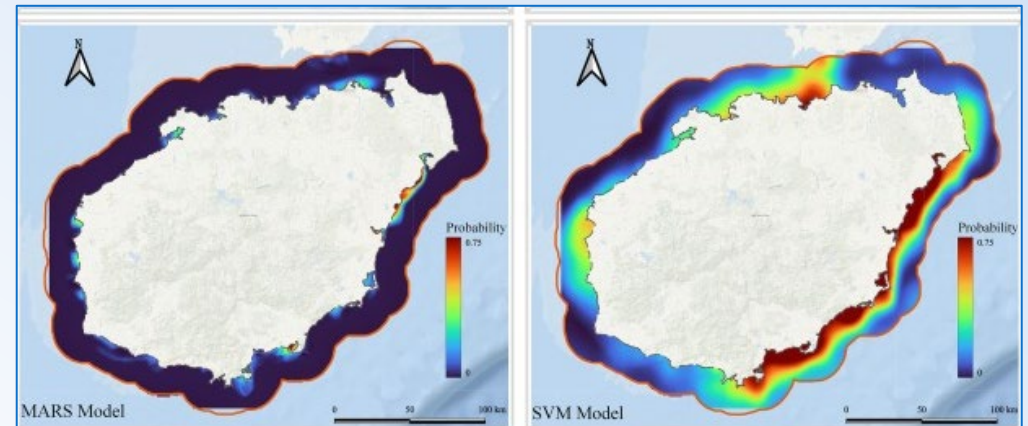
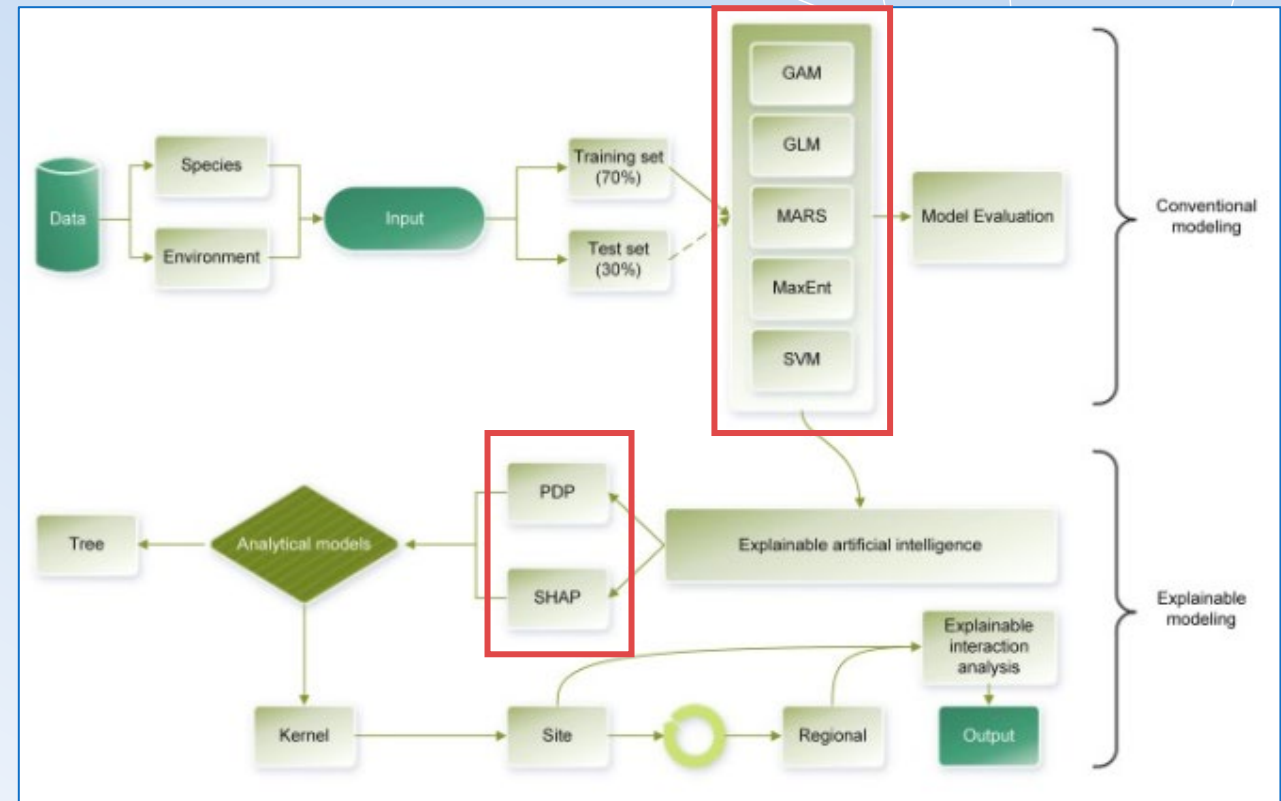
- Ensemble of multiple ML SDMs
- ~15 predictor variables, including process-derived

Explainable AI (XAI) methods

- SHAP: quantify predictor variable contributions and interactions
- PDPs: plot marginal response curves and thresholds for key predictors

Key results

- Ensemble outperforms single models
- Ensemble reduces biases of individual algorithms.
- XAI yields actionable, interpretable predictor thresholds for decision making



Conclusions

1

Hybrid process +
data-driven
ensembles produce
***higher-confidence
HSIs***

2

Translating HSIs
into ***usable data
products*** and
***communicating
uncertainty*** is vital!

3

Local ***expert insights***
can be translated in
the HSMs

4

***Prioritize model
efficiencies***, compute
comes at a cost

5

***Ecological
modeling is worth
the investment!***

THANK YOU!

QUESTIONS?



Ryan Hostak, MS

Tetra Tech



ryan.hostak@tetratech.com

From Past to Future: Land Cover Forecasting to Guide Environmental Planning in the Houston-Galveston Region

Durga Joshi, PhD

Megha Shrestha, PhD

Alvaro Iglesias

Thushara Ranatunga, PhD

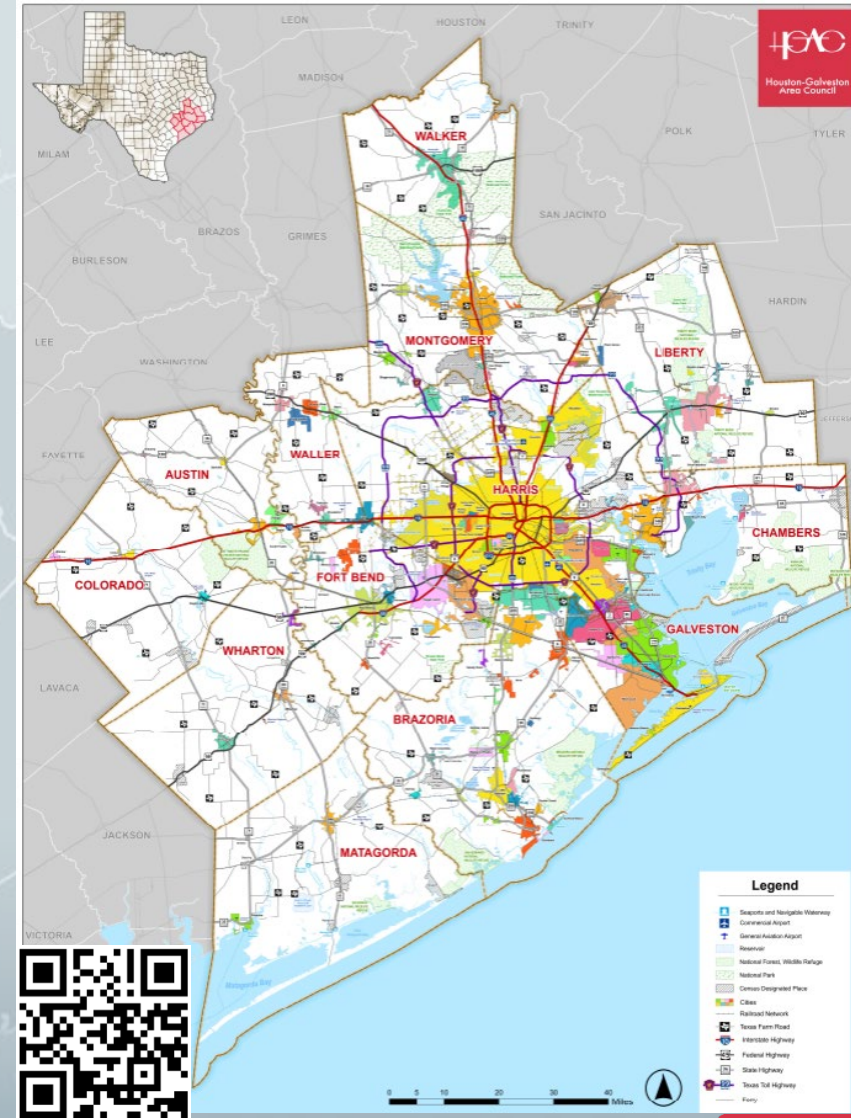
Galveston Bay Estuary Program

Feb 25, 2026

**Data Analytics and Research Group
Houston-Galveston Area Council**

Houston-Galveston Area Council (H-GAC)

- H-GAC is a voluntary association of local governments serving the 13-county Gulf Coast Planning Region of Texas.
- Mission: To promote regional cooperation and planning, ensuring the orderly development and welfare of our communities.
- Service Area: Covers ~12,500 square miles, home to over 7 million residents.
- Key Programs:
 - Transportation Planning
 - Community and Environmental Planning
 - Public Safety and Homeland Security
 - Workforce Development
 - Aging and Disability Resources
 - Data Analytics and Research



Project Overview

Motivation:

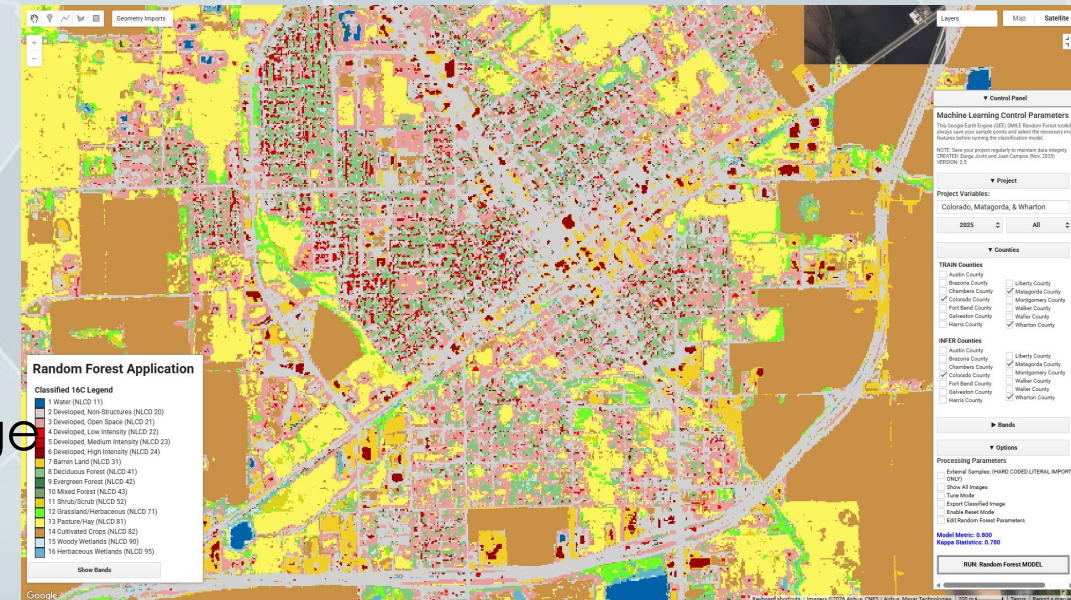
Our region is growing rapidly, yet most planning decisions still depend on static or outdated land-cover maps that cannot anticipate future change.

Project Approach

- Built NLCD-consistent land-cover datasets for the H-GAC
- Learn from past land-cover change to inform future conditions
- Forecast land cover through 2050
- Map areas with the highest likelihood of future change

Importance to Regional Planning

- Land cover underpins a wide range of environmental, infrastructure, and planning analyses
- Forward-looking projections provide early insight into emerging landscape patterns
- Results help anticipate potential pressure areas before change occurs
- Supports GBEP goals related to resilience, conservation, and sustainable growth



Data Modeling & Forecasting (TerrSet Land Cover Modeling (LCM))

Patterns observed in historical land cover transitions were used to project future change under a business-as-usual scenario

Extensively used and well-documented land change modeling framework

Designed specifically for land cover and land use **change forecasting**

Uses **historical transitions** to **estimate future change** patterns

Incorporates **spatial drivers** of change (e.g., proximity, suitability variables)

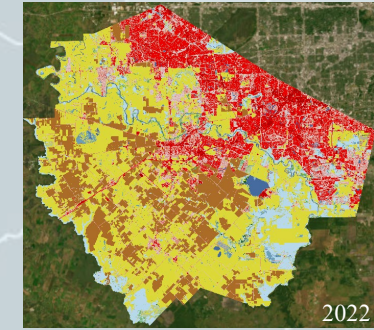
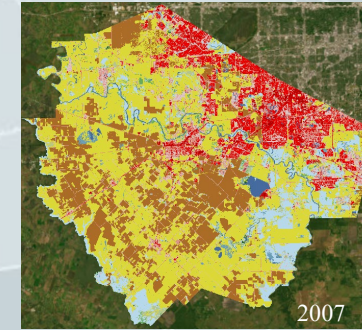
Produces **spatially explicit, map-based** projections suitable for regional planning

Widely applied in **urban growth, agricultural expansion, and ecological land change studies**

Data Used

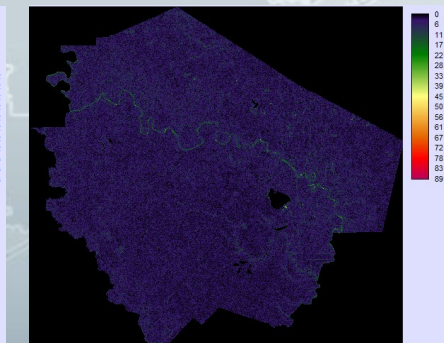
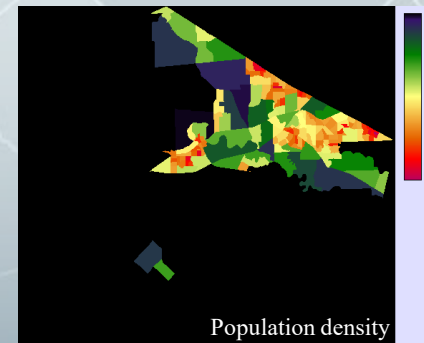
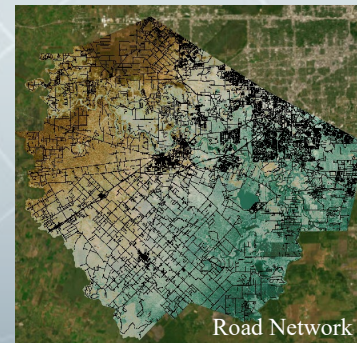
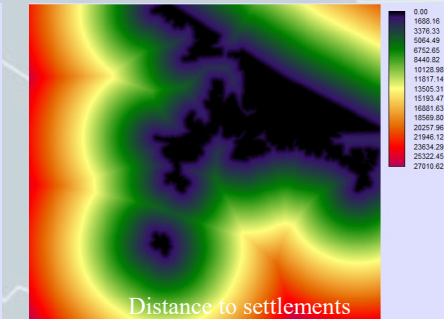
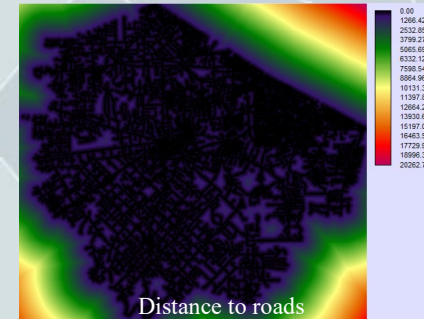
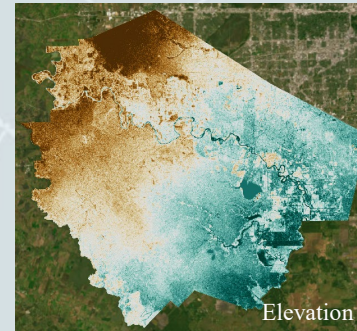
Observed Land Cover Change (NLCD)

- Land cover maps 2007
- Land cover maps 2022



Spatial Driver Variables

- Road network (2007 baseline)
- Elevation
- Population density
- Distance to roads
- Distance to settlements
- Distance to water



WorkFlow

Change Analysis | Transition Potentials | Change Prediction | Planning | REDD Project

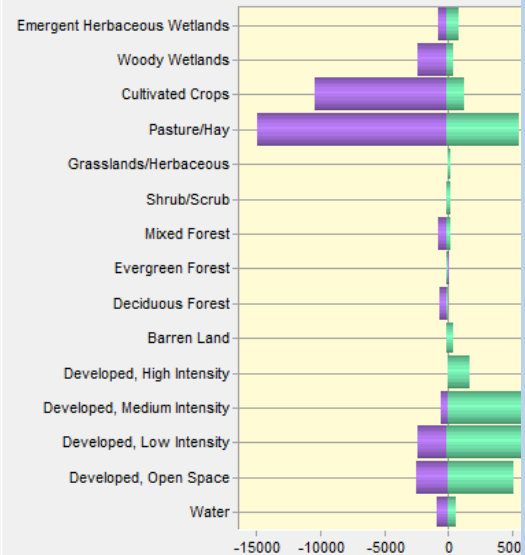
LCM Session Parameters

- Create new session :
- Use existing session : LCPred_I2
- Earlier land cover image : LndCvFB2007_2_new
- Later land cover image : LndCvFB2022_new
- REDD project
- Basis roads layer (optional) : FBroad2007
- Elevation model (optional) : FBDEM
- Use special palette

Change Analysis

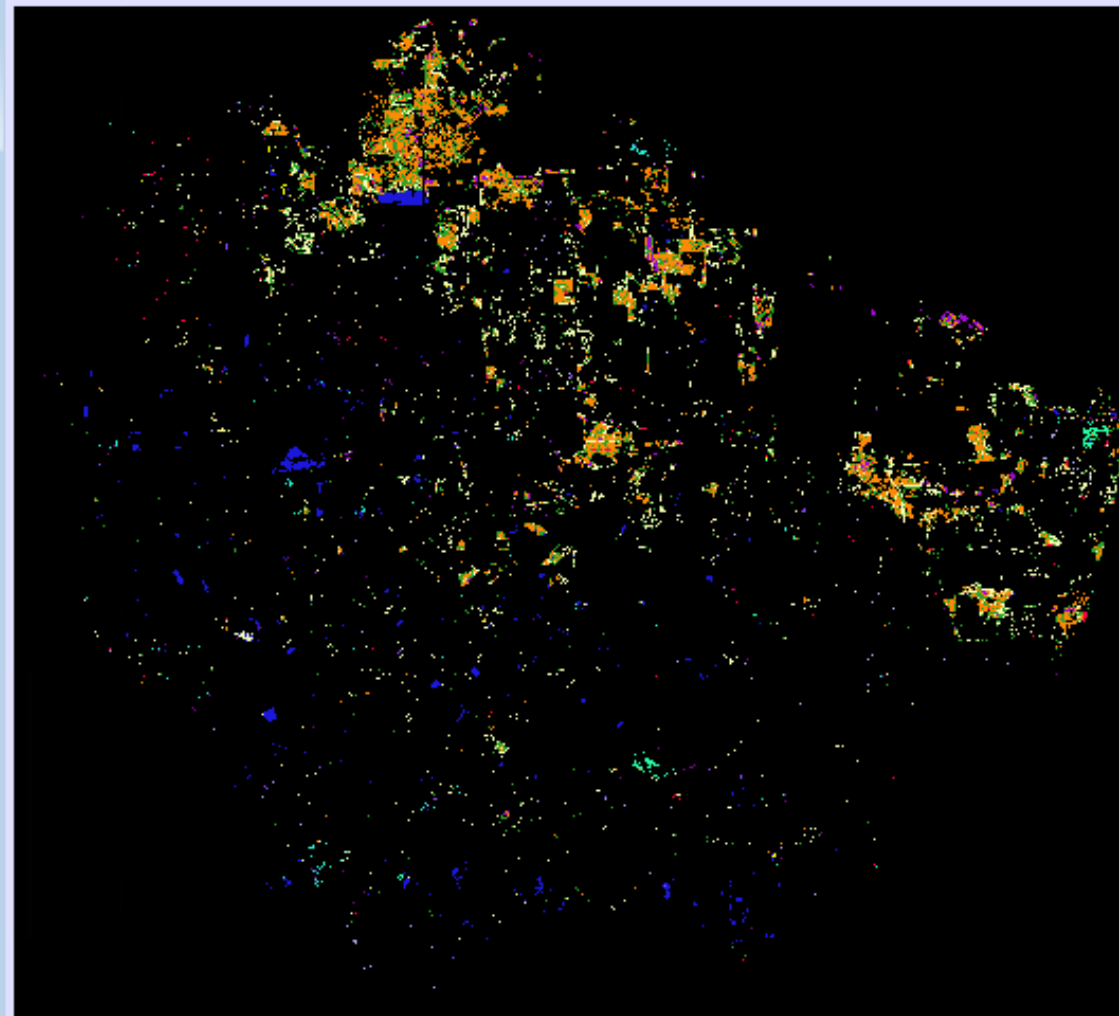
- Gains and losses by category Units : H
- Net change by category
- Contributors to net change experienced by : Water

Gains and losses between 2007 and 2022



tmp000

Transition from Pasture/Hay to All between LndCvFB2007_2_new and LndCvFB2022_new



- Pasture/Hay to Water
- Pasture/Hay to Developed, Open Space
- Pasture/Hay to Developed, Low Intensity
- Pasture/Hay to Developed, Medium Intensity
- Pasture/Hay to Developed, High Intensity
- Pasture/Hay to Barren Land
- Pasture/Hay to Deciduous Forest
- Pasture/Hay to Evergreen Forest
- Pasture/Hay to Mixed Forest
- Pasture/Hay to Shrub/Scrub
- Pasture/Hay to Grasslands/Herbaceous
- Pasture/Hay to Cultivated Crops
- Pasture/Hay to Woody Wetlands
- Pasture/Hay to Emergent Herbaceous Wetlands

Transition Potential Modeling

Land Change Modeler : LCM

Change Analysis | Transition Potentials | Change Prediction | Planning | REDD Project | TerrSet Geospatial Monitoring and Modeling System

File | IDRISI GIS Analysis | IDRISI Image Processing | Land Change Modeler | Habitat and Biodiversity Modeler | GeOSIRIS | Ecosystem Services Modeler | Earth Trends Modeler | Climate Change Adaptation Modeler

Window | Help

Transition Sub-Model

From: T
 Yes Developed, Open Space D
 Yes Developed, Low Intensity D
 Yes Pasture/Hay D
 Yes Pasture/Hay D
 Yes Pasture/Hay D

Yes to all To group sub-mo
 No to all Sub-Model to be ev.

Variable Transformat

Transition Sub-Model

Sub
 Variable: Role:
 DistfrmRd Dynam
 DistfrmUrAr Static
 transfPopDen Static

Insert layer group...

Run Transition Sub-M

MLP DecisionForest Lc
 Minimum cells that transitioned fr
 Minimum cells that persisted from
 Sample size per class: 10000 [5]

MLP neural network parameters
 Training parameters:
 Use automatic training
 Use dynamic learning rate
 Start learning rate: 0.01
 End learning rate: 0.001
 Momentum factor: 0.5
 Sigmoid constant a: 1.0
 Hidden layer nodes: 7

Stopping criteria
 RMS: 0.01

RF 1 : 575775 c : 504 r : 1889 x : 6497.122642 y : 689208.867188
 Iterations : 0 Learning rate : 0.01

Transition Sub-Models : Status

| From: | To: | Sub-Model Name: |
|------------------------------|-----------------------------|-----------------|
| Yes Developed, Open Space | Developed, Low Intensity | OpentoLow |
| Yes Developed, Low Intensity | Developed, Medium Intensity | LowtoMed |
| Yes Pasture/Hay | Developed, Open Space | PastutoOpen |
| Yes Pasture/Hay | Developed, Low Intensity | PastutoLow |
| Yes Pasture/Hay | Developed, Medium Intensity | PastutoMed |

Yes to all To group sub-models, give them a common name Group all
 No to all Sub-Model to be evaluated: OpentoLow Group none

Variable Transformation Utility

Transition Sub-Model Structure

Run Transition Sub-Model

1. Water (NLCD 11)
 2. Developed, Open Space (NLCD 21)
 3. Developed, Low Intensity (NLCD 22)
 4. Developed, Medium Intensity (NLCD 23)
 5. Developed, High Intensity (NLCD 24)
 6. Barren Land (NLCD 31)
 7. Deciduous Forest (NLCD 41)
 8. Evergreen Forest (NLCD 42)
 9. Mixed Forest (NLCD 43)
 10. Shrub/Scrub (NLCD 52)
 11. Grassland/Herbaceous (NLCD 71)
 12. Pasture/Hay (NLCD 81)
 13. Cultivated Crops (NLCD 82)
 14. Woody Wetlands (NLCD 90)
 15. Herbaceous Wetlands (NLCD 95)

icpred_t2_transition_potential_from_12_to_2
 Potential for transition from 12 to 2

icpred_t2_transition_potential_from_12_to_13
 Potential for transition from 12 to 13

icpred_t2_transition_potential_from_3_to_4
 Potential for transition from 3 to 4

icpred_t2_transition_potential_from_12_to_3
 Potential for transition from 12 to 3

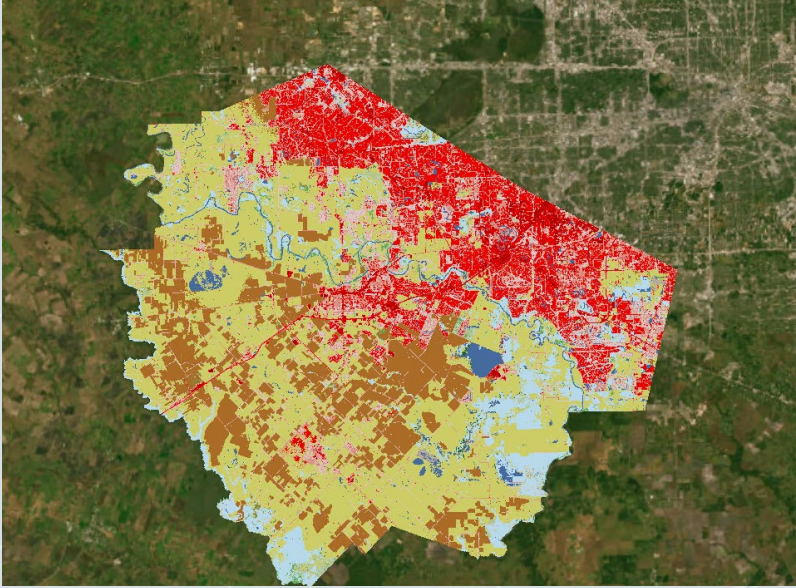
Composer
 icpred_t2_transition_po
 Auto-Arrange

Monday, December 29, 2025
 Mon 2:03 PM (Local time)

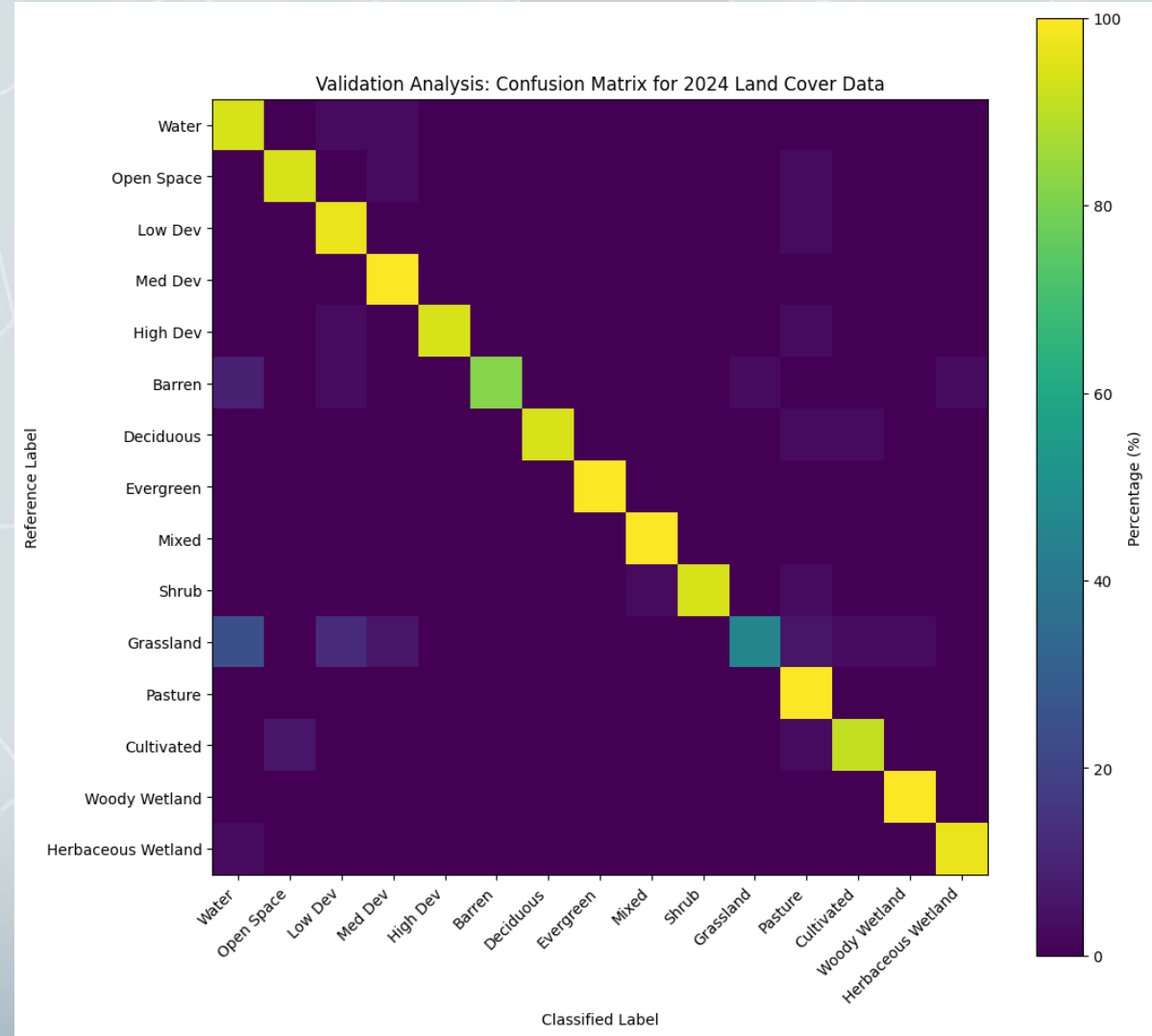
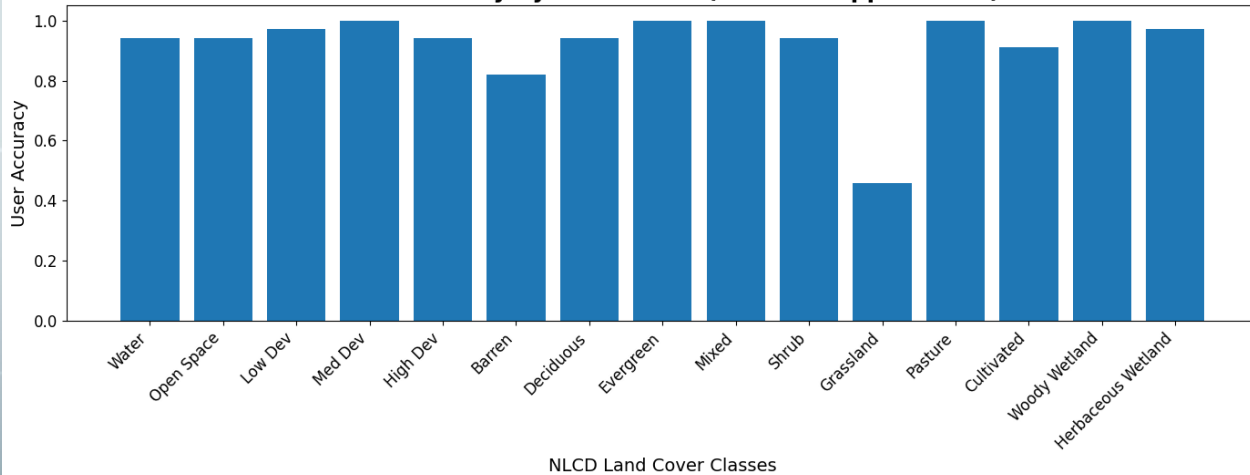
Model Output

| Transition | | Variables Used | Samples (Per Class) | RMS | | Accuracy (%) | Skill (Overall) | Skill (Transition) |
|----------------|------------------|--|------------------------|----------|---------|-----------------|--------------------|-----------------------|
| From | To | | | Training | Testing | | | |
| Cropland to | Low Developed | DistfrmRd, DistfrmUrAr, logPopDen, FBDEMpw | 7000 | 0.3617 | 0.3702 | 80.06 | 0.6013 | 0.6866 |
| Cropland | Medium Developed | DistfrmRd, DistfrmUrAr, logPopDen, FBDEMpw, FBSlopePw | 10000 | 0.3467 | 0.3464 | 81.63 | 0.6326 | 0.689 |
| Cropland | Pasture | DistfrmUrAr, FBSlopePw, FBDEMpw, logPopDen | 10000 | 0.4852 | 0.4905 | 56.43 | 0.1285 | 0.0346 |
| Low Developed | Medium Developed | DistfrmRd, DistfrmUrAr, logPopDen, FBDEMpw, FBSlopePw | 10000 | 0.4666 | 0.4672 | 65.44 | 0.3088 | 0.3212 |
| Open Developed | Low Developed | DistfrmRd, DistfrmUrAr, transfPopDen | 10000 | 0.4888 | 0.4904 | 58.92 | 0.1783 | 0.5276 |
| Pasture | Cropland | DistfrmRd, DistfrmUrAr, logPopDen, FBDEMpw, FBSlopePw | 7000 | 0.4761 | 0.4765 | 61.05 | 0.2211 | 0.0113 |
| Pasture | Low Developed | DistfrmRd, DistfrmUrAr, logPopDen, FBDEMpw, FBSlopePw | 10000 | 0.3933 | 0.4029 | 77.57 | 0.5514 | 0.5652 |
| Pasture | Medium Developed | DistfrmRd, DistfrmUrAr, logPopDen, FBDEMpw, FBSlopePw | 10000 | 0.3577 | 0.3669 | 82.35 | 0.6471 | 0.6303 |
| Pasture | Open Developed | DistfrmRd, DistfrmUrAr, logPopDen, FBDEMpw, FBSlopePw | 10000 | 0.4197 | 0.4142 | 75.7 | 0.514 | 0.5288 |

Validation (LC 2024)



How Accurate Is the Map?
User Accuracy by NLCD Class (Overall Kappa = 0.92)



Projected Land Cover – Example (LC 2045)

TerrSet Geospatial Monitoring and Modeling System

File | IDRISI GIS Analysis | IDRISI Image Processing | **Land Change Modeler** | Habitat and Biodiversity Modeler | GeOSIRIS | Ecosystem Services Modeler | Earth Trends Modeler | Climate Change Adaptation Modeler

Land Change Modeler : LCM

Change Analysis | Transition Potentials | Change Prediction | Planning | REDD Project

Change Demand Modeling

Markov Chain Prediction Date : 2045 External Model

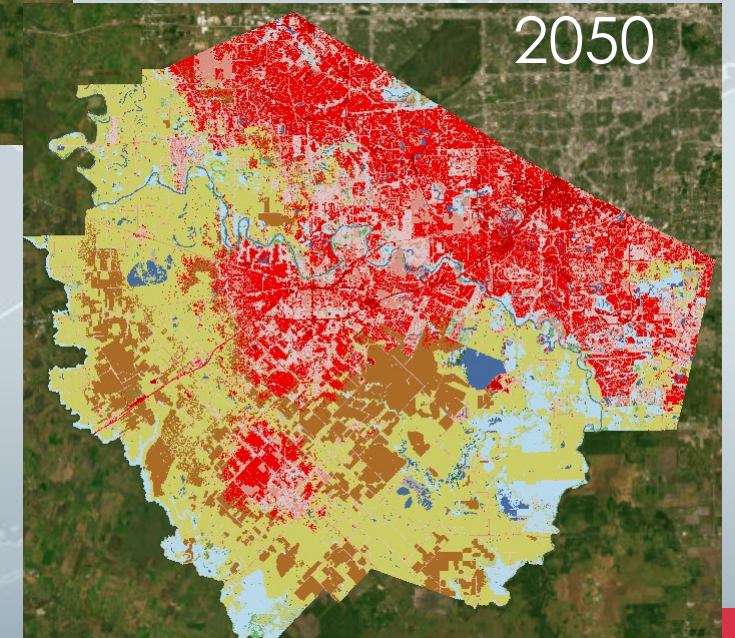
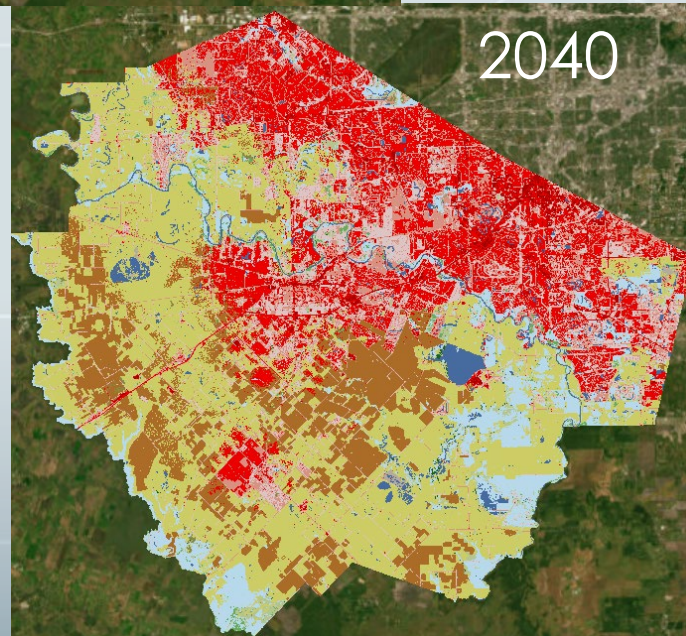
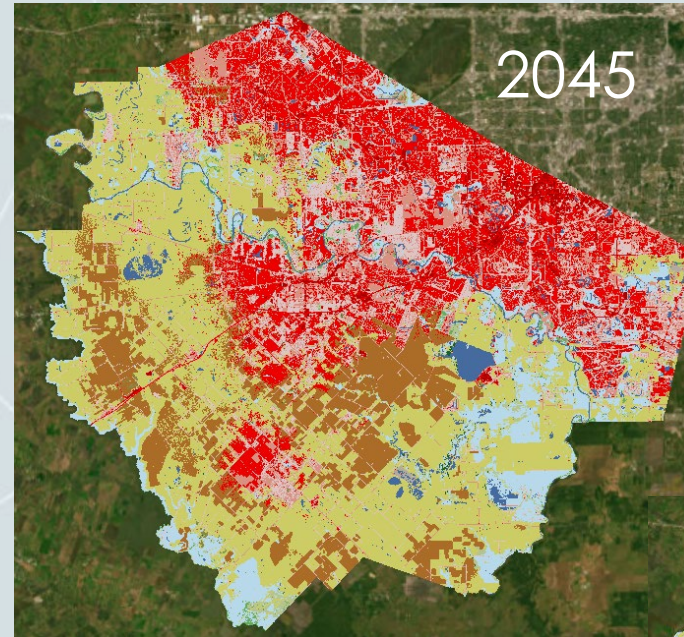
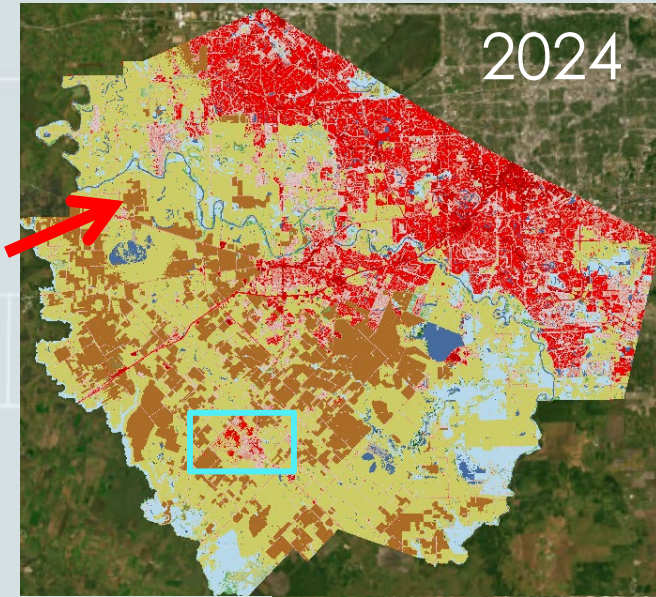
Transition Probabilities Grid

Given : Probability of changing to :

| | Water | Developed, Open Space | Developed, Low Intensity | Developed, Medium Intensity | Developed, High Intensity | Barren Land | Deciduous Forest | Evergreen Forest | Mixed Forest | Shrub/Scrub | Grasslands/Herbaceous | Pasture/Hay | Cultivated Crops | Woody Wetlands | Emergent Herbaceous Wetlands |
|------------------------------|--------|-----------------------|--------------------------|-----------------------------|---------------------------|-------------|------------------|------------------|--------------|-------------|-----------------------|-------------|------------------|----------------|------------------------------|
| Water | 0.6629 | 0.0021 | 0.0481 | 0.0322 | 0.0011 | 0.0529 | 0.0019 | 0.0012 | 0.0094 | 0.0010 | 0.0161 | 0.1010 | 0.0121 | 0.0113 | 0.0465 |
| Developed, Open Space | 0.0005 | 0.7364 | 0.1180 | 0.0892 | 0.0301 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0000 | 0.0000 | 0.0229 | 0.0021 | 0.0002 | 0.0000 |
| Developed, Low Intensity | 0.0039 | 0.0157 | 0.7935 | 0.1622 | 0.0187 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0046 | 0.0007 | 0.0002 | 0.0001 |
| Developed, Medium Intensity | 0.0027 | 0.0008 | 0.0254 | 0.9506 | 0.0172 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0029 | 0.0003 | 0.0000 | 0.0000 |
| Developed, High Intensity | 0.0001 | 0.0004 | 0.0017 | 0.0174 | 0.9785 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0018 | 0.0001 | 0.0000 | 0.0000 |
| Barren Land | 0.1368 | 0.0035 | 0.0461 | 0.0873 | 0.0013 | 0.5334 | 0.0001 | 0.0001 | 0.0009 | 0.0001 | 0.0016 | 0.1351 | 0.0253 | 0.0021 | 0.0263 |
| Deciduous Forest | 0.0063 | 0.0285 | 0.0479 | 0.0693 | 0.0027 | 0.0002 | 0.5809 | 0.0003 | 0.0466 | 0.0161 | 0.0037 | 0.1906 | 0.0026 | 0.0040 | 0.0002 |
| Evergreen Forest | 0.0038 | 0.0389 | 0.0619 | 0.0884 | 0.0215 | 0.0001 | 0.0002 | 0.6012 | 0.0203 | 0.0043 | 0.0287 | 0.1267 | 0.0029 | 0.0011 | 0.0001 |
| Mixed Forest | 0.0032 | 0.0326 | 0.0341 | 0.0384 | 0.0042 | 0.0003 | 0.0116 | 0.0105 | 0.7183 | 0.0071 | 0.0020 | 0.1283 | 0.0047 | 0.0046 | 0.0002 |
| Shrub/Scrub | 0.0014 | 0.0349 | 0.0454 | 0.0181 | 0.0032 | 0.0001 | 0.0031 | 0.0283 | 0.1507 | 0.5532 | 0.0009 | 0.1583 | 0.0009 | 0.0014 | 0.0001 |
| Grasslands/Herbaceous | 0.1346 | 0.0040 | 0.0471 | 0.1108 | 0.0097 | 0.0027 | 0.0078 | 0.0001 | 0.0007 | 0.0003 | 0.4111 | 0.2425 | 0.0175 | 0.0088 | 0.0023 |
| Pasture/Hay | 0.0035 | 0.0526 | 0.0498 | 0.0791 | 0.0088 | 0.0024 | 0.0004 | 0.0007 | 0.0022 | 0.0020 | 0.0007 | 0.7766 | 0.0164 | 0.0025 | 0.0023 |
| Cultivated Crops | 0.0033 | 0.0282 | 0.0520 | 0.1091 | 0.0107 | 0.0028 | 0.0002 | 0.0001 | 0.0005 | 0.0030 | 0.0003 | 0.1177 | 0.6710 | 0.0004 | 0.0010 |
| Woody Wetlands | 0.0034 | 0.0121 | 0.0361 | 0.0552 | 0.0032 | 0.0010 | 0.0000 | 0.0001 | 0.0003 | 0.0001 | 0.0006 | 0.0188 | 0.0037 | 0.8283 | 0.0372 |
| Emergent Herbaceous Wetlands | 0.0331 | 0.0081 | 0.0312 | 0.0778 | 0.0077 | 0.0227 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0002 | 0.0748 | 0.0140 | 0.1038 | 0.6264 |

RF 1 : 582662 c : 43 r : 99 x : -7317.744630 y : 742905.910290

Future Predictions



- Water (NLCD 11)
- Developed, Open Space (NLCD 21)
- Developed, Low Intensity (NLCD 22)
- Developed, Medium Intensity (NLCD 23)
- Developed, High Intensity (NLCD 24)
- Barren Land (NLCD 31)
- Deciduous Forest (NLCD 41)
- Evergreen Forest (NLCD 42)
- Mixed Forest (NLCD 43)
- Shrub/Scrub (NLCD 52)
- Grassland/Herbaceous (NLCD 71)
- Pasture/Hay (NLCD 81)
- Cultivated Crops (NLCD 82)
- Woody Wetlands (NLCD 90)
- Herbaceous Wetlands (NLCD 95)

Top transition- 2045

- By 2045, the landscape transitions from a largely stable system to one dominated by agricultural expansion (pasture/hay) and urban densification, with substantial losses in forests, grasslands, and emergent wetlands.

| From → To | Probability | Interpretation |
|------------------------------------|-------------|-------------------------------------|
| Grassland → Pasture/Hay | 24.25% | Widespread agricultural conversion |
| Deciduous Forest → Pasture/Hay | 19.06% | Major forest-to-agriculture shift |
| Shrub/Scrub → Pasture/Hay | 15.83% | Early-stage land conversion |
| Low → Medium Intensity Development | 16.22% | Strong urban densification |
| Barren → Open Water | 13.68% | Flooding / reclamation / subsidence |
| Mixed Forest → Pasture/Hay | 12.83% | Loss of forest diversity |
| Evergreen Forest → Pasture/Hay | 12.67% | Large-scale forest clearing |
| Cropland → Pasture/Hay | 11.77% | Agricultural restructuring |
| Developed Open → Developed Low | 11.80% | Suburban growth |
| Emergent → Woody Wetlands | 10.38% | Wetland succession |

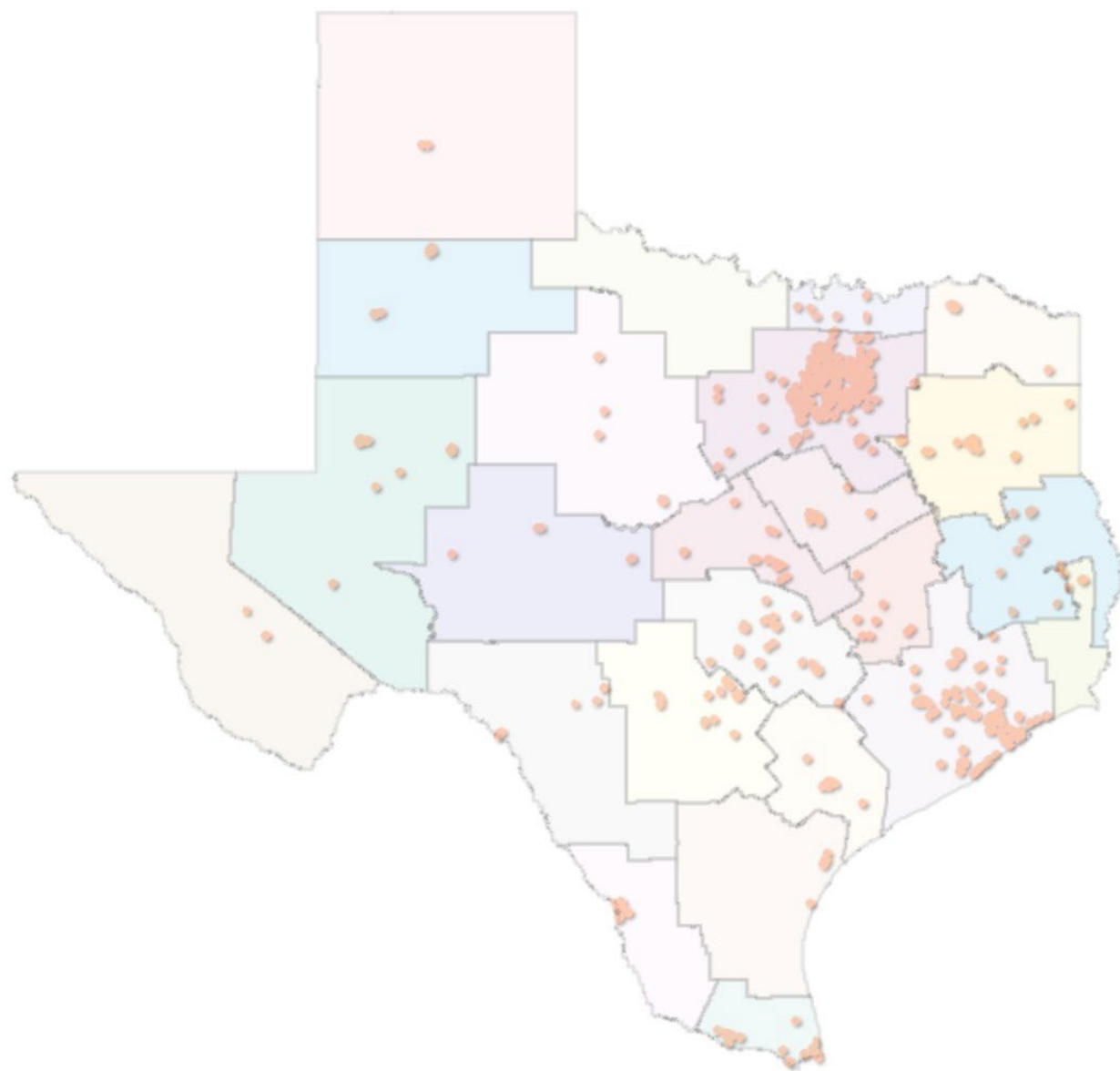
Extending Forecasting to Wetland change Analysis

- Forecast wetland transition and vulnerability hotspots under future scenarios
- Support proactive wetland planning, conservation, and restoration in high-risk interface areas
- Support TMDL/WPP projects by future bacteria and nutrient loading estimates
- Support flood/hydro modeling and future scenario plannings

Thank you...!

THUSHARA RANATUNGA, Ph.D., GISP
Manager - Geospatial Analytics

Data Analytics and Research Department
Houston-Galveston Area Council
thushara.ranatunga@h-gac.com



Leveraging the Texas Litter Database for Citizen Science and Watershed Stewardship

www.texaslitter.org

Kirsten Sorensen

Senior Program Manager, Research and Cleanups - Keep Texas Beautiful

Agenda



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Intro to Keep Texas Beautiful and the Texas Litter Database

Our credentials, what the database tracks, and how it can be leveraged for these World Cup events

Introduction to the STOP Method

Overview of the STOP Method

How to Conduct a STOP Litter Sample

Step-by-step procedures for conducting a STOP sample

How This Data is Used

Submitting data can have far-reaching implications beyond immediate use

Q&A

Time for questions



Keep Texas Beautiful & the Texas Litter Database



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About Keep Texas Beautiful

- Mission: To inspire and empower Texans to keep our communities clean and beautiful
- Statewide network of around 250 KTB Affiliates and Recycling Partners
- Programs focused on:
 - Litter Prevention
 - Beautification
 - Waste Reduction
- Maintains the **Texas Litter Database**



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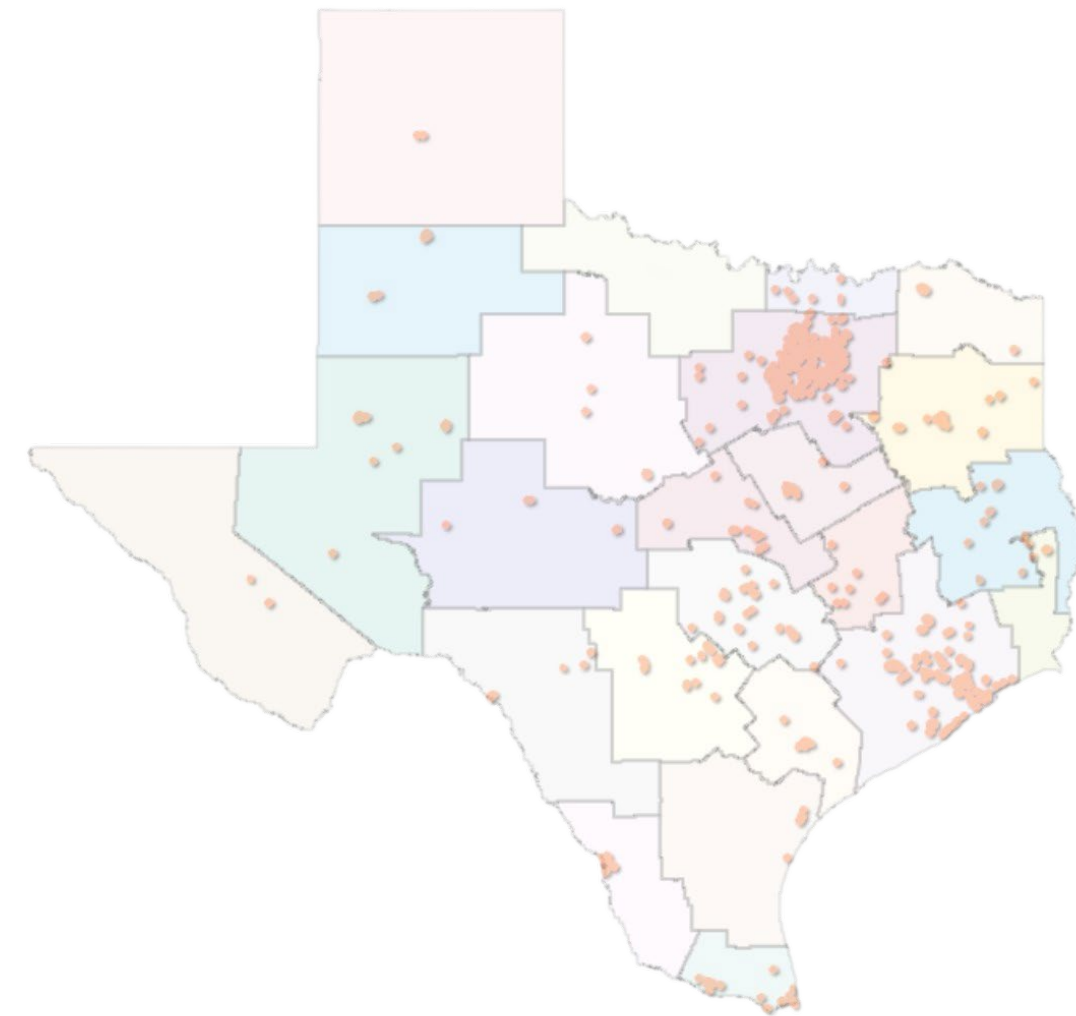
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What is the Texas Litter Database?

The Texas Litter Database was created in partnership by Keep Texas Beautiful, HARC, and Black Cat GIS with funding from the Garver Black Hilyard Family Foundation, originally launched in 2021.

It is the first statewide litter database of its kind.

Public data source that can be leveraged by communities in addition to provide evidence for policy and research.



HARC





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Who Uses It?

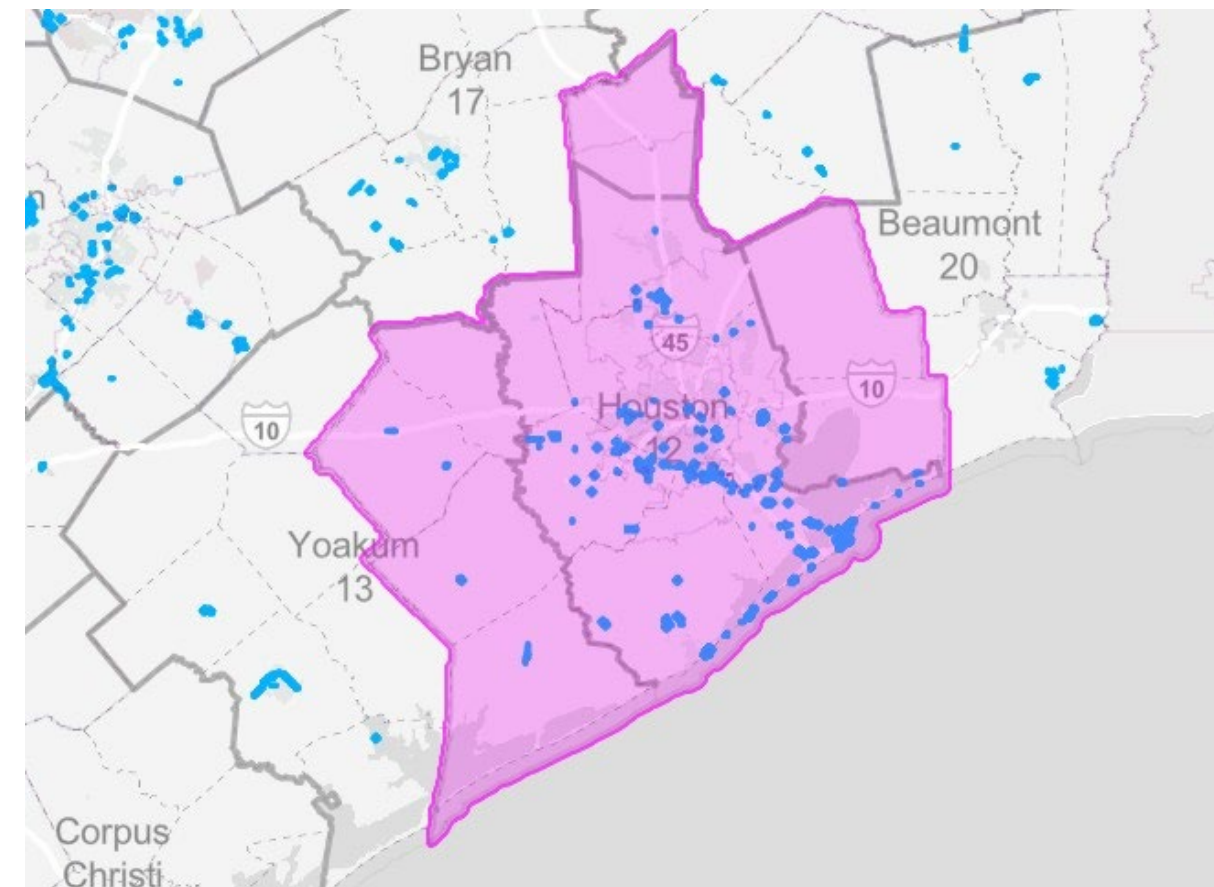
The Texas Litter Database has been broadly adopted statewide, including:

Users

- 648 organizations have reported to the Texas Litter Database

Geographic Coverage

- 95 counties reporting at least one litter cleanup
 - 37% of Texas counties
- Vast majority of reports from the DFW Metroplex and Houston-Galveston region



Houston-Galveston Area Council of Government Region



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What Does It Measure?

There are two types of reports accepted by the Texas Litter Database:

- **Cleanup Reports**

- Location (drawn on map)
- Site Details
- Trash Weight and/or Volume
- Volunteer Data

- **Litter Samples**

- All of the above
- Detailed item count of trash sample



Introduction to the STOP Method



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What is the STOP Method?

Stop, Track, remOve, and Prevent

- Originally modeled on NOAA's Marine Debris Tracker
- Incorporates commonly found items in surveys conducted in Texas (particularly the Gulf Coast region)
- Trash flows downhill → Gulf Coast is a reflection of the trash problem across Texas





Keep Texas Beautiful

Samples from 2021 - 2025

Currently, there are **448 Litter Audits** published to the **live data set** that have sorted and categorized 57,107 individual pieces of trash

- **10 Categories:** Hard and Solid Plastic, Plastic Film, Polystyrene, Metal, Glass, Rubber, PPE, Paper and Lumber, Fabric, and Large/Hazardous Items
- Hard and Solid Plastics and Plastic Film account for 73% of all litter found in Texas

Examples: any "hard" plastic that is not styrofoam or plastic film

| Item | Tally | Total # |
|---------------------------------|-------|---------|
| 6 pack rings | | |
| Beverage Bottles/ Containers | | |
| Bottle/ Container Caps | | |
| Buoys and Floats | | |
| Cigar plastic tips | | |
| Cigarette butts | | |
| Disposable lighters | | |
| Fishing Lures and Line | | |
| Food Containers | | |
| Fragments | | |
| Non-Food Containers | | |
| Personal care products | | |
| Plastic Cups/ Plates | | |
| Plastic Rope/net pieces | | |
| Plastic Toys | | |
| Plastic Utensils | | |
| Shotgun Shell Casings | | |
| Straws | | |
| Other: | | |

Hard and Solid Plastic



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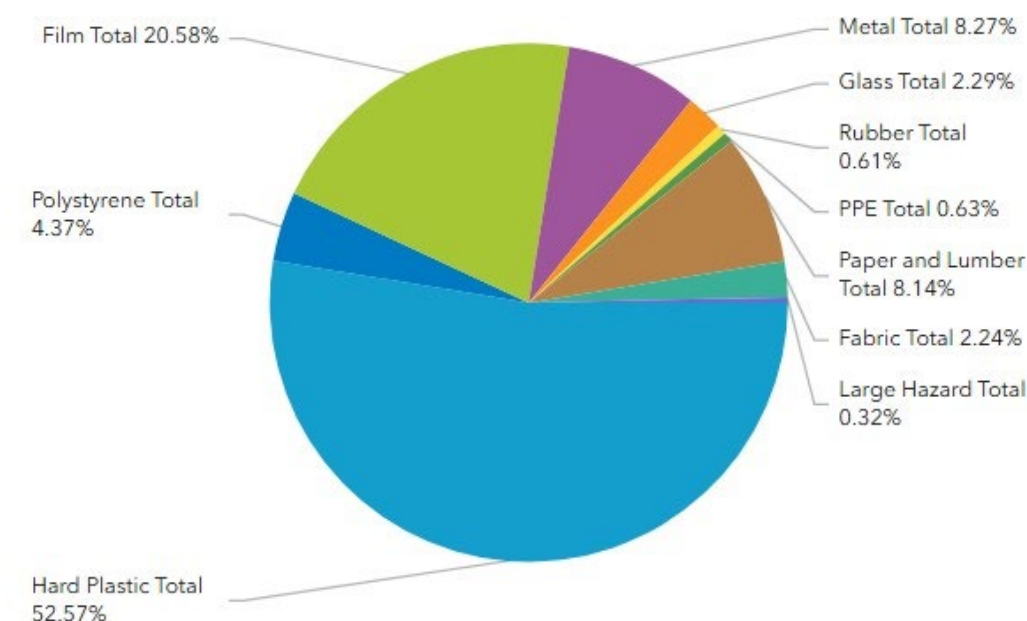
Baseline Data

448 Statewide Samples Tell Us:

- Approximately 73% of Texas litter (by item) is composed of plastic
- You can expect to find approximately 125 pieces of litter per 500 square meters (approximately the size of a basketball court)

Baseline Average

- This sets a statewide average that can be a helpful benchmark – if you conduct a survey in your area and get wildly different percentages, this may tell you that you have a specific problem in your area that varies from the norm



Major litter category percentages of trash collected on detailed surveys.

On average, surveys find
(when corrected for area)

124.86

individual trash items per 500 square meters.



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What We've Learned: Item Counts

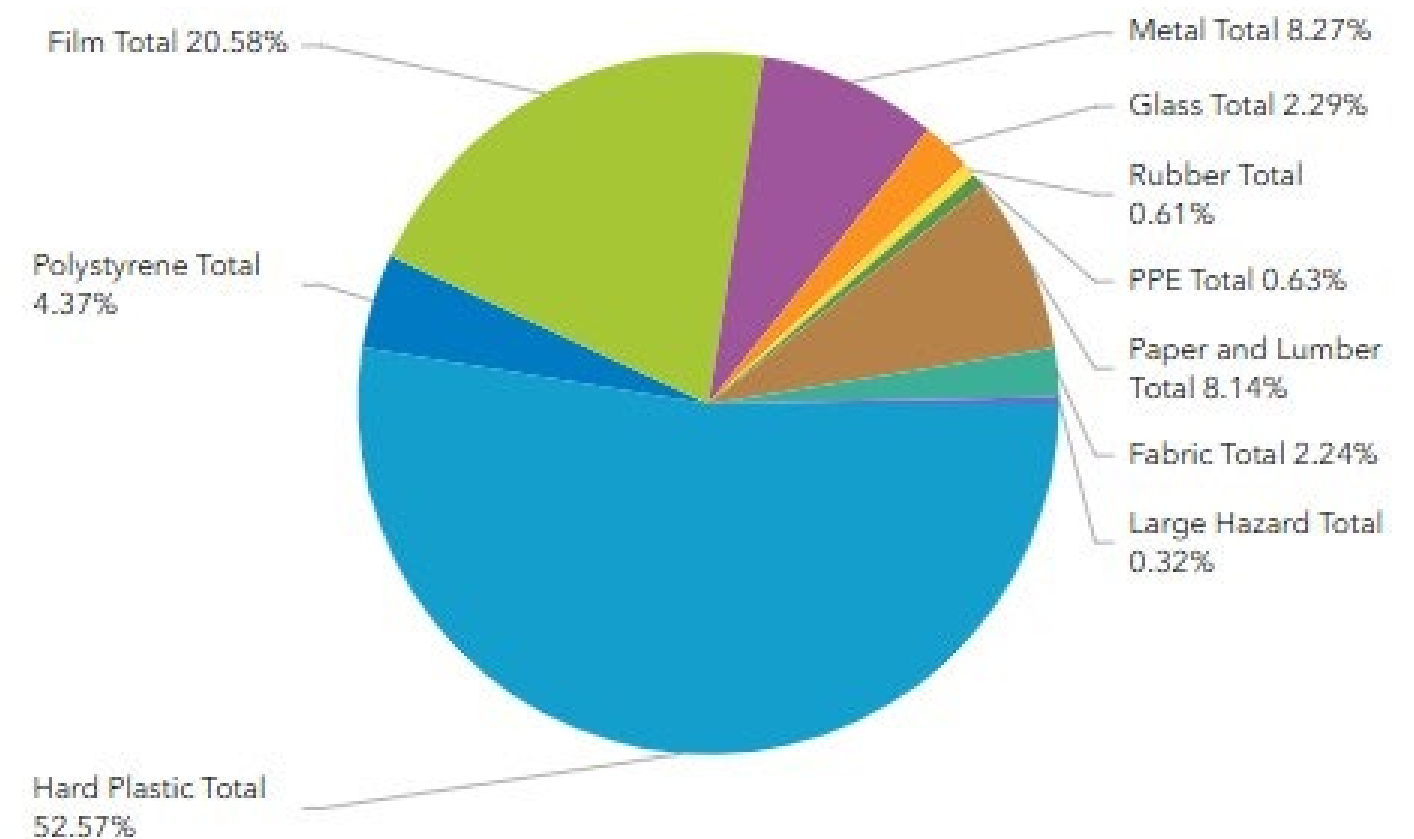
Individual Item Counts (Top Offenders)

On average, surveys find 12 individual trash items per 500 square meters (Size of an NBA Basketball Court)

Top Individual Item Counts:

- Plastic Bottle or Container Caps (8K)
- Plastic Beverage Bottles (5K)
- Film Food or Drink Wrappers (4.9K)
- Fishing Lines and Plastic Lures (4.5K)
- Cigarette Butts (4.4K)
- Film Bags (4.1K)

If your sample results deviate substantially from these averages, that tells you that you have a specific problem in your area



Major litter category percentages of trash collected on detailed surveys.

What We've Learned



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Example: SPLASH

SPLASH (Stopping Plastics and Litter Along Shorelines) is a project of the American Bird Conservancy, the Gulf Coast Bird Observatory, and Black Cat GIS to address the fact that trash acculations 10X faster on the Texas coast than other Gulf states

SPLASH totals found that 26% of their top individual item count is styrofoam fragments (vs state average of 73% plastics)

Why might more styrofoam wind up on the coast?

Top 10 Items

Based on total items counted

SPLASH Transect Data Sept. 2020 - Sept. 2024

| | Item | Number |
|----|-----------------------------|--------|
| 1 | Styrofoam Fragments | 10,997 |
| 2 | Hard Plastic Fragments | 8,214 |
| 3 | Plastic Film Fragments | 4,952 |
| 4 | Bottle/Container Caps | 3,898 |
| 5 | Fishing Lures and Line | 3,801 |
| 6 | Plastic Bags | 2,347 |
| 7 | Beverage Bottles/Containers | 2,323 |
| 8 | Glass Fragments | 1,867 |
| 9 | Plastic Food Wrappers | 1,843 |
| 10 | Metal Cans | 1,543 |
| | | |



SPLASH

STOPPING PLASTICS AND
LITTER ALONG SHORELINES

What We've Learned



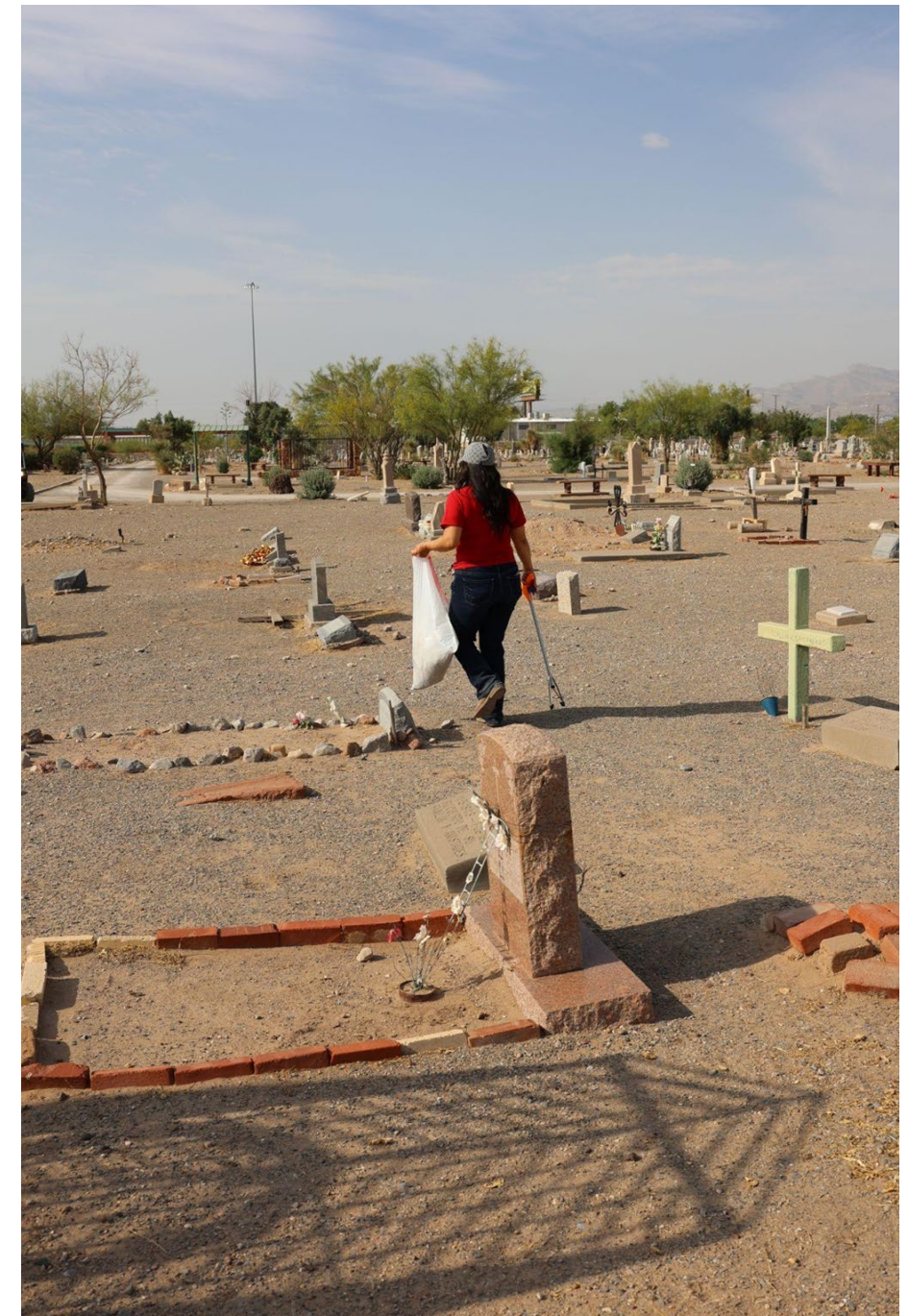
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Example: El Paso Cleanup, May 2025

Keep Texas Beautiful traveled to El Paso to host a corporate cleanup event at a historic cemetery, and conducted a litter audit demonstration

The percentages of trash types found in the El Paso cleanup also varied radically from statewide totals - 46% of the individual items found were plastic film (versus 21% statewide)

What individual item might account for this difference, and why might that be a problem in West Texas?



How to Conduct a STOP Litter Sample



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How to Conduct a STOP Sample



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Preparing to Conduct a STOP Litter Sample

- Pick a Site
- Get Your Equipment
- Pick Your Process (Transect vs Random Bag Sample)
- Tally Your Data
- Submit to the Texas Litter Database



Pick a Site

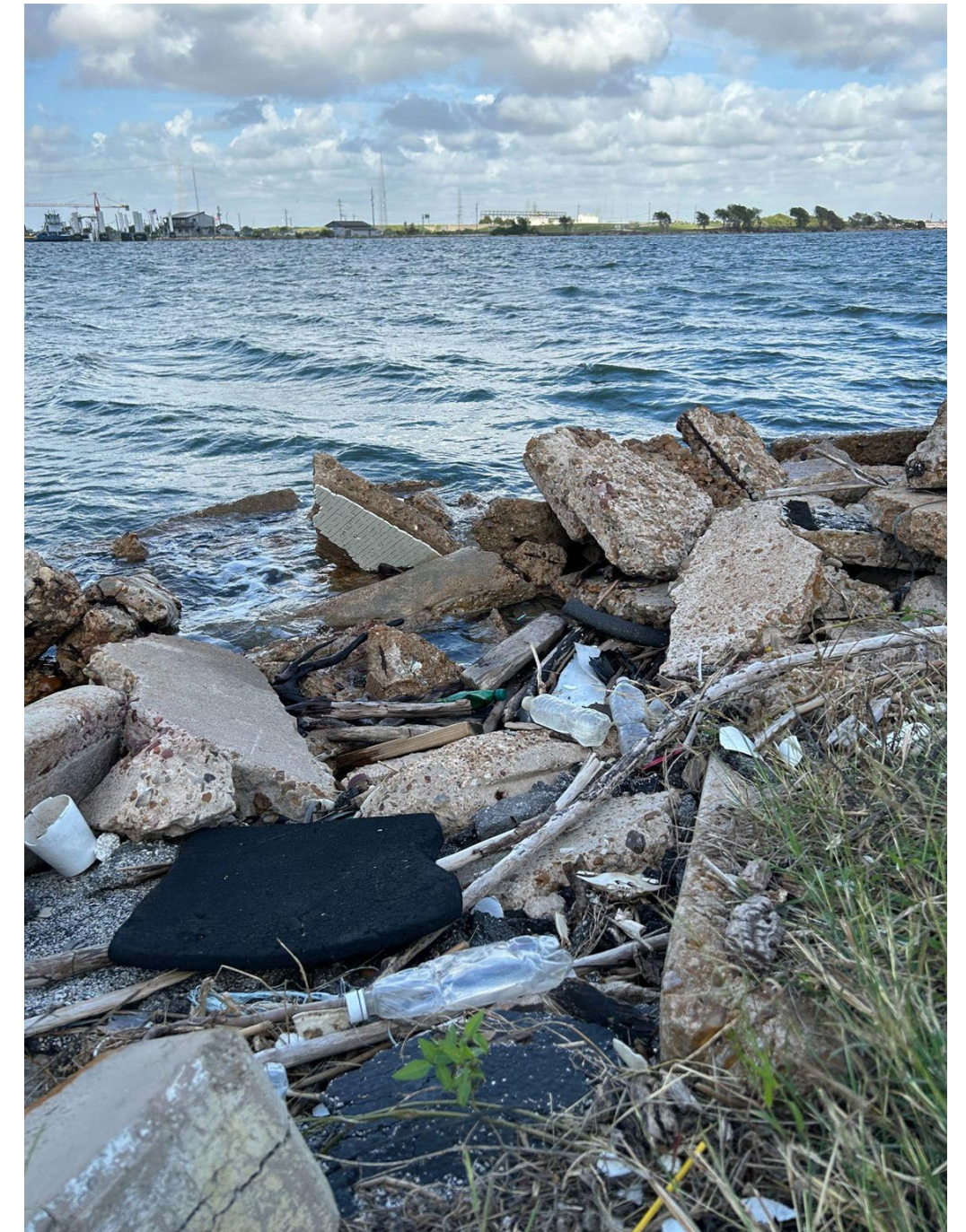


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Define Your Cleanup Area

Choose an area you want to learn more about, and identify a goal

- The World Cup Sustainability Committee has identified areas of interest for this project – some considerations include World Cup event locations, Houston parks, wastewater outfalls, stormwater discharge points, etc
- In this case, we're hoping to gain an understanding of what impact these large-scale events have on the local environment, including trash types and where they end up



Get Your Equipment



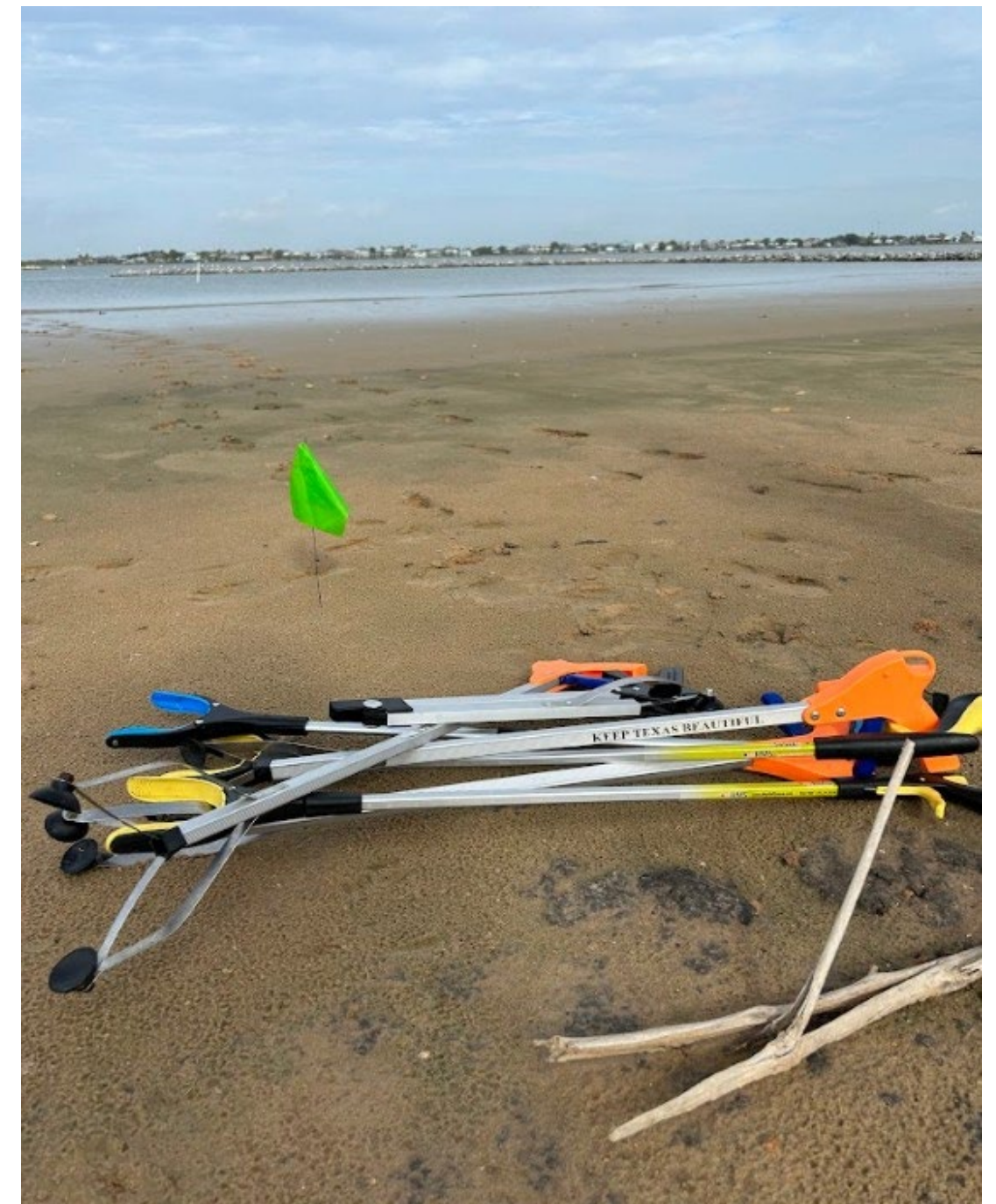
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Consider Cleanup and Data Collection Needs

- Trash Bags and Gloves
- Clip board, printed data sheet, pencil
- Litter grabbers
- Fish scale (to weigh trash)
- Optional: tarp, buckets or baskets (for sorting), onion bags (if collecting damp or water-logged trash)

Consider Safety

- If it will be difficult terrain, communicate to volunteers so they can wear proper attire for a safe cleanup



Pick Your Process



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Transect Method - Catalog Entire Sample Site

For this method, you'll catalog every single piece of trash collected in the sample area – works best for small areas, or areas that aren't heavily littered (for capacity reasons - does not have to be a literal "transect," it can be any size or shape of area so long as it can be mapped accurately)

Random Bag Sample - Large-Scale Cleanup

This method is best employed when conducting a cleanup at a very large area - instead of cataloging every single piece of trash, you select a few bags at random to catalog as a representative sample



Pick Your Process - Transect Method

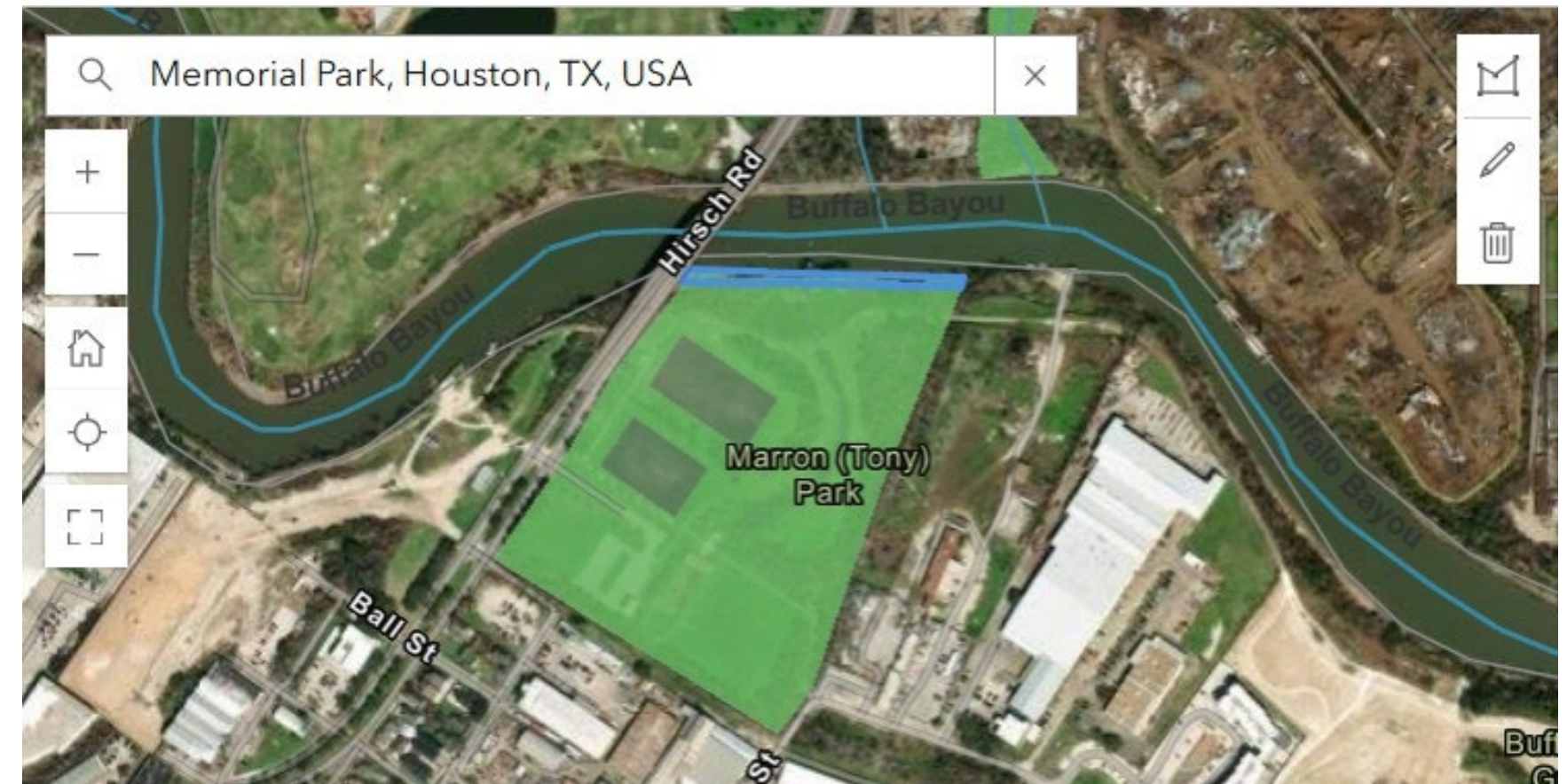


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Transect Method

Example: Marron (Tony) Park

If you decided you want to study just the litter you're finding on the shoreline by the Buffalo Bayou, you could decide to take a sample of only the trash found in that area - you'll see the blue polygon shape drawn only on the shoreline



Specificity = Best Data



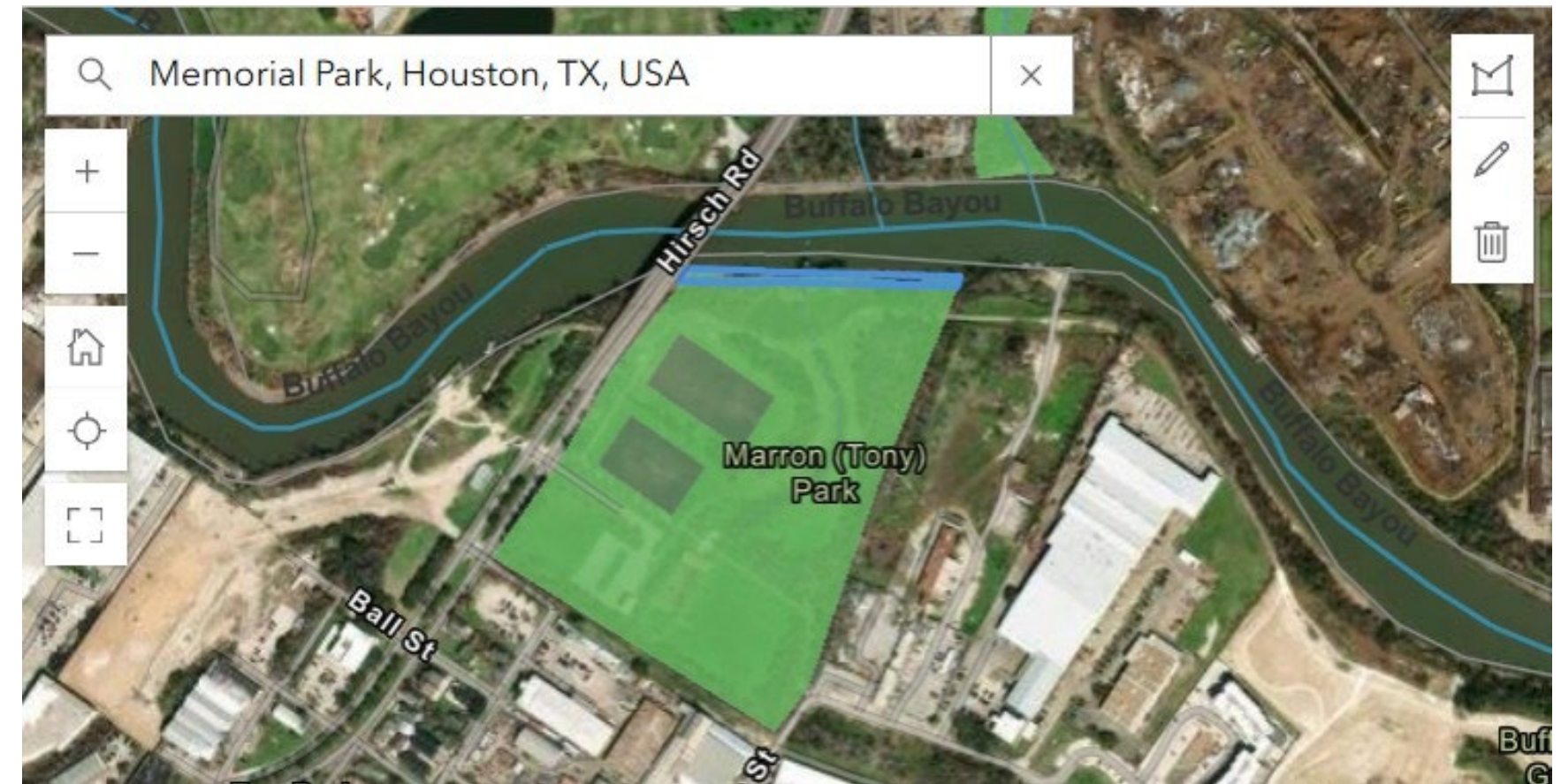
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Important Reminders: Transect Method

This is science, so we want to be as exact as possible to make sure we get clean data!

Transect Method Reminders

- 1) Make sure you draw the sample cleanup area on the map as accurately as possible
- 2) Train participants to not pick up trash from outside the sample area and combine it with sample trash (if also conducting a wider cleanup)



Pick Your Process - Random Bag Sample



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Random Bag Sample Method

Example: Marron (Tony) Park

If your group is cleaning up the entire park (see polygon drawn around the entire park), you'll have too much litter to catalog each and every piece - so instead, you can select a random number of bags out of your total to sample, and take a complete inventory of the trash found within those sample bags



Specificity = Valid Data



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Important Reminders: Random Bag Sample Method

This is science, so we want to be as exact as possible to make sure we get clean data!

Random Bag Sample Reminders

- 1) Record the total number of bags of litter collected, AND the number of bags being sampled
- 2) Weigh the sample trash separately, and then weigh the total trash (including sample) so the results can be generalized



Tally Your Data



Keep Texas Beautiful

STOP Field Sheet

- One Page (front and back)
- 10 Categories (Plastics, Styrofoam, Metal, Glass, etc)
- Option for estimating fragments (ie, hundreds of styrofoam beads)
- Write-in option for notable item not listed in a category

Site name: _____

Date surveyed: _____

Contact name: _____

Contact email: _____

Type of Survey: Transect or Random bag sample


What was the transect distance/ area?: _____

Weight of bagged trash: SURVEYED: _____ ENTIRE CLEANUP: _____

Number of bags collected: SURVEYED: _____ ENTIRE CLEANUP: _____

Circle if the following are visible from the survey site: Trash Can Recycling Bin

Is this an illegal dump site? Yes No


Scan this QR code for the online reporting form! 

Examples: any "hard" plastic that is not styrofoam or plastic film

| Item | ESTIMATED FRAGMENTS (Circle best choice) | | | Tally | Total # |
|---------------------------------|--|----------|-----------|-------|---------|
| | 1 - 25 | 26 - 100 | 101 - 999 | | |
| 6 pack rings | | | | | |
| Beverage Bottles/ Containers | | | | | |
| Bottle/ Container Caps | | | | | |
| Buoys and Floats | | | | | |
| Cigarette butts | | | | | |
| Cigar Plastic tips | | | | | |
| Vape pens/ cartridges/ e-cigs | | | | | |
| Disposable lighters | | | | | |
| Fishing Lures and Line | | | | | |
| Food Containers | | | | | |
| Non-Food Containers | | | | | |
| Personal Care/ Hygiene Products | | | | | |
| Plastic Cups/ Plates | | | | | |
| Plastic Utensils | | | | | |
| Straws | | | | | |
| Plastic Rope/net pieces | | | | | |
| Plastic Toys | | | | | |
| Shotgun Shell/ Wad | | | | | |
| Writing Pens, Markers | | | | | |
| Other | | | | | |

Examples: styrofoam cups, to-go boxes, insulation

| Item | ESTIMATED FRAGMENTS (Circle best choice) | | | Tally | Total # |
|---------------------------|--|----------|----------|-------|---------|
| | 1 - 25 | 26 - 100 | 101 - 99 | | |
| Styrofoam Cups/ Plates | | | | | |
| Fishing Buoy/ Floats | | | | | |
| Food Wrappers/ Containers | | | | | |
| Non Food Container | | | | | |
| Insulation | | | | | |
| Jugs/ Containers | | | | | |
| Foam ear plugs | | | | | |
| Other: | | | | | |

Enter your data at:  www.texaslitterer.org

Examples: chip bags, clear wrappers, candy wrappers

| Item | ESTIMATED FRAGMENTS (Circle best choice) | | | Tally | Total # |
|---------------------------------|--|----------|-----------|-------|---------|
| | 1 - 25 | 26 - 100 | 101 - 999 | | |
| Abandoned Utility Flag | | | | | |
| Shopping/ Trash Bags | | | | | |
| Food or Drink Wrappers | | | | | |
| Non Food/ Drink Wrapper | | | | | |
| Latex Balloons | | | | | |
| Mylar Balloons | | | | | |
| Personal Care/ Hygiene Products | | | | | |
| Large pieces of film | | | | | |
| Ribbon | | | | | |
| Other | | | | | |

Examples: any wearable object used to protect the wearer from illness

| Item | ESTIMATED FRAGMENTS (Circle best choice) | | | Tally | Total # |
|-----------------------|--|----------|-----------|-------|---------|
| | 1 - 25 | 26 - 100 | 101 - 999 | | |
| PPE Disposable Gloves | | | | | |
| PPE Face Masks | | | | | |
| Other | | | | | |

Examples: any MAN MADE products made from trees/ wood

| Item | ESTIMATED FRAGMENTS (Circle best choice) | | | Tally | Total # |
|-----------------------------|--|----------|-----------|-------|---------|
| | 1 - 25 | 26 - 100 | 101 - 999 | | |
| Cardboard Cartons | | | | | |
| Lumber/ Building Material | | | | | |
| Paper/ Cardboard- NON Boxes | | | | | |
| Paper Bags | | | | | |
| Food Container/ Wrapper | | | | | |
| Other | | | | | |

Examples: any metal including foil, aluminum, iron, tin, etc.

| Item | ESTIMATED FRAGMENTS (Circle best choice) | | | Tally | Total # |
|--------------------|--|----------|-----------|-------|---------|
| | 1 - 25 | 26 - 100 | 101 - 999 | | |
| Aerosol cans | | | | | |
| Aluminum Foil | | | | | |
| Aluminum/ Tin cans | | | | | |
| Crab/ Fish traps | | | | | |
| Metal Bottle Caps | | | | | |
| Metal Wire | | | | | |
| Shopping Carts | | | | | |
| Other | | | | | |

Examples: any "hard" plastic that is not styrofoam or plastic film

| Item | ESTIMATED FRAGMENTS (Circle best choice) | | | Tally | Total # |
|------------------|--|----------|-----------|-------|---------|
| | 1 - 25 | 26 - 100 | 101 - 999 | | |
| Beverage Bottles | | | | | |
| Jars | | | | | |
| Other | | | | | |

Examples: any "hard" plastic that is not styrofoam or plastic film

| Item | ESTIMATED FRAGMENTS (Circle best choice) | | | Tally | Total # |
|--------------------------|--|----------|-----------|-------|---------|
| | 1 - 25 | 26 - 100 | 101 - 999 | | |
| Flip flops/ Shoe soles | | | | | |
| Work (Thick) Gloves | | | | | |
| Tires | | | | | |
| Partial tires/ fragments | | | | | |
| Rubber Balls | | | | | |
| Other | | | | | |

Examples: any "hard" plastic that is not styrofoam or plastic film

| Item | ESTIMATED FRAGMENTS (Circle best choice) | | | Tally | Total # |
|-----------------------------|--|----------|-----------|-------|---------|
| | 1 - 25 | 26 - 100 | 101 - 999 | | |
| Regular Household Batteries | | | | | |
| Car/ Boat Batteries | | | | | |
| Lithium Batteries | | | | | |
| Biological/ Hazardous Waste | | | | | |
| Used Diapers | | | | | |
| Abandoned Boats/Vehicles | | | | | |
| Appliances | | | | | |
| Furniture | | | | | |
| Medical Waste/ Needles | | | | | |
| Construction Material | | | | | |
| Other | | | | | |

Thanks for taking time to collect valuable data!

Tally Your Data




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Don't Forget Top Portion!

We need all of these details from the cleanup for the sample to yield valid data that we can publish to the site, including:

- Weight and number of bags
- Site Features (visible trash can, recycling bin, illegal dumping)

| | |
|--|--|
| Site name: _____ | Scan this QR code for the online reporting form!  |
| Date surveyed: _____ | |
| Contact name: _____ | |
| Contact email: _____ | |
| Type of Survey: <small>(circle)</small> Transect or Random bag sample | What was the transect distance/ area?: _____ |
| Weight of bagged trash: SURVEYED: _____ ENTIRE CLEANUP: _____ <small>(Only needed if random bag sample)</small> | |
| Number of bags collected: SURVEYED: _____ ENTIRE CLEANUP: _____ <small>(Only needed if random bag sample)</small> | |
| Circle if the following are visible from the survey site: Trash Can Recycling Bin | Is this an illegal dump site? Yes No |

Tally Your Data



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In the Field? Or a Separate Location?

There are several options for tallying your trash count –

Tally As You Go – If you’re doing a transect method, you can have 2-3 people picking up trash and calling out items to one person with a clipboard, who takes a tally of each item type as you go

Sort On-Site – Take the trash to a picnic table, or set up a tarp on the ground or another surface, dump out the trash and sort

Take It Home – If short on time, or conditions are rough (wind, rain, etc) you can take that bagged trash to a separate location and tally it after the cleanup takes place

Examples: any “hard” plastic that is not styrofoam or plastic film

Hard and Solid Plastic

| Item | Tally | Total # |
|---------------------------------|-------|---------|
| 6 pack rings | | |
| Beverage Bottles/ Containers | | |
| Bottle/ Container Caps | | |
| Buoys and Floats | | |
| Cigar plastic tips | | |
| Cigarette butts | | |
| Disposable lighters | | |
| Fishing Lures and Line | | |
| Food Containers | | |
| Fragments | | |
| Non-Food Containers | | |
| Personal care products | | |
| Plastic Cups/ Plates | | |
| Plastic Rope/net pieces | | |
| Plastic Toys | | |
| Plastic Utensils | | |
| Shotgun Shell Casings | | |
| Straws | | |
| Other: | | |

Submit to the Texas Litter Database



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Enter Your Data Into the Texas Litter Database

Currently, reports can only be submitted via computer (not optimized for mobile devices)

Visit www.texaslitter.org

Select "Submit Data"

Select "Trash Survey Reporting"

www.texaslitter.org



Cleanup Reporting

Fill out this form to report large cleanup events to KTB.

[Enter Cleanup Data](#)



Trash Survey Reporting

This survey collects detailed trash surveys- STOP, NOAA, ETAP, etc. Report your surveys that include transects or random bag audits that record detailed information on individual trash items.

[Enter Trash Surveys](#)

Submit to the Texas Litter Database



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Enter Survey & Cleanup Details

Tip: Familiarize yourself with the report and the polygon mapping tool before going out in the field

- Contact Information
- Draw Cleanup or Survey Area on the Map
- Trash Volume and Weight Data
- Site Information
- Survey Results
 - Fragment Counts
 - Individual Item Counts

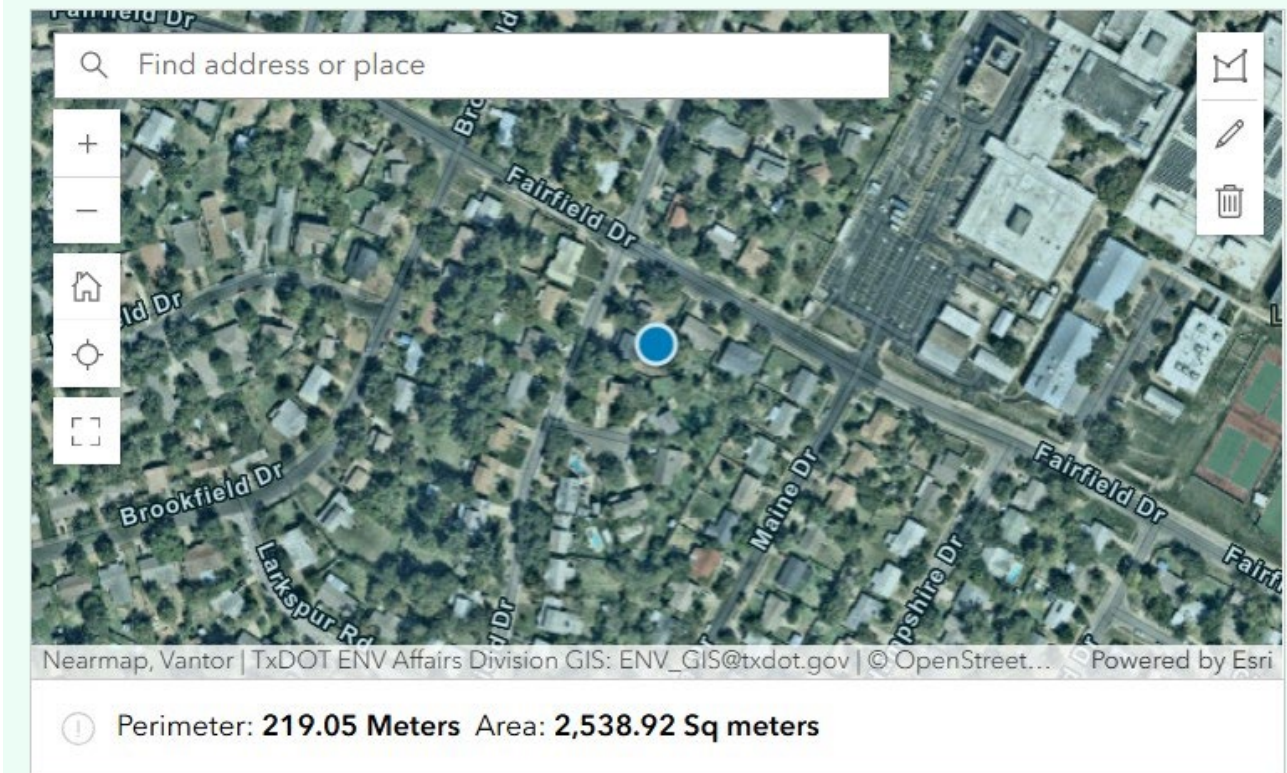
Where did you complete the survey?*

Use the tool below to draw a polygon around the area covered by the survey. Zoom in to see park boundaries and landmarks. Do your best approximation, it doesn't have to be perfect!

Click the white icon on the top right of the map, then click at each corner of your polygon. Double-click to finish the shape.

TRANSECTS- measure out the transect and area covered in the survey

RANDOM BAG SAMPLE- measure out the area covered by the entire cleanup, we will use this number with the bag counts to calculate what the sample covers



Submit to the Texas Litter Database



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Fragment Estimates

Provide a visual estimate of the number of fragments you found of the various material types in the survey area.

Think of fragments as smaller pieces of trash that are difficult to identify to a definite product, small and difficult to pick up in bulk.

| | Zero- none found | 1 to 25 fragments | 26 to 100 fragments | 101 to 999 fragments | Over 1000 fragments |
|-------------------|----------------------------------|----------------------------------|----------------------------------|-----------------------|-----------------------|
| Hard Plastic* | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Polystyrene* | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Plastic Film* | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Metal/ Aluminum* | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Glass* | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Rubber* | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Paper* | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Clothing/ Fabric* | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| Hard Plastic ▶

| Polystyrene (e.g. Styrofoam) ▶

| Plastic Film ▶

| Metal and Aluminum ▶

| Glass ▶

| Rubber ▶

| PPE ▶

| Paper or Lumber ▶

| Clothing and Fabric ▶

| Large or Hazardous Items ▶

| Hard Plastic ▼

Examples: any "hard" plastic that is not Styrofoam or plastic film
Enter number of individual items counted on survey below.

six pack rings

plastic beverage bottles

plastic bottle or container caps

fishing buoys or floats

How STOP Data is Used



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Examples of Research



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Research by **Amanda Hackney** of Black Cat GIS show different relationships between geographic features in an area and the litter found there utilizing GIS data:

- Aspect of a Slope (ESE to SSE)
- Sinuosity (curvier waterways catch more trash)
- Distance to wastewater outfall (closer = more trash)





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How Can This Data be Used?

Targeted Educational Campaigns

Identify local issues, communicate that to the public

Resource Allocation for Infrastructure

Data can support grant requests, track grant data, justification for budget allocation, etc

Engage Businesses

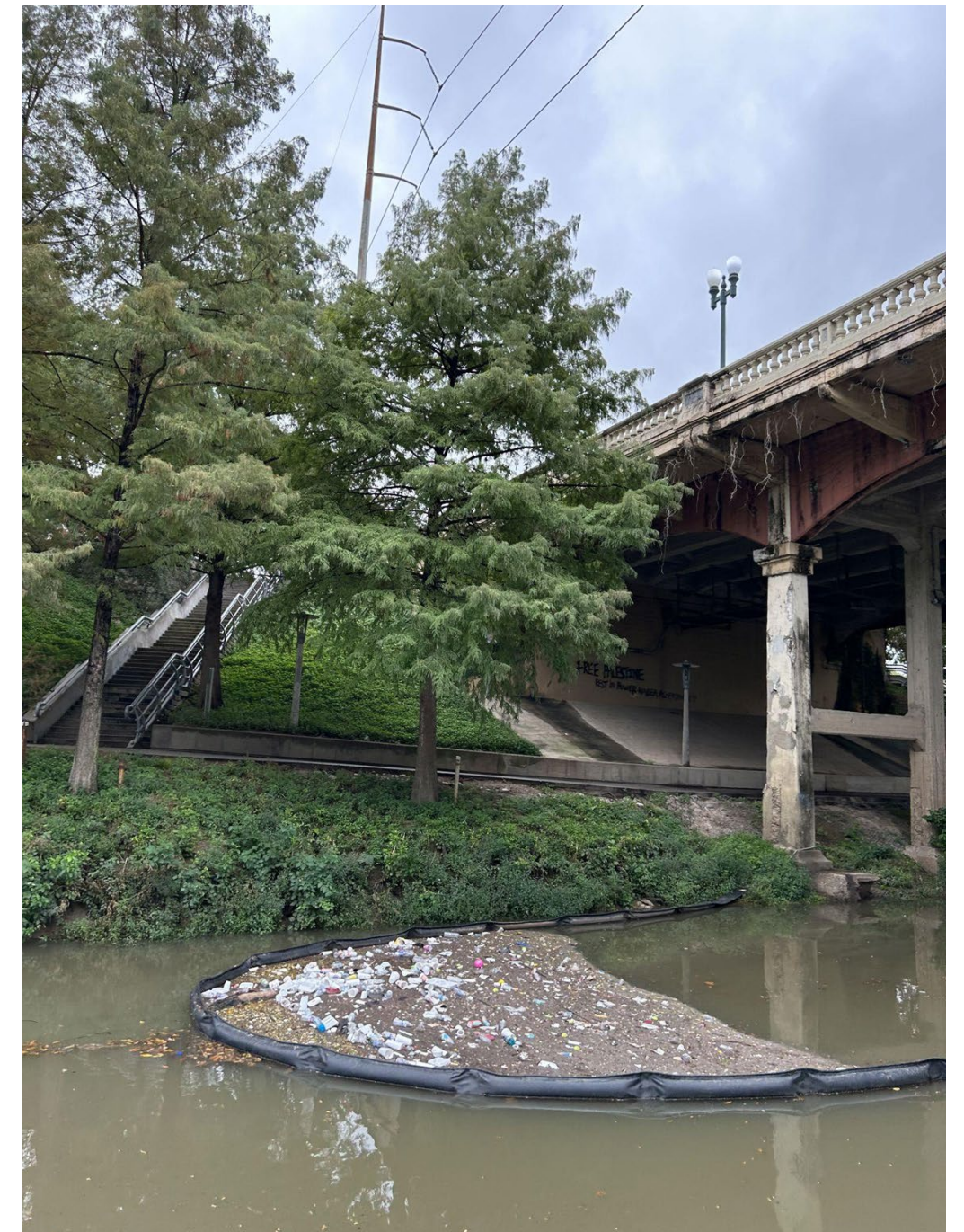
Invite local businesses to be part of the solution

Data Points for Research and Legislative Support

Submitting data can have far-reaching implications beyond immediate use

Replicable Model

Because this is the first statewide database, you're contributing to a model that can be replicated in other states



Why Data Collection Matters



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We Can't Reach a Solution Without Understanding the Problem

- Tool for civic engagement - foster partnerships and collaboration between residents, volunteer groups, and organizations
- Track hot spots, where cleanups take place, and potentially identify gaps in those efforts
- Track trends over time, including measuring efficacy of any given solution
- Use the collected data for various reporting needs



Questions?



**Keep Texas
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texaslitter@ktb.org



Thank You!

Texas Litter Database
www.texaslitter.org

Reach me at kirsten@ktb.org

Kirsten Sorensen

Senior Program Manager, Research and Cleanups - Keep Texas Beautiful