

# BAYOU BLUES: MAPPING MARINE DEBRIS IN THE LOWER GALVESTON BAY WATERSHED TO AID MANAGEMENT



Amanda Hackney, Jess Lucas - Black Cat GIS and Biological  
Dr. David Retchless – Texas A&M Galveston



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- **What?**

- **Composition of litter in waterways**

- **Where?**

- **Locations of litter “traps”**

- **Why?**

- **That’s a good question....**



# Project Goals



- Promote the use of STOP statewide
- Encourage the use of the Texas Litter Database
- Continue to gather data
- Develop a spatial model of the lower Galveston Bay watershed to predict hotspots (and driving factors)



# STOP Litter Surveys

## STOP: Study, Track, Remove and Prevent methodology

- Measure a line transect
- Pick up every single piece of trash you see
- Try to get any piece of trash the size of a cigarette butt or larger
- After you've collected all the trash, record the number of individual items directly in the trash report page





# Setting up a transect





# Data Collection

## San Luis Pass Marsh Roadway

Site name: \_\_\_\_\_

Date surveyed: \_\_\_\_\_

Start/ end time: \_\_\_\_\_

Contact name: \_\_\_\_\_

Contact email: \_\_\_\_\_



Number of people: \_\_\_\_\_ Length of transect (line): \_\_\_\_\_

Total weight of bagged trash: \_\_\_\_\_ Number of bottles picked up in 2 minute count: \_\_\_\_\_

Coordinates of survey midpoint: \_\_\_\_\_ Is a trash can visible from the survey site? \_\_\_\_\_

(Find the middle of your survey transect along the shoreline and report the latitude/ longitude so

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

Item	Tally	Total #
<b>ESTIMATED FRAGMENTS</b> (Circle best choice)	1 - 25	101 - 999
	26 - 100	Over 1000
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		
Non-Food Containers		
Personal Care/ Hygiene Products		
Plastic Cups/ Plates		
Plastic Rope/net		
Plastic Toys		
Plastic Utensils		
Shotgun Shell/ Wad		
Shoes		
Writing Pens, Markers		
Other		

Example: styrofoam caps

Item	Tally
<b>ESTIMATED FRAGMENTS</b> (Circle best choice)	1 - 25
	26 - 100
Styrofoam Caps/ Plates	
Fishing Floats	
Food Wrappers/ Containers	
Insulation	
Jugs/ Containers	
Other:	

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Examples: chip bags, clear wrappers, candy wrappers

Item	Tally	Total #
<b>ESTIMATED FRAGMENTS</b> (Circle best choice)	1 - 25	101 - 999
	26 - 100	Over 1000
Abandoned Utility Flag		
Shopping/ Trash		
Food or Drink		
Latex Balloons		
Mylar Balloons		
Newspaper Film		
Personal Care/ Hygiene		
Ribbon		
Other		

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

Item	Tally	Total #
<b>ESTIMATED FRAGMENTS</b> (Circle best choice)	1 - 25	101 - 999
	26 - 100	Over 1000
Aerosol cans		
Aluminum Foil		
Aluminum/ Tin cans		
Crab/ Fish traps		
Metal Bottle Caps		
Metal Wire		
Other		

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

Item	Tally	Total #
<b>ESTIMATED FRAGMENTS</b> (Circle best choice)	1 - 25	101 - 999
	26 - 100	Over 1000
Beverage Bottles		
Jars		
Other		

Examples: any MAN MADE products made from trees/ wood

Item	Tally	Total #
<b>ESTIMATED FRAGMENTS</b> (Circle best choice)	1 - 25	101 - 999
	26 - 100	Over 1000
Flip flops/ Shoe soles		
Work (Thick) Gloves		
Tires		
Rubber Balls		
Other		

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

Item	Tally	Total #
<b>ESTIMATED FRAGMENTS</b> (Circle best choice)	1 - 25	101 - 999
	26 - 100	Over 1000
PPE Disposable Gloves		
PPE Face Masks		
Other		

Examples: any MAN MADE products made from trees/ wood

Item	Tally	Total #
<b>ESTIMATED FRAGMENTS</b> (Circle best choice)	1 - 25	101 - 999
	26 - 100	Over 1000
Cardboard Cartons		
Lumber/ Building Material		
Paper/ Cardboard		
Paper Bags		
Food Container/ Wrapper		
Other		

Examples: any MAN MADE products made from trees/ wood

Item	Tally	Total #
<b>ESTIMATED FRAGMENTS</b> (Circle best choice)	1 - 25	101 - 999
	26 - 100	Over 1000
Clothing		
Gloves (non rubber)		
Rope/ nets		
NON NYLON		
Towels/ Rags		
Shoes/ Shoe Tops		
Other		

Examples: any MAN MADE products made from trees/ wood

Item	Tally	Total #
<b>ESTIMATED FRAGMENTS</b> (Circle best choice)	1 - 25	101 - 999
	26 - 100	Over 1000
Regular Household Batteries		
Car/ Boat Batteries		
Other Hazardous Waste		
Boats/Vehicles		
Appliances		
Furniture		
Construction Material		
Other		

It's so easy to make a difference! Thank you for taking your time to provide Texas scientists this incredibly valuable information!

Enter your data at [txlitter.org](http://txlitter.org)!





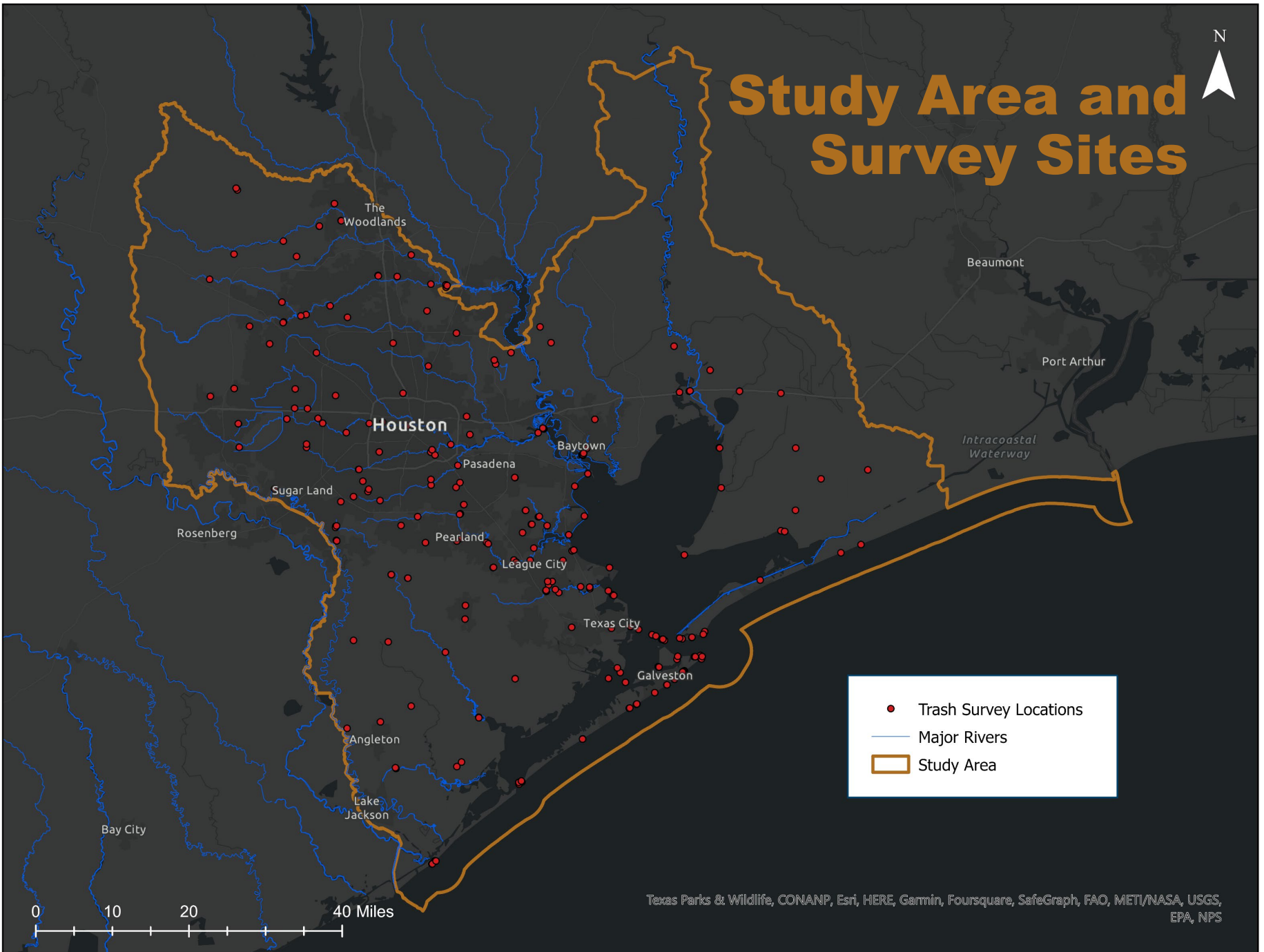


# GIS Analysis

- Data was downloaded from the Texas Litter Database
  - February 2020- May 2023
- Incomplete or outlier surveys removed
- Imported into ArcPro from Excel
- 365 surveys
- Distance standardized
- Fragments estimated in field- no used at this time



# Study Area and Survey Sites

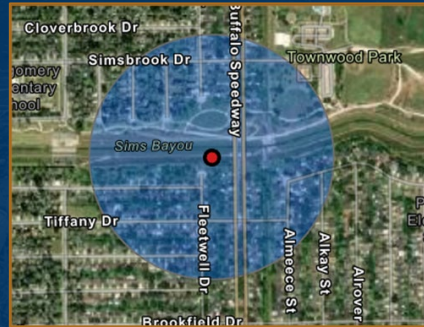




# Model Variables: Exploratory Regression

## • Total Trash Items

- Aspect
- Slope
- Elevation
- Profile
- Land Cover
- Mean Sinuosity
- Population in HUC 12 Watershed
- Home Occupancy in HUC Watershed
- Percent Natural Cover



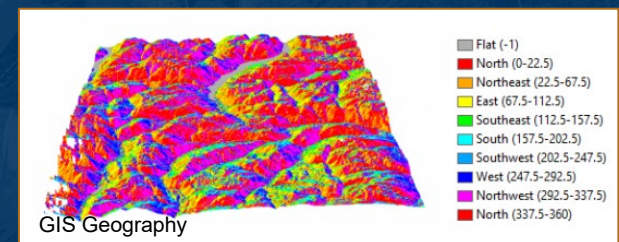
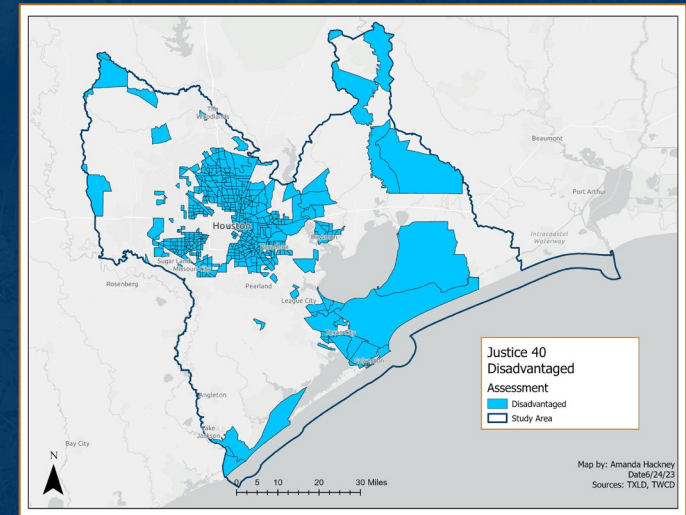
## • Distance to:

- Justice 40 Community
- Major Roads
- Minor Roads
- Streets
- Bridges
- Wastewater Outfalls
- MS4 Water Outfalls
- Waste Management Sites
- Boat Ramps/ Fishing Piers
- Bus Stops

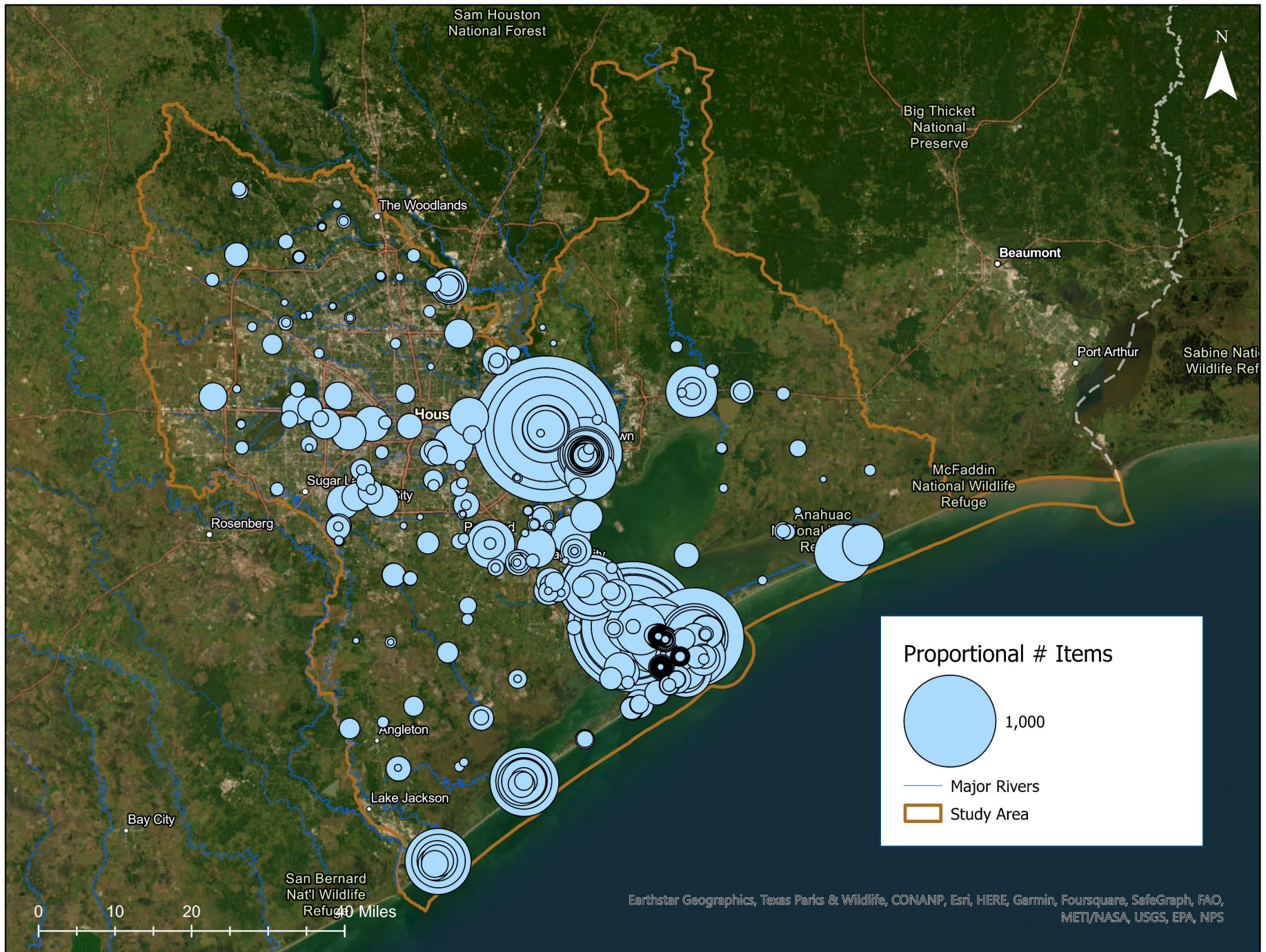


# Model Inputs to MaxEnt

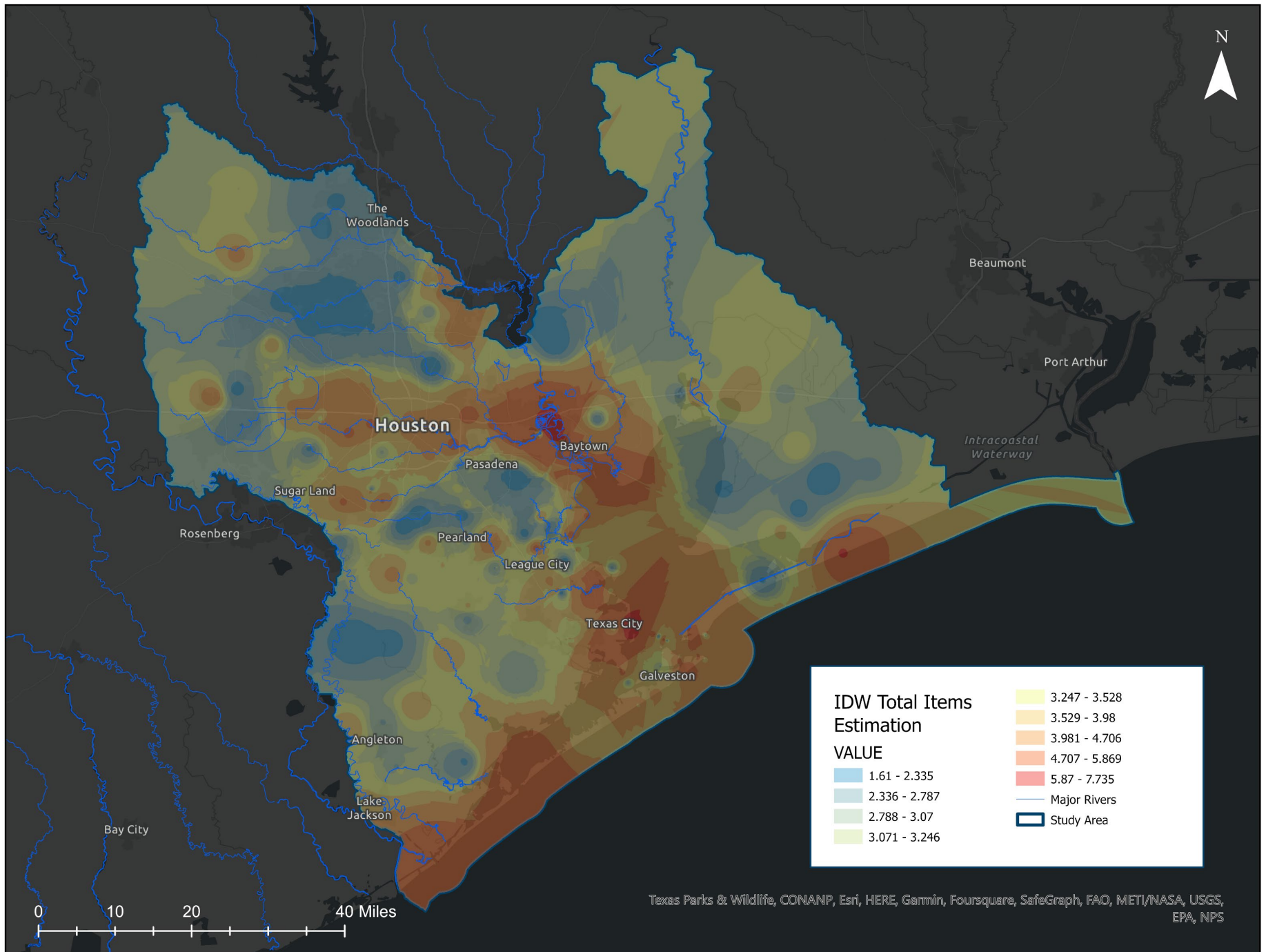
- Distance to Justice 40 tract
  - closer more trash
- Distance to Bus Stop
  - farther more trash
- Distance to Wastewater Outfall
  - closer more trash
- Aspect
  - heaviest 125 (ESE) -175 (SSE)
- Elevation
- Census Population
- Census Household Count
- **Final Adj R Square= 0.35**







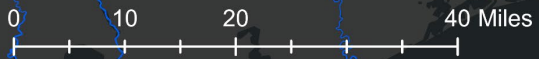




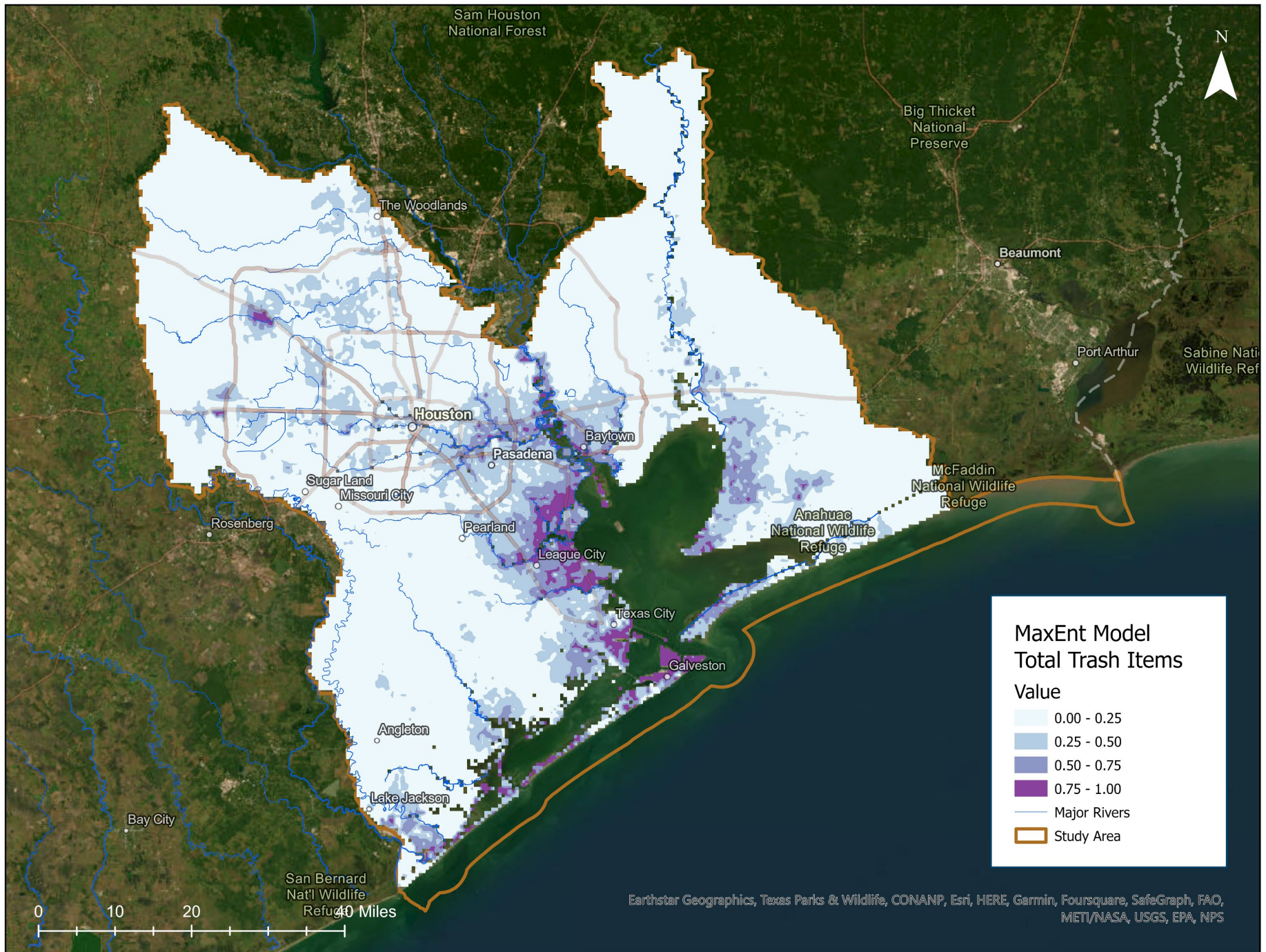
**IDW Total Items Estimation**

**VALUE**

- 1.61 - 2.335
- 2.336 - 2.787
- 2.788 - 3.07
- 3.071 - 3.246
- 3.247 - 3.528
- 3.529 - 3.98
- 3.981 - 4.706
- 4.707 - 5.869
- 5.87 - 7.735
- Major Rivers
- Study Area







Sam Houston National Forest

Big Thicket National Preserve

The Woodlands

Beaumont

Port Arthur

Sabine Nat'l Wildlife Ref

Houston

Baytown

Pasadena

McFaddin National Wildlife Refuge

Sugar Land

Missouri City

Anahuac National Wildlife Refuge

Rosenberg

Pearland

League City

Texas City

Galveston

Angleton

Lake Jackson

Bay City

San Bernard Nat'l Wildlife Refuge



# Future Work-

- Surveys to ground-truth predictive model
- Migration of Texas Litter Database to ESRI platform
- Dissemination of results to partners for cleanup and outreach planning



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Beautiful  
KEEP AMERICA BEAUTIFUL AFFILIATE



HARC



**Amanda Hackney-** [a.hackney@blackcatgis.com](mailto:a.hackney@blackcatgis.com)  
**Jess Lucas-** [j.lucas@blackcatgis.com](mailto:j.lucas@blackcatgis.com)  
**Dr. David Retchless-** [retchled@tamu.edu](mailto:retchled@tamu.edu)