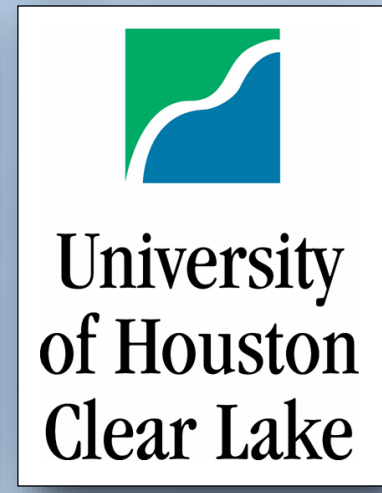


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ESTIMATING ABUNDANCE OF MICROPLASTICS IN SURFACE WATERS AND SEDIMENTS OF THE GALVESTON BAY WATERSHED



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Introduction

- Plastic production exceeds 300 MMT annually, and 60% of all plastics created have ended up in the environment, where they never fully degrade.
- Microplastics (MP), small plastic pieces <5 mm, occur as larger plastic debris fragments, industrial resin pellets (nurdles), fibers, filaments, and films.
- MP can absorb toxins, posing many ecotoxicological and human health risks.
- Heavily urbanized estuaries are especially vulnerable to MP pollution.
- Houston is the oil and gas industry capital of the USA, and studies have demonstrated both the potential for MP pollution, and the usefulness of long-term monitoring.
- Little research has been conducted to estimate the MP pollution in surface waters and sediments of Galveston Bay, which is necessary in order to combat the problem.

Objectives

- Collect and analyze samples to establish baseline levels of MP pollution in surface waters and sediments of Galveston Bay.
- Describe MP found and factors contributing to distribution of MP in Galveston Bay surface waters and sediments.

Study Area

- Galveston Bay supports up to 50% of the country's petrochemical industry, from the Houston Ship Channel to Texas City (Rowe et al., 2020; Figure 1).

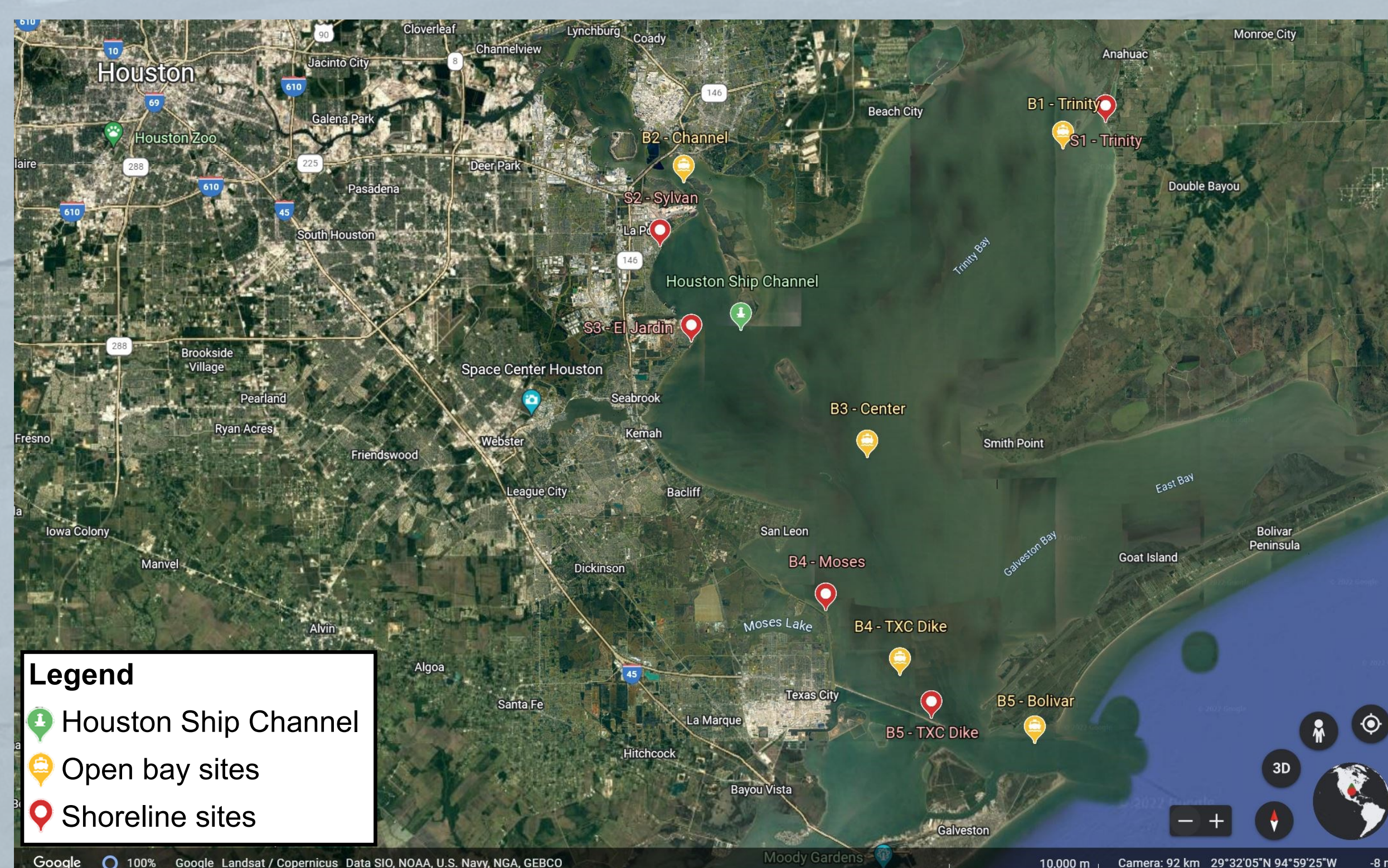


Figure 1. Study area map showing the sampled locations and their proximity to the Houston Ship Channel.

Materials & Methods

Sample Collection

- 5 Open Bay Sites
 - 3 replicate neuston tows
 - 335 µm mesh net with flowmeter (Figure 2)
 - Standard 15 min
 - Preserved with 70% ethanol
 - 3 replicate 1L water grabs
 - 3 replicate sediment grabs (Figure 3)
 - Preserved in lab fridge
- 5 Shoreline Sites
 - 3 replicate 1L water grabs
 - Florida Microplastics Awareness Project procedures (FMAP, 2017)
 - 3 replicate sediment quadrats 100 m apart
 - Mississippi State Extension Microplastics procedures (Sartain et al., 2018)
- Sampling Frequency
 - Round 1 — March 2022 ✓
 - Round 2 — August 2022

Sample Analysis

- Density separation (Figure 4)
 - Less dense MP particles should float on saltwater as sediment sample is added and aerated
- Water sample vacuum filtration
- Microscopic analysis
 - MERI Guide to MP Identification (2015)
- Sample analysis is ongoing



Figure 4. Density separator apparatus as described in Sartain et al. (2018), shown here assembled for a TIRN outreach event. Sieves are stacked in descending mesh size (200 > 100 > 75 > 55 µm) to prevent clogging of mesh, and all material is collected for microscopic analysis.



Figure 2. A neuston net mounted on aluminum frame measuring 1m x 0.5m with Sea-Gear MF315 flowmeter mounted in the mouth was used to sample surface layer of water at 5 open bay sites.



Figure 3. Benthic sediment samples were collected using Ekman grab (pictured) or Petite Ponar.

Future Work & Directions

- Understanding the extent of MP pollution in an area can facilitate future research, such as MP toxin adherence and biota interactions.
- This work can be used to inform policy makers on the stressors to the local ecosystem.

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