Evaluation of Microplastic Loading in Texas Diamondback Terrapin (*Malaclemys terrapin littoralis*) and their Associated Habitats

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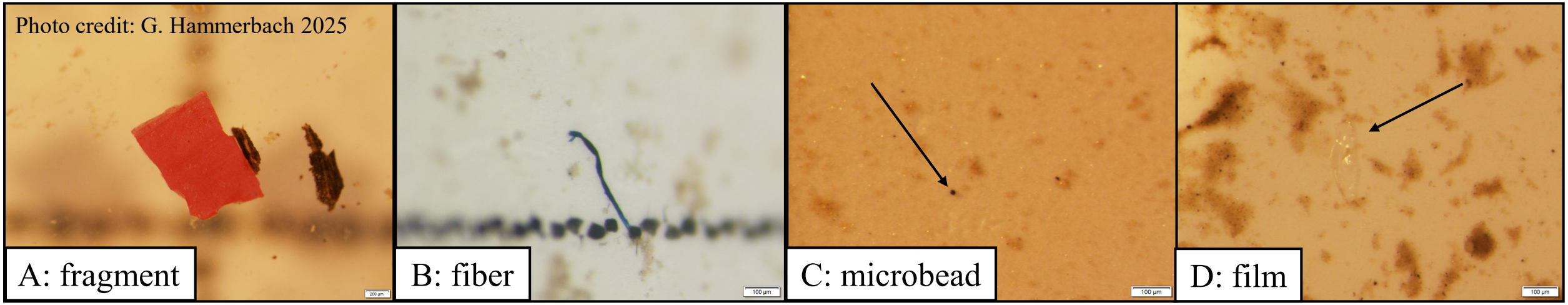
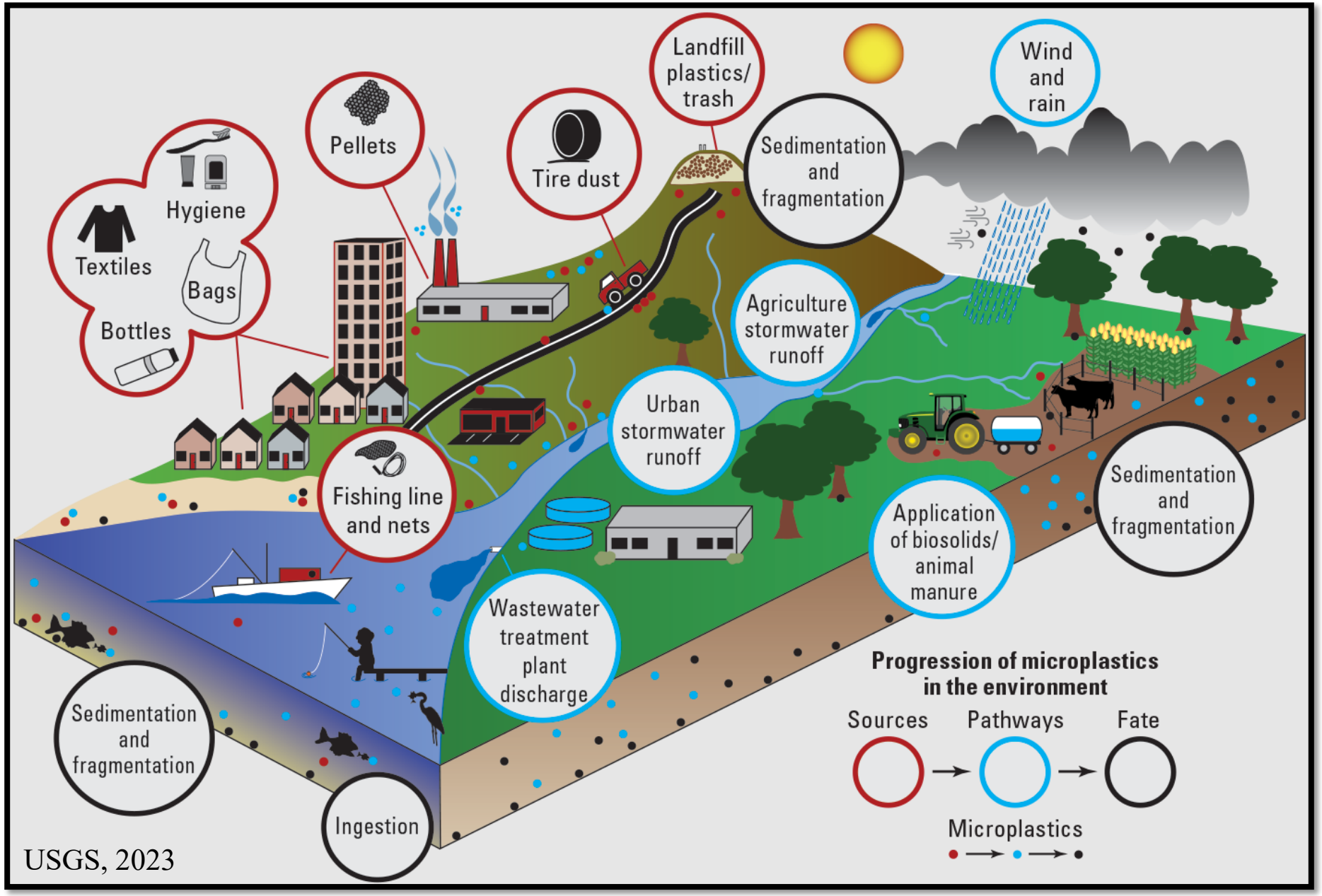
Introduction

- 1-µm to 5-mm in dimension (Dong et al., 2023)
- Composed of synthetic polymers such as polyethylene (PE), polyvinyl chloride (PVC), polypropylene (PP), polystyrene (PS) (Hou and Rao, 2022)
- Classified by type (i.e., fragment, fiber, microbead, film, etc.) (Markley et al. 2024)

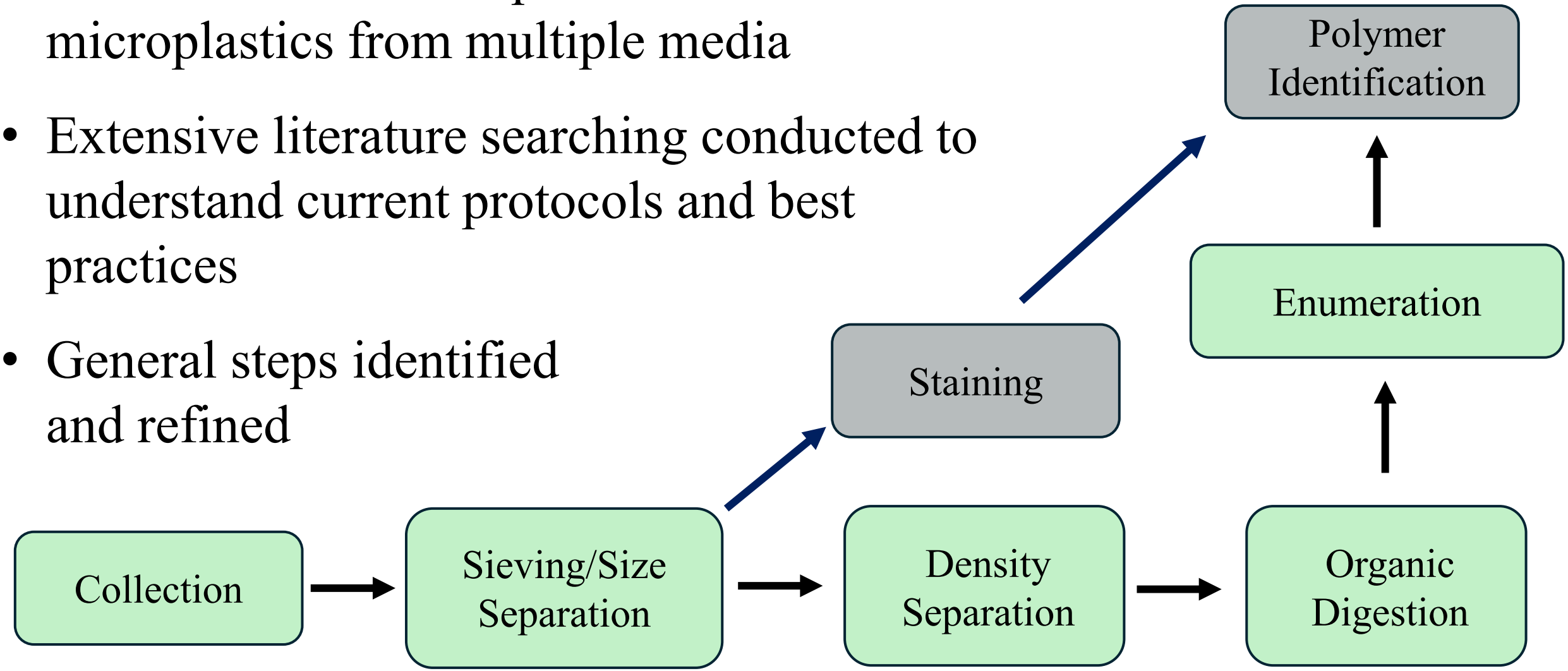


Microplastic Contaminant Pathway



Steps for Identifying Microplastics

- Lack of standardized protocols for extraction of microplastics from multiple media
- Extensive literature searching conducted to understand current protocols and best practices
- General steps identified and refined



Objectives

1. Quantify baseline microplastic loading in saltmarshes throughout Matagorda and San Antonio Bay.
2. Compare microplastic loading between spatially distinct sites in Matagorda and San Antonio Bay.
3. Compare site level microplastic loading to health factors in Texas Diamondback Terrapin.
4. Compare excreted microplastics in fecal samples to health factors in Texas Diamondback Terrapin.

Site Distribution

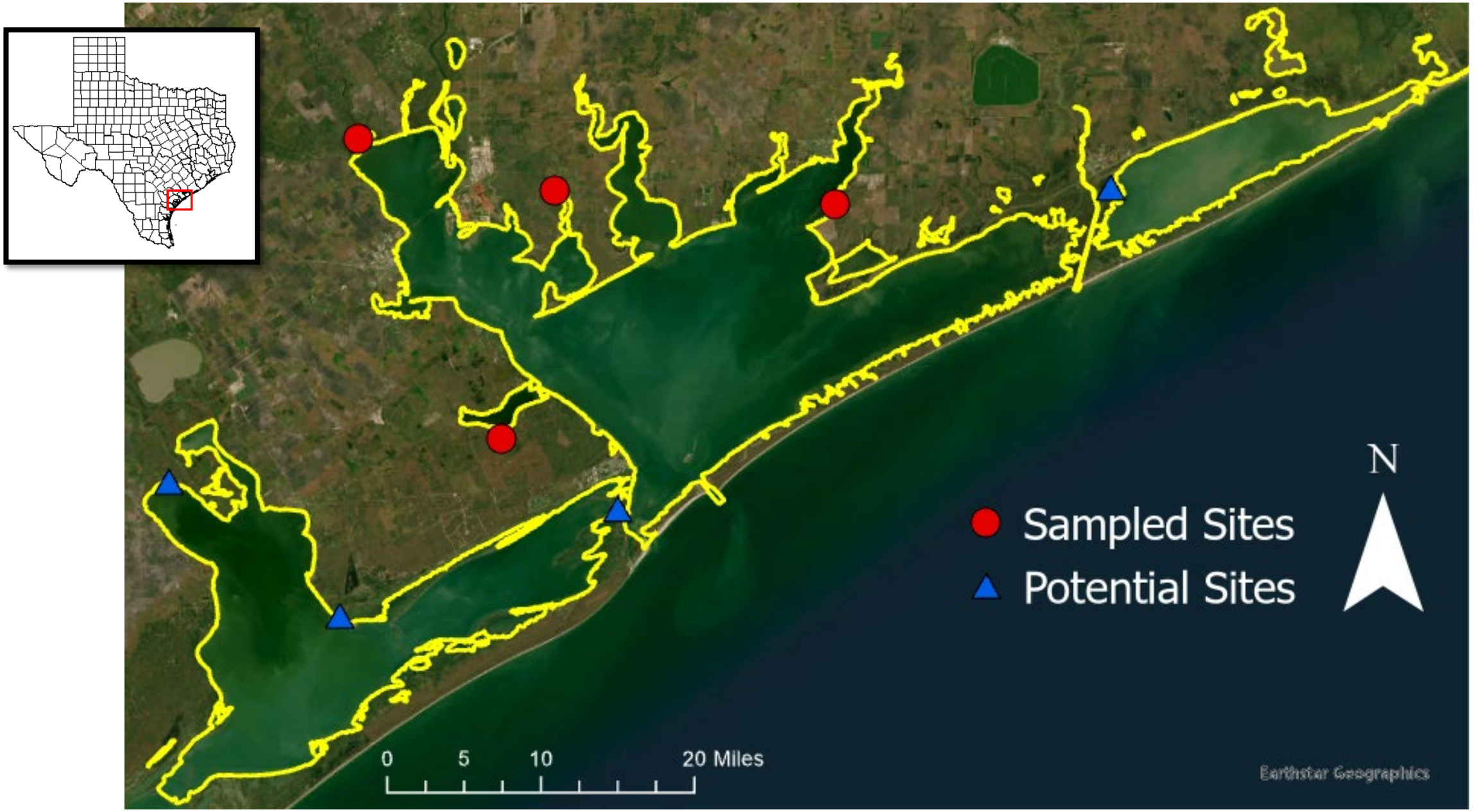
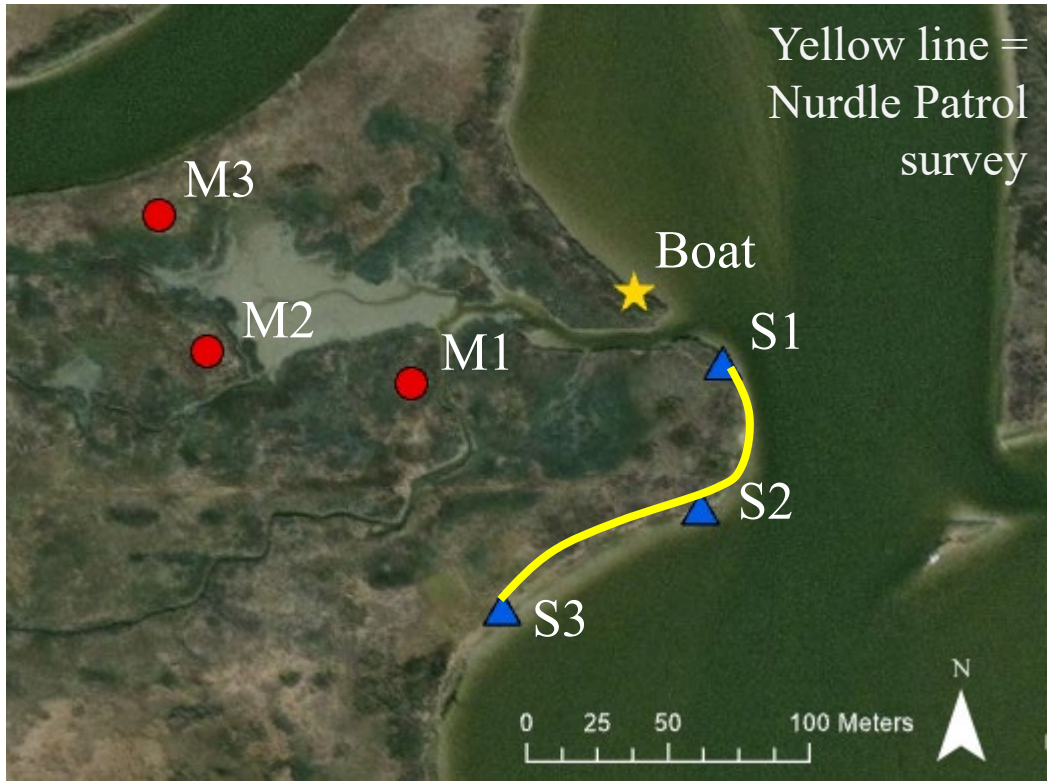


Table 1. Sources, sediment types, core sizes, and sieve sizes across a subset of microplastic literature.

Source	Sediment type	Core diameter	Number of cores	Sample depth(s)
Alvarez-Zeferino et al. 2020	Beach shorelines	19-cm	10 per site	5-cm
Khan and Prezant 2018	Salt marsh (mussel bed)	7.62-cm	3 per plot	10-cm
Lloret et al. 2021	Estuarine marsh	9-cm	2 total	127.5-162.5-cm
Lourenco et al. 2017	Intertidal wetlands	3-cm square (PLOT)	1 per site	1-cm
Lo et al. 2018	Sandy beaches to mud flats (1:1)	50-cm x 50-cm PLOT	10 per transect	2-3-cm
Sartain et al. 2018	Beach shorelines	50-cm x 50-cm PLOT	Unknown	3-cm
Zhou et al. 2020	Sandy to Muddy	30-cm x 30-cm PLOT	5-7 per transect	2-cm

Sediment Sample Collection

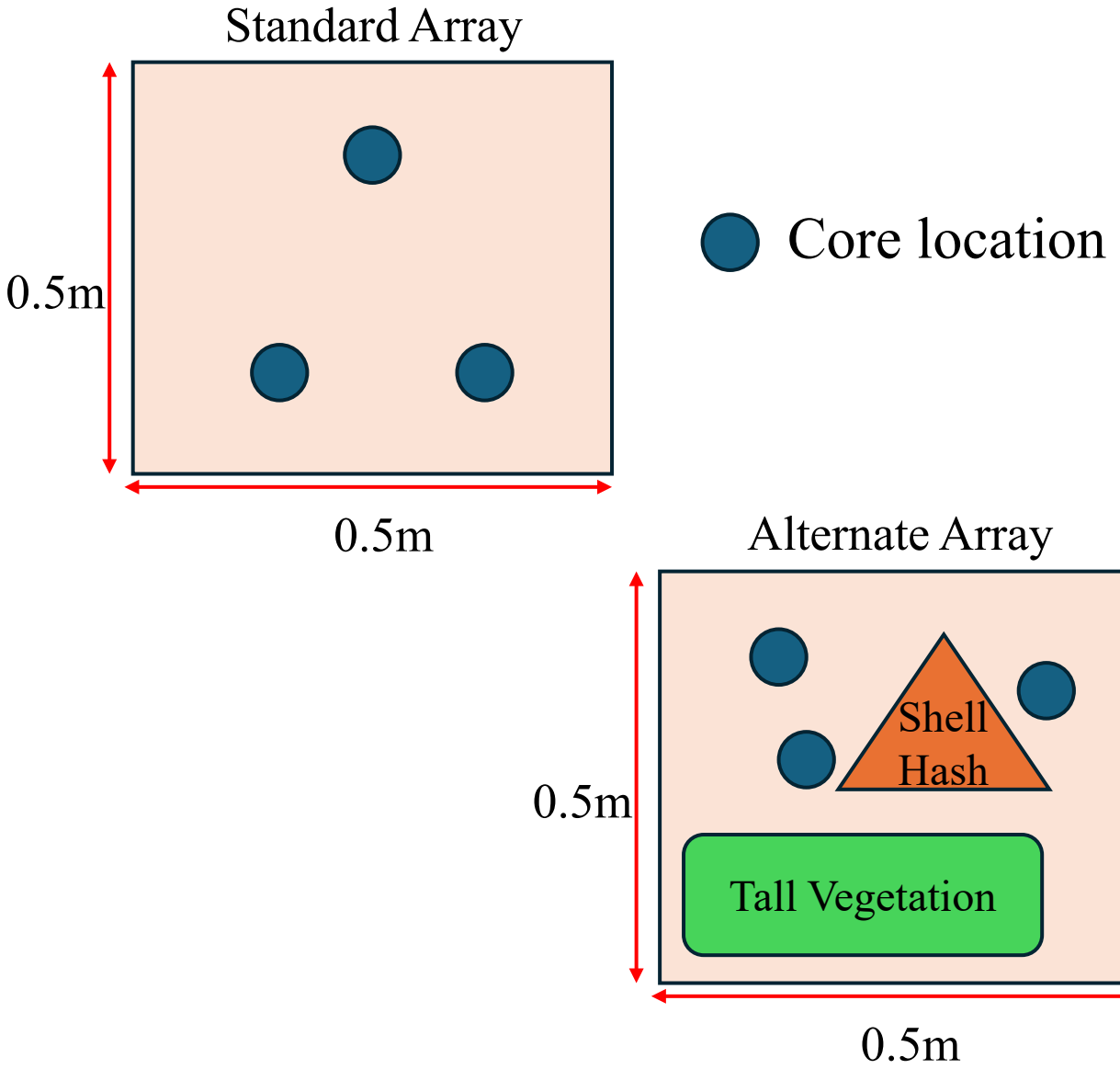
Quadrat Distribution



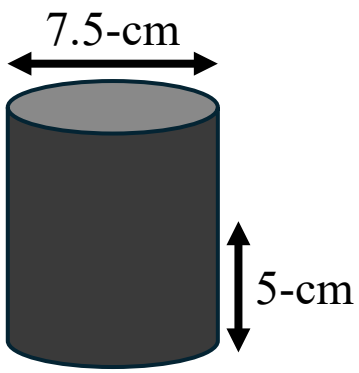
Inner marsh samples (n = 3) per quadrat

Shoreline samples (n = 3) per quadrat

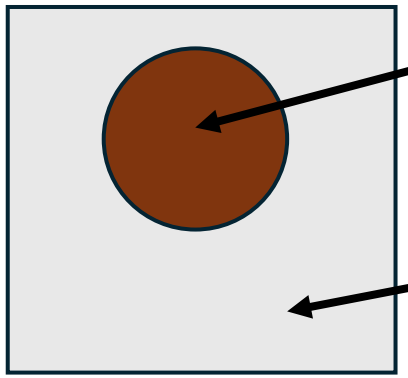
Core Distribution

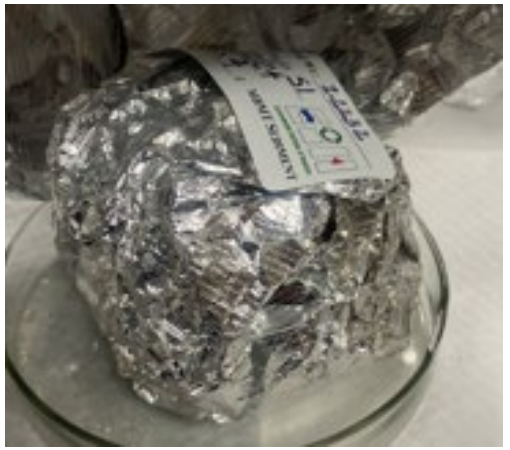


Sample Storage



Rinsed metal corer





Gently wrapped, weighed, and labeled

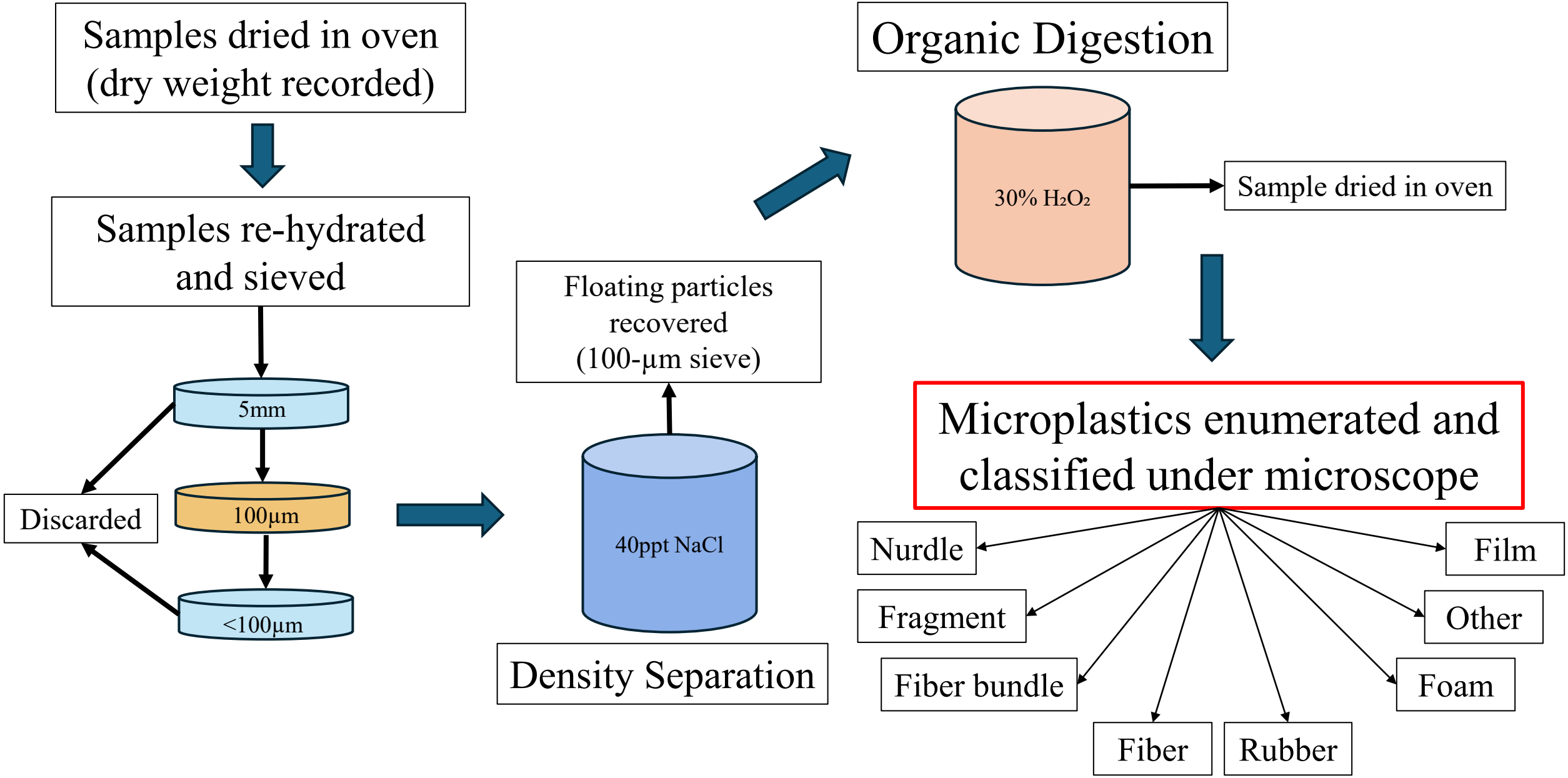
Wrapped with additional foil and stored in aluminum container with aluminum wrapped lid

Samples refrigerated until lab processing

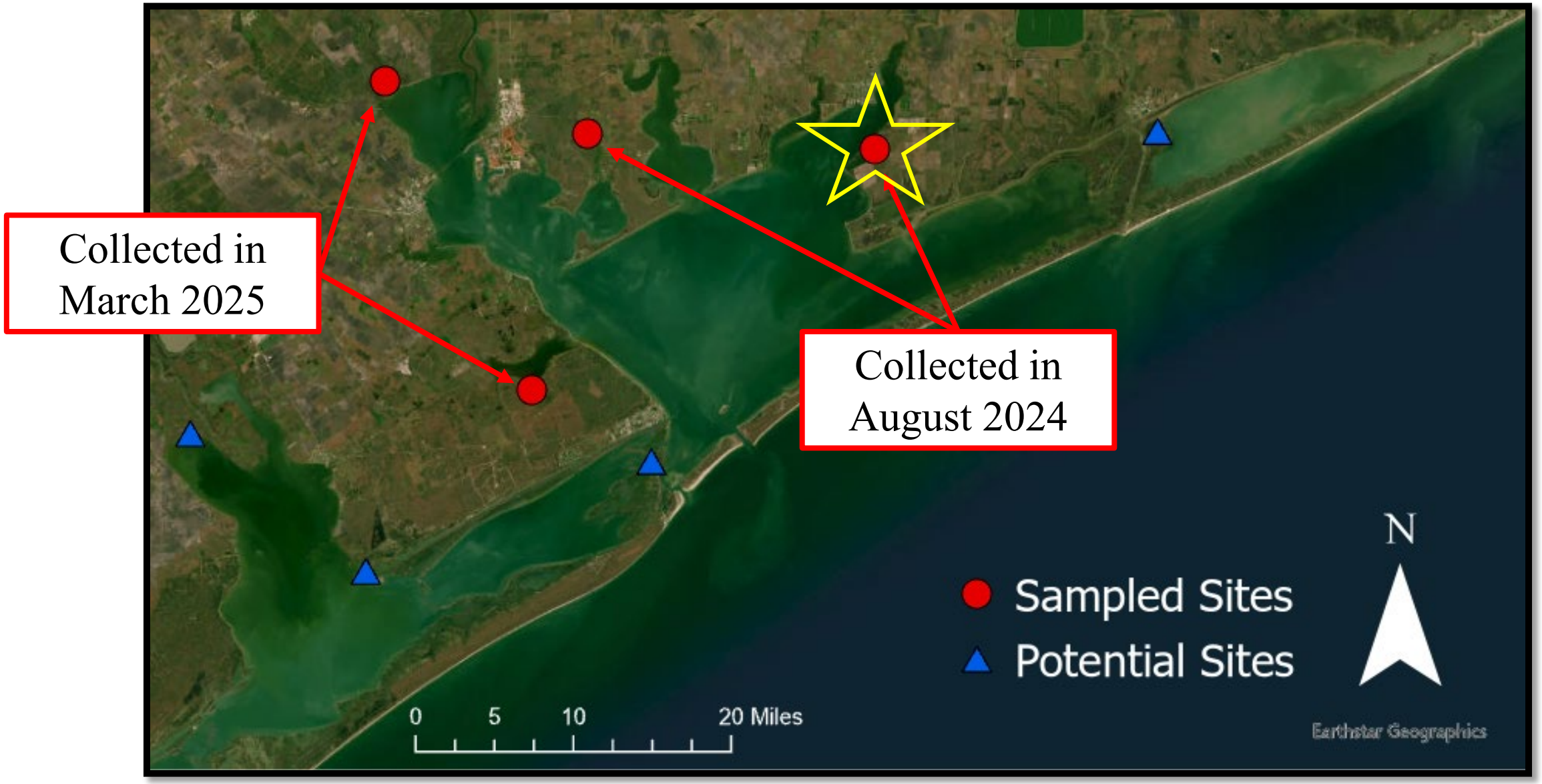
Table 2. Sources, sediment types, sieve size, density separation reagent, and digestion reagent across a subset of microplastic literature.

Source	Sediment type	Sieve Range	Density Separation Reagent	Organic Digestion Reagent
Alvarez-Zeferino et al. 2020	Beach shorelines	1.13–mm – 5-mm	$CaCl_2$	HCl then 30% H_2O_2
Beckwith and Fuentes 2018	Beach shorelines	63–µm – 125-µm	NaCl	None
Lloret et al. 2021	Estuarine salt marsh	250–µm – 5-mm	$ZnCl_2$	Fenton's reagent
Lo et al. 2018	Sandy beaches to mud flats (1:1)	250–µm – 5-mm	$ZnCl_2$	Fenton's reagent
Sartain et al. 2018	Beach shorelines	55–µm – 5-mm	NaCl	None
Vermeiren et al. 2020	Estuary (low to high)	50–µm – 0.5-mm	$ZnCl_2$	30% H_2O_2 vs Fenton's
Zhou et al. 2020	Sandy to Muddy	5–µm – 50-µm	NaCl	Fenton's reagent

Laboratory Processing Flow Chart

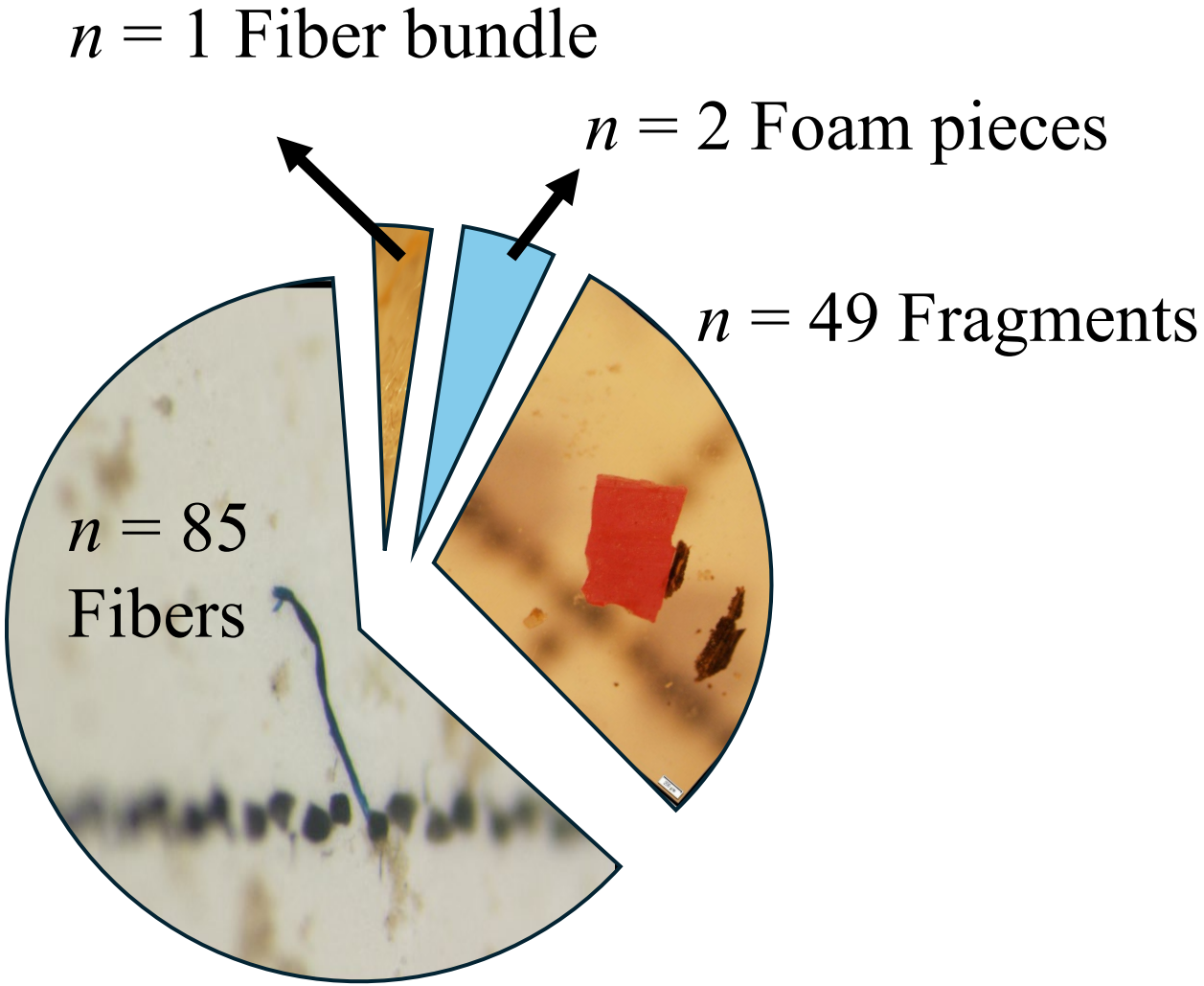


Preliminary Results

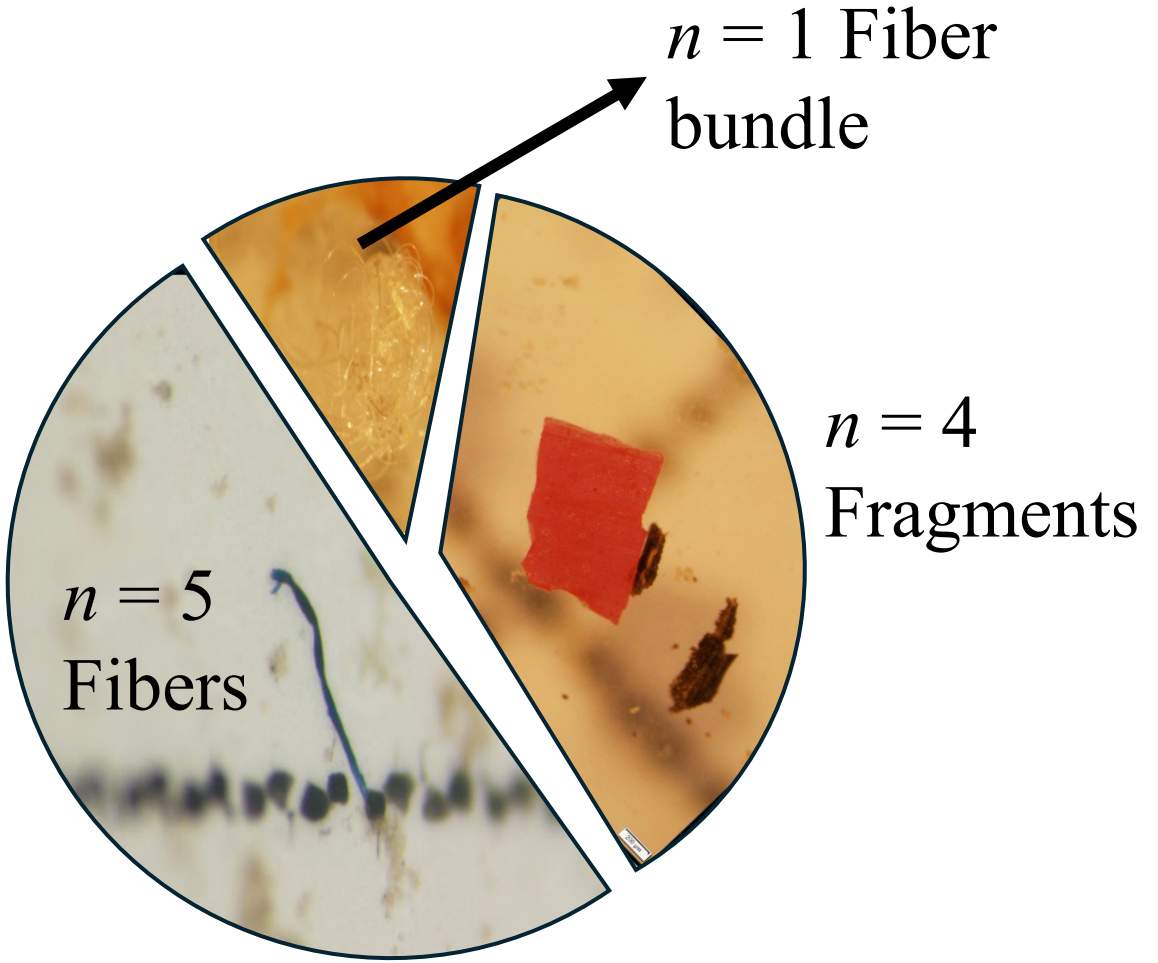


Preliminary Results: Baseline Microplastics

Shoreline Samples (n = 9 cores)

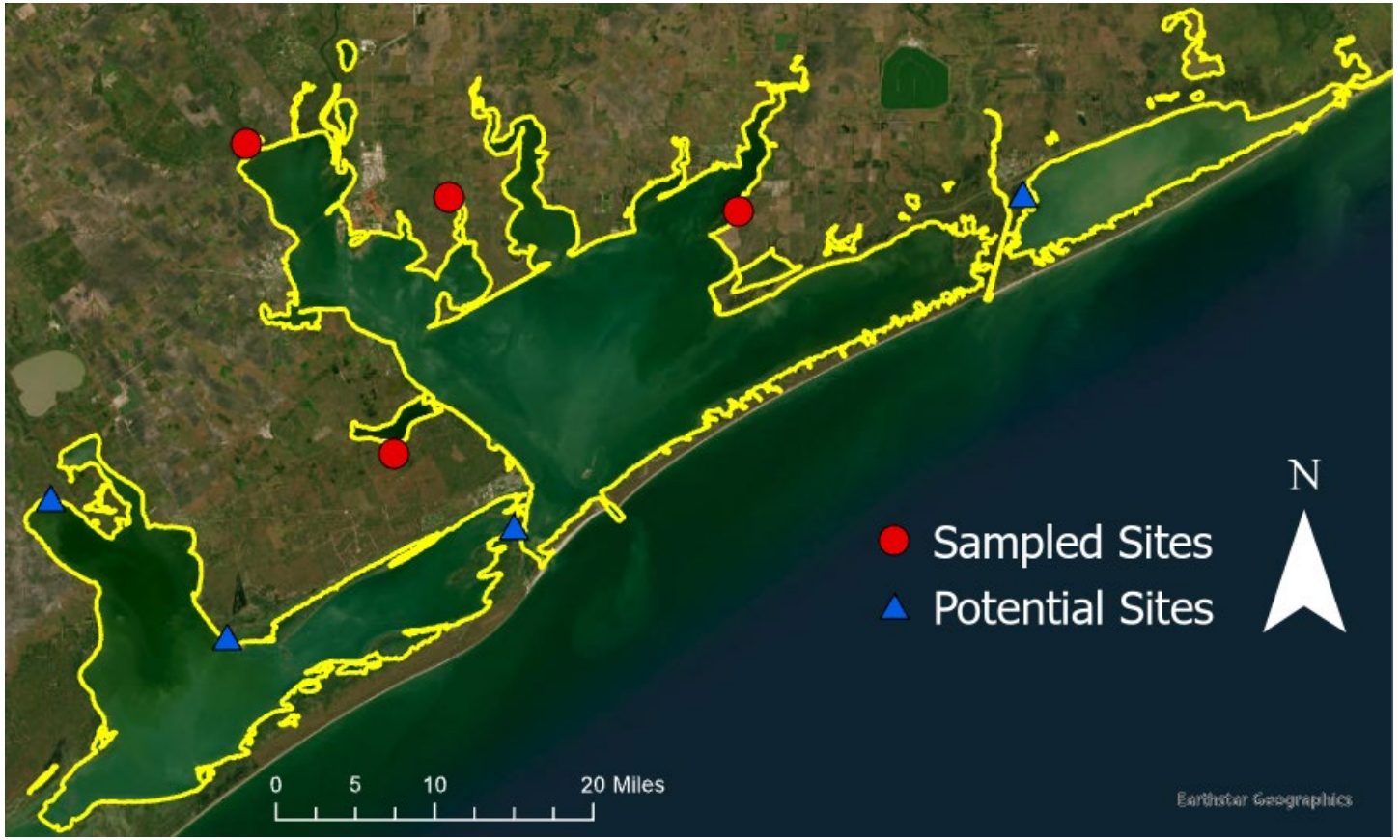


Marsh Samples (n = 4 cores)



Future Plans

- Objective 1: Additional sample collection and processing
- Objective 2: Comparison of microplastic loading between sites and sample types
- Objectives 3 and 4: Comparing microplastic loading at the site level and in fecal samples to health factors in Texas Diamondback Terrapin



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