

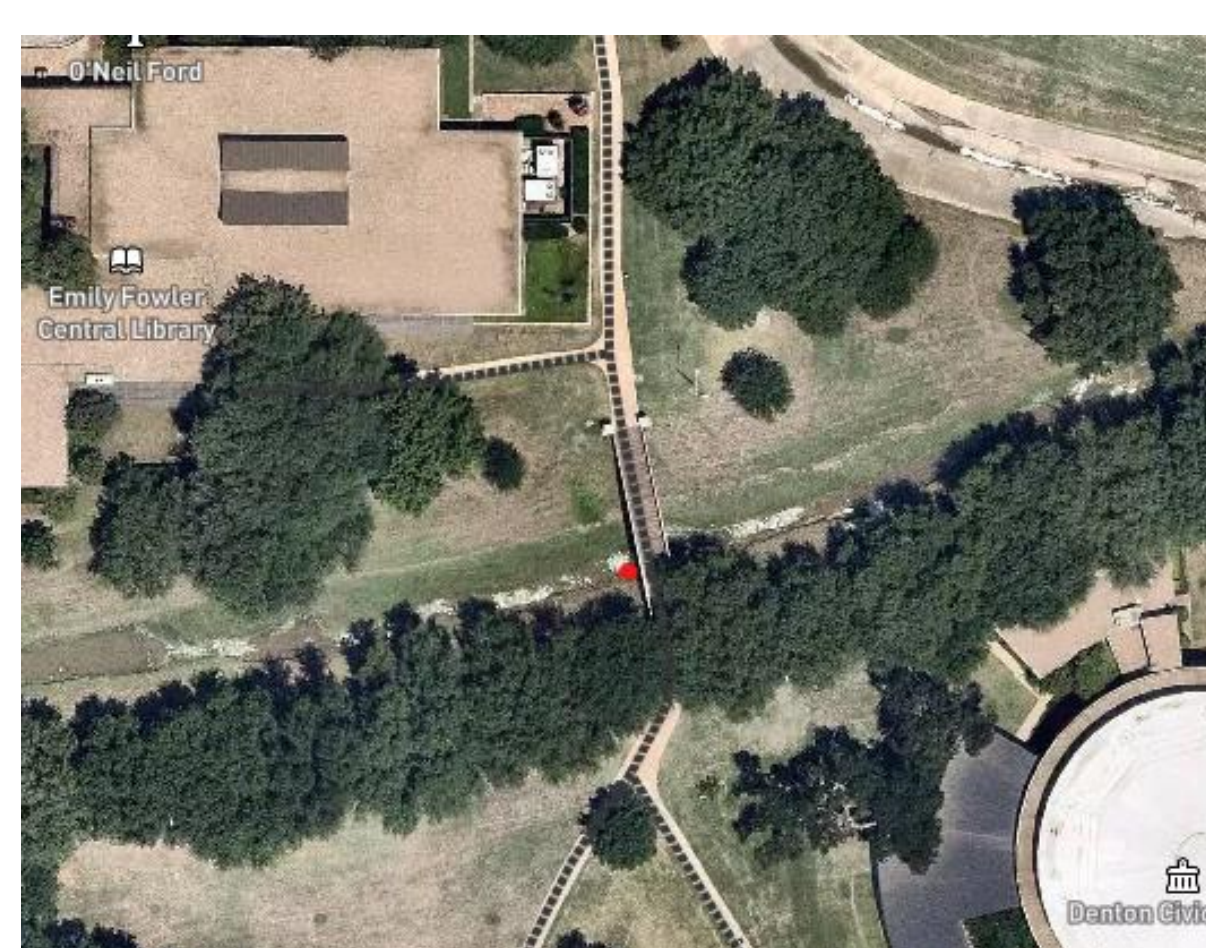
Removal, isolation, and analysis of microplastics from local soil using physical and chemical techniques

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ABSTRACT: Plastic pollution continues to be a severe and -still- unresolved problem in the 21st century. The mechanical fragmentation of plastic waste in the natural environment has led to the formation of below 5 mm plastic litter known as “microplastics.” While many scientists have worked studying the fate of microplastics in oceanic and fresh water, less attention has been placed on soil. Therefore, the purpose of this project focuses on soil samples, specifically those collected locally at the Clear Creek Natural Heritage Center in Denton, TX. Techniques such as mechanical sieving, vacuum filtration, and Fenton oxidation will be described; furthermore, spectroscopic, and microscopic results from the collected microplastics will be discussed in detail.

Introduction

This project details the extraction microplastics from soil. A total of three sites were selected for sampling including urban and semi-rural areas as reported below. All samples were collected using plastic-free containers and tools

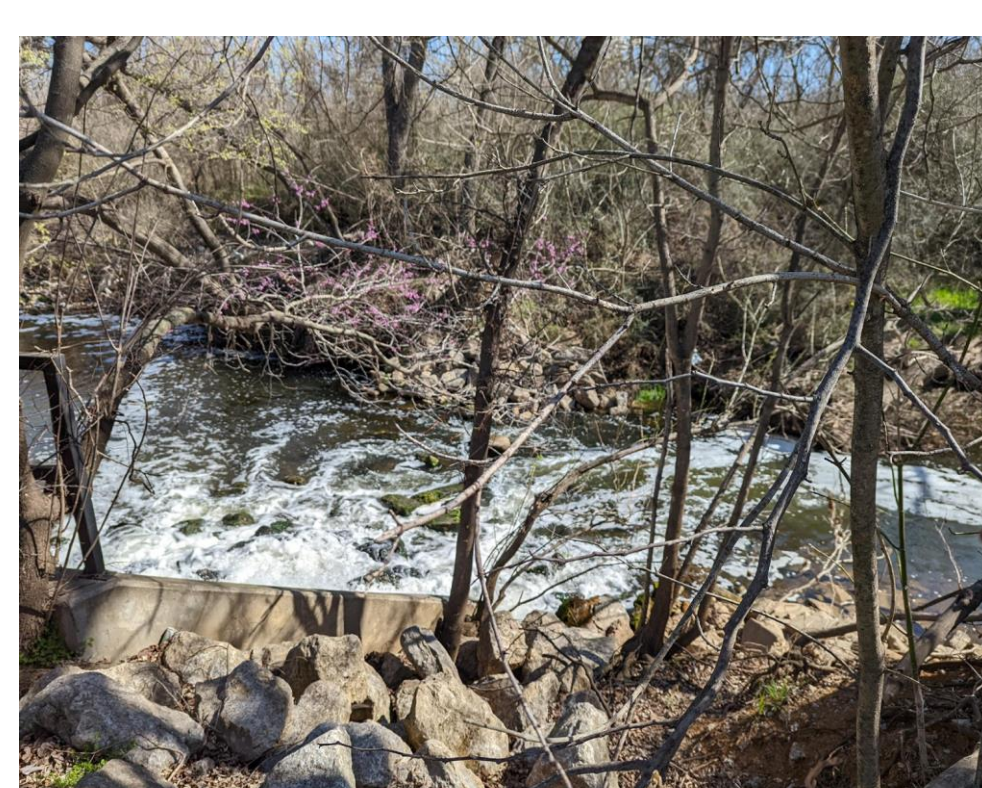


Sample location 1:
Quakertown Park Creek



Sample location 1 Quakertown Park Creek
 Located at 210° SW 33°11'33" N 97°4'16" W
 Water temperature 12° C
 Air Temperature 14.4° C

Sample location 2 & 3: Pecan Creek Waste Treatment Plant



Sample location 3 Upstream
 Located at 33°11'51" N 97°4'31" W
 At 550 ft elevation
 Water temperature 20.5° C
 Air Temperature 21.6° C



Sample location 2 Downstream
 Located at 33°11'33" N 97°4'16" W
 At 560 ft elevation
 Water temperature 20.5° C
 Air Temperature 18.8° C

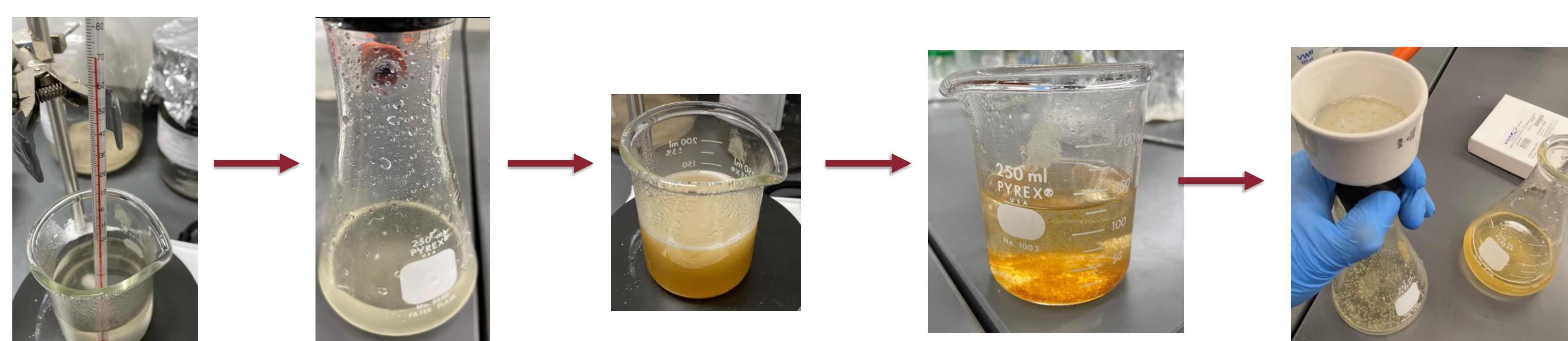
Methodology and Results

This methodology describes all steps for location 1. First, a soil sample of about 25 g was placed in a glass beaker and dried overnight at 100 ° C. Then it was grinded using ceramic mortar and pestle. Next, the sample was sieved to remove all particles of sizes larger than 500 microns.



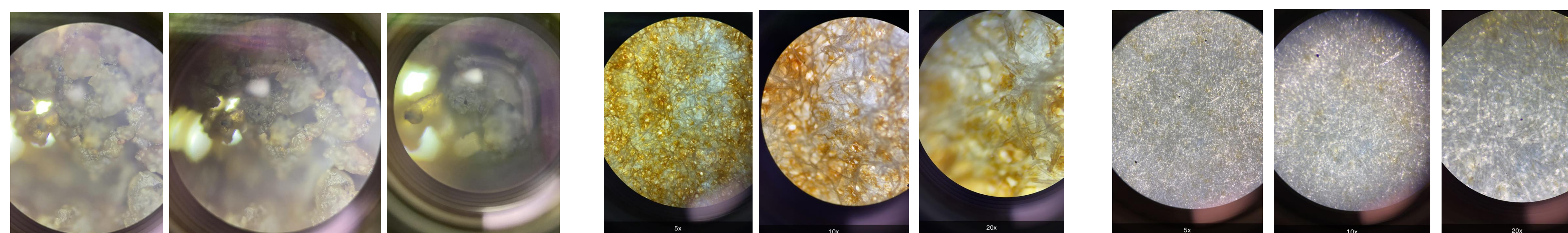
Mesh separation sizes
 > 4000 microns
 > 2000 microns
 > 500 microns

A total of 12.48 g of filtered soil was mixed with approximately 150 mL of a concentrate calcium chloride solution and let sit for at least one hour. This allowed any microplastics to float while the mineral content sediments at the bottom of the flask. The sample was then carefully filtered.



The filtrate was then placed in a 250 mL beaker and heated to 75° C before the Fenton reagent was added to degrade all organic matter. After the reaction reached room temperature, the mixture was then passed through a nylon filter.

After each filtration the filters were observed under microscope at 5x, 10x, 20x



Acknowledgments

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