

Brevards Microplastics: A Literature Review and Proposed Methods to Study Florida Beaches

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Introduction

With populations along coastlines rapidly increasing so does the risk of microplastics entering the environment. Previous studies have found that 68% of microplastics found in the environment come from man-made cellulosic materials like rayon.¹ Little information is known about the distribution, transportation, and final location of microplastics once they are introduced.² Brevard County contains multiple types of beaches that differ substantially in human activity levels, urban density, and land-use patterns. Having a full picture of microplastic distribution and intensity is vital to understanding and reversing the impact these pollutants have on the environment.

Objectives

1. Compare previous microplastic studies to determine the state of the research and scale of the problem
2. Create a detailed methodology to conduct future research specific to Brevard County

Previous Research

Previous research demonstrates that microplastic pollution is widespread across coastal and estuarine environments with varying levels depending largely on the proximity to urbanization and human activity. Sample sites across the southeastern United States coastal region showed high microplastic abundances which were strongly influenced by proximity to urban areas and nearby ocean currents¹. In a Tampa Bay study microplastics such as fibers, flakes, fragments, and beads were found throughout both the waters and sediment³. These types of microplastics are primarily comprised of particles associated with urban and industrial inputs³. A study done in California revealed a clear positive relationship between urbanization and plastic litter with urban areas having significantly higher abundances of plastic compared to non-urban areas⁴.

Proposed Methods

Sampling Methods

1. Study five sites in Brevard County varying in population density. Possible locations include Cape Canaveral, Cocoa Beach, Satellite Beach, Melbourne Beach, and Sebastian Inlet (Fig. 1)
2. Sample sites will be visited from the Northernmost location to the Southernmost location throughout the same day
3. Three random sand samples will be collected from each location and stored within labeled vials

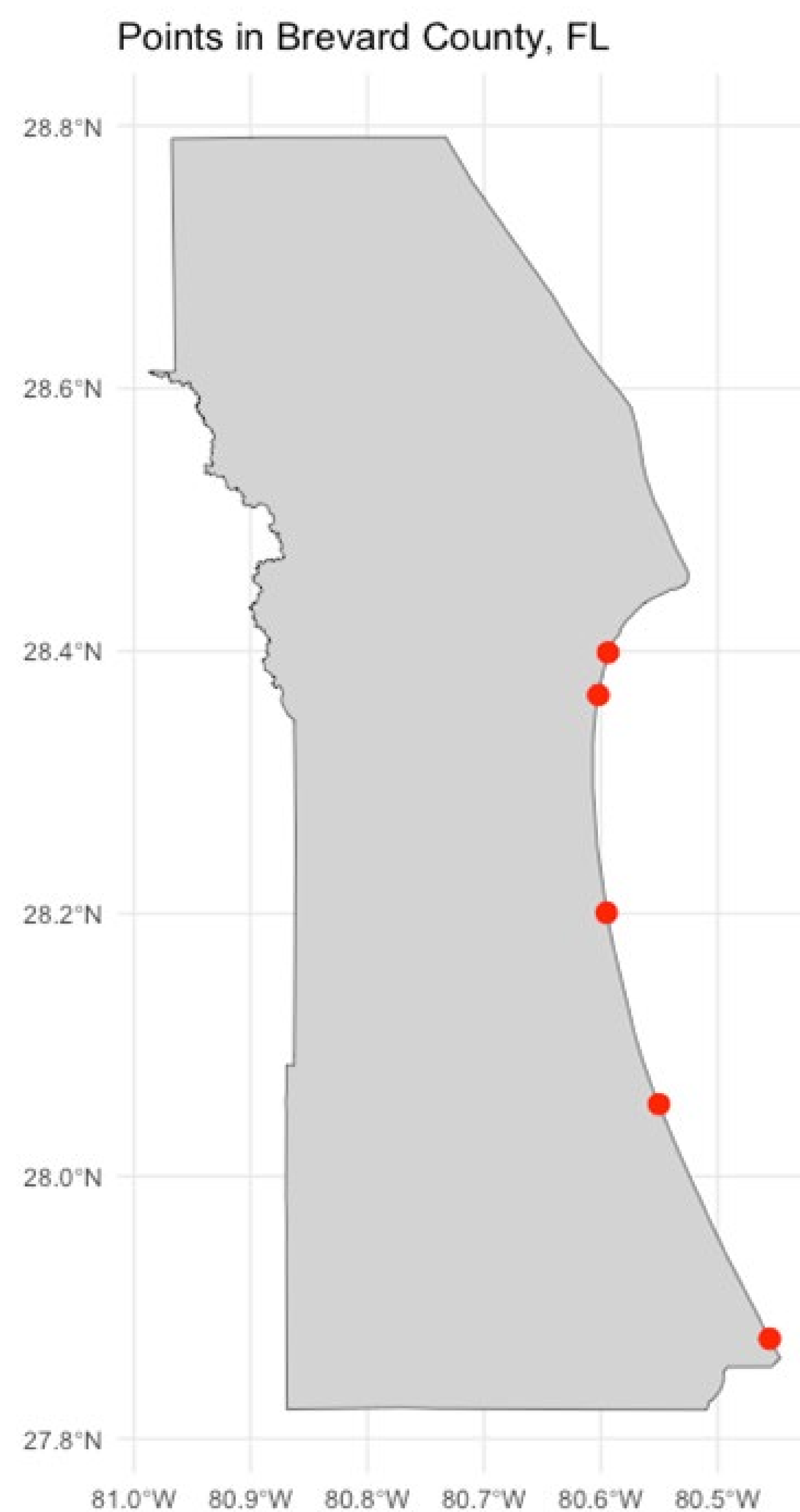


Figure 1. Proposed sampling locations for Brevard County microplastic study

Proposed Methods (Cont.)

Sampling Analysis

1. Weigh the collected sample to get a base weight
2. Take an initial look at the collected samples and remove any large debris or macroplastics
3. Submerge the samples in water to separate the microplastics from the sand grains
4. Use a filter to collect the suspended microplastics
5. Weigh the collected microplastics to get an average proportion for the area

Spatial Analysis

1. Census data for the nearest major cities corresponding with each sample location will be collected
2. Coordinates for each sample location will be overlaid on a map using ArcGIS along with census populations and land development data

Conclusion

With a proposed methodology in place to study and collect information on microplastic levels throughout Brevard County we are one step closer to understanding the current anthropogenic impact. This methodology can also be expanded upon depending on the scale of microplastic concentrations desired and the makeup in the areas, such as fibers or fragments.

A future course of action with the proposed methodology can be the implementation of citizen science. Having volunteer groups or schools working with the county to collect this information is a key way to get the message of microplastic pollution out to the public and collect critical data over a large area.

References

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3. McEachern et. al, Microplastics in Tampa Bay, Florida: Abundance and variability in estuarine waters and sediments, 2019.
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