

# Assessing Marine Debris through Stormwater Regulation in Wilmington, NC

## INTRODUCTION

Anthropogenic litter is commonly found polluting many natural environments in today's world. Whether it be on land or in aquatic environments, litter is unsightly and is harmful to many forms of life, as represented by the 8 problems listed below. When litter is managed improperly, it is carried into waterways during storm events and is eventually deposited into our oceans, where it becomes marine debris ("Sources of Aquatic Trash", 2017). Plastic litter represents a large portion of this marine debris. Trash originating on land makes up about 80% of marine debris and the other 20% stems from at sea disposals ("Toxicological Threats of Plastic", 2017). Large cities and towns produce high amounts of litter, and with an increasing global population, this poses a potential problem for our waterways. While litter travels downstream it disrupts natural processes and threatens human and environmental health ("Assessing Litter Loading", 2017).

This study was based off a pilot project performed by the Duke Environmental Law and Policy Clinic. In this study, four waterways in Wilmington, North Carolina were surveyed. Two of them drain into the Intracoastal Waterway (Bradley Creek and Hewletts Creek) and two drain into the Cape Fear River (Greenfield Lake and Burnt Mill Creek). It is hypothesized that if a stormwater pollution problem is present in Wilmington, North Carolina, then the waterways will have a high impairment score. The predetermined impairment scores were used in the Duke Environmental Law & Policy Clinic pilot project.

### 8 Problems with Plastic Pollution

- Loss of beach front value
- Plague marine nurseries
- Transport invasive species
- Entangle and capture marine life
- Navigational hazard for marine life and people
- Absorb and leach chemicals
- Ingested by marine life
- Interfere with the benthos

(Monteleone, 2011)

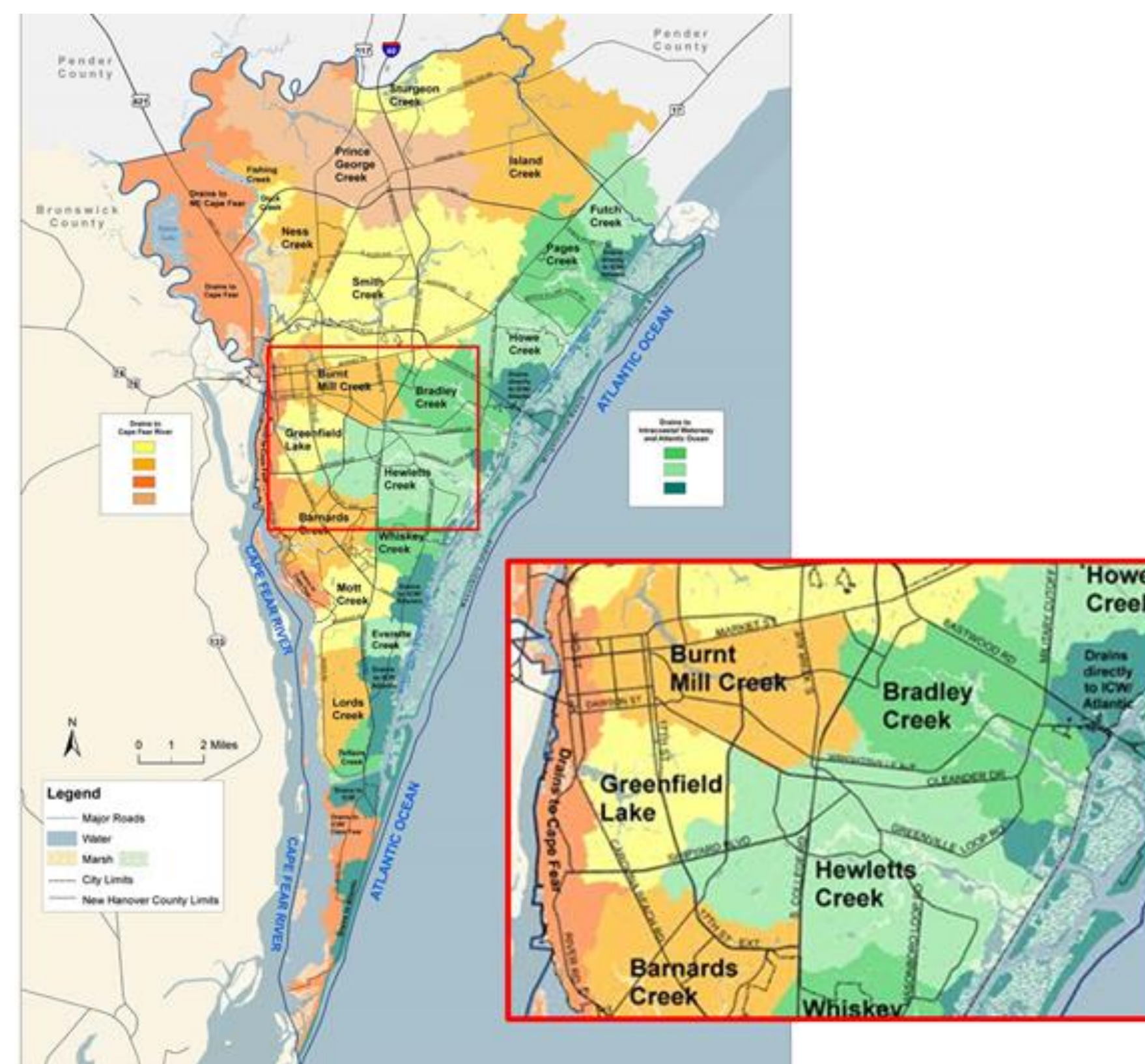


Figure 1. Watersheds of Wilmington.

## PHOTOS



Dead crawfish in metal can.



Trash hotspot at Bradley Creek.

## METHODS

Sampling Process: Prepared by the Duke Environmental Law & Policy Clinic

- 1) Travel to selected sampling site with equipment
- 2) Measure and mark three 30 meter transects with two 30 meter buffers in-between
- 3) Collect anthropogenic litter present from the center, sides, and one meter up each bank within the transects, keeping each transect's litter separated
  - Exclude buffer transects
- 4) Sort collected litter by transect according to specific categories (plastic film, hard plastic, styrofoam and other foams, metal, glass, and other material)
- 5) Record all data: state the type of litter while the note-taker records the number of litter items and identifiable brands on the data sheet
- 6) Dispose of trash properly

## RESULTS

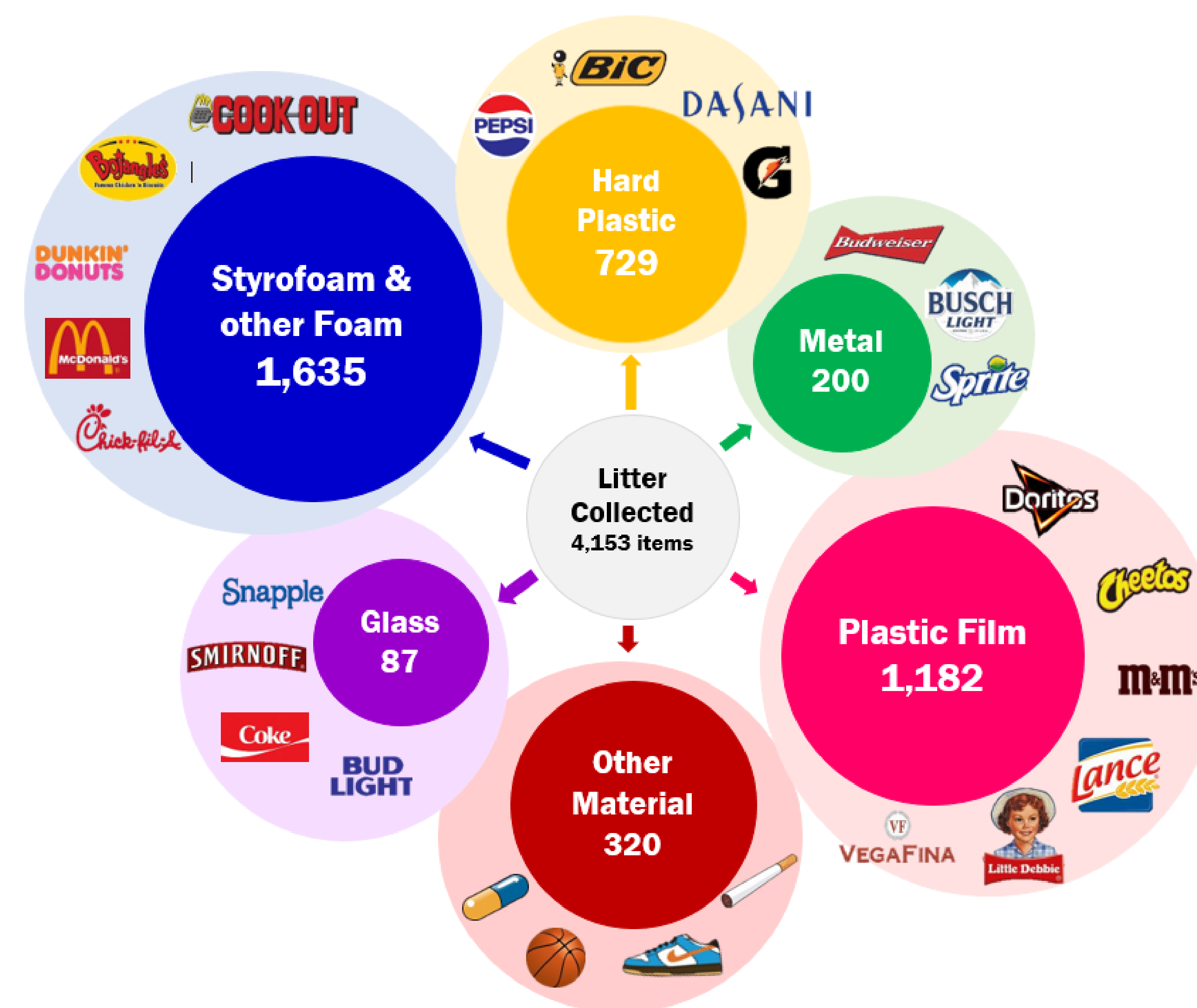


Figure 2. Overview of types of litter and common brands.

Sample Site	Average Number of Litter Items per 30 meter Transect	Impairment Score
Bradley Creek	451.3 ± 243.3	High
Burnt Mill Creek	242.3 ± 72.5	High
Greenfield Lake	429.7 ± 155.2	High
Hewletts Creek	261.0 ± 64.7	High

Figure 3. Average amount of litter per site with standard error and impairment score.

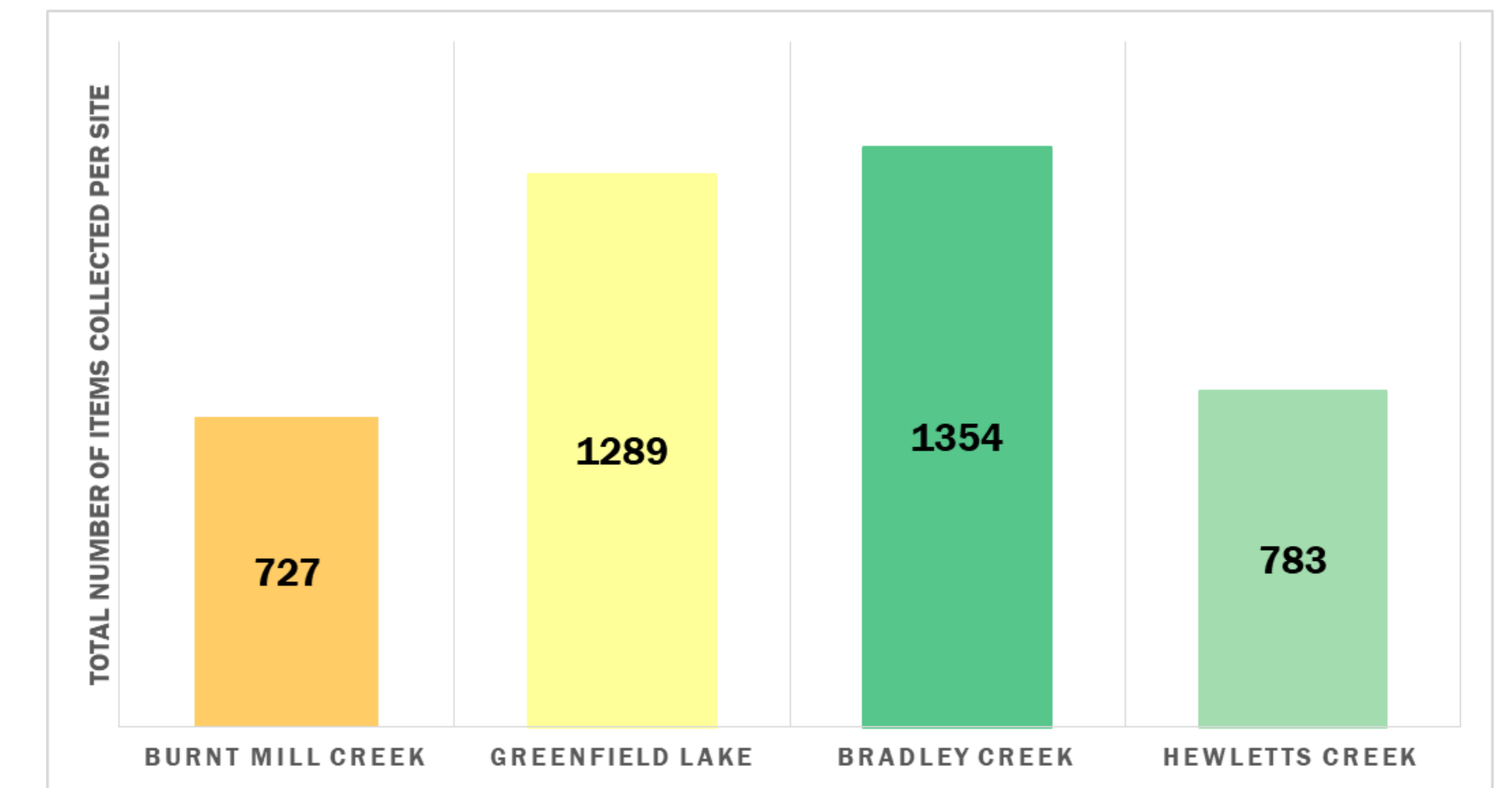


Figure 4. Total number of litter items collected at each site.

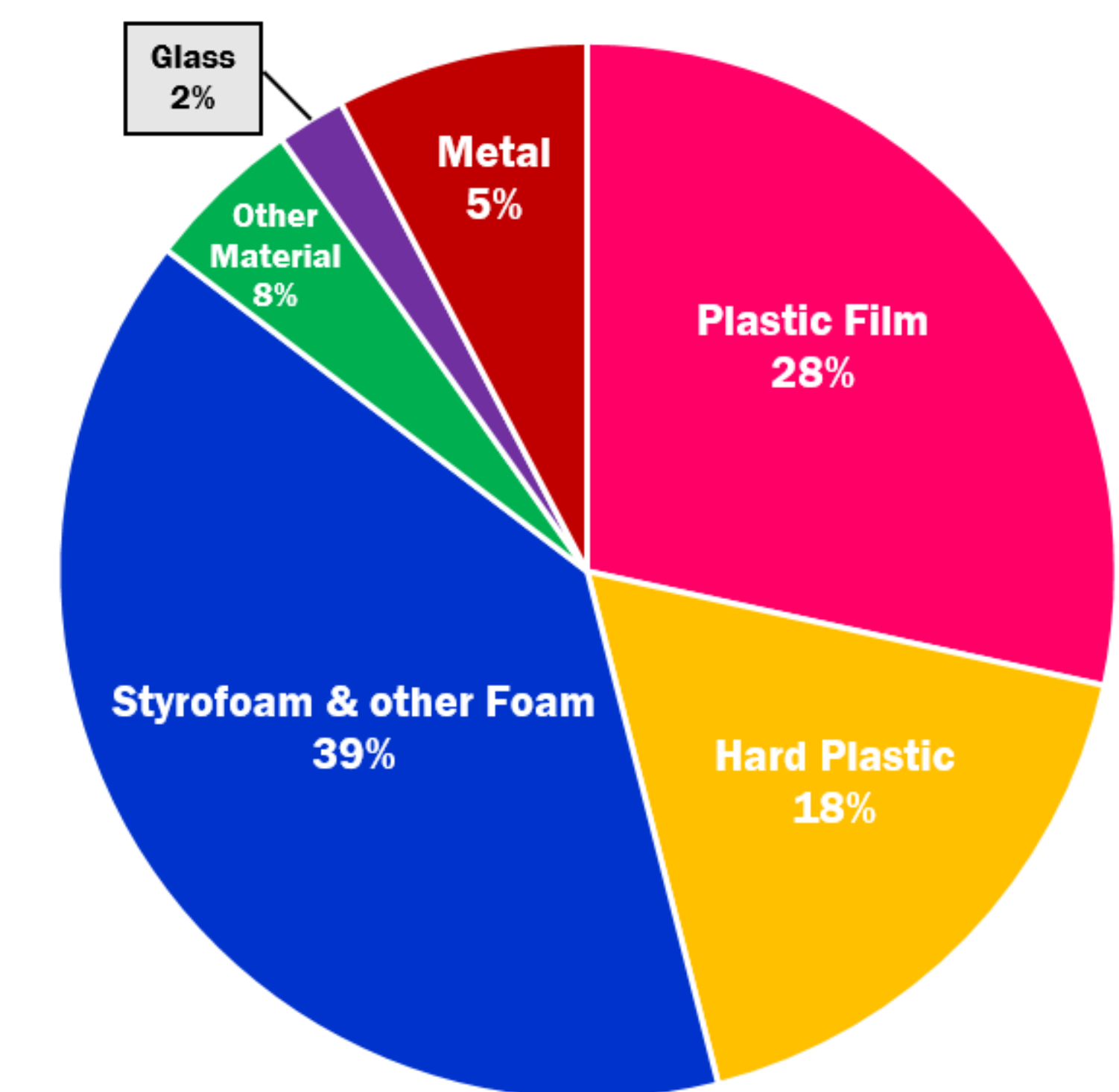


Figure 5. Percent total of each litter type found.

## CONCLUSIONS

There is a stormwater pollution problem in Wilmington, North Carolina. High impairment scores were calculated in all surveyed waterways. About 90% of all litter collected was plastic materials. Single use plastics were frequently observed at all sites. After completing this research, we feel that the data collection sheets could be improved to better represent the litter load. Transects were modified at Burnt Mill Creek due to environmental hazards. The information obtained from this research could be used to support stormwater legislation in North Carolina. We hope to shed light on plastic pollution and continue research from which policy can be implemented to preserve our natural environments.

### References and Acknowledgments

- Assessing Litter Loading in Urban Streams: Litter Survey Protocol. (2017). Duke University, & Environmental Law and Policy Clinic.
- Mallin, M. A., McIver, M. R., & Iraola, N. (2017). *Environmental Quality of Wilmington and New Hanover County Watersheds, 2016.*, Center for Marine Science, University of North Carolina Wilmington.
- Monteleone, B. L. (2011). *The Plastic Ocean Project: An exploration of plastic pollution in the ocean's subtropical gyres and the consequences* (Unpublished master's thesis). University of North Carolina Wilmington.
- Sources of Aquatic Trash. (2017). Retrieved from <https://www.epa.gov/trash-free-waters/sources-aquatic-trash>.
- Toxicological Threats of Plastic. (2017). Retrieved from <https://www.epa.gov/trash-free-waters/toxicological-threats-plastic#what-type>.

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