

# Marine Debris on a Barrier Island in the Southeastern United States

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## BACKGROUND AND AIMS

- Anthropogenic marine debris has significant ecological, societal, and economic impacts.
- Few data currently exist that characterize the scale of anthropogenic debris on beaches in the Southeast United States.
- Study Aim: To examine the abundance of anthropogenic and natural debris on an undeveloped barrier island off the coast of the Southeastern United States: St. Catherine's Island, Georgia

## METHODS

- Standing stock survey: June 13th to 21<sup>st</sup>, 2021.
- Data collected by trained participants from the Sewanee Island Ecology Program.
- Each instance of macro-debris (>2.5 cm) found on the beach surface was recorded.

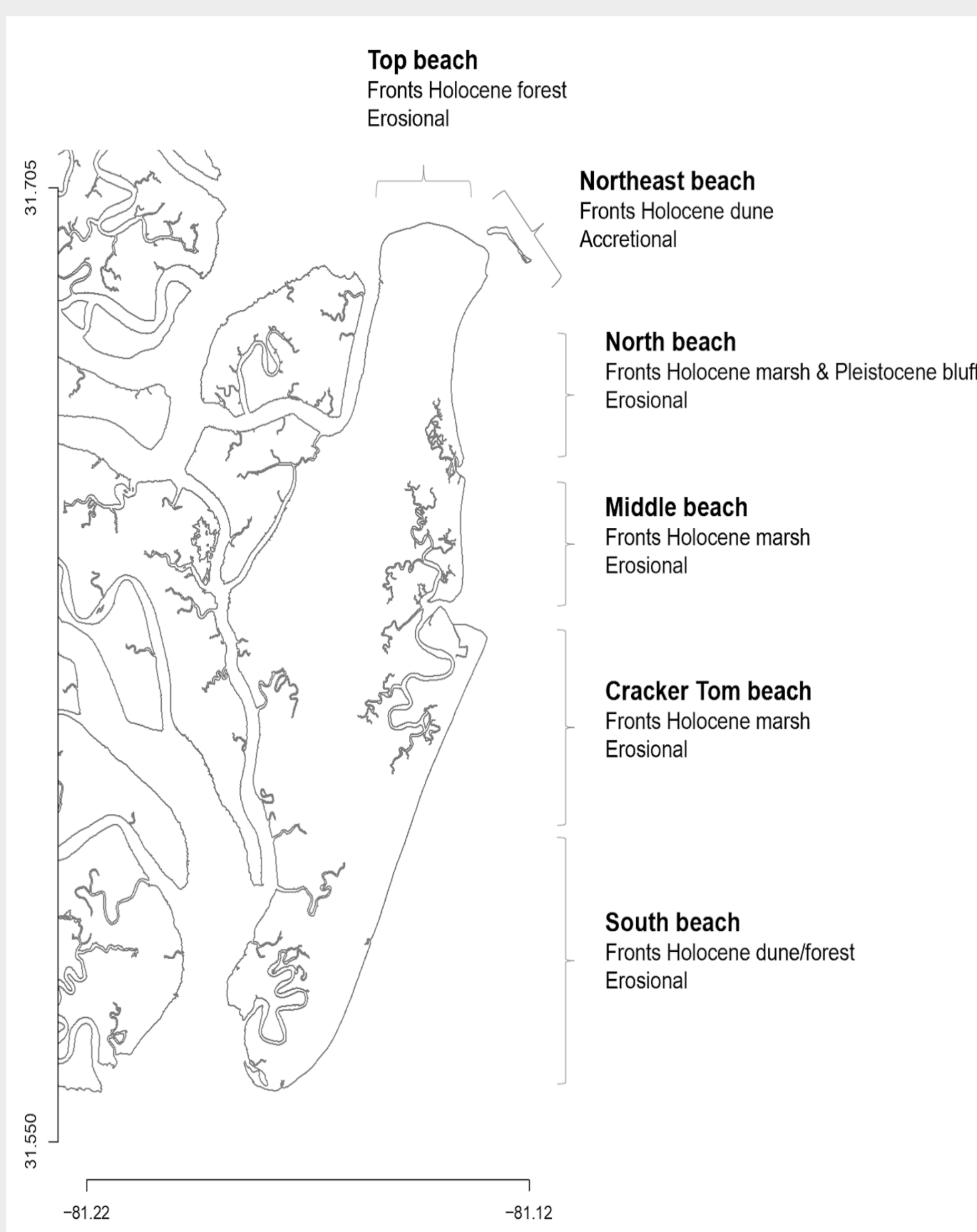
## DATA ANALYSIS

- Mean, SD, and debris density calculated for each beach and the entire island.
- Debris location was used to look at depositional patterns from the wrack line and beach terminus.

## RESULTS & DISCUSSION

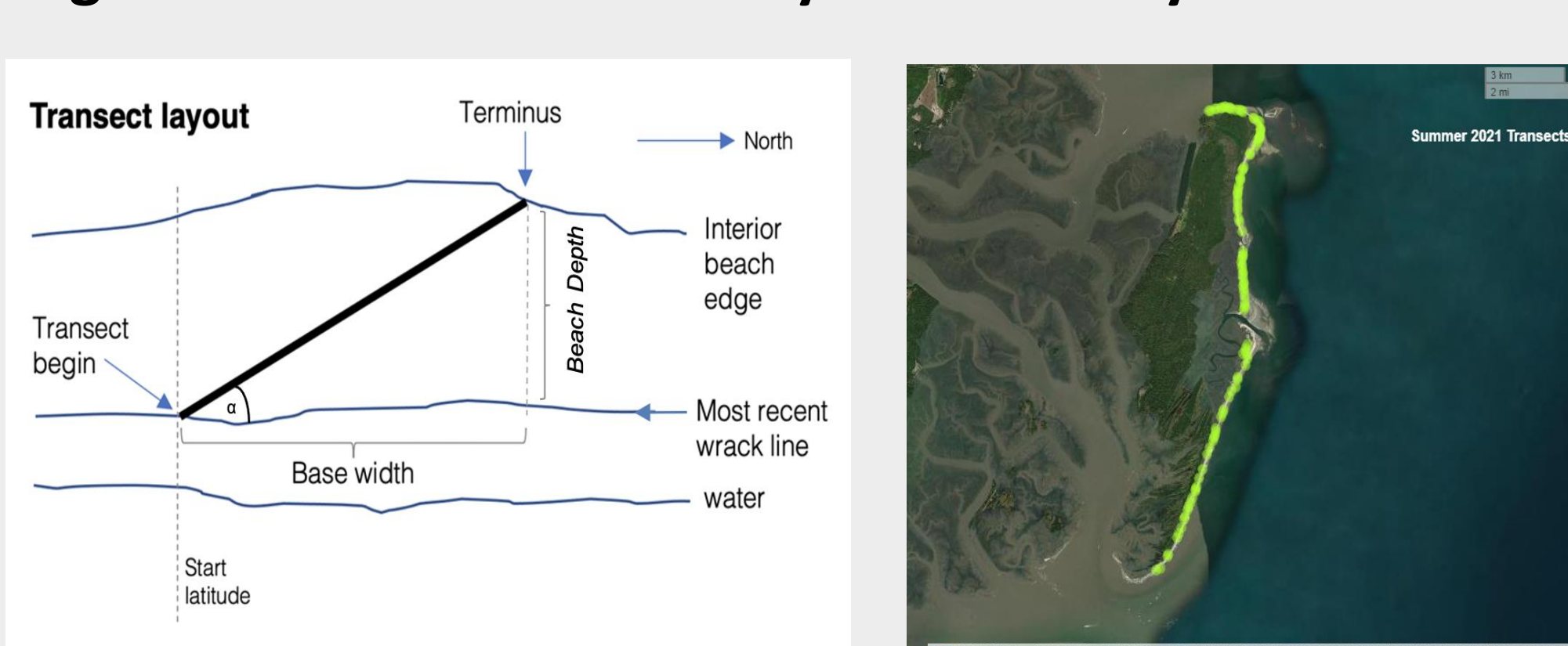
- Debris densities varied by beach location, material, size of debris, and type of terminus habitat (see below)
- The average density of anthropogenic macro-debris was 0.0268 items/m<sup>2</sup>.
- There are an estimated 13,239 anthropogenic debris items on the island. Most are plastic.
- Despite its remote location and limited access, St. Catherine's Island is a sink for plastics and other anthropogenic debris posing threats to endangered wildlife.
- Results provide a baseline for future studies.

**Figure 1. St. Catherine's Island: Beach Areas and Characteristics**



St. Catherine's Island, Georgia is a private, barrier island that is bounded to the north and south by tidal estuaries with no significant input of fresh water or fluvial sediment from the mainland. The island is accessible only by boat. The 23.7 KM of beachfront on the island is divided into 6 beach sections. Most beaches are highly erosional due, in part, anthropogenic modifications to land and fluvial systems to the north and dredging of the Savannah Ship Channel which have decreased sediment influx to the island. Sea level rise is exacerbating erosion.

**Figure 2. Orientation and Layout of Survey Transects**



Transects begin predetermined by randomly selected latitude and longitude.

Transect length and base width were measured by participants. Beach depth and angle ( $\alpha$ ) were calculated.

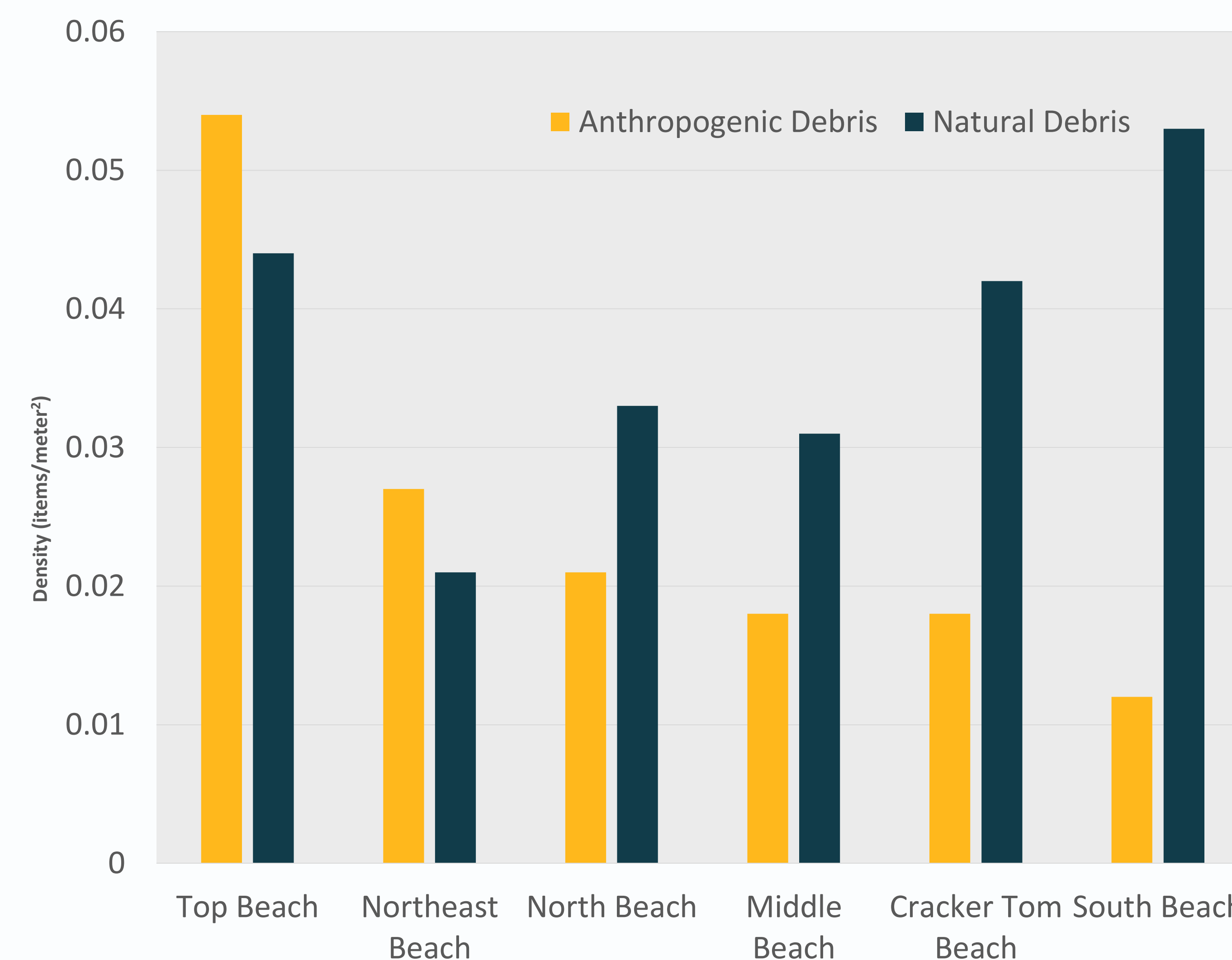
Green dots indicate transect locations along the beaches of St. Catherine's Island.

15-20 transects were sampled at each beach location.

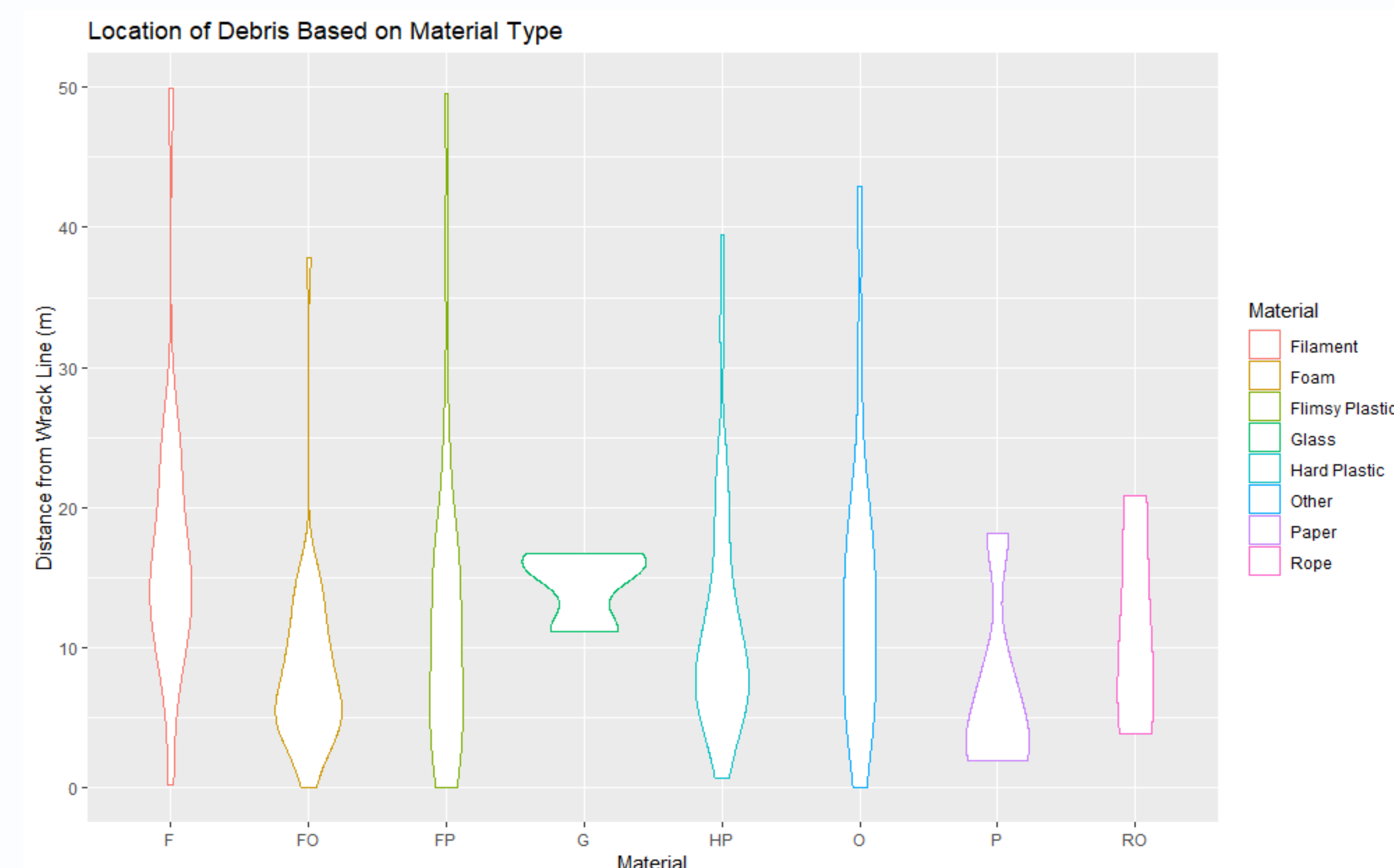
**Table 1. Anthropogenic Debris on St. Catherine's Island by Beach. The northernmost beach (Top Beach) had the lowest beach depth but the largest abundance of anthropogenic debris.**

Beach Name	Observed Anthropogenic Debris (n)	Observed Natural Debris (n)	Total length of Transects Surveyed (m)	Number of Transects	Area of Transects Surveyed (m <sup>2</sup> )	Mean Beach Depth (m)	S.D. Beach Depth (m)
Top	84	69	764.9	15	1529.8	9.611	(2.974)
South	58	123	1158.9	20	2317.8	28.105	(9.879)
Cracker Tom	31	87	1031.3	20	2062.6	17.346	(9.633)
North	31	66	1035	18	2070	23.791	(13.990)
Middle	20	67	1035	20	2070	29.569	(14.058)
Northeast	12	35	826.2	15	1652.4	21.445	(9.800)
Total Anthropogenic Debris: 236		Total Natural Debris: 447		Total Debris: 683			

**Figure 3. Anthropogenic and Natural Debris Density by Beach. Anthropogenic debris was more dense than natural debris on the two northernmost beaches.**



**Figure 4. Distribution of debris distance (m) from Wrack Line based on Material Type (Top 8 most abundant material types shown). Lightweight items (e.g., Filament) were generally found farther from the wrack line.**



**Table 2. Size and Abundance of Anthropogenic Debris on St. Catherine's Island. Plastics (hard and flimsy plastic) had the highest mean density and accounted for 50.4% of all anthropogenic debris on the island.**

Material	Mean Density (items/m <sup>2</sup> )	(SD)	Mean Size	(SD)	Observed Pieces of Debris (n)	Estimated Total Debris	Percentage
Hard Plastic	0.007092	0.01266	11.25625	10.1545	81	3495	34.30%
Foam	0.001843	0.007303	7.475	7.608994	41	908	17.40%
Flimsy Plastic	0.001649	0.004401	15.48611	11.2488	38	812	16.10%
Filament	0.000753	0.003820	28.38235	54.59439	18	382	7.60%
Rope	0.020384	0.000169	25.28571	18.52669	7	152	3.00%
Paper	0.020468	0.002645	8.1	7.249138	5	230	2.10%
Glass	0.000266	0.001071	12.33333	11.15049	3	62	1.30%
Fabric	4.62E-05	0.000481	6	-	1	22	0.04%
Styrofoam	9.25E-04	0.000962	-	-	1	45	0.04%
Wood	8.19E-05	0.000851	80	-	1	40	0.04%
Other	0.003458	0.006357	29.56757	58.35597	39	1704	16.50%

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