

**NOAA's Marine Debris Monitoring and Assessment Project:
Promoting Standardization and Citizen Science**

**NOAA's Marine Debris Monitoring and Assessment Project:
La Promoción de Normalización y Ciencia de los Ciudadanos**

**NOAA's Marine Debris Monitoring and Assessment Project:
Promouvoir la Normalisation et de Citoyens de la Science**

AMY V. UHRIN

*NOAA, National Ocean Service — Office of Response and Restoration, Marine Debris Division,
1305 East West Highway, SSMC4, Room 10240, Silver Spring, Maryland 20910 USA.
amy.uhrin@noaa.gov*

EXTENDED ABSTRACT

Marine debris monitoring requires coordinated effort and commitment by the partners involved, and can reap great benefits. Monitoring data provide important information on the types and sources of debris and can identify targets for mitigation, evaluate the effectiveness of marine debris prevention and management efforts, and determine the impacts that debris is having on the environment. Marine debris shoreline monitoring is an effective way to engage volunteers in a rewarding citizen science experience while providing valuable scientific data. In fact, with the appropriate training, guidance, and support, volunteer citizen scientists collect marine debris data of a comparable quality to scientific researchers (van der Velde et al. 2016).

Events associated with the 2011 Japan Tsunami and the concern that debris from the tsunami would wash ashore on the west coast of the United States, Alaska and Hawaii, served as a strong impetus for the development of rapid assessment techniques as a means to acquire baseline data on existing marine debris levels in these regions. As a result, the Marine Debris Monitoring and Assessment Project (MDMAP) was initiated in 2012 by NOAA's Marine Debris Program to provide widely applicable and inexpensive monitoring protocols to partners, with the intention of promoting standardization of shoreline marine debris monitoring methods (Lippiatt 2013). Since its inception, the MDMAP has grown considerably with 159 shoreline monitoring sites across 16 states including Alaska, Alabama, California, Delaware, Florida, Hawaii, Louisiana, Maryland, Michigan, Mississippi, New Jersey, Oregon, Texas, Virginia, and Washington. In addition, programs in American Samoa, Canada, Costa Rica, Palau, Federated States of Micronesia, Mexico, and Ecuador have employed MDMAP protocols. Data collected as part of a MDMAP-related monitoring program are entered into a web-based database that is accessible to the public and freely downloadable upon request (<https://mdmap.orr.noaa.gov/login>).

Partners select their own shoreline sites at which they choose between conducting accumulation or standing stock surveys. Both survey types are limited to debris items at least 2.5 cm in the longest dimension. Accumulation surveys assess the flux of debris to a site (# items/m²/time). Accumulation surveys require initial removal of all debris from the site followed by regular surveys to record and remove all debris. Standing stock surveys are used to measure the load of debris over time (# items/m² of shoreline). Debris is not removed during standing stock surveys. Since the MDMAP began, in the United States, over 323,000 total debris items have been recorded from both survey types combined (Table 1). The majority of debris encountered is composed of plastic (Figure 1). In terms of frequency of debris types, plastic fragments tend to dominate both survey types (Figures 2 & 3). When fragments are excluded from the totals, plastic rope and netting dominate the accumulation surveys, followed by plastic caps and cigarette butts (Figure 2). When fragments are excluded from the standing-stock totals, plastic bottle caps dominate, followed by processed lumber, food wrappers, and cigarette butts (Figure 3).

In 2016, the Marine Debris Program launched the Get Started Toolbox (<https://marinedebris.noaa.gov/research/monitoring-toolbox>) to support both existing and interested monitoring partners. The Toolbox is a freely accessible online resource, which houses a series of online tutorials, survey datasheets, a detailed user guide to the database, data analysis examples and templates, a marine debris photo-identification guide, and an online enrollment page. Since its inception, the MDMAP has morphed from a program originally targeting the research community to a broader citizen science initiative. The MDMAP network also provides tools and opportunities for outreach and raising awareness about marine debris issues, sharing the message that every individual can become a part of the solution.

Table 1. Summary statistics (through January 2017) from the MDMAP database (United States sites only).

Survey Type	Organizations	Sites	Completed Surveys	# Items Recorded
<i>Accumulation</i>	36	96	1674	291,156
<i>Standing Stock</i>	10	63	2800	32,749
<i>Total</i>	46	159	4,474	323,905

KEYWORDS: Marine debris, monitoring, citizen science, NOAA Marine Debris Program, Monitoring and Assessment Project

LITERATURE CITED

Lippiatt, S., S. Opfer, and C. Arthur. 2013. *Marine Debris Monitoring and Assessment*. NOAA Technical Memorandum NOS-OR&R-46.
 van der Velde, T., D.A. Milton, T.J. Lawson, M. Lansdell, C. Wilcox, G. Davis, G. Perkins, and B.D. Hardesty. 2016. Is citizen science data worth our investment? *Biological Conservation*. <http://dx.doi.org/10.1016/j.biocon.2016.05.025>.

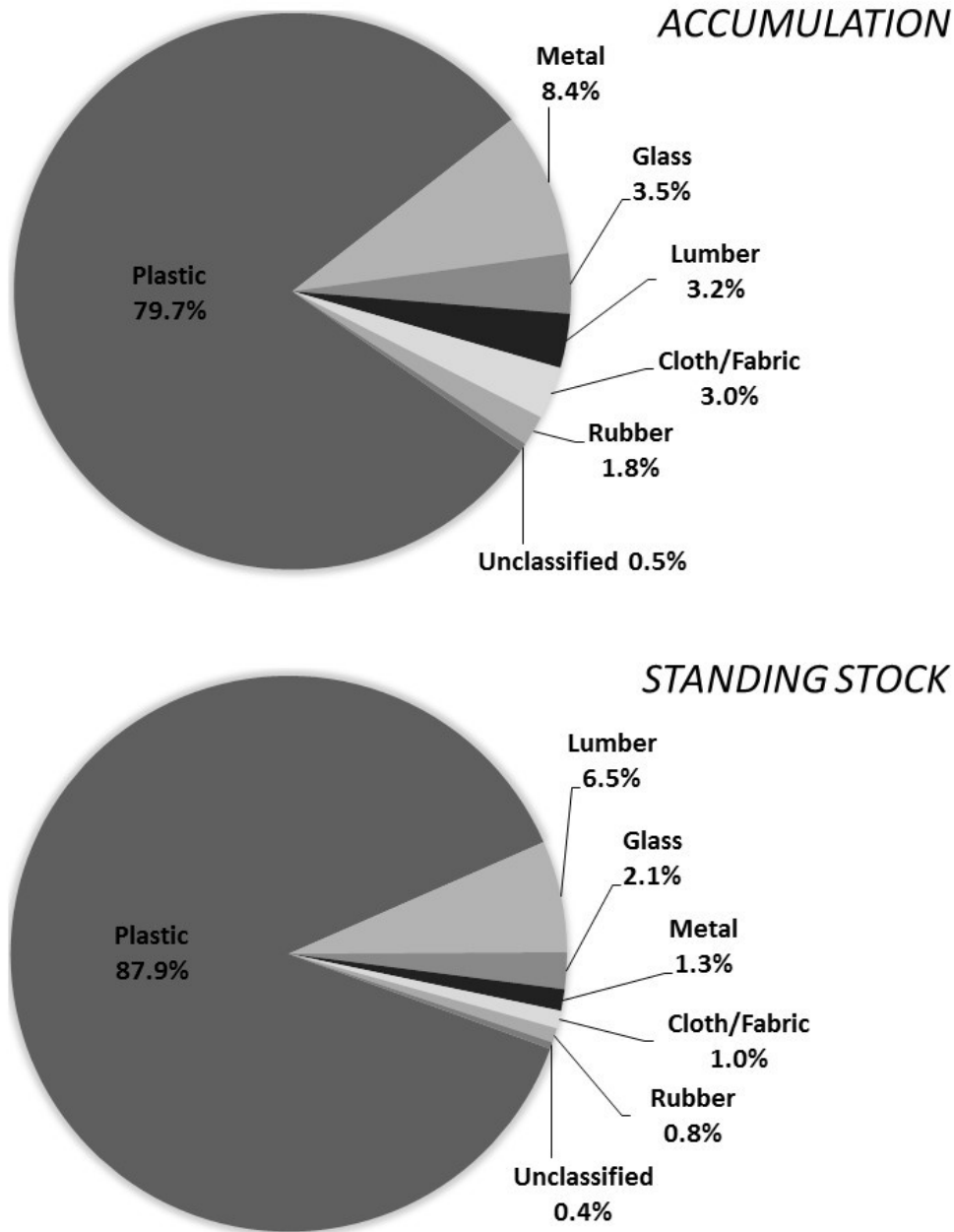


Figure 1. Debris composition by type for MDMAP Accumulation (top) and standing Stock surveys (bottom) from sites located within the 50 United States (data through January 2017).

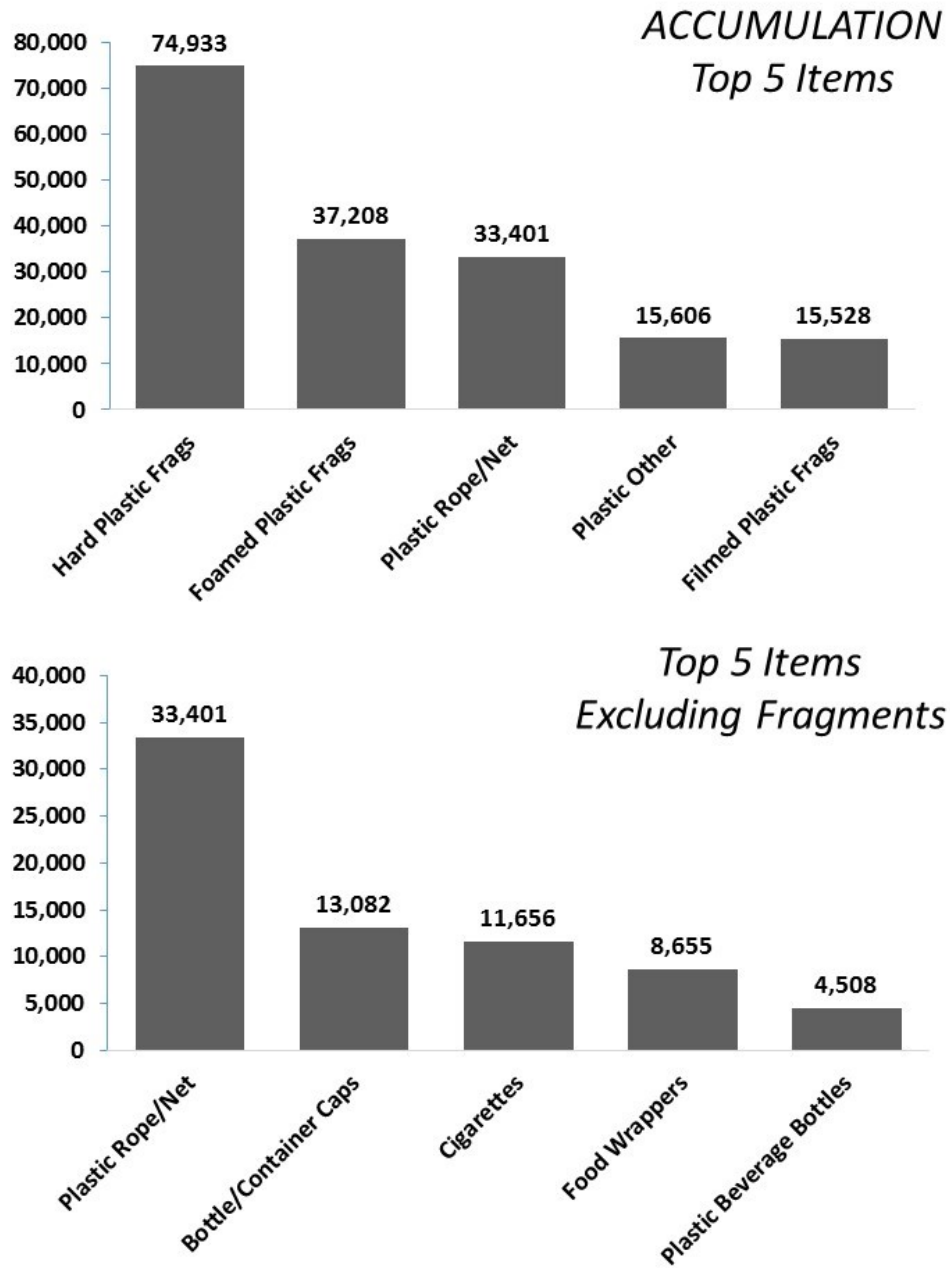


Figure 2. Top 5 items from MDMAP accumulation surveys including fragments (top) and excluding fragments (bottom) from sites located within the 50 United States (data through January 2017).

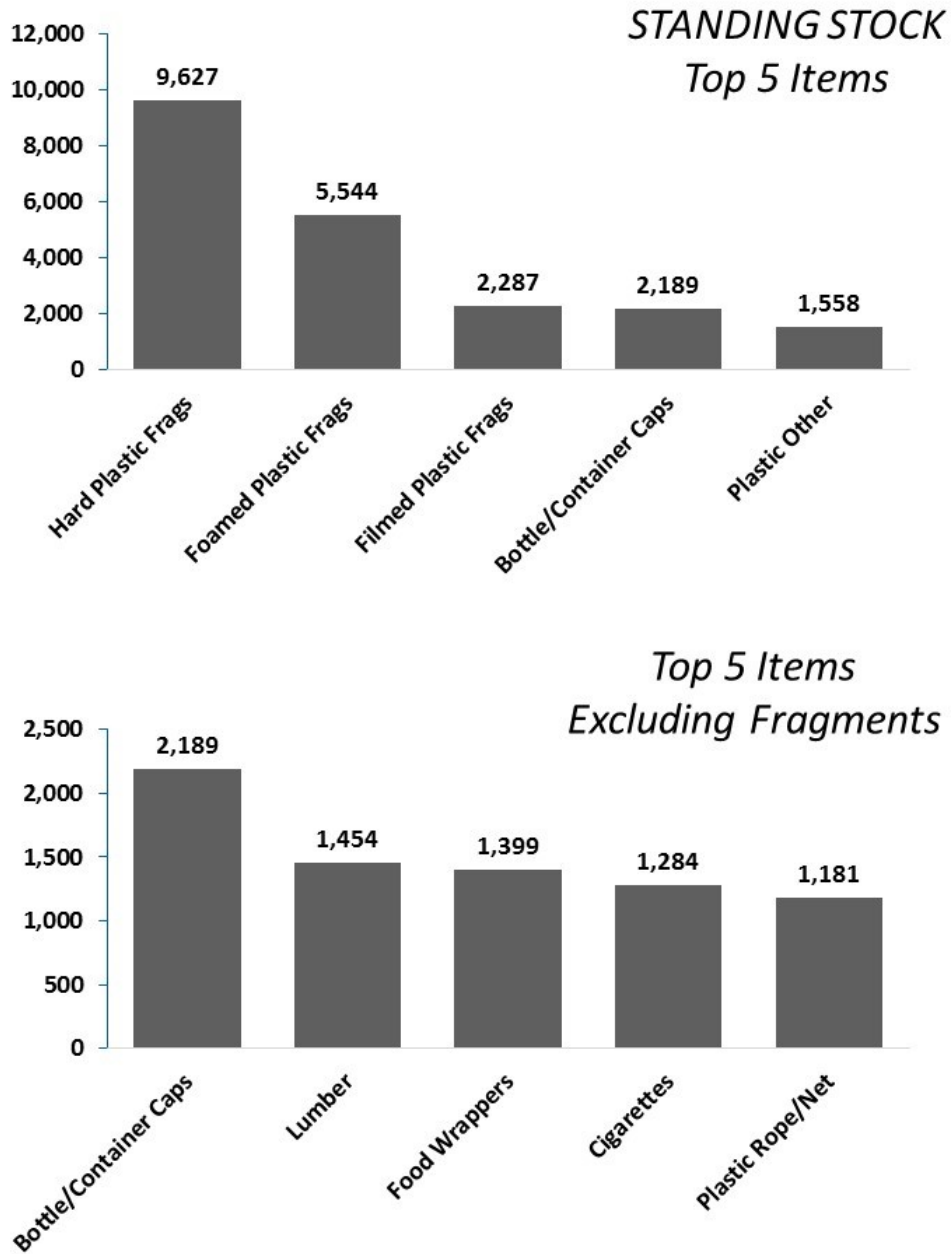


Figure 3. Top 5 items from MDMAP standing stock surveys including fragments (top) and excluding fragments (bottom) from sites located within the 50 United States (data through January 2017).